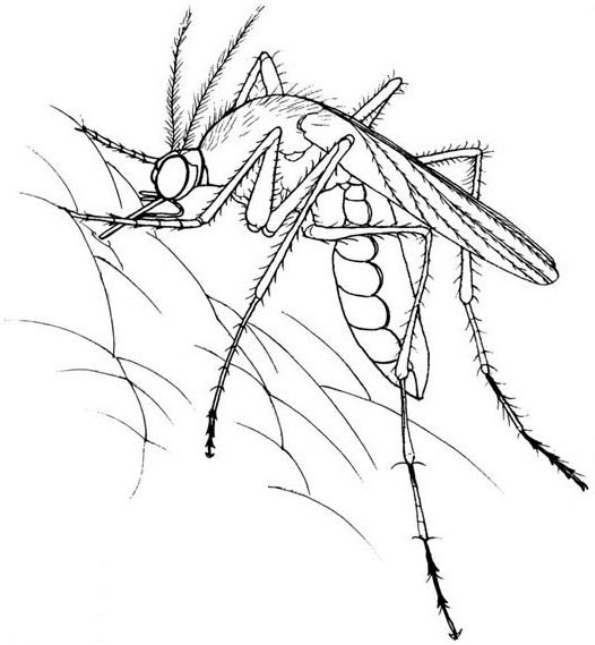
Surveillance and Control of Selected Mosquito-borne Diseases in Florida

2013 Guidebook



Florida HEALTH

Purpose

This publication establishes guidelines for detecting and monitoring mosquito-borne diseases and minimizing the risk of human infection. This manual identifies functions and prescribes responsibilities which will assure that appropriate prevention and control methods are initiated promptly and effectively. Please address comments to Stephanie Moody-Geissler, Florida Department of Health's Division of Disease Control and Health Protection (DCHP), 4052 Bald Cypress Way, Bin A-12, Tallahassee, Florida 32399-1720, (850) 245-4444 x2437, FAX (850) 922-8473.

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Acknowledgements

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Chapter 1
Arthropod-borne Disease Control Coordination

The Surveillance and Control of Selected Mosquito-borne Diseases in Florida Guidebook provides information on diseases of concern and is updated annually. It establishes guidelines for detecting and monitoring mosquito-borne diseases and minimizing the risk of human infection. It describes agency coordination and responsibilities in the control of mosquito-borne diseases and explains the components of the state surveillance system and responses to identified disease activity.

Control of arthropod-borne diseases in Florida is coordinated through interagency cooperation at the state and local levels. Intensification of surveillance and initiation of control measures occur in response to evidence of increased transmission in nature. Different agencies become involved at various times during routine surveillance. Therefore, a crucial part of a good surveillance program is to disseminate information to the proper agencies and persons.

Roles and Responsibilities:

I. Department of Health (DOH) County Health Department (CHD)

Contact: Local county health departments

- Conduct epidemiologic investigation to search for new, previously undetected cases and classify cases as to time (chronological distribution), place (geographic distribution of residence and place of likely exposure), risk factors, and person (demographics).
- Collect reports of suspected, probable, and confirmed human cases of reportable and exotic arthropod-borne diseases of public health significance and enter into Merlin or other appropriate epidemiologic reporting database. Case definitions are available at: http://www.doh.state.fl.us/disease_ctrl/epi/surv/CaseDefinitions.html. Confirmed and probable cases are reportable under Chapter 381, Florida Statutes.
- Facilitate submission of diagnostic specimens from health care providers and hospitals as required.
- Participate in appropriate sentinel avian and horse surveillance activities.
- Communicate current arbovirus surveillance activity with the appropriate mosquito control personnel, health care personnel, local community leaders, media and public, etc. as appropriate and coordinate plans for prevention and control activities.
- Provide community information and education as required.
- Coordinate with the DOH DCHP and with local mosquito control to issue health advisories and alerts to the media or to the public.

II. DOH Bureau of Public Health Laboratories (BPHL)

Contact: Department of Health Bureau of Public Health Laboratories, Tampa, (813) 974-8000; Jacksonville, (904) 791-1500.

- Conduct appropriate tests to confirm or support the diagnosis of arthropod-borne diseases in humans.
- Conduct appropriate tests as part of surveillance for arthropod-borne disease agents in animals and mosquitoes. Fax animal test results to Florida Department of Agriculture and

Consumer Services (FDACS) Animal Industries and fax positive results to the DCHP. Provide mosquito test results to the submitter; reports positive results to the CHD and DCHP.

- Report by telephone the results of all probable and confirmed human serologic or virologic tests to the CHD, the DCHP, and to the attending health care provider. Submit follow-up written reports as soon as possible.
- Prepare weekly summary reports with results for sentinel flock testing, including the number of sentinel sera submitted, number tested, and number positive by county. Send summary reports electronically to the submitter, the DCHP, and the CHD.

III. DOH Division of Disease Control and Health Protection, Bureau of Epidemiology
Contact: Division of Disease Control and Health Protection, (850) 245-4300.

- Direct statewide surveillance, prevention and control programs for human arthropod-borne diseases.
- Provide guidelines for sentinel arbovirus surveillance.
- Conduct epidemiologic analyses of data from CHDs and laboratories.
- Conduct or participate in epidemiologic investigations.
- Distribute weekly electronic arbovirus epidemiology summary reports to CHDs, mosquito control agencies, FDACS, health care providers and veterinarians, Centers for Disease Control and Prevention (CDC) and other interested parties and post to the Mosquito-Borne Disease Program public web page.
- Maintains human surveillance database (Merlin), disease outbreak communication system (EpiCom), and the electronic surveillance system for the early notification of community-based epidemics (ESSENCE).
- Maintain information connectivity among agencies via weekly summary reports, appropriate media including, *Epi Update*, the program website, and as-needed arbovirus conference calls.
- Recommend declarations of health advisories and alerts to the County Health Officer.
- Recommend health threat declarations to the State Surgeon General.
- Coordinate prevention and control activities with CHDs, FDACS, Department of Environmental Protection (DEP), Florida Tourism Board, mosquito control agencies and other key organizations.
- Report human and veterinary arbovirus cases into the national arbovirus surveillance database, ArboNet, and coordinate and consult with CDC on national and international arbovirus surveillance and studies, and enhancement of prevention and control efforts.

IV. DOH State Health Office (Press/Communications)
Contact: Communications Director and Press Secretary, (850) 245-4111

Review and produce arbovirus related press releases, media advisories, social media messages and other risk communication materials as appropriate.

- Communicate to other Public Information Officer's (PIO's) in relevant agencies.
- Distribute mosquito-borne illness messaging to appropriate sources.
- Coordinate with CHD PIO's and DCHP regarding media responses to medical advisories and alerts.

- Establish proactive tools in alerting media and public about threat.
- Communicate with the Executive Office of the Governor's Office of Communication if necessary.

V. Florida Department of Agriculture and Consumer Services, Bureau of Entomology and Pest Control

Contact: Bureau of Entomology and Pest Control, (850) 617-7997 or (850) 617-7929.

Collect and distribute mosquito species and count data from local mosquito control agencies.

- Provide technical advice and support, mosquito control, and other services as needed to local mosquito control programs, DCHP, and CHDs.
- Facilitate the sharing of mosquito control personnel and equipment between districts, as allowed for in Florida Statutes 388.231 and 388.351.
- Coordinate with DCHP and with local CHDs before releasing vector data to the media or to the public.
- Notify local mosquito control of unusual arbovirus activity or events.

VI. Florida Department of Agriculture and Consumer Services, Division of Animal Industry and Bureau of Diagnostic Laboratories

Contact: State Agriculture Veterinarian, (850) 410-0900; State Diagnostic Laboratory (veterinary), (321) 697-1400 (Kissimmee) or 386-330-5700 (Live Oak).

- Direct statewide surveillance for animal arthropod-borne diseases with Florida veterinarians and other partners and determine likely exposure site.
- Conduct appropriate tests for detection of arthropod-borne diseases in animals.
- Report veterinary arbovirus cases to the DCHP as soon as exposure site is determined.
- Provide animal health alerts and animal arbovirus prevention information to animal industry organizations such as the United States Department of Agriculture (USDA), Florida Veterinary Medical Association (FVMA), and private veterinarians.

VII. Mosquito Control Agencies

Contact: local mosquito control agencies or the Florida Coordinating Council on Mosquito Control at (850) 922-7011.

- Conduct appropriate mosquito and arbovirus surveillance as feasible.
- Share arbovirus surveillance data with partners as appropriate.
- Provide larvicide and adulticide applications as appropriate and feasible.
- Provide adequate avian serosurveillance of most likely sites of Eastern Equine Encephalitis virus (EEEV), St. Louis encephalitis virus (SLEV), and West Nile virus (WNV) activity (maintain and monitor flocks and collect blood samples) as feasible.
- Disseminate public information on mosquito control activities.

VIII. Florida Universities
Contact: Florida Medical Entomological Laboratory (FMEL), (772) 778-7200; Florida State University, (850) 770-2260.; University of Florida, (352) 273-7526; University of South Florida, (813) 974-0507.

- Provide arthropod-borne disease research at: the FMEL, University of Florida; Florida State University and University of South Florida.
- Distribute research findings.
- Provide consultation and technical assistance to disease and arthropod control agencies.

IX. Department of Environmental Protection
Contact: Bureau of Natural and Cultural Resources, Florida Park Service, (850) 245-3029.

- Coordinate efforts for intensified mosquito control on protected public lands as needed during health threats and emergencies.
- Provide consultation and technical assistance as required.
- Provide arbovirus surveillance information as appropriate to the DEP Safety Coordinator and Safety Advisory Board, Florida Park Service district offices and safety coordinators, DEP Boating Safety Officers, DEP Division of Law Enforcement, and DEP Office of Coastal and Aquatic Managed Areas

X. Florida Fish and Wildlife Conservation Commission
Contact: Florida FWC, (850) 488-3831.

- Maintain a database for bird mortality reporting and surveillance.
- Provide consultation and technical assistance as needed on arthropod-borne infection and disease in wildlife.
- Provide arbovirus surveillance information as appropriate to regional biologists and wildlife rehabilitators.

XI. Florida Tourism Marketing Corporation
Contact: Visit Florida, (850) 488-5607.

- Provide timely and accurate arboviral prevention information to attractions, hotels/motels and travel agencies.

XII. Health Care Providers and Hospitals
Contact: Local health care providers and hospitals or the Florida Medical Association at (850) 224-6496.

- Report suspected cases of arthropod-borne diseases to their local CHD as required by law.
- Submit appropriately timed specimens for confirmation of clinical diagnosis [e.g., cerebrospinal fluid (CSF) and sera, or paired sera drawn at least 1 week apart].

XIII. Veterinarians
Contact: Local veterinarians or the Florida Veterinary Medical Association at (407) 851-3862.

- Report suspected veterinary cases of EEEV and WNV infection to the State Veterinarian (FDACS) or suspect human cases to the local CHD

(http://dohiws.doh.state.fl.us/Divisions/Disease_Control/epi/PrimaryEpiContactList.pdf) as required by law.

XIV. Centers for Disease Control and Prevention (CDC), Division of Vector-Borne Diseases
Contact: Division of Vector-Borne Diseases, (970) 221-6400.

- Provide technical assistance and laboratory support as requested.
- Coordinate with the World Health Organization and its regional offices (e.g., Pan American Health Organization) on international surveillance, research, prevention, and control.

XV. Notification and Public Information of Arboviral Surveillance Results

- On a weekly basis, DOH will summarize the surveillance data and email the information to the Interagency Arbovirus Taskforce representatives. DOH will also provide this information to the CHDs and CDC.

DOH will be responsible for release of public information regarding recommended public precautions. Local organized mosquito control districts, with the assistance of FDACS Bureau of Entomology and Pest Control will be responsible for release of public information regarding mosquito control activities. The FDACS Bureau of Entomology and Pest Control will be responsible for release of public information regarding mosquito control activities in those regions of the state where there are no local organized mosquito control units. FDACS Division of Animal Industry will be responsible for release of public information regarding animal health issues.

For the purposes of coordinated local responses and possible intensification of integrated vector control, CHD epidemiologists should share non-identifying case locality and onset information of human arbovirus cases under investigation with local mosquito control districts. DOH will notify the workgroup members by email of the county of residence of such suspect cases.

The interagency partners will strive to immediately share significant new information with each other and the other individuals and organizations listed in this section in order to assure the most rapid response possible to new developments.

Chapter 2
Select Endemic Mosquito-borne Viruses in Florida

Overview

Arthropod-borne viruses, i.e. “arboviruses”, are viruses that are maintained in nature through transmission between susceptible animal hosts by blood-feeding arthropods (e.g., mosquitoes and ticks). Most arboviruses that cause human encephalitis are members of three of the major virus families: the Togaviridae (genus *Alphavirus*), Flaviviridae, and Bunyaviridae.

All arboviral encephalitides are zoonotic, being maintained in complex life cycles involving a nonhuman primary vertebrate host and a primary arthropod vector. These cycles usually remain undetected until humans encroach on a natural focus, or the virus escapes this focus via a secondary vector or vertebrate host as the result of some ecologic change. Humans and domestic animals can develop clinical illness but usually are dead-end hosts because they do not produce significant viremia, and do not contribute to the transmission cycle. Many arboviruses that cause encephalitis have a variety of different vertebrate hosts and some are transmitted by more than one vector. Maintenance of the viruses in nature may be facilitated by vertical transmission in the vector (e.g., the virus is transmitted from the female to the offspring).

Arboviral diseases have a global distribution. Arboviral agents of encephalitis in the United States include: St. Louis encephalitis virus (SLEV), West Nile virus (WNV), Eastern equine encephalitis virus (EEEV), Western equine encephalitis virus (WEEV), Venezuelan equine encephalitis virus (VEEV), Everglades virus (EVEV), and the California serogroup viruses including La Crosse encephalitis virus, all of which are transmitted by mosquitoes. Most cases of arboviral encephalitis occur from June through September, when arthropods are most active. In Florida, where arthropods are active late into the year, cases can occur into the winter months. Most human infections are asymptomatic or may result in a nonspecific flu-like syndrome. Onset may be insidious or sudden with fever, headache, myalgias, malaise and occasionally prostration. Infection may, however, lead to encephalitis, with a fatal outcome or permanent neurologic sequelae. Fortunately, only a small proportion of infected people progress to having encephalitis.

Laboratory criteria for arboviral disease diagnosis include: Seroconversion in virus-specific IgM- or IgG- negative acute sample to IgM or IgG positive convalescent sample; Isolation of virus from, or demonstration of specific viral antigen or nucleic acid in, tissue, blood, CSF, or other body fluid; virus-specific IgM antibodies in CSF and a negative result for other IgM antibodies in CSF for arboviruses endemic to the region where exposure occurred; Virus-specific IgM antibodies in serum with confirmatory virus-specific neutralizing antibodies in the same or a later specimen.

Because the arboviral encephalitides are viral diseases, antibiotics are not helpful for treatment and the effectiveness of antiviral agents has not been shown. Treatment is supportive, attempting to deal with problems such as swelling of the brain, respiratory paralysis and other treatable complications like bacterial pneumonia. There are currently no commercially available human vaccines for these diseases, though several types of WNV vaccine are in development. A vaccine is available for horses and ratites (ostriches and emus) against EEEV, WEEV and VEEV. Equine vaccines protecting against WNV have been on the market since 2001.

Arboviral disease can be prevented through personal and community protective measures. Personal protective measures include reducing time outdoors, wearing long pants and long-sleeved shirts, applying Environmental Protection Agency (EPA) approved mosquito repellent to exposed skin areas as recommended by CDC and maintaining screens/doors. Residual

insecticide applications, on and around screen doors, give added protection. Community preventive measures include reducing mosquito-breeding sites around residences (e.g., drain water from garbage cans, house gutters, buckets, pool covers, coolers, toys, flower pots or any other containers and removing/destroying discarded tires, bottles, cans, pots and pans, broken appliances) and may include the use of insecticides (larvicides and adulticides) to kill mosquitoes. Repellents containing DEET (N,N-diethyl-m-toluamide), picaridin or permethrin (on clothing) are excellent tools for personal protection. Additional options on the market, specifically IR3535 and oil of lemon eucalyptus, are registered with the EPA and have performed well in evidence published in the peer reviewed literature. Some references indicate that picaridin is reportedly less irritating to the skin. For CDC's latest guidelines, see http://www.cdc.gov/ncidod/dvbid/westnile/resources/uprepinfo.pdf.

For more information on choosing repellent use the EPA search tool at: http://cfpub.epa.gov/oppref/insect/#searchform

Several local, state, and federal agencies are involved with the surveillance and control of arboviral diseases. Mosquito-borne encephalitis surveillance activities include monitoring mosquito vector population numbers, screening sentinel chickens, wild birds, and other animal cases to detect increased arbovirus activity before infections occur in people, and to instituting interventions to significantly reduce risk of transmission to humans. An important component of any surveillance system is the establishment of baseline data against which current disease activity can be measured. All stakeholders involved in arbovirus surveillance should collect and maintain baseline data for each surveillance activity, and utilize this information to assess the level of risk to the human population. In addition, the rapid diagnostic techniques used in threat recognition can shorten public health response time and reduce the geographic spread of infected vectors, and thereby, the cost of containing them.

The surveillance required to determine risk is being increasingly refined by the utilization of technologies which allow for rapid identification of zoonotic viruses in bird and mosquito populations. Virus isolation and detection are useful to identify viral agents in mosquito vectors. While virus isolation still depends upon growth of virus in cell culture or neonatal mice, virus detection has been greatly facilitated by the availability of virus-specific genomic sequence information for use in polymerase chain reaction (PCR) assays, and monoclonal antibodies (MAbs) for use in IFA and ELISA tests. MAbs with avidities sufficiently high to allow for specific binding to virus antigens in a complex protein mixture (e.g., mosquito pool suspensions) have also enhanced the ability to rapidly identify virus agents *in situ*.

St. Louis Encephalitis (SLE)

Epidemiology: St. Louis encephalitis virus (SLEV), a flavivirus, was the most common mosquito-transmitted human pathogen in the U.S. prior to the introduction of WNV in 1999. During the summer season, SLEV is maintained in a mosquito-bird cycle, with periodic amplification by birds and *Culex* mosquitoes. In Florida, the principal vector is *Culex nigripalpus*, a ubiquitous species found throughout Florida. Infection with SLEV results in inapparent infections in a variety of birds and mammals with a resultant period of viremia that lasts a matter of days. Humans represent an incidental, dead-end host.

The first recognized SLE outbreak occurred in St. Louis, Missouri in 1933. Since then, many SLE epidemics have been documented in North America with the vector species varying by region. In Florida, SLE outbreaks were documented in 1959 (N=68), 1961 (N=25), 1962 (N=222), 1977 (N=110), 1980 (N=10), 1990 (N=223), 1993 (N=8) and 1997 (N=9). The epicenter of the outbreaks was the Tampa Bay area for all years but 1977 and 1990. In 1980, six sporadic cases of SLE were reported from counties around Tampa Bay (Pinellas, Hillsborough, Pasco, Manatee and Sarasota). In addition, four cases were reported from residents of Fort Walton Beach in Okaloosa County. This incident was particularly interesting in that human cases of SLE had never before been documented in the panhandle of Florida. These cases also occurred between July 10 and August 2, much earlier than the normal transmission peak seen in September and October. In October 2012, SLEV was identified in an *Anopheles crucians* mosquito pool collected in Bay County during a WNV outbreak.

These outbreaks stimulated the establishment of research into mosquito-borne diseases and mosquito control activities including two arbovirus research facilities in Tampa and Vero Beach. The most widely used surveillance technique in Florida has been the use of chicken sentinel flocks, and these are maintained in about half of Florida's 67 counties. SLEV activity in Florida has decreased dramatically since WNV was first detected in the state in 2001[1]. Research suggests that antibodies for WNV may protect against SLEV during reinfection in house finches[2]. No human SLE cases have been reported in Florida since 2003. However, in 2011 (>60) and in 2012 (>80) sentinel chickens tested positive for antibodies to SLEV in Pinellas, Hillsborough and several other counties in central and south Florida, suggesting potential for possible resurgence. This activity would have gone undetected without sentinel flock surveillance.

Incubation period: The estimated incubation range is four to 21 days following the bite of an infected mosquito.

Clinical symptoms: The clinical spectrum of human SLEV infection includes inapparent infection, mild illness (fever with headache), aseptic meningitis, and encephalitis that can progress to coma and death. Less than 1% of SLEV infections in people are clinically apparent and the vast majority of infections remain undiagnosed. Encephalitis, especially that progressing to coma and death, is more common with older age. The case fatality rate in Florida SLEV epidemics has ranged from four to 30 percent. Deaths were almost exclusively among people aged 50 and older.

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[1] Ottendorfer C, Ambrose J, et al. Isolation of Genotype V St. Louis encephalitis virus in Florida, Emerg Infect Dis. 2009, 15(4): 604-606.

[2] Fang Y, Reisen WK. Previous Infection with West Nile or St. Louis encephalitis viruses provides cross protection during reinfection in house finches. Am JTrop Med Hyg. 2006, 75(3): 480-5.

West Nile Fever and Neuroinvasive Disease

Epidemiology: West Nile virus (WNV), a flavivirus, was first identified in Uganda in 1937 and remained in the eastern hemisphere until introduced to the northeastern U.S. in the summer and fall of 1999. Since then the virus has spread and by the end of 2004, it had been detected in 48 states. The virus is closely related to SLEV and cross reacts with SLEV in serological testing. WNV was first detected in Florida in July 2001 in a crow in Jefferson County. Since its initial detection, WNV activity has been reported in all 67 Florida counties.

Risk factors for arbovirus exposure include spending much time outside, not using repellent or other prevention methods routinely, outdoor smoking without using repellent, as well as torn or no screens at the residence, and not using air conditioning. Those at risk due to spending much time outside include those with outside occupation or hobbies and the homeless[3].

The peak period of transmission in Florida is July through September. Like SLEV, the natural cycle of WNV appears to involve *Culex* mosquitoes and wild birds. However, unlike SLEV, WNV causes high rates of mortality in certain families of birds, especially corvids (crows and jays) and ratites (e.g., emu and ostrich). It is also pathogenic for horses. In Florida, WNV has been identified most frequently in *Cx. nigripalpus* mosquitoes. *Culex quinquefasciatus* has also been found to be an important vector in the southern US, particularly in urban areas. Three hundred and one human WNV illness cases were reported in Florida between 2001-2012 with the highest number of cases reported in 2003 (94 cases). In 2012, a nationwide outbreak of WNV infections occurred with high intensity transmission occurring in eastern Texas. The 2012 outbreak also involved north Florida, with all but one of 68 Florida acquired cases reporting exposure in the northern part of the state. West Nile virus was isolated from 2 pools of *Cx. nigripalpus* mosquitoes collected in Duval County where 28 of the human cases were reported. More than 1,000 cases of equine WNV infection were confirmed in Florida in the past 10 years. A WNV illness outbreak also occurred in alligators at an alligator farm in Glades County in 2011; infected alligators amplify virus and may transmit virus to other alligators and people through fecal shedding and contact with tissues while viremic[4].

Incubation period: Symptoms appear between two to 15 days after the bite of an infected mosquito.

Clinical symptoms: The clinical spectrum for human WNV infection includes asymptomatic infection, mild illness (fever and headache), aseptic meningitis, and encephalitis that can progress to coma and death. Approximately 80% of those infected show no clinical symptoms. Twenty percent have mild symptoms, and less than 1% suffers from the neuroinvasive form of illness. Individuals over 50 years of age and those with pre-existing medical conditions seem to be at increased risk of severe disease. Immunosuppressed persons including transplant recipients are also at increased risk of developing severe disease[5]. A growing body of scientific literature also indicates that in some instances, animal and human WNV infections may be chronic.[6-10] Economical impacts of WNV neuroinvasive disease have been calculated to be

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[3] Zielinski-Gutiérrez, E. 2004. West Nile Virus & Other Mosquito-borne Infections. The Health Care of Homeless Persons (181-186). The Boston Health Care for the Homeless Program. http://www.bhchp.org/BHCHP%20Manual/pdf_files/Part1_PDF/WestNileVirus.pdf

[4] Klenk K, et. al. 2004. Alligators as West Nile virus amplifiers. Emerg Infect Dis. 10:2150-2155.

[5] CDC. 2005. West Nile Virus Infections in Organ Transplant Recipients --- New York and Pennsylvania, August--September, 2005 MMWR. 54(40);1021-1023.

[6] Pogodina VV, et al. Study on West Nile virus persistence in monkeys. Archives of Virology 1983; 75: 71–86.

[7] Tesh RB, Xiao SY. Persistence of West Nile Virus infection in vertebrates. In: Diamond MS, ed. West Nile Encephalitis Virus Infection. New York: Springer, 2009,pp. 361–377

$225,000 for each fatal infection and $136,839 for non-fatal cases[11]. The impacts and cost of chronic infection have yet to be determined.

West Nile virus infections in **asymptomatic blood donors** do not meet reportable disease criteria, however, do provide useful surveillance information for CHDs as blood bank testing targets detection of the active viremic stage using nucleic acid-amplification testing (NAT)[12]. Suspect samples from the blood banks should be forwarded to DOH BPHL for confirmatory testing. Some patients in early stages of viremia go on to develop clinical disease and should then be reported as a case. Donors that remain asymptomatic but whose blood samples test positive for WNV at BPHL are assumed to have been exposed in the two weeks prior to donation, and can be used to meet the mosquito-borne illness advisory or alert criteria for the county that exposure most likely occurred in.

Differentiating West Nile Fever and Dengue Fever

-Neuroinvasive disease is relatively uncommon with dengue infections and more likely to be WNV infection than dengue. Confusion differentiating WNV and dengue infections is most likely in patients without symptoms of neuroinvasive disease (fever patients).

- There is increased suspicion of dengue if the patient has travelled to a dengue endemic country in the 2 weeks prior to febrile illness onset.

-Suspicion of dengue is increased if a household member has travelled to a dengue endemic country in the 4 weeks prior to patient illness, especially if the traveler had a febrile illness since returning home.

-Counties in south and central Florida, especially those with multiple imported dengue cases should be particularly alert for local dengue cases.

-Joint pain is often much more severe in cases of dengue fever compared to WNV fever.

-Thrombocytopenia and leukopenia are more common and generally more severe in cases of dengue fever compared to WNV fever.

-WNV IgM titers are negative or low positive in dengue fever patients; however the WNV IgG can be quite elevated in dengue patients since IgG strongly cross-reacts between flaviviruses.

More Information

-Maintain good communications with local mosquito control professionals and be aware when the number of vector mosquitoes are elevated (*Aedes aegypti* and *Aedes albopictus* for dengue, *Culex* species for WNV)
-If you have any questions about dengue, WNV illness, or other arbovirus illnesses, please contact the state Arbovirus Surveillance Coordinator at 850-245-4444 ext. 2437.

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[8] Siddharthan V, et al. Persistent West Nile virus associated with a neurological sequela in hamsters identified by motor unit number estimation. J Viro. Published online: 18 February 2009. doi:10.1128/JVI.00017-09

[9] Tonry JH, et al. Persistent shedding of West Nile virus in the urine of experimentally infected hamsters. Am J Trop Med Hyg. 2005; 73: 320–324

[10] Murray K, et al. Persistent infection with West Nile virus years after initial infection. J Infect Dis. 2010; 201: 2–4.

[11] Zohrabian A, Meltzer MI, Ratard R, Billah K, Molinari NA, Roy K, et al. West Nile virus economic impact, Louisiana, 2002. Emer Infect Dis. 2004;1736-44. http://www.cdc.gov/ncidod/EID/vol10no10/03-0925.htm

[12] CDC. Detection of West Nile Virus in Blood Donations --- United States, 2003. MMWR. 52(32);769-772.

[12] Bingham AM, et al. Detection of Eastern Equine Encephalomyelitis Virus RNA in North American Snakes. Am J Trop Med Hyg. 2012; 87 1140–1144

Eastern Equine Encephalitis (EEE)

Epidemiology: Eastern equine encephalitis virus (EEEV) is an alphavirus that was first identified in the 1930s and currently occurs in focal locations of the eastern United States. EEEV occurs in natural cycles involving birds and *Culiseta melanura* in freshwater swampy areas with a peak of activity between May and August. In this usual cycle of transmission, virus does not escape from the swampy areas because the mosquito involved prefers to feed upon birds and does not usually bite humans or other mammals. While the role of non-avian vertebrates in the transmission cycle of EEEV is unclear a study in 2012 indicated that snakes in the wild may harbor the virus through winter hibernation acting as a bridge to the next season[13]. For reasons not fully understood, the virus may escape from endemic foci in swamp areas in birds or bridge vectors such as *Coquillettidia perturbans, Aedes atlanticus, Cx. nigripalpus, Cx. quinquefasciatus, Aedes sollicitans* and *Aedes vexans.* These species feed on both birds and mammals and can transmit the virus and cause disease in people, horses, dogs and some birds such as pheasants, quail, ostriches and emus. Native bird species are rarely clinically affected by the virus. While small focal outbreaks of human disease have occurred in the United States, equine epizootics can be a common occurrence in unvaccinated populations since horses typically live outdoors and can attract hordes of biting mosquitoes. Human cases may be preceded by those in horses; therefore, horse cases may be used as a potential surveillance tool. Migratory birds may introduce the EEEV to northern states in the spring each year. Human and equine cases occur within five miles of *Cs. melanura*-producing swamps. All evidence indicates that human EEE does **not** have epidemic potential in Florida. Continuous surveillance in Florida for the past fifty-five years (1957-2012) has documented 86 sporadic cases in people (average 1.6 cases per year; range 0-5). In none of the years was the total number of human cases greater than five. Although sentinel chicken serosurveillance may not be as predictive of human infections for EEEV as for WNV or SLEV, if the level of activity is high, mosquito control and personal protection should be recommended to reduce human risk.

Whereas *Cs. melanura* is distributed statewide, human (and equine) cases of disease have predominantly been in areas north of Lake Okeechobee. Historically, there have been clusters of cases in seven areas: Escambia County; Walton-Holmes-Jackson counties; Duval County; Alachua-Marion counties; Leon-Wakulla-Jefferson-Madison counties; the lower St. Johns area of Volusia, Flagler, Putnam and Clay counties; and the Green Swamp region of Lake, Orange, Pasco, Polk, Osceola, Pinellas, Hillsborough and Manatee counties.

Incubation period: It takes from three to ten days after the bite of an infected mosquito for an individual to develop symptoms of EEE.

Clinical symptoms: Compared with some other arboviral diseases, fewer EEEV infections are likely to be asymptomatic. In New Jersey it is estimated that for every 23 people bitten by an infected mosquito, one will develop clinical disease. The symptoms begin with a sudden onset of fever, general muscle pains, and a headache of increasing severity. Many individuals will progress to more severe symptoms such as seizures and coma. Approximately 30-45% of all patients with clinical encephalitis caused by EEEV will die from the disease, with some deaths occurring following extended illness more than a year after infection (Michelle George, FL DOH unpublished data). Of those who recover, many will suffer permanent brain damage requiring long-term medical care. Individuals under 20 years of age seem to be at increased risk of severe disease and account for 75% of reported cases in Florida. Persons over 50 years of age may also be at increased risk.

[13] Bingham AM, et al. EEEV RNA in North American snakes. Am J Trop Med Hyg. 2012; 87: 1140–1144

Other Arboviral Encephalitides

Other arboviral encephalitides of minor public health significance that occur in Florida are caused by Everglades virus (EVEV), an alphavirus, (family *Togaviridae*) and La Crosse, Keystone and Jamestown Canyon viruses (family *Bunyaviridae*; California group). To date, no reported human cases of WEE have been acquired in Florida. While serologic evidence of EVEV infection has been documented in south Florida, only three clinical cases have ever been identified, two near Homestead and Florida City in Miami-Dade County (1968 and 1971) and one near Vero Beach (1968). Highlands J virus (HJV) is a mosquito-transmitted alphavirus that is similar to EEEV in its natural cycle. HJV is transmitted from *Cs. melanura* mosquitoes to songbirds in freshwater swamps. It has a low pathogenicity in mammals and rarely causes disease in humans or horses. During the 1990-91 SLE outbreak in Florida, four patients were reported to be infected with SLEV and HJV; however, exposure to HJV has not been associated with human illness. There have been outbreaks reported in caged birds but the symptoms are mild.

The only recorded human case of Keystone virus illness occurred in a young child from Sarasota in 1964. One human case of Jamestown Canyon virus encephalitis was confirmed in Lee County in 1993. La Crosse encephalitis virus occurs in the Appalachian and Midwestern regions of the United States. It is not believed to be present in Florida.

Occupational Precautions:

Although arboviruses are most often transmitted by the bite of infected mosquitoes, many of these viruses can also be transmitted through needle sticks, cuts, or mucous membrane contact with infected animals blood, or tissues. Workers involved in necropsies or other procedures involving potentially infectious materials should use every precaution to minimize their risk for exposure to fluids or tissues during handling, including standard droplet and contact precautions; using and disposing of needles, scalpels, and other sharp instruments safely; and minimizing the generation of aerosols.[14]

[14] CDC. 2002. Laboratory-Acquired West Nile Virus Infections --- United States, 2002. MMWR. 51(50);1133-1135

Case Definition

Acute Arboviral Diseases (neuroinvasive and non-neuroinvasive)

Reporting code = 06210 Western Equine Encephalitis virus (neuroinvasive)
= 06211 Western Equine Encephalitis virus (non-neuroinvasive)
= 06220 Eastern Equine Encephalitis virus (neuroinvasive)
= 06221 Eastern Equine Encephalitis virus (non-neuroinvasive)
= 06230 St. Louis Encephalitis virus (neuroinvasive)
= 06231 St. Louis Encephalitis virus (non-neuroinvasive)
= 06250 California serogroup virus (neuroinvasive)
= 06251 California serogroup virus (non-neuroinvasive)
= 06620 Venezuelan Equine Encephalitis virus (neuroinvasive)
= 06621 Venezuelan Equine Encephalitis virus (non-neuroinvasive)
= 06630 West Nile virus (neuroinvasive)
= 06631 West Nile virus (non-neuroinvasive)

Case report form: *Florida Confidential Vector-borne Disease Infection Case Report*

MERLIN ELECTRONIC SUBMISSION

Background

Arthropod-borne viruses (arboviruses) are transmitted to humans primarily through the bites of infected mosquitoes, ticks, sand flies, or midges. Other modes of transmission for some arboviruses include blood transfusion, organ transplantation, perinatal transmission, consumption of unpasteurized dairy products, breastfeeding, and laboratory exposures.

More than 130 arboviruses are known to cause human disease. Most arboviruses of public health importance belong to one of three virus genera: *Flavivirus*, *Alphavirus*, and *Bunyavirus*.

Clinical description

Most arboviral infections are asymptomatic. Clinical disease ranges from mild febrile illness to severe encephalitis. For the purposes of surveillance and reporting, based on their clinical presentation, arboviral disease cases are often categorized into two primary groups: neuroinvasive disease and non-neuroinvasive disease.

Neuroinvasive disease

Many arboviruses cause neuroinvasive disease such as aseptic meningitis, encephalitis, or acute flaccid paralysis (AFP). These illnesses are usually characterized by the acute onset of fever with stiff neck, altered mental status, seizures, limb weakness, cerebrospinal fluid (CSF) pleocytosis (increase in WBC count), or abnormal neuroimaging. AFP may result from anterior ("polio") myelitis, peripheral neuritis, or post-infectious peripheral demyelinating neuropathy (i.e., Guillain-Barré syndrome). Less common neurological manifestations, such as cranial nerve palsies, also occur.

Non-neuroinvasive disease

Most arboviruses are capable of causing an acute systemic febrile illness (e.g., West Nile fever) that may include headache, myalgias, arthralgias, rash, or gastrointestinal symptoms. Rarely, myocarditis, pancreatitis, hepatitis, or ocular manifestations such as chorioretinitis and iridocyclitis can occur.

Clinical criteria for diagnosis

A clinically compatible case of arboviral disease is defined as follows:

Neuroinvasive disease

- Fever (≥100.4°F or 38°C) as reported by the patient or a health-care provider,

AND

- Meningitis, encephalitis, acute flaccid paralysis, or other acute signs of central or peripheral neurologic dysfunction, as documented by a physician,

AND

- Absence of a more likely clinical explanation.

Non-neuroinvasive disease

- Fever (≥100.4°F or 38°C) as reported by the patient or a health-care provider,

AND

- Absence of neuroinvasive disease,

AND

- Absence of a more likely clinical explanation.

Laboratory criteria for diagnosis

Confirmatory:

- Isolation of virus from, or demonstration of specific viral antigen or nucleic acid in tissue, blood, CSF, or other body fluid (e.g., culture, immunohistochemistry [IHC] or PCR),

OR

- Seroconversion in virus-specific IgM- or IgG-negative acute sample to IgM or IgG positive convalescent sample (e.g., enzyme-linked immunosorbent assay [EIA/ELISA], microsphere immunoassay [MIA], or immunofluorescence assay [IFA]),

OR

- Virus-specific IgM antibodies in serum with confirmatory virus-specific neutralizing antibodies in the same or a later specimen (e.g., EIA/ELISA with serum neutralization [SN] or plaque reduction neutralization [PRNT]),

OR

- Virus-specific IgM antibodies (e.g., EIA/ELISA, MIA, or IFA) in CSF and a negative result for other IgM antibodies in CSF for arboviruses endemic to the region where exposure occurred.

Supportive:

Virus-specific IgM antibodies (e.g. EIA/ELISA, MIA, or IFA) in CSF or serum, but no other testing.

Note that in Florida, West Nile virus (WNV) and St. Louis encephalitis virus (SLEV) are endemic and testing should be performed for both viruses. Dengue EIA/ELISA or PCR is recommended in non-neuroinvasive disease cases to rule out local dengue introductions.

Case classification

Confirmed:

Neuroinvasive disease

A case that meets the clinical criteria for neuroinvasive disease with confirmatory laboratory evidence.

Non-neuroinvasive disease

A case that meets the clinical criteria for non-neuroinvasive disease with confirmatory laboratory evidence.

Probable:
Neuroinvasive disease
A case that meets the clinical criteria for neuroinvasive disease with supportive laboratory evidence.

Non-neuroinvasive disease
A case that meets the clinical criteria for non-neuroinvasive disease with supportive laboratory evidence.

Comment

Interpreting arboviral laboratory results

- **Serologic cross-reactivity.** In some instances, arboviruses from the same genus produce cross-reactive antibodies. In geographic areas where two or more closely related arboviruses occur, serologic testing for more than one virus may be needed and results compared to determine the specific causative virus. For example, such testing might be needed to distinguish antibodies resulting from infections (or vaccinations) within genera, e.g., flaviviruses such as West Nile, St. Louis encephalitis, Powassan, dengue, yellow fever, or Japanese encephalitis viruses.
- **Rise and fall of IgM antibodies.** For most arboviral infections, IgM antibodies are generally first detectable at 3 to 8 days after onset of illness and persist for 30 to 90 days, but longer persistence has been documented (e.g, up to 500 days for WNV). Serum collected within 8 days of illness onset may not have detectable IgM and testing should be repeated on a convalescent-phase sample to rule out arboviral infection in those with a compatible clinical syndrome.
- **Persistence of IgM antibodies**. Arboviral IgM antibodies may be detected in some patients months or years after their acute infection. Therefore, the presence of these virus-specific IgM antibodies may signify a past infection and be unrelated to the current acute illness. Finding virus-specific IgM antibodies in CSF or a fourfold or greater change in virus-specific antibody neutralizing titers between acute- and convalescent-phase serum specimens provides additional laboratory evidence that the arbovirus was the likely cause of the patient's recent illness. Clinical and epidemiologic history also should be carefully considered.
- **Persistence of IgG and neutralizing antibodies**. Arboviral IgG and neutralizing antibodies can persist for many years following a symptomatic or asymptomatic infection. Therefore, the presence of these antibodies alone is only evidence of previous infection and clinically compatible cases with the presence of IgG, but not IgM, should be evaluated for other etiologic agents with the exception of some dengue infections. In addition, a virus neutralization test (SN or PRNT) is required to differentiate virus specific IgG within the flavivirus family although commercial laboratories often incorrectly report IgG results for a specific flavivirus. For instance, EIA results reported as positive for WNV IgG antibody should actually be reported as being positive for flavivirus antibody IgG.
- **Other information to consider**. Vaccination history, detailed travel history, date of onset of symptoms, and knowledge of potentially cross-reactive arboviruses known to circulate in the geographic area should be considered when interpreting results.
- **Differentiating between dengue and West Nile infections**
    - Neuroinvasive disease is relatively uncommon with dengue infections and more likely to be WNV infection than dengue. Confusion differentiating WNV and dengue infections is most likely in patients without symptoms of neuroinvasive disease (fever patients).
    - Travel to a dengue endemic country in the 2 weeks prior to febrile illness onset or travel of a household member to a dengue endemic country in the 4 weeks prior to patient illness should increase suspicion of dengue.
    - Joint pain is often much more severe in cases of dengue fever compared to WNV fever.

- Thrombocytopenia and leukopenia are more common in cases of dengue fever compared to WNV fever.
- WNV IgM titers are negative or low positive in dengue fever patients; however the WNV IgG can be quite elevated in dengue patients since IgG strongly cross-reacts between flaviviruses.

Imported arboviral diseases

Human disease cases due to dengue or yellow fever viruses are nationally notifiable to CDC using specific case definitions. However, many other exotic arboviruses (e.g., Chikungunya, Japanese encephalitis, tick-borne encephalitis, Venezuelan equine encephalitis, and Rift Valley fever viruses) are important public health risks for the U.S. as competent vectors exist that could allow for sustained transmission upon establishment of imported arboviral pathogens. Health-care providers and public health officials should maintain a high index of clinical suspicion for cases of potentially exotic or unusual arboviral etiology, particularly in international travelers. If a suspected case occurs, it should be reported to the appropriate local/state health agencies and CDC. Arboviral encephalitis cannot be distinguished clinically from other central nervous system (CNS) infections.

Acute and/or convalescent sera from reported cases must be forwarded to the Bureau of Public Health Laboratories for confirmatory testing.

Note

The Surveillance and Control of Selected Arthropod-borne Diseases in Florida, 2013 Guidebook is found online at the following link: http://www.doh.state.fl.us/Environment/medicine/arboviral/index.html.

For additional information about arboviral diseases, please visit: http://www.doh.state.fl.us/Environment/medicine/arboviral/index.html.

DOH BPHL EIA /ELISA results are reported as positive, negative, or inconclusive; numeric values should not be interpreted as an antibody titer. Antibody titer values are provided for SN or PRNT testing performed at BPHL. IgM should be present in serum within nine days of symptom onset. IgM is detectable in CSF before serum in patients exhibiting neurologic signs.

EEEV serology

Acute and convalescent sera from reported and suspect cases must be acquired and sent to the DOH BPHL.

Laboratory test	**Interpretation**
1. Reverse Transcriptase (RT) PCR on serum, tissue, blood, CSF or other body fluids	Confirmed case
2. Virus isolation in serum, tissue, blood, CSF or other body fluids	Confirmed case
3. Demonstration of specific viral antigen (IHC) in serum, tissue, blood, CSF or other body fluids	Confirmed case
4. CSF EEEV (EIA or ELISA) IgM +	
4.a. Negative for other endemic arboviral IgM antibodies in the same family in CSF	Confirmed case
4.b. Not tested for other endemic arboviral IgM antibodies in the same family in CSF	Probable case
5. Serum EEEV (EIA or ELISA) IgM +	
5.a. Positive for virus-specific neutralizing antibodies in the same or a later specimen (SN or PRNT)	Confirmed case
5.b. Negative or not tested for virus-specific neutralizing antibodies in the same or a later specimen (SN or PRNT)	Probable case
6. EEEV (EIA or ELISA) IgM –	
6.a. IgG -	Not a case
6.b. IgG +	Not a case - Indicative of past infection at an undetermined time

WNV serology

Note: All specimens tested for flaviviruses at the DOH BPHL are tested for antibodies to multiple viruses (i.e. WNV, SLEV and DENV) before considered confirmed. Antibodies cross reactive to all three viruses are often present in flavivirus positive sera. Specific antibodies to the virus causing the infection generally have the highest titers.

Acute and convalescent sera from reported and suspect cases must be acquired and sent to the DOH BPHL.

Laboratory test	**Interpretation**
1. RT PCR on serum, tissue, blood, CSF or other body fluids	Confirmed case
2. Virus isolation in serum, tissue, blood, CSF or other body fluids	Confirmed case
3. Demonstration of specific viral antigen (IHC) in serum, tissue, blood, CSF or other body fluids	Confirmed case
4. CSF WNV (EIA or ELISA) IgM +	
4.a. Negative for other endemic arboviral IgM antibodies in the same family in CSF	Confirmed case
4.b. Not tested for other endemic arboviral IgM antibodies in the same family in CSF	Probable case
5. Serum WNV (EIA or ELISA) IgM +	
5.a. Positive for virus-specific neutralizing antibodies in the same or a later specimen (SN or PRNT)	Confirmed case
5.b. Negative or not tested for virus-specific neutralizing antibodies in the same or a later specimen (SN or PRNT)	Probable case
6. WNV (EIA or ELISA) IgM –	
6.a. IgG -	Not a case
6.b. IgG +	Not a case - Indicative of infection or immunization with a group B flavivirus at an undetermined time

SLEV serology

Acute and convalescent sera from reported and suspect cases must be acquired and sent to the DOH BPHL.

Laboratory test	**Interpretation**
1. RT PCR on serum, tissue, blood, CSF or other body fluids	Confirmed case
2. Virus isolation in serum, tissue, blood, CSF or other body fluids	Confirmed case
3. Demonstration of specific viral antigen (IHC) in serum, tissue, blood, CSF or other body fluids	Confirmed case
4. CSF SLEV (EIA or ELISA) IgM +	
4.a. Negative for other endemic arboviral IgM antibodies in the same family in CSF	Confirmed case
4.b. Not tested for other endemic arboviral IgM antibodies in the same family in CSF	Probable case
5. Serum SLEV (EIA or ELISA) IgM +	
5.a. Positive for virus-specific neutralizing antibodies in the same or a later specimen (SN or PRNT)	Confirmed case
5.b. Negative or not tested for virus-specific neutralizing antibodies in the same or a later specimen (SN or PRNT)	Probable case
6. SLEV (EIA or ELISA) IgM –	
6.a. IgG -	Not a case
6.b. IgG +	Not a case - Indicative of infection or immunization with a group B flavivirus at an undetermined time

Note: The case definition for Dengue can be found in Chapter 3 and the case definition for Malaria is outlined in Chapter 4.

Chapter 3
Dengue

Overview

Epidemiology: Dengue fever is caused by any of four closely related dengue virus (DENV) serotypes (DENV 1-4). It is a painful, debilitating febrile disease (so-called "break-bone fever") that is rarely fatal. Unlike most other flaviviruses such as WNV, humans are the only important vertebrate hosts of DENV. Dengue has become increasingly common in the Caribbean, Central America, the Pacific, and South America during the past two decades. Today, about 40% of the world's population lives in areas where there is a risk of dengue transmission. The World Health Organization estimates that 50 to 100 million infections occur annually, including 500,000 DHF cases and 22,000 deaths, which are mostly among children.

Until 2009, the last dengue virus epidemic in Florida occurred in 1934-1935. Since then, a small number of cases have been reported each year in individuals with recent travel history to a dengue-endemic country. In past Florida epidemics, the sole vector of the dengue viruses (DENV) was *Ae. aegypti.* However, since that time, *Ae.albopictus* has become established in Florida, and this species is an important vector of DENV in Asia. Both species prefer to feed during the day, unlike most vectors associated with Florida endemic arboviruses. *Ae. aegypti* feeds exclusively on humans, is highly domesticated, and primarily utilizes artificial containers as larval habitats. In contrast, Ae*. albopictus* is an opportunistic feeder and fundamentally a treehole- and leaf axil-dwelling species that is secondarily an artificial container dweller. Traditional CDC Light Traps, which are the standard mosquito traps used for WNV, SLEV, and EEEV mosquito vector surveillance, are not optimal for these species.

During the summer of 2009, local dengue transmission was identified in Key West, FL[15] and it continued in 2010. No cases have been reported from Key West since November 2010. Twelve unrelated sporadic cases of locally transmitted dengue were also identified in other central and south Florida counties in 2010 (2), 2011 (7), and 2012 (3).

Incubation period: Incubation period is three to 14 days, in most cases. People can transmit the virus to other mosquitoes if bitten while viremic; the viremic stage usually begins the day before symptom onset and continues for five days. It then takes eight to 12 days for the mosquito to become infectious to previously uninfected people. A significant proportion (up to 50%) of people infected with dengue do not display symptoms but can still transmit the virus to mosquitoes.

Clinical symptoms: Symptoms generally last three to ten days although the febrile stage is seven days or less (range 2-7 days).This illness is characterized by fever, myalgia, arthralgia, retro-orbital pain, abnormal vascular permeability, hypovolemia and abnormal blood clotting mechanisms. Up to 50% of infected persons may be asymptomatic but still infectious to mosquitoes. Others may experience a non-specific febrile illness rather than the classic break-bone fever. Dengue hemorrhagic fever-dengue shock syndrome (DHF-DSS) is a group of severe hemorrhagic symptoms that occur in a small percent of those infected. In those with severe disease, shock is the predominant sign. The DHF case fatality rate can be 10% or higher if untreated, but is typically drastically lowered (<1%) with timely and appropriate fluid therapy. Encephalitis is a rare consequence of dengue infection; fulminate hepatitis can also occur. There is some indication that dengue may be transmitted in utero. Infection with one dengue serotype does not protect against the others. Those at greater risk for DHF and DSS include persons with previous dengue infection,

[15] Radke et al., 2011.Dengue Outbreak in Key West, Florida, 2009. Emerg Infect Dis [serial on the Internet]. 2011 Jan [Accessed on 12/27/2011]. http://dx.doi.org/10.3201/eid1801.110130

pregnant women, infants, the elderly, and those with co-morbidities. However severe illness can also occur in those without any of these risk factors.

Case Definition

Dengue Fever

Reporting code = 06100
Case report form: *Vector-borne Disease Infection CRF*
MERLIN ELECTRONIC SUBMISSION

Clinical description

Dengue fever (DF) is most commonly an acute febrile illness defined by the presence of fever and two or more of the following, retro-orbital or ocular pain, headache, rash, myalgia, arthralgia, leukopenia, or hemorrhagic manifestations (e.g., positive tourniquet test, petechiae; purpura/ecchymosis; epistaxis; gum bleeding; blood in vomitus, urine, or stool; or vaginal bleeding) but not meeting the case definition of dengue hemorrhagic fever. Anorexia, nausea, abdominal pain, and persistent vomiting may also occur but are not case-defining criteria for DF.

Dengue hemorrhagic fever (DHF) is characterized by all of the following:

- Fever lasting from 2-7 days
- Evidence of hemorrhagic manifestation or a positive tourniquet test
- Thrombocytopenia (≤100,000 cells per mm^3)

AND one of the following:

- Evidence of plasma leakage shown by hemoconcentration (an increase in hematocrit ≥20% above average for age or a decrease in hematocrit ≥20% of baseline following fluid replacement therapy),
- Pleural effusion,
- Ascites, or
- Hypoproteinemia

Dengue shock syndrome (DSS) has all of the criteria for DHF plus circulatory failure as evidenced by:

- Rapid and weak pulse and narrow pulse pressure (<20mm Hg)

OR

- Age-specific hypotension and cold, clammy skin and restlessness.

Laboratory criteria for diagnosis

Confirmatory:

- Isolation of dengue virus from or demonstration of dengue-specific arboviral antigen or genomic sequences in tissue, blood, cerebropspinal fluid (CSF), or other body fluid by culture, polymerase chain reaction (PCR) test, immunofluorescence, or immunohistochemistry (IHC);

OR

- Seroconversion from negative for dengue-specific serum IgM or IgG antibody in an acute phase (≤ 5 days after symptom onset) specimen to positive for dengue-specific serum IgM or IgG antibodies in a convalescent-phase specimen collected ≥5 days after symptom onset (e.g., enzyme-linked immunosorbent assay [EIA/ELISA], microsphere immunoassay (MIA), or immunofluorescence assay [IFA]);

OR

- Demonstration of a ≥4-fold rise in plaque reduction neutralization test (PRNT) end point titer (as expressed by the reciprocal of the last serum dilution showing a 90% reduction in plaque

counts compared to the virus infected control) between dengue viruses and other flaviviruses tested in a convalescent serum sample;

OR

- Virus-specific IgM antibodies demonstrated in CSF (e.g., EIA/ELISA, MIA, or IFA).

Supportive:
A positive IgM antibody test on a single acute or convalescent-phase serum specimen to one or more dengue virus antigens).

Criteria for Epidemiologic Linkage

- Travel to a dengue endemic country or presence at a location with an ongoing outbreak within previous 2 weeks of dengue-like illness

And

- Association in time and place with a confirmed or probable dengue case.

Case classification

Confirmed: a clinically compatible case with confirmatory laboratory evidence.

Probable: a clinically compatible case with supportive laboratory evidence.

Suspect:

- A clinically compatible person >18-years-old with both epidemiologic linkage criteria

OR

- A febrile illness in a person <18-years-old with confirmatory or supportive laboratory evidence.

Comment

Dengue re-infection:
CDC estimates approximately 20% of dengue cases that have been previously exposed to another dengue virus may have transient or no significant elevation in dengue IgM titers, making identification of such cases extremely difficult. An individual with a dengue re-infection may show elevated IgG titers but no IgM titers. During an epidemiological investigation, it is important to ask if there has been any lifetime travel to a dengue endemic country; first dengue infection may have occurred years prior and with few or no symptoms.

Differentiating between dengue and West Nile virus infections

- Neuroinvasive disease is relatively uncommon with dengue infections and more likely to be WNV infection than dengue. Confusion differentiating WNV and dengue infections is most likely in patients without symptoms of neuroinvasive disease (fever patients).
- Travel to a dengue endemic country in the 2 weeks prior to febrile illness onset or travel of a household member to a dengue endemic country in the 4 weeks prior to patient illness should increase suspicion of dengue.
- Joint pain is often much more severe in cases of dengue fever compared to WNV fever.
- Thrombocytopenia and leukopenia are more common in cases of dengue fever compared to WNV fever.
- WNV IgM titers are negative or low positive in dengue fever patients; however the WNV IgG can be quite elevated in dengue patients since IgG strongly cross-reacts between flaviviruses.

Guide to Interpretation and Classification of Common Dengue Laboratory Tests

Laboratory test	**Days post-onset of sample collection**	**Interpretation of positive result**	**Explanation**
Real Time-PCR	≤ 5 days	Confirmatory (*Note)	Patient viremic while febrile; days 0-7
IgM (paired specimens, acute and convalescent)	≤ 5 days for acute specimen, > 5 days for convalescent. (ideally 2 weeks apart)	Confirmatory	Negative IgM in an acute specimen followed by a positive IgM in a convalescent speciment
IgG (paired specimens, acute and convalescent)	≤ 5 days for acute specimen, > 5 days for convalescent. (ideally 2 weeks apart)	Confirmatory	Must be 4 fold increase in titer between acute and convalescent specimen
IgM (single serum specimen)	> 5 days	Probable	IgM can remain positive for ≥ 3 months in cases of acute dengue infection
*Note: Only PCR for dengue or IgM ELISA-based antibody test can be used for diagnosis of dengue in single serum specimens			
NB: Previous flavivirus infections and the high prevalence of dengue IgG antibody in some population (e.g., those resident in, or long-term visitors of dengue endemic countries) complicate interpretation of dengue serological test results. Therefore, a single serum sample tested using a dengue-specific IgG or combined IgM/IgG ("all antibody") test is generally not helpful for diagnosis of confirmed or probable cases of dengue. For this reason suspect cases are defined clinically and epidemiologically, without IgG or combined IgG/IgM serological testing. If only a single serum sample is available for testing, a test for dengue-specific IgM antibody is preferred.			

Acute and/or convalescent sera from individuals with infections believed to be Florida-acquired must be forwarded to the Bureau of Public Health Laboratories (BPHL). Acute sera from individuals with infections believed to be acquired outside Florida should also be forwarded to BPHL.

Chapter 4
Malaria

Overview

Malaria is one of the world's greatest public health problems. Approximately 500 million of the world's population are infected each year and between 2 and 2.5 million people die from malaria annually. One in three people in the world, a total of 2.2 billion people, are at risk of being infected by the mosquito-borne parasite *Plasmodium falciparum*. Endemic malaria was eradicated from Florida in the late 1940s. Although malaria is no longer endemic in Florida, it is often seen in travelers returning to the state from endemic malaria regions of the world. *Anopheles* mosquitoes, responsible for transmitting malaria to humans, are common in the state and autochthonous malaria transmission is still possible.

Human malaria is caused by four species of protozoan parasites of the genus *Plasmodium: P. vivax, P. falciparum, P. malariae, and P. ovale.* All four are transmitted from person to person via the bite and blood-feeding behavior of mosquitoes of only the genus *Anopheles.* A fifth *Plasmodium* species that can cause severe illness and potentially death in humans is *Plasmodium knowlesi*. This species is endemic to Southeast Asia and macaque monkeys appear to be the primary reservoir.

Vector: In Florida, there are eight identifiable *Anopheles* species, all of which are potentially capable of transmitting malaria, however only one *Anopheles quadrimaculatus,* is a major malaria vector in Florida:

- *An. quadrimaculatus*
  - Principal malaria carrier.
  - Found in every county, more abundant in northern Florida.
  - Breeds in alkaline ponds, lakes and gum swamps in the limestone and red clay regions of northern and western Florida.
- *An. crucians*
  - Breeds in acid ponds and cypress swamps.
- *An. punctipennis*
  - Breeds in winter in slow-flowing alkaline streams of northern and western Florida.
- *An. perplexens*
  - Rare mosquito found in north central Florida.
- *An. atropos*
  - Breed in salt marshes.
- *An. albimanus*
  - Very rare species.
  - Breeds in sunlit pools on the Florida Keys.
  - Major malaria vector in Central America.
- *An. walkeri*
  - More common in central Florida.
  - Breeds in heavily vegetated lakes.
- *An. barberi*
  - Breeds in tree holes.

Epidemiology: Although now rare in the United States, malaria was once a major scourge of Florida (both *P. vivax* and *P. falciparum),* occurring in all 67 counties. Data collected since 1917 from the Bureau of Vital Statistics (Provost 1946, unpublished) showed 24 counties with annual death rates from malaria of 100 per 100,000; eight had rates above 200; and Dixie County, in 1930, had a death rate above 300. According to the usually accepted ratio of 200 malaria cases

per death, these rates meant 20%, 40%, and 60% of the populations involved had malaria morbidity. The 24 counties having the highest rate of malaria in Florida and the U.S. were Dixie, Taylor, Jefferson, Lafayette, Wakulla, Gilchrist, Madison, Citrus, Levy, Hernando, Gadsden, Suwannee, Leon, Jackson, Calhoun, Franklin, Okeechobee, Hamilton, Washington, Pasco, Sumter, Columbia, Holmes and Liberty. Malaria morbidity reports for Florida show a steady decrease since 1934 with no large outbreak since 1937. This reduction in malaria incidence was probably due to mosquito control activities, improved housing including screening, use of repellents, agricultural and other drainage practices, and the use of anti-malarial drugs.

Local transmission of malaria was not reported in Florida between 1948-1990. In June 1990, Florida had its first case of human malaria (*P. vivax*) in 42 years, acquired presumably through the bite of a mosquito in Gulf County. Two induced cases of *P. falciparum* occurred in Broward County in 1996 and were probably related to iatrogenic spread in a hospital setting where a patient was being treated for imported malaria infection. Also in 1996, two cryptic cases of *P. vivax* infection occurred in Palm Beach County. One of these cases was in a homeless male and the other was in a resident living in a nearby area. The largest *P. vivax* outbreak in recent Florida history (with eight cases) occurred in Palm Beach County in 2003 in an area located very close to the 1996 Palm Beach County malaria cases[16]. One Manatee County resident acquired *P. falciparum* via a blood transfusion in 2009[17]. In November, 2010, *P. falciparum* with cryptic origin (possibly Florida acquired) was reported in Duval County.

The number of malaria cases in the U.S. has been gradually increasing from the early 1970s and may represent increasing cases from migrants and increased travel among U.S. citizens. The population in Florida at greatest risk of infection is immigrants returning to their home countries to visit friends and relatives (VFR's). FAQ sheets for this group are available in Chapter 9 and at http://www.doh.state.fl.us/Environment/medicine/arboviral/Malaria.html.

Clinical symptoms: The symptoms of malaria will vary depending on the species, but the initial attack may start with lassitude, headache, anorexia, occasional nausea and vomiting. The fever is comprised of a cold stage (shivering and a feeling of intense cold), a hot stage (distressing heat, dryness, burning, intense headache, nausea, and vomiting) and finally a profuse sweating stage. The typical attack often begins in the early afternoon and lasts from eight to twelve hours.

Persons experiencing these symptoms and having been in an area with malaria are encouraged to see a doctor immediately. Emergency treatment consultation advice is available for health care providers through the **CDC Malaria Hotline** (770-488-7788 or 855-856-4713 toll-free) from 9:00 a.m. to 5:00 p.m. Eastern Time. After hours or on weekends and holidays, call the CDC Emergency Operation Center at (770)-488-7100 and ask to page the person on call for the Malaria Branch. All cases of malaria should be reported to the appropriate CHD.

Plasmodium vivax occurs throughout most of the temperate zone, large areas of the tropics, and less commonly in tropical Africa. Severity of the primary attack ranges from mild to severe, usually not resulting in death. *Plasmodium falciparum* is generally confined to tropical or subtropical regions including Haiti and is particularly severe and often fatal in infants, young children and in non-immune persons. *Plasmodium malariae* is frequently named "quartan malaria" because the fever recurs on the fourth day after a two-day interval. The fevers of the other three malaria species recur on the third day after a one-day interval. *Plasmodium malariae* occurs over both

[16] CDC. 2004. Multifocal autochthonous transmission of malaria-Florida, 2003. MMWR 53(19):412-3.
[17] Mali, S. et. al. 2011. Malaria Surveillance-United States 2009. MMWR 60(3). http://www.cdc.gov/mmwr/pdf/ss/ss6003.pdf

tropical and sub-tropical areas. The disease is less severe, but may have a long persistence. *Plasmodium ovale* is similar to *P. vivax* malaria, but with a prolonged latency and generally milder clinical symptoms. It is most common in West Africa. *Plasmodium knowlesi* circulates in non-human primates in Southeast Asia and may cause severe or even fatal infections in humans.

Malaria incubation periods may be extended in patients who receive incomplete prophylaxis, other medications including some antibiotics, or in those recently residing in areas where the parasite is hyperendemic.

Specific characteristics

Vivax malaria

Incubation period: 12-17 days (nine to ten months recorded)

Clinical symptoms*:*

- Primary attack (eight to ten hours duration)
- Sudden, shaking chill often for several hours, headache, back pain, nausea, malaise
- Irregular fever during the first two to four days up to 104-105 degrees Fahrenheit (F)
- Fever terminates by crisis with drenching sweat, up to several hours
- Series of fevers every 48 hours with diminishing intensity for 2 weeks
- Two-week latent period
- Secondary attacks (less intense) for two months
- Six- to nine-month latent period
- Long-term relapses - 2.5-3 years

Pathology:

- Infects new red blood cells (RBCs), red cell destruction leads to anemia
- Enlarged spleen, pulp tarry, malphigian bodies pale gray, malaria pigment within reticulo-endothelial cells
- Congested and enlarged liver, destruction of the bile canaliculi
- Granular casts in urine and fatty degeneration in kidneys
- Infected RBCs are sticky and adhere to capillary, hemorrhages, tissue anoxia and electrolyte imbalance

Falciparum malaria

Incubation period: nine to 14 days (longer incubation periods reported)

Clinical symptoms:

- Headache, back pain, prostration, chill
- Fever irregular, and no distinct periodicity, sweating may be present even when fever is low, higher temperature up to 105-110 degrees F
- Pulse and respiration rates are rapid
- Nausea, vomiting and diarrhea increase, frequently a cough
- Cerebral manifestations of excitation, depression, behavioral changes with psychotic tendencies, coma without hyperpyrexia
- Bilious form - nausea, vomiting, gastric distress, jaundice
- Algid form - high internal heat, body cold and clammy
- Choleraic form - stools loose ("rice water")
- Severe dehydration and anemia
- If untreated, “pernicious malaria” may develop suddenly
- Frequent recrudescence during first month, radical cure in about 10 months

Pathology:

- Infects all RBCs
- Few parasites may be present
- Spleen and liver enlargement
- Acute hemolysis of erythrocytes (hemoglobinuria) with dark, mahogany-red urine (blackwater fever)
- Renal failure

Malariae malaria

Incubation period: 18-40 days

- Clinical symptoms are similar to vivax malaria
- Untreated infections may have relapses 30-50 years later

Ovale malaria

Incubation period: Similar to *P. vivax*

- Clinical symptoms similar to vivax malaria
- Spontaneous recovery common, fewer relapses

Surveillance issues

Imported malaria will continue to be an issue for travelers and visitors to Florida, including migrant workers. Locally acquired cases are possible when *An. quadrimaculatus* and *An. crucians* which are present throughout the state seek blood meals from parasitic human hosts. Surveillance and investigation of reported cases will continue to be important. To optimize surveillance data:

- Remind health care providers and public health workers regularly about the possibility of the importation of malaria among travelers and visitors, including migrant workers, and the danger of not clinically diagnosing malaria from more common febrile illnesses and immediately reporting all confirmed cases.
- Obtain pre-treatment blood films and conduct thorough investigations of all cases with special attention to finding secondary cases and preventing further disease.
- Inform public health officials including the state vectorborne disease surveillance coordinator, CHD Director/Administrators and the local mosquito control director, when an imported malaria case has been detected.

Surveillance issues for mosquito control agencies

- Survey and map annually for all actual and potential Anopheline larval breeding sites in the district.
- Annually map Anopheline adult distribution and record the seasonal abundance collections in the county.
- Be informed of all imported and introduced malaria in the county and Florida.

Any case that is not readily explained by foreign travel or visitors (including migrant workers) is strongly suggestive of local transmission. Airport associated malaria should also be considered[18]. When a case of malaria has been identified, the public should be warned to report any fever of unknown origin to their health care provider. CHDs should alert the local mosquito control. A blood

[18] Zucker JR. Changing patterns of autochthonous malaria transmission in the United States: a review of recent outbreaks. Emerg Infect Dis. 1996;2(1):37-43.

film smear and whole blood in a purple-top tube are submitted for hemoparasitologic analysis of all fever cases suspected of having malaria. *Babesia* can be mistaken for malaria parasites, and vice versa. It is important that the specimens are collected before treatment is initiated. Useful information and general guidance on suspected local malaria investigations is provided in a 2006 MMWR publication[19]:

Depending on circumstances such as abundance of vectors, human population density in the area, number of suspected human cases, etc., mosquito abatement measures may be initiated. Abatement responses are coordinated with local mosquito control officials and FDACS Bureau of Entomology and Pest Control.

Malaria prophylaxis for travelers

Individuals traveling to malaria-endemic countries should consult with their doctor about anti-malarial prophylaxis. More information can be found at the CDC website: http://www.cdc.gov/malaria/travelers/index.html. Those with *P. falciparum* infection, pregnant women, children, and individuals with no established immunity to malaria are particularly at risk for severe or fatal illness. Any traveler experiencing malaria-like symptoms during or after travel should seek immediate medical attention.

[19]Filler, S.J et. al. 2006. Locally Acquired Mosquito-Transmitted Malaria: A Guide for Investigations in the United States, 2006, MMWR, Vol. 55 / No. RR-13 http://www.cdc.gov/mmwr/PDF/rr/rr5513.pdf

Case Definition

Malaria

Rreporting code = 08460
Case report form: CDC 54.1 2010
Malaria Case Surveillance Report

Clinical description

Signs and symptoms are variable; however, most patients experience fever. In addition to fever, common associated symptoms include headache, back pain, chills, sweats, myalgia, nausea, vomiting, diarrhea, and cough. Untreated *Plasmodium falciparum* infection can lead to coma, renal failure, pulmonary edema, and death. The diagnosis of malaria should be considered for any person who has these symptoms and who has traveled to an area in which malaria is endemic. Asymptomatic parasitemia can occur among persons who have been long-term residents of areas in which malaria is endemic.

Laboratory criteria for diagnosis

Detection of malaria parasites in thick or thin peripheral blood films
OR
Detection of species specific parasite DNA in a sample of peripheral blood using a polymerase chain reaction (PCR) test
OR
Detection of circulating malaria-specific antigens using rapid diagnostic test (RDT)

Case classification

Confirmed: detection and specific identification of malaria parasite by microscopy on blood films in a laboratory with appropriate expertise OR detection of *Plasmodium* species by nucleic acid amplification test in any person (symptomatic or asymptomatic) diagnosed in the United States, regardless of whether the person experienced previous episodes of malaria while outside the country.

Suspect: detection of *Plasmodium* species by rapid diagnostic antigen testing **without confirmation by microscopy or nucleic acid amplification testing** in any person (symptomatic or asymptomatic) diagnosed in the United States, regardless of whether the person experienced previous episodes of malaria while outside the country.

Comment

A subsequent attack experienced by the same person but caused by a different *Plasmodium* species is counted as an additional case. A subsequent attack experienced by the same person and caused by the same species in the United States may indicate a relapsing infection or treatment failure caused by drug resistance.

Permanent slides from all diagnosed and suspected cases must be sent to the Bureau of Public Health Laboratories.

Cases also are classified according to the following World Health Organization categories:
Autochthonous:

- Indigenous: malaria acquired by mosquito transmission in an area where malaria is a regular occurrence
- Introduced: malaria acquired by mosquito transmission from an imported case in an area where malaria is not a regular occurrence

Imported: malaria acquired outside a specific area (e.g., the United States and its territories)

Induced: malaria acquired through artificial means (e.g., blood transfusion, common syringes, or malariotherapy [the treatment of disease by raising the body temperature through infecting the patient with malaria])

Relapsing: renewed manifestation (i.e., of clinical symptoms and/or parasitemia) of malarial infection that is separated from previous manifestations of the same infection by an interval greater than any interval resulting from the normal periodicity of the paroxysms

Cryptic: an isolated case of malaria that cannot be epidemiologically linked to additional cases

A copy of laboratory test results must accompany the paper CDC Malaria Case Surveillance Report Form http://www.cdc.gov/malaria/resources/pdf/report/malaria_form.pdf .

Chapter 5
Other Exotic Mosquito-borne Diseases of Interest

The diseases described in this chapter are currently not endemic in the United States, but there is risk of introduction by an infected traveler or immigrant. Although not all are nationally notifiable, cases of any of these diseases, whether imported or locally-acquired, should be reported to the DOH Bureau of Epidemiology as they are of urgent public health significance. Recognition of transmission in Florida requires an immediate response by local mosquito control personnel. Suspect cases should be immediately reported to the state arbovirus coordinator.

Yellow Fever

Epidemiology: Yellow fever is caused by infection with yellow fever virus (YFV), a flavivirus in the same family as WNV and dengue virus. Like dengue, it is transmitted to humans by infected *Ae. aegypti* mosquitoes and there is no animal reservoir. Yellow fever was previously a major public health concern in the United States, but it currently occurs only in tropical regions of Africa and parts of South America. The last epidemic in North America occurred in New Orleans in 1905.

Yellow fever is a rare cause of illness in U.S. travelers to endemic countries. Fortunately, it can be prevented by vaccination. Travelers should be vaccinated for yellow fever before visiting areas where it occurs. International regulations require proof of vaccination for travel to and from certain countries. Travelers should also take the precautions against mosquito bites found in this guide. Additional travel information can be found in CDC's Health Information for International Travel book (http://wwwnc.cdc.gov/travel/page/yellowbook-2012-home.htm) or at http://www.cdc.gov/vaccines/vpd-vac/yf/default.htm

Incubation period: The incubation period of yellow fever is usually three to six days.

Clinical symptoms: Illness ranges in severity from a self-limited febrile illness to severe hepatitis and hemorrhagic fever. Symptoms of severe infection are high fever, chills, headache, muscle aches, vomiting, and backache. After a brief recovery period, the infection can lead to shock, bleeding, and kidney and liver failure. Liver failure causes jaundice, the yellowing of the skin and the whites of the eyes. Severe infections can be fatal. There is no specific treatment, only supportive care and treatment of symptoms. Aspirin should be avoided.

Yellow fever is a nationally reportable disease. Cases should be reported into Merlin using the Florida Confidential Vector-Borne Disease Infection Case Report in Appendix B.

Case Definition

Yellow Fever

Reporting code = 06090
Case report form: http://www.doh.state.fl.us/disease_ctrl/epi/surv/Vectorborne_CRF.pdf

Clinical description

A mosquito-borne viral illness characterized by acute onset and constitutional symptoms followed by a brief remission and a recurrence of fever, hepatitis, albuminuria, and symptoms and, in some instances, renal failure, shock, and generalized hemorrhages

Laboratory criteria for diagnosis

- Four-fold or greater rise in yellow fever antibody titer in a patient who has no history of recent yellow fever vaccination and cross-reactions to other flaviviruses have been excluded

OR

- Demonstration of YFV, antigen, or genome in tissue, blood, or other body fluid

Case classification

Confirmed: a clinically compatible case that is laboratory confirmed
Probable: a clinically compatible case with supportive serology (stable elevated antibody titer to yellow fever virus [e.g., ≥32 by complement fixation, ≥256 by immunofluorescence assay, ≥320 by hemagglutination inhibition, ≥160 by neutralization, or a positive serologic result by IgM-capture enzyme immunoassay]. Cross-reactive serologic reactions to other flaviviruses must be excluded, and the patient must not have a history of yellow fever vaccination.

Chikungunya

Epidemiology: Chikungunya fever (CHIK) is caused by infection with Chikungunya virus (CHIKV), an alphavirus in the family *Togaviridae*. There is no vaccine available for CHIK, so travelers to endemic areas should use measures to avoid mosquitoes. Diagnosis in travelers is rare, but has occurred in Florida and throughout the U.S. particularly during epidemics in endemic countries. The virus is primarily found in parts of Africa and Asia; however, outbreaks have been documented in Europe. A 2007 outbreak in Italy was especially concerning as the country has a public health and vector control infrastructure similar to that of the U.S. The vector implicated in the outbreak was *Ae. albopictus*, a species with wide distribution in Florida.

CHIKV is transmitted by two main vectors: *Ae. aegypti* (primarily) and *Ae. albopictus*. These mosquitoes also serve as the vectors for dengue and both are found in Florida. While CHIKV is not known to circulate in the Americas, the risk of introduction is possible due to viremic traveler importation of the virus, the presence of competent vectors, and a susceptible population.

Humans serve as the primary reservoir for CHIKV; however other vertebrates such as non-human primates may also serve as potential hosts.

Incubation period: After a mosquito bites a viremic host, on average it takes 10 days for the mosquito to become infectious to people (extrinsic incubation period). In humans the incubation period is typically three to seven days from the time of the mosquito bite, but can range from one to 12 days.

Clinical symptoms: Between 3% and 28% of cases may be asymptomatic. Acute phase symptoms include a sudden onset of continuous or intermittent high fever (usually >102º F) with severe joint pain. Tendons may also be involved. Joint and tendon pain commonly involve the hands and feet, is usually bilateral, and often is accompanied by swelling. Other joints may be involved and back pain is reported in up to 50% of cases. Maculopapular rash is reported in approximately half of all patients usually 2-5 days after fever onset. Children and infants may demonstrate vesiculobullous skin lesions. These symptoms can last 3-10 days. Other symptoms may include headache, fatigue, depression, nausea, vomiting and muscle pain. Mild thrombocytopenia, leucopenia and elevated liver function tests may be reported. Relapse of joint and tendon pain can occur after initial improvement of clinical signs; relapse is most common one

to three months after symptom onset. Some patients have prolonged fatigue and depression lasting weeks or months. Long lasting chronic joint pain lasting years may also occur in some patients. Infection is believed to provide life-long immunity. Fatalities related to chikungunya infection are rare.

CHIKV and DENV are difficult to differentiate clinically. However maculopapular rash is more frequent in CHIK and pain in a CHIK case is often more localized in joints and tendons, particularly the hands and feet, and may be associated with visible swelling. Signs of shock or hemorrhage are much less commonly reported for CHIKV compared to DENV. It is also important to note that CHIK and DEN can occur as co-infections.

Case Classification

Acute serum samples should be collected <8 days after onset of symptoms with a convalescent serum sample collected 10-14 days after the acute sample

Confirmed case: a suspect case with any of the following CHIK specific tests:

- Viral isolation or detection of viral RNA by RT-PCR.
- Detection of IgM in a single serum sample (collected during acute or convalescent phase).
- Four-fold increase in CHIKV-specific antibody titers (samples collected at least two to three weeks apart).

Suspect case: a patient with acute onset of fever >38.5ºC (101.3ºF) and severe arthralgia or arthritis not explained by other medical conditions, and who resides or has visited epidemic or endemic areas within two weeks prior to the onset of symptoms.

IgM antibody levels are highest three to five weeks after the onset of disease and persist for about two months. The virus may be isolated from the blood during the first few days of infection.

More information on CHIK can be found at http://www.cdc.gov/chikungunya/.
Information specific to Preparedness and Response for CHIKV Introduction in the Americas:
http://new.paho.org/hq/index.php?option=com_docman&task=doc_download&gid=16984&Itemid

Rift Valley Fever

Rift Valley fever (RVF) is caused by infection with the RVF virus (RVFV), in the family *Bunyaviridae*. The virus primarily affects livestock, such as cattle, buffalo, sheep, goats, and camels, and can cause large epizootics. Humans, primarily those exposed to diseased animals, can also be infected. If introduced to Florida, RVF would be a significant threat to the agriculture industry, with cattle and small ruminants especially affected. This could result in an export ban on beef to other countries, causing billions of dollars of economic loss.

Epidemiology: The RVFV is generally found in regions of eastern and southern Africa, but also exists in sub-Saharan Africa and Madagascar. In 2000, RVFV was first documented outside Africa in Saudi Arabia and Yemen. RVFV is transmitted by a number of different species of mosquitoes. Humans can also get the disease if they are exposed to the blood, body fluids, or tissues of infected animals.

Incubation period: Two to six days.

Clinical symptoms: Many infected individuals have no illness or mild symptoms. People who become ill usually experience fever, generalized weakness, back pain, dizziness, and extreme

weight loss. However, some patients (less than 1%) can experience ocular disease, hemorrhagic fever, or encephalitis that can be fatal. Case fatality rates are significantly higher in infected animals. Serological tests such as ELISA or EIA may confirm the presence of specific IgM antibodies to the virus. The virus may be isolated from the blood during the first few days of infection.

Chapter 6
Human Mosquito-borne Disease Surveillance

SLEV, WNV, and EEEV infection, malaria, dengue and yellow fever are reportable human diseases in Florida per rule 64-D3 (F.S. 381.0031; FAC 64D-3). County health departments provide case information to the DOH Bureau of Epidemiology for data analysis and dissemination. When dealing with cases of human arthropod-borne diseases, close communication and coordination among partner agencies is essential to prevent further human disease transmission

Surveillance for endemic arbovirus diseases includes human, domestic and wild animal disease surveillance and monitoring for arbovirus activity through arbovirus infected sentinel chicken and mosquito testing. Chapter 7 provides details related to non- human arbovirus disease surveillance. Human surveillance is the primary surveillance tool for arboviruses such as dengue and chikungunya that have no non-human vertebrate reservoirs.

DOH protects the confidentiality of all persons who may have arboviral or other notifiable diseases (Ch. 381.0055, F.S.). However, when there is a need to protect the public's health, the DOH is allowed to share confidential information with people who need to know (Ch. 381.0031, F.S.). Such instances include sharing mosquito exposure information of human arbovirus cases with recent disease onset with mosquito control districts to ensure appropriate mosquito surveillance and control. The information should be shared between one contact at the CHD (the case investigator) and one contact at the Mosquito Control District (mosquito control operations chief) and the information shared should be limited to ONLY that necessary for effective mosquito control. Information should be shared over the phone; email correspondence with the DOH is public record and should not contain personal identifiers of persons with arboviral disease. The exact address of the human case may or may not be needed to ensure effective mosquito control. In urban areas, a city block or neighborhood may be sufficient while in rural areas. It may be necessary to share the exact address of the patient's residence. It is expected that those in possession of confidential information treat it in such a way that the privacy of the individual is maintained. It is expected that mosquito control district personnel will shred notes with confidential information when they are no longer needed.

Example of a shared information agreement:
The parameters that xxxxxx County Health Department and Mosquito Control Division have agreed upon are as follow:

- Block number (i.e., 900 Adam Street) and Street Address of the residence of the WNV human case (criteria may vary with arbovirus depending on virus ecology)
- Zip Code of the person's residence
- Notification of both confirmed and suspect human arboviral cases
- Patient's date of onset
- CHDs and MC work as partners and as stewards of the privacy of affected citizens

See Appendix B for a writen buisness agreement template: Agreed protocol for reporting arbovirus human cases to Mosquito Control jurisdictions by County Health Departments

Surveillance and Prevention

County health department responsibilities include:

- Publicize 'Drain and Cover' (see Chapter 9) message and distribute arboviral diseases educational materials to the public to increase awareness among people at the beginning of

transmission season (depending upon the historical surveillance data, and positive horse cases and increased seroconversion rates in sentinel chickens in current year).

- Arboviral diseases and malaria are reportable diseases in Florida as per rule 64-D3 (F.S. 381.0031; FAC 64D-3). CHDs should send information to local health care providers about clinical signs and symptoms of arboviral illness (see Appendix B) at the beginning of transmission season or during periods of increased activity.

Case Investigation

Human arboviral case investigations should be initiated upon receipt.

- County health departments may receive notification of cases from a variety of sources including health care providers, hospitals, laboratories, or DOH Central Office.

- When a CHD receives notice of a potential case of mosquito-borne disease, the designated staff person shall gather information about the case and risk factors for infection through an interview with the patient and/or health care provider.

- Notify the health care provider that the CHD will be contacting the case since DOH follows up on all cases to assess risks factors, to characterize the occurrence of these infections in Florida, and to identify potential means for preventing further illness.
- Obtain the following information from the health care provider:
    - Date of onset
    - Signs and symptoms
    - Predisposing conditions (e.g., immunosuppression)
    - Tests performed (including EIA, PCR, culture or any other test performed)
    - Treatments for pre existing conditions (e.g., rheumatic arthritis)
    - Ask what information has been given to the patient, including whether the patient knows about the diagnosis and risk factors
    - For mosquito-borne illnesses that humans act as a reservoir for (dengue, malaria, Chikungunya, etc.) ask if patients were advised to avoid mosquito bites while ill
    - Obtain as much demographic information as possible, including contact information (home, cell, and/or work phone numbers)
    - Ask how and where the patient can be contacted (i.e., at hospital or home)

- The CHD designee will arrange acute and convalescent blood sample collection and submission to the DOH Bureau of Public Health Laboratories (BPHL), as appropriate, in order to confirm infection with a vector-borne disease.

- If the potential case meets the case definition for a confirmed, probable, or suspect case, the CHD is responsible for reporting all required information in Merlin under the appropriate disease code.

Case Interview

- Contact the case to complete an interview as soon as possible after being reported to optimize recall. Use the Florida Confidential Vector-borne Disease Case Report form found in Appendix B.
- Remind patient to avoid mosquito bites while ill
- Obtain history of mosquito bites 14 days prior to onset of symptoms
- Ask for travel and activity history
  - Travel outside county of residence, state, or country
  - Travel to dengue endemic areas and any febrile illnesses or travel reported for household members in the month prior to patient's onset (suspect dengue cases only)
  - Occupation
  - Hobbies (gardening, fresh water fishing, hunting)
  - Other outdoor activities (smoking outside, etc.)
  - Other risk factors (intact screens, regular use of repellants, etc.)
- Collect history of blood transfusions or organ transplants in the past 6 months and any blood donations in the 2 weeks prior to symptom onset
- As part of the interview, provide basic education to the cases about personal protection measures to prevent mosquito bites and the 'Drain and Cover' message.

Response

- CHDs will immediately inform the state Arbovirus Surveillance Coordinator of the detection of arbovirus disease in their area and coordinate with the DCHP and local mosquito control personnel to ensure timely vector surveillance and control and to issue health advisory/ alerts to the public once lack of travel outside the county is established and laboratory confirmation at BPHL is complete as advised in the Florida Department of Health Response Plan for Mosquito-Borne Diseases (Chapter 8).
- Local mosquito control personnel may conduct immediate assessment of the area and take measures to reduce exposure of residents to vectors.
- CHDs will post an EpiCom message indicating the details of locally acquired mosquito-borne disease cases.
- Issue a press release and initiate a vigorous public education campaign through the news media encouraging residents to assist in the effort to eliminate artificial container habitats to prevent breeding of *Aedes* mosquitoes which transmit exotic diseases dengue and chikungunya, as appropriate when a local mosquito-borne disease infection is confirmed. Press or media releases are **not** recommended for imported mosquito-borne disease infections.
- CHDs will provide public information to specific at risk communities such as immigrant workers, outdoor workers, Tribes, and homeless people, as appropriate.
- Educational materials and fact-sheets should be provided in appropriate languages other than English if there are immigrant populations in affected area.
- CHDs will send information to local health care providers about clinical signs and symptoms of malaria, dengue or other-non-endemic mosquito transmitted disease when CDC issues a Health Alert Network (HAN).
- CHDs will send information to local health care providers about clinical signs and symptoms of malaria and dengue when there is unusual number of imported cases or increased trend of imported cases compared to base line for the county.

Laboratory Evaluation

DOH Bureau of Public Health Laboratories (BPHL) provides confirmatory laboratory testing services for patients with clinical signs of arboviral disease. Due to the cross-reactivity between WNV and other closely related flaviviruses, positive private laboratory test results for antibodies to WNV or other arboviruses must be confirmed by the DOH BPHL (i.e., specimens testing positive at private laboratories must be forwarded to the state laboratory for confirmation). Health care providers should submit acute and convalescent serum and/or CSF samples to either the Tampa or Jacksonville BPHL for endemic arbovirus cases. Acute serum samples from imported dengue should also be forward to BPHL, if possible. Even though a very early acute serum may be negative it is recommended that it be collected and submitted without waiting for the convalescent specimen. The convalescent specimen (drawn two weeks later) should be routinely sent to confirm negative and positive results.

It is important to confirm identification of a specific agent in instances of a suspected arbovirus infection. This results in appropriate patient therapy and effective vector control operations designed to limit transmission to additional susceptible human hosts. Confirmation is dependent upon viral isolation/detection or antibody detection by serologic assays such as the serum-neutralization (SN), enzyme-linked immunosorbent assay (ELISA), microbead immunoassay (MIA) and immunofluorescent antibody (IFA) tests. Interpretation of each of the tests is dependent upon the time of specimen collection relative to the date of symptom onset, the patient's previous arbovirus infection history, and serum cross-reactivity within the antigenic complex. In Florida, previous DENV infection or previous yellow fever vaccination are the most common factors that can complicate the interpretation of antibody tests. In addition, current infections with HSV, EBV, *Streptococcus*, influenza or other pathogens may also complicate the interpretation of antibody tests.

Human sera are assayed by IgM and IgG ELISA assays; equivocal results are confirmed by serum neutralization.

Available Laboratory Testing

Virus Isolation (culture) and detection (RT-PCR assays) - It is rare to isolate SLEV or WNV from blood or CSF taken during the acute phase of encephalitis due to brief viremic stage prior to onset of illness. SLEV and WNV can be detected in brain tissue collected at necropsy. EEE and WEE viruses are also usually only isolated from the brain. The dengue viruses, however, frequently may isolated/detected from blood during the first few days after onset of illness. Virus may also be detected in blood donated prior to development of clinical symptoms.

Immunohistochemistry (IHC) - IHC is a laboratory test to detect viral antigens in serum, CSF, tissues or other body fluids.

Serum Neutralization (SN) or Plaque Reduction Neutralization test (PRNT) - Neutralizing antibody is primarily IgG. SN antibody rises late in the course of infection, and may persist for life after some viral infections.

Capture Enzyme Immunoassay for IgM Antibody - IgM can be detected in either serum or CSF using a capture enzyme immunoassay. The presence of significant levels of IgM is generally a reliable indicator of recent infection. However, a subset of case patients may have serum IgM antibody to flaviviruses persisting for over a year, thus somewhat limiting the value of the assay as a measure of recent infection. Since IgM antibody does not cross the blood-brain barrier, its presence in CSF indicates local antibody synthesis in response to a central nervous system

infection and is usually diagnostic. Cross-reactivity within a virus group (e.g., flaviviruses) is common.

EIA for IgG Antibody: IgG can be determined in serum using EIA. A positive IgG result is indicative of infection or immunization with a group B Flavivirus at an undetermined time. Dengue re-infection can also cause a significant elevation in IgG antibody titers.

Specimen Collection

When virus isolation/detection is to be attempted, blood serum, CSF and tissue samples are placed on dry ice immediately after collection and kept frozen on dry ice while in transit to the laboratory. Fluids are kept in standard sterile airtight tubes, and tissue in an airtight sterile container without added media or fixative. Each specimen must be labeled with the patient's name. Hold serum in a refrigerator until shipped. When serum is to be examined only for antibody, it may be shipped at ambient temperature (do not freeze) provided it has been collected and handled aseptically. Nevertheless, shipping sera with frozen-gel ice in an insulated cooler provides a better specimen. At least 2ml of serum or CSF are required for antibody testing. Throat swabs, when collected for enterovirus testing must be dacron swabs in viral transport media.

Shipping Specimens

Clinical sera are sent immediately to the assigned DOH BPHL (Jacksonville or Tampa, addresses below). Ship specimens for serology testing to either DOH BPHL and molecular testing (PCR) for dengue is available at both BPHL Tampa and Jacksonville. A DOH Laboratory Submission Form should be completed for each patient, listing all specimens. Follow packaging and shipping guidelines for diagnostic specimens (Biological Substance, Category B, UN3373[20],[21]). If viral isolation/detection is desired (e.g., for dengue), sera must be shipped frozen on dry ice to the BPHL. A completed Florida DOH Clinical Laboratory Submission Form DH1847 should accompany all specimens:
http://www.doh.state.fl.us/lab/PDF_Files/DOH_Form_DH1847_1009_v12152010.pdf or found in Appendix B. The BPHL provides training classes between March and July of each year (pending continued funding) on packaging and shipping for clinical personnel that need to ship specimens. For information on these classes, contact Betty_Wheeler@doh.state.fl.us or 904-791-1568. The BPHL home page is at http://www.doh.state.fl.us/lab/index.html.

NOTE: Unseparated, whole blood is an unsatisfactory specimen and therefore, should not be shipped to the laboratory.

To expedite receipt of specimens at the laboratory, overnight or 2-day express shipment is suggested. If sera are shipped on Friday, the package must be clearly marked for "Saturday Morning Delivery". The following must appear on the shipping label:

DOH Bureau of Public Health Laboratories - Virology 1217 Pearl Street Jacksonville, FL 32202 Phone (904) 791-1539, 791-1540	OR	DOH Bureau of Public Health Laboratories - Virology 3602 Spectrum Boulevard Tampa, FL 33612 Phone (813)974-8000

[20] http://www.phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Files/Transporting_Infectious_Substances_brochure.pdf
[21] http://images.fedex.com/downloads/shared/packagingtips/pointers.pdf

Transfusion and Transplant Associated Infections

Although uncommon, a number of arthropod-borne diseases can also be transmitted via blood transfusion or tissue transplant. Blood banks in the U.S. test donated samples for WNV and viremic blood donors are reported to CDC. Donors are typically questioned about travel to malaria-endemic countries and not permitted to donate within a year of travel or within three years of last malaria symptoms. Despite these precautions, infections can still occur.

When investigating a case of WNV infection, malaria, dengue, or other arthropod-borne diseases such as Chagas disease or babesiosis, it is important to inquire about history of transfusions or transplants, particularly when no obvious exposure can be identified. In 2009, a malaria infection with *P. falciparum* was confirmed in an individual with no history of international travel following a blood transfusion and through blood center trace back. One donor was confirmed as malaria positive[22].

[22] Mali, S. et. al. 2011. Malaria Surveillance-United States 2009. MMWR 60(3). http://www.cdc.gov/mmwr/pdf/ss/ss6003.pdf

Chapter 7
Non-Human Mosquito-borne Disease Monitoring Activities

The ideal mosquito-borne surveillance program measures the amount of viral amplification and transmission in nature and reliably provides information on the risk of human disease. A complete surveillance program consists of monitoring arboviral seroconversion rates in sentinel chickens, weather patterns, the abundance of vector and amplification host species, and the incidence of human and animal disease. The ultimate goal of surveillance is to increase our ability to predict when and where arboviral transmission to humans is likely to occur so that vector and disease control activities can be implemented prior to the beginning of an epidemic. Continuous local surveillance is also invaluable in monitoring both the progress and the cessation of periods of epidemic risk to humans**.**

Sentinel Chickens

Arboviruses are found in mosquitoes throughout Florida during most of the year. Sentinel chickens can be infected with mosquito-borne viruses via the bite of an infected mosquito during any month, but transmission is most often reported between August and November.

Historically, sentinel chickens have been more frequently infected with SLEV and WNV than EEEV. This is likely due to the focal distribution of EEEV in Florida and the low probability that sentinel flocks are located in EEEV transmission zones. Therefore, sentinel chicken surveillance may be less useful for predicting EEEV transmission to humans. However, during years of heavy EEEV transmission in Florida, EEEV transmission was reported in sentinel chickens over a wide area indicating a generalized risk of transmission to humans throughout the traditional Florida EEEV transmission zone.

Local health and mosquito control agencies should use sentinel chicken flocks to assess local mosquito transmission of WNV and other arboviruses. Local governments without mosquito control and/or sentinel chicken surveillance capabilities should work to establish programs in uncovered areas. Testing of sentinel chicken sera for virus and/or antibody will be conducted by the DOH Bureau of Public Health Laboratories in Tampa, and results reported to submitters and participating programs as quickly as possible.

Sentinel chicken programs are maintained by mosquito control districts and/ or CHDs, depending on local resources and priorities. Such programs entail determining flock placement; flock care; weekly collection, processing, and shipping of blood specimens; and notification of appropriate agencies and persons regarding seroconversion data. Under certain conditions, “backyard” juvenile (birds hatched during the sample year) chickens (i.e., birds maintained for other purposes) can be monitored.

Under ideal circumstances, sentinel chicken flocks should be located in every Florida county because mosquito-borne arbovirus transmission can be quite focal and spread rapidly. When flocks are not maintained in a county, that CHD often relies on the results of sentinel chicken surveillance in contiguous counties to aid in decision-making. Because of the introduction of WNV into Florida in 2001, chicken surveillance should be conducted throughout the state.

Chickens are not known to transmit mosquito-borne viruses directly to people. They are also not effective virus amplifying hosts. Mosquitoes that bite an infected chicken are unlikely to become infected.

Sentinel Chicken Flock Information

- The surveillance site should be permanently located in an area free from public access and vandalism. Mosquito control personnel should be consulted for advice on flock placement in counties where CHDs maintain flocks.
- The location of each flock (i.e., maps and GPS coordinates) should be reported to the Bureau of Epidemiology each January.
- The number of flocks maintained in each county depends on the size of the county and the resources available for maintaining a sentinel chicken surveillance program. However, a minimum of six chickens per flock is suggested to maintain uninterrupted arboviral surveillance around the vicinity of the flock.
- Sentinel flocks should be located in a variety of habitats throughout the county. These should include, but are not limited to, hardwood hammocks, pine flatwoods, coastal habitats, freshwater marshes, saltwater marshes, residential areas, city and county parks, and urban centers.
- Backyard chicken flocks selected for retrospective surveys should be located within two to three miles of mosquito breeding areas. During a medical alert, chicken flocks within a two-mile radius of a human case may be sampled.
- Female Leghorn, Barred Rock, Rhode Island Red or Minorcan chickens that reach the age of 10-12 weeks before being placed in the field are ideal for surveillance (game chickens are not recommended). All-hen flocks may be preferred in some urban areas when cocks crowing might annoy residents.
- The local county agricultural extension agent can be contacted to obtain information for contacting local chicken breeders. If a local source of chickens is not available, assistance may be obtained from neighboring counties or mosquito control personnel at FDACS (Contact Jennifer Jennings Glover at (850) 251-1226 or jennifer jenningsglover@freshfromflorida.com.
- Each chicken must be properly identified by a uniquely numbered wing or leg band–(e.g., available from National Band and Tag Company at (859) 261-2035, or http://www.nationalband.com/).
- Animal care workers should take precautionary measures when handling chickens and when conducting routine maintenance of cages. Workers should wear latex gloves to protect against contact with chicken feces. Arboviruses are not transmitted by contact with chicken feces, but other illness-causing organisms can be found in the excreta. Chicken feces should be treated carefully and properly disinfected and disposed. Dust masks may be used to protect against respiratory irritants when performing work with significant dust levels such as cleaning cages. See Appendix D - Infection Control and Personal Protective Equipment Guidelines for persons involved in surveillance, eradication, and control of avian influenza outbreaks in birds in Florida.

Husbandry

- Housing should be constructed in such a manner that the chickens can be protected from the elements (shade and protection from rain is required) and from predators. It is recommended that cages be maintained above the ground.
- A raccoon/fox-proof wired (or double wiring) coop with a strong door and a secure lock to the entrance used for feeding and bleeding purposes should be sufficient to protect the chickens. Mosquitoes must have free access to the coop interior.
- Housing should be adapted to the condition of the terrain and should have adequate slope to keep the ground dry.

- Chickens should be fed in accordance with feed manufacturer's recommendations, including the addition of chicken scratch. Sufficient amounts of fresh water should be supplied to the flocks and cages should be cleaned on a regular basis.
- A separate flock of chickens should be kept in a mosquito-proof building, to replace chickens lost due to seroconversion or mortality.
- Clusters of morbidity or mortality among flocks should be reported to FDACS, Division of Animal Industry, at (850) 410-0900.

Bleeding Schedules/Record Keeping

- Accurate records should be maintained for future reference with detailed information on the location of the site (exact address and GPS coordinates), surrounding vegetation, and weather conditions during the surveillance season.
- *All chickens in the flock should be bled every week.*
- Blood samples are screened initially using the Hemagglutination Inhibition (HAI) test. This test is broadly reactive and will indicate the presence of flavivirus or alphavirus antibodies. The samples with a positive HAI to either alpha or flavivirus are then tested using the IgM ELISA. This test will indicate which virus the sample has antibodies for. Sometimes, the HAI test will be positive and the IgM ELISA test will be negative. When this happens, the samples are tested using serum neutralization.
- Antibody positive chickens may revert to false HI negative status on later serum samples; thus, chickens that are reported as confirmed positive should be removed from the flock and replaced with a baseline negative bird from the holding flock.
- The weekly seroconversion rate is the number of confirmed arbovirus antibody positive chickens divided by the number of birds tested. Seroconversion rates can be calculated for the state, county, or individual flocks.
- Serologically negative chickens may be bled throughout the season, but all chickens should be replaced annually with new birds early in the year (April-May).
- *Chickens that seroconvert or die should be replaced with a non-immune chicken having a NEW band number.* The new band number must not duplicate the band number of other chickens at that site. Notify the DOH BPHL and update the FLEHS flock managment database website as to dead/missing chickens and their replacements.

Instructions for Bleeding Chickens

A blood "collection kit" should be assembled for use in the field. A plastic craft tray or small, light tool box should contain: needles, syringes, serum separator tubes, latex gloves, two pencils or sharpie markers, a small tightly closed plastic container of alcohol-soaked cotton balls, a checklist of chicken wingband numbers by site, insect repellent and waterless hand disinfectant/cleaner for the worker. Hand sanitizers containing 70% alcohol are most effective. In addition, bring a sharps safety disposal container, appropriate disposal bags for waste, and a small cooler of ice (ice is useful for hemostasis if gentle pressure fails to assist with clotting).

Bleeding should be undertaken only by appropriately trained professionals. A person working alone may bleed chickens (a chicken restrainer to facilitate this is described in *Mosquito News 3(2):357-359, 1986)*. Two field personnel can make the process easier. Once securely restrained, the bird should be placed on its side and the opposite wing extended for easiest access to the vein that is to be bled:

1. Stretch out a wing to expose its underside. Alternate wings each time the chicken is bled in order to allow healing. (Some may choose to take samples from jugular veins).
2. Pluck feathers where the wing joins the body to expose the vein. Wet the area with alcohol to make the vein more readily visible and to clean the venipuncture site.
3. Carefully insert into the vein, bevel side up, a 23 or 25-gauge 0.5-inch needle (depending on the size of the vein) fitted to a 3cc syringe. Use a new needle and syringe for each chicken.
4. Withdraw 1.5 to 2.0cc of whole blood by drawing on the plunger *slowly* in order to keep the vein from collapsing.
5. Remove needle and apply gentle pressure with alcohol-soaked cotton ball at the site of venipuncture for hemostasis.

Note: Latex gloves and a face shield or protective eyewear should be worn during the entire bleeding procedure. Hands should be cleaned with an alcohol based disinfectant after removing gloves and the gloves disposed of. Hand sanitizers containing 70% alcohol are most effective. Should a novel strain of avian influenza be detected in the United States, additional occupational safety measures will be necessary Guidelines are available in Appendix D.

6. Dispense the blood slowly into a 4-inch commercial serum separator tube. (Tubes can be purchased from Fisher Scientific, 1-(800)-766-7000, www.fishersci.com or other scientific/medical supply companies). The use of these tubes precludes the need to transfer serum and label to a second sterile tube, thus reducing the chance of mislabeling a specimen, and saving technician time. The use of such tubes reduces the rate of bacterial contamination and produces more useable serum.

Note: To reduce hemolysis, uncork the tube, carefully recap and remove the needle from the syringe and slowly express the blood into the tube. Needles should only be recapped using a one-handed technique (using the syringe to scoop the cap onto the needle), or by using forceps or a clamp. Uncapped needles can be removed from the syringe by a mechanical unwinding device that deposits the needle directly into the sharps container.

In addition, all needles must be deposited into a sharps container at the point of origin, which is defined as the area where the waste is generated. The sharps containers must be transported by a DOH-registered transporter (see http://www.myfloridaeh.com/community/biomedical/transporters.htm)to a permitted storage or treatment facility that has an active permit from the DOH. Treatment must be achieved by incineration, steam sterilization, or an alternative treatment process approved by the DOH.

If the phlebotomist is stuck by a needle during the bleeding procedure, the chicken blood needs to be tested for virus. Contact the DOH Bureau of Public Health Laboratories in Tampa at (813) 974-8000 for directions. If an arbovirus is detected in the chicken blood, the phlebotomist should contact his/her local CHD to facilitate testing.

7. Label each vial using a waterproof marking pen or pencil with the following information:
    a. *Important* - Correct bird number from the permanent wing tag or leg band
    b. Flock site location/name
    c. Collection date
8. Lay tubes on their side (this increases serum yield). Keep tubes on coldpacks to help reduce hemolysis (rupturing of RBCs).
9. If possible, centrifuge for 15 minutes at 1200rpm, trapping the clot in the bottom of the tube.
10. The tube may be shipped directly to the DOH BPHL in Tampa, without decanting the serum.

11. A new computerized submission and reporting system is in development to enhance and streamline data transmission between submitters and the laboratory.

A completed submittal form must be included with serum samples shipped to the DOH BPHL. Serology submittal forms with barcodes for each collection are generated by the specimen submitter using the Florida's Environmental Health Surveillance System (FLEHS) database. The barcodes contain information such as county name, site number, bird number, date collected and whether the bird is new or not. The DOH BPHL will assign laboratory numbers and scan the barcodes when the serum samples are received and the information stored in the barcodes is transferred electronically to the BPHL Laboratory Information System (LIMS). When the DOH BPHL completes a test, results are entered into the DOH BPHL LIMS. The results will be automatically transferred to FL EHS and can be accessed by the submitter. Please contact the Arbovirus Surveillance Coordinator for information on FLEHS and the use of this database. Samples received before noon on Wednesday will have HI test results reported on the following Friday.

Serum Testing/Data Dissemination

Sentinel chicken sera are tested at DOH BPHL Tampa (contact the laboratory at 813-974-8000). The Tampa laboratory communicates the results weekly to the county coordinator submitting specimens as well as the CHD, the DOH Bureau of Epidemiology and the FDACS Bureau of Entomology and Pest Control.

Dead Bird Reporting and Testing

West Nile virus infection causes morbidity and mortality in many bird species in the United States. In some species, especially crows and blue jays (corvids), there has been substantial mortality due to WNV infection. Detection of local bird mortality may indicate the presence of the virus in a geographic area. Thus, monitoring of dead bird mortality is considered a tool for WNV surveillance[23]. The FWC coordinates the monitoring efforts of dead bird mortality in the state. Dead bird sightings may be reported on their website: http://www.MyFWC.com/bird/. The data are used to detect focal areas with intense WNV activity.

Because of the understanding we have gained about the mortality rates of different bird species infected with WNV, under most circumstances dead bird testing is not warranted. Instead, ask the public to report bird mortality sightings on the http://www.MyFWC.com/bird/ website. CHD staff and other agency personnel should assist with the reporting process, as needed.

The DOH BPHL Tampa, accepts dead bird specimens. When there is a need to verify the cause of an increased corvid or overall bird mortality, a representative sample may be submitted to the BPHL Tampa for WNV testing. When dead bird carcasses are in the appropriate condition for WNV diagnostic testing, the carcass and an Arbovirus Surveillance: Necropsy and Virus Isolation form may be submitted by DCHP, FDACS, FWC, mosquito control staff, veterinarians or wildlife rehabilitators to the DOH BPHL Tampa to be sampled and tested using PCR assay and/or virus isolation. The laboratory submission form can be found in Appendix B. Initial testing should take about one week. Clusters of mortality of single non-corvid species or families of birds such as doves, ducks or pelicans are usually not caused by WNV and should not be submitted for WNV testing. However, the findings of these dead birds need to be reported. The FWC tracks all clusters of wild bird mortality in the state and investigates select mortality clusters reported at the website above.

General precautionary measures should be observed when handling a dead bird.

[23] Interim Guidance for States Conducting Avian Mortality Surveillance for West Nile Virus (WNV) and/or Highly Pathogenic H5N1 Avian Influenza Virus. CDC. http://www.cdc.gov/ncidod/dvbid/westnile/resources/Interimguidance_WNV_HPAI_bird_surveillance_082206.pdf

When collecting a dead bird to submit for testing:

Avoid touching the bird with your bare hands. Wear disposable gloves or place a plastic bag over your hand to pick up the bird. After the bird is placed in a plastic bag, seal it tightly. Remove the gloves or plastic bag from your hands by turning them inside out. Dispose of the gloves or plastic bag in a trash bag. Place the bag containing the bird in a second plastic bag and tie securely. Place the double-bagged bird in a cooler with blue ice. Wash your hands thoroughly with soap and water. Ship the bird in either a hard-sided cooler or a Styrofoam cooler placed in a cardboard box. It is important to specify that the package be shipped via ground transportation. The shipping company should let you know if the package is unable to be shipped by ground to a certain location. If this is the case, a pressure container will need to be used to ship the package via air. Additional packaging and shipping information can be found at:
http://www.doh.state.fl.us/environment/medicine/arboviral/protocol_bird.htm

When disposing of a dead bird:

Avoid touching the bird with your bare hands. Wear disposable gloves or place a plastic bag over your hand to pick up the bird. Bury the bird two feet deep **or** place the bird in a plastic bag and tie securely. Remove the gloves or plastic bag from your hands by turning them inside out. Dispose of the gloves or plastic bag in the trash bag. Place the bag containing the bird in a second bag and tie securely. Place the double-bagged bird in the garbage. Wash your hands thoroughly with soap and water. Wash any clothing that has come into contact with the bird with normal household detergent at normal temperatures.

Laboratory Testing Protocol

At the DOH BPHL in Tampa, sera collected from sentinel chicken flocks and wild birds and animals are tested for antibody to EEEV, SLEV, and WNV with three different serological assays according to the following algorithm: All specimens are screened using an HI assay to detect alphavirus (EEEV or HJV), and/or flavivirus (SLEV or WNV) antibodies. Sentinel chicken sera that are flavivirus positive are tested in an SLEV and WNV IgM ELISA assay. Sentinel sera that are alphavirus positive in the HI assay are tested for IgM antibody to EEEV. IgM antibody negative sera and IgM antibody equivocal sera may be assayed by SN for confirmation of etiology. HI flavivirus antibody positive wild bird or mammalian sera are assayed by SN to confirm the etiological agent. Dead bird specimens are processed and assayed by PCR for detection of EEEV, WNV and SLEV nucleic acids. A portion of tissue is also placed in cell culture for virus isolation attempts. Reports are sent to the County where the bird was collected and the submitter. Forms for submission of samples are located in Appendix-B.

Veterinary Surveillance

Cases of equine and other animal arboviral disease are also used to assess the impact of WNV and EEEV in the state. Veterinarians should send equine sera or brain tissue to the FDACS Bronson Animal Disease Diagnostic Laboratory in Kissimmee for evaluation (Phone - (321) 697-1400). Results should be available within a week. Positive animals are reported to DOH by FDACS.

Equine Case Definition

A **confirmed case** of an arboviral infection is illness in an equine with clinical signs, plus one or more of the following, in an antemortem test:

1. Isolation of an arbovirus from tissue, blood, or CSF;
2. An associated four-fold or greater change in neutralizing or HI antibody titer to an arbovirus in appropriately timed, paired sera (nonvaccinated or known vaccine history); or
3. Detection of IgM antibody to an arbovirus by IgM Antibody Capture ELISA (MAC-ELISA).

In a post-mortem sample, a confirmed arbovirus case is positive by:

1. PCR for arbovirus genomic sequences in tissue, blood, or CSF;
2. Positive immunohistochemistry for arbovirus antigen in tissue; or
3. Isolation of an arbovirus from those samples.

Clinical signs should include one or more of the following: depression, ataxia (including stumbling, staggering, wobbly gait, or incoordination), weakness, inability to stand, death, elevated rectal temperature, change in mentation, and cranial nerve abnormalities (primarily weakness of the tongue). Horses are also commonly hyperaesthetic for one to several days. In certain arbovirus infections, horses can present with rapid onset of head pressing, coma, aimless wandering, and blindness.

All samples must be submitted with an Arbovirus Encephalitis Case Information Form FDACS 09125 for appropriate classification of test results. This form is located in Appendix B

Mosquito Monitoring

The accurate measurement of vector abundance and population structure is a critical component of arboviral surveillance. Factors such as vector movement, blood feeding, egg laying and the age of the population determine whether there is a high or low risk of viral transmission and the potential for human infection. The number of mosquitoes collected is not as important as the day-to-day changes in the number collected. Therefore, it is the quality of collections, not the quantity, which is important. Ideally, the method of surveillance and sampling sites should remain constant from year-to-year to allow comparison between years.

Laboratory testing of pooled mosquitoes is available from the DOH Bureau of Public Health Laboratories. However, it is important to note that such testing need only be conducted when specific aims of the surveillance program have been defined, and it has been determined by the DOH that the testing is necessary to enhance the ultimate goal of risk reduction.

Trapping Mosquitoes

Current methodologies for trapping mosquitoes are available from the Florida Coordinating Council on Mosquito Control or local mosquito control agencies. Printed or diskette copies of Florida Mosquito Control: The State of the Mission as defined by mosquito controllers, regulators, and environmental managers are available from the Florida Medical Entomology Laboratory, University of Florida/IFAS, 200 9th Street SE, Vero Beach, Florida 32962, (772) 778-7200, or downloaded from FMEL web page: http://fmel.ifas.ufl.edu/white_paper/FWP09.pdf

Collections of flying mosquitoes (mostly host-seeking females) can be made by utilizing many different light trap designs (CDC, New Jersey, and updraft to name a few). Light traps can be run with or without added carbon dioxide (CO_2) and other secondary attractants such as octenol. Ovipositing female mosquitoes can be collected in gravid traps. Host-baited traps, including lard can traps and Trinidad traps, can be used to collect host-seeking female mosquitoes. Sentinel chicken cages can be fitted with exit traps which collect female mosquitoes (empty and blood fed) as they exit the sentinel cage, usually early in the morning. Resting mosquitoes can be collected with backpack aspirators and large, medium, or small hand-held aspirators.

Once collections are counted, the number of mosquitoes in each group for each species should be entered into a database for graphical presentation or plotted manually so that day-to-day changes in mosquito abundance can be readily seen. Age determinations allow for identification of periods in which the risk of viral transmission is highest.

Collection Techniques

1. Traps
    a. CDC (with or without CO_2)
    b. Gravid, ABC light traps (with CO_2), MM-X traps (a.k.a. pickle jar) (with CO_2)
    c. Lard can
    d. Mosquito Magnet traps
    e. BG- Sentinel Mosquito trap (Biogents)
2. Traps may be set anyplace arboviral transmission is suspected to be ongoing. Arboviral transmission can be extremely focal in widely dispersed habitats. So, other trap sites and collection techniques should be considered including: ground aspirator collections at mosquito daytime resting sites, avian roosts, and areas of past virus activity.
3. Maintain accurate and detailed nightly records for each collecting bag and each resulting mosquito pool.
4. Priority: ornithophilic (mainly feeds on birds) and opportunistic mosquitoes
    a. *Culex*
    b. *Culiseta*
    c. *Mansonia*
    d. *Coquillettidia*
    e. *Aedes*
5. Mosquitoes should be live or recently (<2 hr) dead, non-fed or gravid females only. Do not pool blood-feed mosquitoes because, if positive, it is impossible to tell whether the virus originated in the mosquito or in the blood meal.

Sample Processing

1. Prior to sending the samples, the BPHL Tampa must be contacted.
2. Hold samples on wet ice in field or transport traps in coolers to the DOH BPHL Tampa
    a. Do not use dry ice to kill or anesthetize collections because the CO_2 acidifies the sample and may kill the virus, thus interfering with tests designed to isolate live virus. However, it is desirable to ship mosquitoes that are sealed within proper tubes to the DOH BPHL Tampa on dry ice (see instructions below).
    b. Make sure mosquitoes are kept alive by keeping them in a humid environment with access to cotton balls soaked with 5% sugar water
    c. Once mosquitoes are killed, they must be kept in a freezer maintained at -70°C or colder.
3. Use a chill table to sort the specimens. Triethylamine (TEA) can also be used to anesthetize the insects for the sorting process.

4. Group female mosquitoes into pools of 50 individual mosquitoes by species, site, and week (or night) of collection. Be careful not to contaminate the sample by including loose body parts (e.g. legs) belonging to other mosquito pools.
5. *Do not combine mosquitoes or mosquito species trapped on different nights, different sites, or in different types of traps at the same site.*
6. Make sure each mosquito pool is clearly and accurately labeled with a unique identifier number. This information plus any notes or comments for each pool should appear on a master data sheet, which is copied and maintained in two separate locations. Information on the pool should include:
    a. Mosquito species
    b. Number of specimens
    c. Mosquito data (sex and empty or gravid for females)
    d. Collection date
    e. Collection location
    f. Collection method (attractant trap type or non-attractant collection; if traps used, note attractant used as this indicates bias for particular age classes)
7. Accurate species identification is essential. If you are unsure of the species identification do not guess. Either have the specimen accurately identified or discard it. Unidentified pools will be not be tested by the DOH BPHL Tampa.
8. Label tubes (preferably 2.0 ml plastic, snap-cap microcentrifuge tubes (Fisher Cat # 02-681-258) with the unique identification number or with the following information: species name and number, site, collection date, numbers of mosquitoes. Seal the tube with plastic film (or plastic electrical tape) and store it at -70^0 C. A proper seal is essential to prevent intrusion by carbon dioxide gas when the specimens are shipped on dry ice! Maintain accurate records.
9. Complete the "Arbovirus Surveillance Mosquito" form and send with the submitted pools to DOH BPHLTampa.
    a. Drive to DOH BPHL Tampa or send overnight mail on dry ice.
    b. Contact the laboratory prior to sending samples.
    c. Laboratory address:
       Virology
       DOH Bureau of Public Health Laboratories
       3602 Spectrum Blvd
       Tampa, FL 33612
       Tel: (813)974-8000
10. To benefit arboviral surveillance programs, mosquitoes should be pooled and shipped to the DOH BPHLTampa within 24 hours of collection. In addition, the shipments need to arrive at the laboratory on a weekday to make sure staff is available to process the specimens. Results will be reported back to the collector within two weeks.

Viral Assay of Mosquitoes

Samples are screened in a molecular assay (RT-PCR) for WNV and, when appropriate, EEEV. Pools positive for WNV are reported by email to the submitter. When molecular screening is completed, a report is mailed to the submitter and to DOH Bureau of Epidemiology. Samples are then inoculated onto cell cultures for arbovirus isolation. When an isolate is detected, it is identified using multiple primer sets and probes. Gene sequencing may be performed. Virus isolates are reported by email to the submitter. When isolation attempts are complete, a report is mailed to the submitter.

Mosquito pools testing at the DOH BPHL Tampa will be given priorities and tested based upon the following guidelines:

- Priority 1- Validation and confirmation of commercial testing (VecTest™, RAMP®, PCR, etc.).
- Priority 2- Pilot testing, such as well designed transmission studies. Such studies must have prior approval through the Arbovirus Surveillance Program.
- Mosquito testing due to clustering of animal or human cases of disease (e.g. to determine local minimum infection rates (MIRs).
- Routine mosquito surveillance testing and testing for other purposes will be available at the submitter's expense, and only on a space available basis.

In Florida, no surveillance has been done to prospectively evaluate SLEV, EEEV or WNV infection rates in mosquitoes. It is clear that during epidemic periods, high SLEV or WNV infection rates can be demonstrated in *Cx. nigripalpus* mosquitoes.

If implemented, surveillance based on viral assay of mosquitoes would require several years of operation to evaluate its sensitivity and specificity for detecting periods of elevated risk of arbovirus transmission. Surveillance of mosquito infections should not supplant other sources of information pertinent to arbovirus activity (e.g., transmission to sentinel and/or wild vertebrates, real-time monitoring of local *Cx. nigripalpus* population dynamics, and rainfall data).

Each organization performing mosquito viral assays should provide test results to the Department of Health Arbovirus Surveillance Coordinator for inclusion in the statewide database. This should include assay method for positive pools, number of pools and number of individuals per pool, species, date, site collected, and agent detected. For negative pools, number of pools of each species should be provided. For further information on using mosquito testing for arbovirus surveillance, see Donald Shroyer's 2001 Wing Beats article[24]. For further guidance on commercial assays for WNV and EEEV in mosquitoes (i.e. VecTest™, RAMP® test) see the article by Burkhalter, KL, et.al. 2006.[25]

It is essential that laboratories conducting viral surveillance with mosquitoes (including, for example, RAMP or VecTests) provide appropriate safety procedures for working with Biosafety (BSL)-2, BSL-3 pathogens. For appropriate standards of practice, refer to *Biosafety in Microbiological and Biomedical Laboratories* (BMBL) 5th edition, at http://www.cdc.gov/od/ohs/biosfty/bmbl5/bmbl5toc.htm. It is important to remember that homogenization can produce dangerous aerosols and appropriate protective measures should be observed. Note: the test kit homogenization reagent may not kill all pathogens present in the specimen.

Laboratories also conducting PCR, should be aware that the reagents, even if not contaminated by virus, may be hazardous materials requiring appropriate chemical hazard protocols and disposal.

In addition, EEEV is considered a "select agent" (potential to pose a severe threat to public health and safety) by the Department of Health and Human Services (HHS) and the United States Department of Agriculture (USDA). CDC and USDA is responsible for the regulation of these agents. Restrictions on having EEEV in the laboratory can be found at: http://www.selectagents.gov/

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[24] Shroyer, D.A. 2001. The collection and processing of mosquitoes for arbovirus assay: some fundamental considerations. Wing Beats 2001 , vol 12(2);4 http://wingbeats.floridamosquito.org/WingBeats/pdfs/Vol12No2.pdf

[25] Burkhalter, KL, et.al, 2006. Evaluation of Commercial Assays for Detecting West Nile Virus. Journal of the American Mosquito Control Association; Vol. 22 :1 (2006); 64-69.

The DOH laboratory submission form Arbovirus Surveillance: Mosquito for mosquito testing can be found in Appendix B.

Weather Analysis – Rainfall Monitoring

Daily rainfall and groundwater accumulations are important meteorological factors when attempting to predict changes in vector abundance, as well as viral amplification and transmission. Monitoring daily rainfall is important for three reasons. First, the length of the Florida dry season is an important factor in determining the potential survival of overwintering and potentially infected mosquito vectors. During years with a long dry season (i.e., January through June), there is a lower potential for virus transmission during the following autumn. If the dry season is short, as in 1990, viral amplification and transmission can begin as early as May or June. Second, once the dry season ends, heavy spring rains allow a quick, early season buildup of vector mosquitoes. Finally, daily rainfall patterns are responsible for driving the overall behavior of *Culex* vectors by determining when and where eggs are laid, when host seeking and biting occurs, and when the virus is transmitted. This theory is applicable to SLEV and WNV. The same may not apply to north Florida since vectors, habitat, and environmental conditions are very different in this part of the state.

Rainfall data are available from the National Weather Service (National Oceanographic and Atmospheric Administration; NOAA). For more localized information, however, it is often necessary to use independent measurements. To monitor daily rainfall, fence post style rain gauges are read, emptied, and the amount of rainfall recorded at roughly the same time each day. Annual rainfall records include the timing, amount, and intensity of rain at the beginning of the wet season. This alerts personnel to a potential buildup of the vector population. Daily rainfall records throughout the wet season may show patterns of heavy rain (> 2 inches) followed by 10 to 14 day droughts. These conditions are ideal for completion of extrinsic incubation of the virus in infected vectors and for synchronizing vector egg laying, blood feeding and potential virus transmission. Finally, it is important to know when the dry season begins, as this may mark the end of virus transmission for that year.

Meteorological conditions predispose regions to epidemic arboviral conditions. Specifically, droughts during the Amplification (April-June) and Early Transmission (July-September) phases of the annual Florida arboviral cycle greatly enhances the probability of epidemic transmission[26]. Real-time measures of drought are criticallly important for assessing epidemic risk in Florida. We currently use the Keetch-Byram Drought Index (KBDI) to assess daily surface wetness conditions throughout the state. It has recently become evident that modeled water table data (WTD) provide a much more sensitive measure of ground water pooling and *Culex* reproductive behavior. One of the most reliable epidemic signatures is modeled WTD that can be tracked throughout the year in real-time and used to predict arboviral transmission[27]. Unfortunately, modeled WTD are not presently available to workers in the field. This may change in the near future, and once the WTD become available for general use, they will provide a powerful tool for monitoring and predicting arboviral epidemics.

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[26] Day J, F. 2001Predicting St. Louis encephalitis virus epidemics: Lessons from recent, and not so recent, outbreaks, *Annu Rev Entomol* 46:111-138

[27] Shaman, J. et al. 2004. Seasonal forecast of SLEV transmission, Florida, *Emerging Infectious Diseases*,10:802-809. http://wwwnc.cdc.gov/eid/article/10/5/pdfs/03-0246.pdf

Chapter 8
Florida Department of Health Response Plan for Mosquito-borne Diseases

Mosquito-borne disease cycles are complex and often involve multiple mosquito species and several vertebrate host species including humans. Virus transmission can be sporadic (spatially and temporally dispersed) or focal (spatially and temporally isolated). This response plan for mosquito-borne diseases is intended for use by county health department public information officers and mosquito control districts. The plan can also be used regionally for adjoining counties with similar habitats and ecologies, but it is not a response plan for the state as a whole.

The need for mosquito-borne disease advisories and alerts is determined by the CHD Director/Administrator after consultation with local mosquito control experts and DOH Central Office. A number of important factors should be considered prior to the issuance of an advisory or alert. These include, but are not limited to: animal surveillance activity (sentinel chicken surveillance, wild bird surveillance, and domestic animals) in the same or surrounding counties, weather information, the time of year, vector surveillance (the abundance and age structure of known vectors), epidemiology of the virus in question, historic arbovirus distribution records, and the presence of human and equine cases in the same or contiguous counties. The CHD Director/Administrator also facilitates the response to mosquito-borne diseases. This includes working closely with the DOH Bureau of Epidemiology, local and state mosquito control personnel, health care providers, veterinarians, emergency room personnel, and officials in neighboring counties.

The FDACS Bureau of Entomology and Pest Control may provide technical support and leadership to affected counties, mosquito surveillance in areas lacking capability, coordination and delegation of mosquito control activity, aerial mosquito control through their Operational Support Section, and emergency mosquito control funds. The FDACS Bureau of Entomology and Pest Control response plan is included in this chapter.

In addition to the Florida Department of Health Response Plan, a document has been developed by a team coordinated by Dr. Walter Tabachnick, Florida Medical Entomology Laboratory, to guide the mosquito control response for WNV at various levels of mosquito activity. These response guidelines have been approved by the Florida Coordinating Council on Mosquito Control and are included below as Appendix E [Florida Mosquito Control Arbovirus Response Plan- West Nile Virus (FMCARP-WNV)].

The Department of Health Response Plan is also appropriate for the response to outbreaks of locally-acquired exotic or non-endemic arthropod-borne diseases such as Chikungunya virus. However, animal surveillance data will not always be available or utilized in the evaluation of these introductions and outbreaks. The Department of Health response plan is intended for use by CHDs and differs from the Florida Mosquito Control Arbovirus Response Plan in Appendix E. The DOH plan includes the following levels:

Level 1: No activity
This level describes the absence of cycling arboviruses in Florida.

- DOH Response:
  - Surveillance (human and animal sentinel surveillance, mosquito-borne disease surveillance)
  - Distribution of weekly arbovirus surveillance reports

- Mosquito Control Response:
  - Operations targeting nuisance and/or disease-carrying mosquitoes
  - Surveillance in sentinel chickens, mosquitoes, and birds
  - Coordinate communication with county health department regarding real time surveillance results

Level 2: Background activity
Describes time periods when mosquito-borne virus activity does not exceed average historical levels.

- DOH Response: (in addition to the response outlined above)
  - Public announcements about personal protection

- Mosquito Control Response: (in addition to the response outlined above)
  - Monitor potential hot spots using surveillance tools
  - Public announcements about personal protection
  - Coordinate communication with county health department regarding real time surveillance results

- FDACS Bureau of Entomology and Pest Control Response:
  - Monitor activity detected through existing surveillance programs
  - Routinely disseminate surveillance information to mosquito control programs

Level 3: Mosquito-Borne Illness Advisory
Mosquito-Borne Illness Advisories are declared when animal and mosquito surveillance data indicate a rise in virus transmission activity and an increased potential for human infections, or when a locally-acquired single human case of exotic or endemic arboviral disease has been confirmed. Mosquito-Borne Illness Advisories may be declared in a county or region where the surveillance data indicate:

1. One sporadic, locally-acquired confirmed human case or blood donor

   OR

2. Where the animal surveillance data over a two-week period indicate:

   a. Two or more confirmed horse cases

      OR

   b. 10% higher than baseline seroconversion rate in the sentinel chickens in a single county (11% current year vs. 1% baseline)

      OR

   c. 10% higher than historical background levels in corvid mortality

      OR

   d. 10% higher than historical background levels in the minimal infection rate (MIR) of vector mosquitoes

- DOH Response: (in addition to the response outlined above)
  - Dissemination of health care provider advisories
  - Dissemination of information internally via EpiCom

- Mosquito Control Response: (in addition to the response outlined above)
  - Mosquito control targeting high risk vector mosquito populations and areas commensurate with arbovirus indicators for risk by performing repetitive nightly spraying operations in high risk areas until vector is suppressed to background levels
  - Consideration for increased surveillance using sentinels in high risk areas with attention to measuring mosquito transmission frequencies using chicken baited mosquito traps or exit traps on sentinel chicken coops
  - Coordinate communication with county health department regarding real time surveillance results
  - Preventive Ultra Low Volume (ULV) and aerial post-epic rainfall brood reduction directed at vector species, and control of nuisance mosquitoes as a lower priority

- FDACS Bureau of Entomology and Pest Control Response: (in addition to the response outlined above)
  - Support surveillance of adult mosquitoes in Level 2 areas not covered by a county or district
  - Assist in public information dissemination

Mosquito-Borne Illness Advisories are lifted by the CHD when activity has returned to background levels. The Arbovirus Surveillance Coordinator at DOH should be notified of the status change. A press release stating the reason for lifting the advisory can also be issued if desired by the CHD. CHDs should notify local partners when advisories are lifted.

Level 4: Mosquito-Borne Illness Alert

Mosquito-Borne Illness Alerts are declared when additional human cases of locally-acquired endemic or exotic arboviral disease have been confirmed, suggestive of a potential disease clustering, or when evidence of intense virus transmission activity has been detected in animal surveillance systems. Mosquito-Borne Illness Alerts may be declared in a county or region where the surveillance data indicate:

1. A cluster of two or more locally-acquired, confirmed human cases and/or blood donors

   OR

2. where the animal surveillance data over a two-week period indicate:

   a. Elevated arbovirus antibody detection in sentinel chickens (above historical background levels):
      i. 50% higher than baseline seroconversion rate in sentinel chickens in a county OR
      ii. 50% higher than baseline seroconversion rate in sentinel chickens in a single flock.

      OR

   b. 50% increase in corvid mortality above historical background levels

- DOH Response: (in addition to the response outlined above)
  - Work with the local mosquito control districts and the Interagency Arbovirus Task Force as needed to assess the risk of human disease and the sufficiency of implemented mosquito control activities

- Mosquito Control Response: (in addition to the response outlined above)
  - Focus mosquito control efforts to high risk mosquito populations and areas, commensurate with arbovirus indicators for risk (i.e. adulticiding hot spots)
  - Consider aerial adulticiding, if not already in place, with focus in high risk areas where wide area control measures are required to respond to the increased level of risk in a timely manner
  - Increase surveillance to obtain estimates of mosquito transmission frequency in targeted areas
  - Coordinate communication with county health department regarding real time surveillance results.
- FDACS Bureau of Entomology and Pest Control Response: (in addition to the response outlined above)
  - Consider aerial or ground control activities through the Operational Support Section
  - Deploy contracted aerial or ground control activities if funding available and if requested by local government (county or city)
  - Local government request should include:
    -citizen notification of dates and times
  - Delineation of areas to be treated, and areas to be avoided including delineation of public lands and sensitive areas
  - Surveillance support

Mosquito-Borne Illness Alerts are lifted after a significant decrease in animal surveillance activity and 6 weeks or more after the onset of the last human case (or sample date in the case of blood donors). The Arbovirus Surveillance Coordinator at DOH should be notified of the status change. A press release stating the reason for lifting the advisory can also be issued if desired by the CHD. CHDs should notify local partners when advisories are lifted.

Level 5: Mosquito-Borne Illness Threat

When there is a potential for a widespread distribution of large numbers of human cases, the State Health Officer may declare a Mosquito-Borne Illness Threat. A mosquito-borne illness threat is a declaration by the State Health Officer that “a threat to the public health exists” as per Ch. 388.45, F.S. The same statute provides the Commissioner of Agriculture the authority to declare “a Threat to Animal Health”. These official declarations also allow FDACS to respond with actions allowing more liberal use of arthropod control measures on certain public lands and movement of mosquito control personnel and equipment into affected counties from other areas of the state, as appropriate.

- DOH Response: (in addition to the response outlined above)
  - Consider distributing daily arbovirus surveillance updates to responsible governmental agencies and other partners
  - Work with local mosquito control district to assess their resource needs for mosquito control activities
  - Advise local authorities on the potential need for elevated disease prevention efforts such as: canceling outdoor events/activities, closing campgrounds, etc

- Mosquito Control Response: (in addition to the response outlined above)
  - Advise county health departments on the justification for elevated disease prevention efforts such as: canceling outdoor events/activities, closing campgrounds, etc
  - Conduct aggressive aerial / truck adulticiding. Consider control on protected lands (with approval from FDACS, DEP, FWC, private owners etc.), as needed, based on justified widespread danger to public health

  - Provide regional inter-county/district and FDACS support, as indicated, for counties in emergency status
  - Request state (FDACS) and Federal Emergency Management Agency (FEMA) support for mosquito control operations, as needed
  - Coordinate communication with county health department regarding real time surveillance results

- FDACS Bureau of Entomology and Pest Control Response: (in addition to the response outlined above)
  - Acquire and distribute emergency funds
  - Activate Emergency Operation Center functions
  - Implement Incident Command System protocols

Mosquito-Borne Illness Threats are downgraded after mosquito surveillance data (i.e. abundance, age structure, or infectivity) indicate a decrease in risk for human arbovirus transmission. If disease risk still exists but no longer meets the standard for a Threat declaration, a new Mosquito-borne Disease Advisory or Alert should be issued, as appropriate.

Under a Level 5 threat, the CHD in the affected county will notify:
1. Community health care providers concerning the potential for transmission of SLEV, WNV or EEEV to people, and the need for health care providers and veterinarians to report new cases
2. The County Mosquito Control Director
3. CHD Directors/Administrators and Mosquito Control Directors in contiguous counties of the mosquito-borne illness threat
4. Local media, education representatives, senior citizen groups, and other citizen groups, as appropriate

The Division of Disease Control and Health Protection will notify FDACS and DEP within 24 hours of the declaration of a mosquito-borne illness threat (Ch. 388.45, F.S.).

Non-disease Mosquito Control Emergencies:

State declared emergencies following hurricane or other flooding events may result in elevated mosquito populations that hinder emergency response without posing an immediate mosquito-borne disease threat. In such cases, FDACS will coordinate response within the state Emergency Management structure, and a Federal Emergency Management Agency (FEMA) developed protocol with requirements to qualify for federal re-imbursement for local mosquito control efforts will be distributed to impacted local Emergency Management Centers.

Please see Chapter 9 for more information on response and public education.

Chapter 9
Public Education

Education messages should be targeted to at-risk populations (e.g., emphasize high risk of SLEV and WNV illness for homeless and the elderly) in low-literacy forms and in languages appropriate to the local population. Media should be used, including radio, newspaper, and television public service announcements.

People can protect themselves from mosquito bites (and therefore arboviruses) by:

DRAIN standing water to stop mosquitoes from multiplying

- Drain water from garbage cans, house gutters, buckets, pool covers, coolers, toys, flower pots or any other containers where sprinkler or rain water has collected.
- Discard old tires, drums, bottles, cans, pots and pans, broken appliances and other items that aren't being used.
- Empty and clean birdbaths and pet's water bowls at least once or twice a week.
- Protect boats and vehicles from rain with tarps that don't accumulate water.
- Maintain swimming pools in good condition and appropriately chlorinated. Empty plastic swimming pools when not in use.

COVER skin with clothing or repellent

- CLOTHING - Wear shoes, socks, and long pants and long-sleeves. This type of protection may be necessary for people who must work in areas where mosquitoes are present.
- REPELLENT - Apply mosquito repellent to bare skin and clothing.
    - Always use repellents according to the label. Repellents with DEET, picaridin, oil of lemon eucalyptus, and IR3535 are effective. Some repellents are not suitable for children. The label will indicate the age range for which the repellent is appropriate. Repellents should not be applied to the hands of children. Adults should apply repellent first to their own hands and then transfer it to the child's skin and clothing. It is not recommended to use DEET on children less than 2 months old. Instead, infants should be kept indoors or mosquito netting used over carriers when mosquitoes are present. According to the CDC, mosquito repellents containing oil of lemon eucalyptus should not be used on children under the age of 3 years.
    - Use mosquito netting to protect children younger than 2 months old.

COVER doors and windows with screens to keep mosquitoes out of your house

- Repair broken screening on windows, doors, porches, and patios. The ordinary window screen with 16x16 or 14x18 meshes to the inch will keep out most mosquitoes. Frequently, mosquitoes follow people into buildings or enter on the host. For this reason, screen doors should open outward and have automatic closing devices. Residual insecticide applications, on and around screen doors, give added protection.

The goals of public education are to inform the public about personal protection measures (described above), provide information and prevent panic. CHDs in coordination with the county mosquito control programs may:

- Issue advisories to minimize outside activities for citizens of affected counties (e.g., activities such as camping, evening and nighttime fishing, etc., are ill advised). Sample advisories and alerts are at the end of this chapter.

- Educate the public about the nature of the public health threat that exists and the level of risk involved (including age-specific risk).
- For EEEV, attempt to gain immediate control of infected adult mosquito populations by use of insecticides applied by ground or aerial applications, as appropriate. Implementation of intensified larviciding programs to reduce future adult populations and elimination of mosquito breeding areas, where applicable, may also be necessary.
- Educate the public about the difficulty in controlling *Cx. nigripalpus*, the main vector for SLEV and WNV. The species has a wide range of larval habitats and the adults are able to fly several miles.

Arbovirus message maps for CHD staff can be found at http://dohiws.doh.state.fl.us/. Click "Crisis & Risk Communications", then "Outbreaks & Incidents", and finally click on "Arboviruses".

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SAMPLE PRESS RELEASE for MOSQUITO-BORNE DISEASE ALERTS

DRAFT CONTACT: name
Month, day, 2013 XXX-XXX-XXXX

MOSQUITO-BORNE DISEASE ALERT ISSUED FOR XXXXXXX COUNTY

--Additional Human Case of (West Nile Virus Illness, Eastern Equine Encephalitis , St. Louis Encephalitis, Dengue) Infection Confirmed--

Today, County Health Department Director/Administrator (Dr.) **XXXXX XXXXXX** announced that the Florida Department of Health (DOH) has issued a mosquito-borne illness alert for **XXXXXX** County. Human cases of XXX have been confirmed and there is a heightened concern that additional residents will become ill. The most recent case involves a XX-year-old (fe)male resident.

DOH continues to advise the public to remain diligent in their personal mosquito protection efforts. These should include remembering **"Drain and Cover".**

DRAIN standing water to stop mosquitoes from multiplying

- Drain water from garbage cans, house gutters, buckets, pool covers, coolers, toys, flower pots or any other containers where sprinkler or rain water has collected.
- Discard old tires, drums, bottles, cans, pots and pans, broken appliances and other items that aren't being used.
- Empty and clean birdbaths and pet's water bowls at least once or twice a week.
- Protect boats and vehicles from rain with tarps that don't accumulate water.
- Maintain swimming pools in good condition and appropriately chlorinated. Empty plastic swimming pools when not in use.

COVER skin with clothing or repellent

- CLOTHING - Wear shoes, socks, and long pants and long-sleeves. This type of protection may be necessary for people who must work in areas where mosquitoes are present.
- REPELLENT - Apply mosquito repellent to bare skin and clothing.
    - Always use repellents according to the label. Repellents with DEET, picaridin, oil of lemon eucalyptus, and IR3535 are effective.
    - Use mosquito netting to protect children younger than 2 months old.

COVER doors and windows with screens to keep mosquitoes out of your house

- Repair broken screening on windows, doors, porches, and patios.

Tips on Repellent Use

- Always read label directions carefully for the approved usage before you apply a repellent. Some repellents are not suitable for children.
- Products with concentrations of up to 30 percent DEET (N,N-diethyl-m-toluamide) are generally recommended. Other US Environmental Protection Agency-approved repellents contain Picaridin, oil of lemon eucalyptus, or IR3535. These products are generally available at local pharmacies. Look for active ingredients to be listed on the product label.
- Apply insect repellent to exposed skin, or onto clothing, but not under clothing.
- In protecting children, read label instructions to be sure the repellent is age-appropriate. According to the CDC, mosquito repellents containing oil of lemon eucalyptus should not

be used on children under the age of three years. DEET is not recommended on children younger than two months old.

- Avoid applying repellents to the hands of children. Adults should apply repellent first to their own hands and then transfer it to the child's skin and clothing.
- If additional protection is necessary, apply a permethrin repellent directly to your clothing. Again, always follow the manufacturer's directions.

For more information on what repellent is right for you consider using the EPA search tool to help you choose skin-applied repellent products:
http://cfpub.epa.gov/oppref/insect/#searchform

DOH continues to conduct statewide surveillance for mosquito borne illnesses, including West Nile virus infections, Eastern equine encephalitis, St. Louis encephalitis, malaria, and dengue.

Residents of Florida are encouraged to report dead birds via the website for Surveillance of Wild-bird Die-offs located at http://www.MyFWC.com/bird. For more information on mosquito-borne illnesses, visit DOH's website at
http://www.doh.state.fl.us/Environment/medicine/arboviral/index.html or call your local county health department.

SAMPLE PRESS RELEASE for MOSQUITO-BORNE DISEASE ADVISORIES

FOR IMMEDIATE RELEASE CONTACT:
Month, day, 2013 Director

FLORIDA DEPARTMENT OF HEALTH
X COUNTY –MOSQUITO-BORNE ILLNESS ADVISORY

X COUNTY--This is to advise that there has been increased mosquito-borne disease activity in areas of **X** County. Several of our sentinel chicken flocks/horses/mosquito pools have tested positive for West Nile Virus/ Eastern Equine Encephalitis Virus/ St. Louis Encephalitis Virus infection. **The risk of transmission to humans has been increased**.

X County Health Department reminds residents and visitors to avoid being bitten by mosquitoes that may cause encephalitis disease. **X** County Mosquito Control and the health department continue surveillance and prevention efforts and encourage everyone to take basic precautions to help limit exposure by following the department of health recommendations.

To protect yourself from mosquitoes, you should remember **"Drain and Cover":**

DRAIN standing water to stop mosquitoes from multiplying

- Drain water from garbage cans, house gutters, buckets, pool covers, coolers, toys, flower pots or any other containers where sprinkler or rain water has collected.
- Discard old tires, drums, bottles, cans, pots and pans, broken appliances and other items that aren't being used.
- Empty and clean birdbaths and pet's water bowls at least once or twice a week.
- Protect boats and vehicles from rain with tarps that don't accumulate water.
- Maintain swimming pools in good condition and appropriately chlorinated. Empty plastic swimming pools when not in use.

COVER skin with clothing or repellent

- CLOTHING - Wear shoes, socks, and long pants and long-sleeves. This type of protection may be necessary for people who must work in areas where mosquitoes are present.
- REPELLENT - Apply mosquito repellent to bare skin and clothing.
    - Always use repellents according to the label. Repellents with DEET(N,N-diethyl-m-toluamide), picaridin, oil of lemon eucalyptus, and IR3535 are effective.
    - Use mosquito netting to protect children younger than 2 months old.

COVER doors and windows with screens to keep mosquitoes out of your house

- Repair broken screening on windows, doors, porches, and patios.

Tips on Repellent Use

- Always read label directions carefully for the approved usage before you apply a repellent. Some repellents are not suitable for children.
- Products with concentrations of up to 30 percent DEET are generally recommended. Other US Environmental Protection Agency-approved repellents contain Picaridin, oil of lemon eucalyptus, or IR3535. These products are generally available at local pharmacies. Look for active ingredients to be listed on the product label.
- Apply insect repellent to exposed skin, or onto clothing, but not under clothing.

- In protecting children, read label instructions to be sure the repellent is age-appropriate. According to the CDC, mosquito repellents containing oil of lemon eucalyptus should not be used on children under the age of three years. DEET is not recommended on children younger than two months old.
- Avoid applying repellents to the hands of children. Adults should apply repellent first to their own hands and then transfer it to the child's skin and clothing.
- If additional protection is necessary, apply a permethrin repellent directly to your clothing. Again, always follow the manufacturer's directions.

For more information on what repellent is right for you consider using the EPA search tool to help you choose skin-applied repellent products:
http://cfpub.epa.gov/oppref/insect/#searchform

DOH continues to conduct statewide surveillance for mosquito borne illnesses, including West Nile virus infections, Eastern equine encephalitis, St. Louis encephalitis, malaria, and dengue. Residents of Florida are encouraged to report dead birds via the web site for Surveillance of Wild-bird Die-offs located at http://www.myfwc.com/bird/. For more information, visit DOH's web site at http://www.doh.state.fl.us/Environment/medicine/arboviral/index.html or call your local county health department.

Sample Hurricane Fact Sheet for Mosquito-Borne Illness

FOR IMMEDIATE RELEASE **CONTACT: COMMUNICATIONS OFFICE**
Month, day, 2013 850-245-4111

****FLOOD/HURRICANE X FACT SHEET****

DEPARTMENT OF HEALTH URGES PRECAUTIONARY MEASURES TO PREVENT WEST NILE VIRUS AND OTHER MOSQUITO-BORNE ILLNESSES

TALLAHASSEE – Due to floodwaters (from Hurricane X), Florida Department of Health (DOH) officials emphasize the importance of Florida's residents and visitors protecting themselves against mosquito-borne diseases.

DOH continues to advise the public to remain diligent in their protecting themselves from mosquito bites by remembering "**Drain and Cover"**:

DRAIN standing water to stop mosquitoes from multiplying

- Drain water from garbage cans, house gutters, buckets, pool covers, coolers, toys, flower pots or any other containers where sprinkler or rain water has collected.
- Discard old tires, drums, bottles, cans, pots and pans, broken appliances and other items that aren't being used.
- Empty and clean birdbaths and pet's water bowls at least once or twice a week.
- Protect boats and vehicles from rain with tarps that don't accumulate water.
- Maintain swimming pools in good condition and appropriately chlorinated. Empty plastic swimming pools when not in use.

COVER skin with clothing or repellent

- CLOTHING - Wear shoes, socks, and long pants and long-sleeves. This type of protection may be necessary for people who must work in areas where mosquitoes are present.
- REPELLENT - Apply mosquito repellent to bare skin and clothing.
    - Always use repellents according to the label. Repellents with DEET, picaridin, oil of lemon eucalyptus, and IR3535 are effective.
    - Use mosquito netting to protect children younger than 2 months old.

COVER doors and windows with screens to keep mosquitoes out of your house

- Repair broken screening on windows, doors, porches, and patios.

Tips on Repellent Use

- Always read label directions carefully for the approved usage before you apply a repellent. Some repellents are not suitable for children.
- Products with concentrations of up to 30 percent DEET(N,N-diethyl-m-toluamide) are generally recommended. Other US Environmental Protection Agency-approved repellents contain Picaridin, oil of lemon eucalyptus, or IR3535. These products are generally available at local pharmacies. Look for active ingredients to be listed on the product label.
- Apply insect repellent to exposed skin, or onto clothing, but not under clothing.

- In protecting children, read label instructions to be sure the repellent is age-appropriate. According to the CDC, mosquito repellents containing oil of lemon eucalyptus should not be used on children under the age of three years. DEET is not recommended on children younger than two months old.
- Avoid applying repellents to the hands of children. Adults should apply repellent first to their own hands and then transfer it to the child's skin and clothing.
- If additional protection is necessary, apply a permethrin repellent directly to your clothing. Again, always follow the manufacturer's directions.

For more information on what repellent is right for you consider using the EPA search tool to help you choose skin-applied repellent products:
http://cfpub.epa.gov/oppref/insect/#searchform

DOH continues to conduct statewide surveillance for mosquito borne illnesses, including West Nile virus infections, Eastern equine encephalitis, St. Louis encephalitis, malaria and dengue. For more information on mosquito-borne illnesses, visit DOH's Web site at http://www.doh.state.fl.us/Environment/medicine/arboviral/index.html or call your local county health department.

Residents of Florida are encouraged to report dead birds via the website for Surveillance of Wild-bird Die-offs located at http://www.MyFWC.com/bird.
Florida Emergency Information Line: 1-(800)-342-3557

Public Information Emergency Support Function: (850) 921-0384

SAMPLE PRESS RELEASE for LIFTING MOSQUITO-BORNE DISEASE ADVISORIES

FOR IMMEDIATE RELEASE
Month, day, 2013

CONTACT:
CHD Director/Administrator

FLORIDA DEPARTMENT OF HEALTH
X COUNTY –MOSQUITO-BORNE ILLNESS ADVISORY

X COUNTY—The **X** County Health Department is lifting the public health advisory for mosquito-borne disease. The advisory has been in place since **April** when a number of **horses/sentinel chickens/a human** was reported to have been infected with **Eastern equine encephalitis/ West Nile virus.**

The cooler weather means there is very little mosquito activity in the area. This is any appropriate time to lift the health advisory. However, in Florida there is a risk of mosquito-borne disease transmission year round.

To protect yourself from mosquito-borne diseases, remember "**Drain and Cover"**:

DRAIN standing water to stop mosquitoes from multiplying

- Drain water from garbage cans, house gutters, buckets, pool covers, coolers, toys, flower pots or any other containers where sprinkler or rain water has collected.
- Discard old tires, drums, bottles, cans, pots and pans, broken appliances and other items that aren't being used.
- Empty and clean birdbaths and pet's water bowls at least once or twice a week.
- Protect boats and vehicles from rain with tarps that don't accumulate water.
- Maintain swimming pools in good condition and appropriately chlorinated. Empty plastic swimming pools when not in use.

COVER skin with clothing or repellent

- CLOTHING - Wear shoes, socks, and long pants and long-sleeves. This type of protection may be necessary for people who must work in areas where mosquitoes are present.
- REPELLENT - Apply mosquito repellent to bare skin and clothing.
    - Always use repellents according to the label. Repellents with DEET, picaridin, oil of lemon eucalyptus, and IR3535 are effective.
    - Use mosquito netting to protect children younger than 2 months old.

COVER doors and windows with screens to keep mosquitoes out of your house

- Repair broken screening on windows, doors, porches, and patios.

The Department of Health (DOH) continues to conduct statewide surveillance for mosquito-borne illnesses, including West Nile virus infections, Eastern equine encephalitis, St. Louis encephalitis, malaria, and dengue.

For more information on mosquito-borne disease, visit DOH's website at http://www.doh.state.fl.us/environment/medicine/arboviral/index.html, or call the X County Health Department..

Repellents

Questions and Answers

Source: Centers for Disease Control and Prevention (CDC)
http://www.cdc.gov/

General Questions

Q. Why should I use insect repellent?
A. Insect repellents can help reduce exposure to mosquito bites that may carry viruses such as West Nile virus that can cause serious illness and even death. Using insect repellent allows you to continue to play and work outdoors with a reduced risk of mosquito bites.

Q. When should I use mosquito repellent?
A. Apply repellent when you are going to be outdoors. Even if you don't notice mosquitoes there is a good chance that they are around. Many of the mosquitoes that carry West Nile virus bite between dusk and dawn. If you are outdoors around these times of the day, it is especially important to apply repellent. In many parts of the country, there are mosquitoes that also bite during the day, and some of these mosquitoes have also been found to carry West Nile virus.

Q. How often should repellent be reapplied?
A. In general you should re-apply repellent if you are being bitten by mosquitoes. Always follow the directions on the product you are using. Sweating, perspiration or getting wet may mean that you need to re-apply repellent more frequently.

Repellents containing a higher concentration (higher percentage) of active ingredient typically provide longer-lasting protection.

Q. How does mosquito repellent work?
A. Female mosquitoes bite people and animals because they need the protein found in blood to help develop their eggs. Mosquitoes are attracted to people by skin odors and carbon dioxide from breath. The active ingredients in repellents make the person unattractive for feeding. Repellents do not kill mosquitoes. Repellents are effective only at short distances from the treated surface, so you may still see mosquitoes flying nearby.

Active Ingredients (Types of Insect Repellent)

Q. Which mosquito repellents work best?
A. CDC recommends using products that have been shown to work in scientific trials and that contain active ingredients which have been registered with the US Environmental Protection Agency (EPA) for use as insect repellents on skin or clothing. When EPA registers a repellent, they evaluate the product for efficacy and potential effects on human beings and the environment. EPA registration means that EPA does not expect a product, when used according to the instructions on the label, to cause unreasonable adverse effects to human health or the environment.

Of the active ingredients registered with the EPA, CDC believes that two have demonstrated a higher degree of efficacy in the peer-reviewed, scientific literature (See Publications page). Products containing these active ingredients typically provide longer-lasting protection than others:

• DEET (N,N-diethyl-m-toluamide)
• Picaridin (KBR 3023)

Oil of lemon eucalyptus [active ingredient: p-menthane 3,8-diol (PMD)], a plant- based repellent, is also registered with EPA. In two recent scientific publications, when oil of lemon eucalyptus was tested against mosquitoes found in the US it provided protection similar to repellents with low concentrations of DEET.

For more information on what repellent is right for you consider using the EPA search tool to help you choose skin-applied repellent products:
http://cfpub.epa.gov/oppref/insect/#searchform

Q. How does the percentage of active ingredient in a product relate to the amount of protection it gives?
A. Typically, the more active ingredient a product contains the longer it provides protection from mosquito bites. The concentration of different active ingredients cannot be directly compared (that is, 10% concentration of one product doesn't mean it works exactly the same as 10% concentration of another product.)

DEET is an effective active ingredient found in many repellent products and in a variety of formulations. Based on a 2002 study (Fradin and Day, 2002. See Publications page).

• A product containing 23.8% DEET provided an average of five hours of protection from mosquito bites.
• A product containing 20% DEET provided almost four hours of protection
• A product with 6.65% DEET provided almost two hours of protection
• Products with 4.75% DEET were both able to provide roughly one and a half hour of protection.

These examples represent results from only one study and are only included to provide a general idea of how such products may work. Actual protection will vary widely based on conditions such as temperature, perspiration, and water exposure.

Choose a repellent that provides protection for the amount of time that you will be outdoors. A product with a higher percentage of active ingredient is a good choice if you will be outdoors for several hours while a product with a lower concentration can be used if time outdoors will be limited. Simply re-apply repellent (following label instructions) if you are outdoors for a longer time than expected and start to be bitten by mosquitoes.

Q. Why does CDC recommend certain types of insect repellent?
A. CDC recommends products containing active ingredients which have been registered with US Environmental Protection Agency (EPA) for use as insect repellents on skin or clothing.

All of the EPA-registered active ingredients have demonstrated repellency however some provide more longer lasting protection than others. Additional research reviewed by CDC suggests that repellents containing DEET (N,N-diethyl-m-toluamide) or picaridin (KBR 3023) typically provide longer-lasting protection than the other products and oil of lemon eucalyptus (p-menthane-3,8-diol) provides longer lasting protection than other plant-based repellents. Permethrin is another long-lasting repellent that is intended for application to clothing and gear, but not directly to skin. In general, the more active ingredient (higher concentration) a repellent contains, the longer time it protects against mosquito bites.

People who are concerned about using repellents may wish to consult their health care provider for advice. The National Pesticide Information Center (NPIC) can also provide information through a toll-free number, 1-(800)-858-7378

Q. How can you know which active ingredient a product contains?
A. Check the product label if you have questions—repellents must specify their active ingredients. In some cases you will note the chemical name in addition to/instead of the "common" name:

• DEET is N,N-diethyl-m-toluamide
• Picaridin is KBR 3023, sometimes known as "Bayrepel" outside the U.S.
• The active ingredient in oil of lemon eucalyptus is p-menthane 3,8-diol (PMD)

Q. What is permethrin?
A. Certain products which contain permethrin are recommended for use on clothing, shoes, bed nets, and camping gear, and are registered with EPA for this use. Permethrin is highly effective as an insecticide and as a repellent. Permethrin-treated clothing repels and kills ticks, mosquitoes, and other arthropods and retains this effect after repeated laundering. The permethrin insecticide should be reapplied following the label instructions. Some commercial products are available pretreated with permethrin.

Q. Where can I find these repellents?
A. Most of these repellents are sold at multiple retail, discount and drug stores. A wider selection may be available at "outdoor" stores or in hunting and camping sections. At this time picaridin is not yet registered with the state pesticide programs in NY and CA, and thus is not available in those areas.

Q. Where can I find more information about picaridin?
A. A technical fact sheet covering picaridin is available from EPA

Q. What are some general considerations to remember when using insect repellents?
A. Always follow the recommendations appearing on the product label.

• Use enough repellent to cover exposed skin or clothing. Don't apply repellent to skin that is under clothing. Heavy application is not necessary to achieve protection.
• Do not apply repellent to cuts, wounds, or irritated skin.
• After returning indoors, wash treated skin with soap and water. (This may vary depending on the product. Check the label.)
• Do not spray aerosol or pump products in enclosed areas.
• Do not spray aerosol or pump products directly to your face. Spray your hands and then rub them carefully over the face, avoiding eyes and mouth.

Q. What are some reactions to be aware of when using insect repellents?
A. Use of repellents products may cause skin reactions in rare cases. Most products also note that eye irritation can occur if product gets in the eye. If you suspect a reaction to a product, discontinue use, wash the treated skin, and call a poison control center. If product gets in the eyes flush with water and consult health care provider or poison control center. If you go to a doctor, take the product with you.

There is a national number to reach a Poison Control Center: 1-(800)-222-1222.

Children

Q. Can insect repellents be used on children?
A. Repellent products must state any age restriction. If there is none, EPA has not required a restriction on the use of the product.

According to the label, oil of lemon eucalyptus products should NOT be used on CHILDREN UNDER THREE YEARS.

In addition to EPA's decisions about use of products on children, many consumers also look to the opinion of the American Academy of Pediatrics (AAP).

The AAP recommends that repellents should contain no more than 30% DEET when used on children. Insect repellents also are not recommended for children younger than 2 months.

AAP has not yet issued specific recommendations or opinion concerning the use of picaridin or oil of lemon eucalyptus for children. CDC will post a link to such information from the Academy when/if it becomes available.

Since it is the most widely available repellent, many people ask about the use of products containing DEET on children. No definitive studies exist in the scientific literature about what concentration of DEET is safe for children. No serious illness has been linked to the use of DEET in children when used according to manufacturer's recommendations.

The AAP Committee on Environmental Health has updated their recommendation for use of DEET products on children in 2003, citing: "Insect repellents containing DEET (N,N-diethyl-m-toluamide, also known as N,N-diethyl-3-methylbenzamide) with a concentration of 10% appear to be as safe as products with a concentration of 30% when used according to the directions on the product labels." AAP recommends that repellents with DEET should not be used on infants less than 2 months old.

Parents should choose the type and concentration of repellent to be used by taking into account the amount of time that a child will be outdoors, exposure to mosquitoes, and the risk of mosquito-transmitted disease in the area.

If you are concerned about using repellent products on children you may wish to consult a health care provider for advice or contact the NPIC through their toll-free number, 1-(800)-858-7378 or npic.orst.edu

Q. What guidelines are available for using a repellent on children?
A. Always follow the recommendations appearing on the product label when using repellent:

• When using repellent on a child, apply it to your own hands and then rub them on your child. Avoid children's eyes and mouth and use it sparingly around their ears.
• Do not apply repellent to children's hands. (Children may tend to put their hands in their mouths.)
• Do not allow young children to apply insect repellent to themselves; have an adult do it for them.
• Keep repellents out of reach of children.
• Do not apply repellent under clothing. If repellent is applied to clothing, wash treated clothing before wearing again. (May vary by product, check label for specific instructions.)

Q. How else can I protect children from mosquito bites?
A. Using repellents on the skin is not the only way to avoid mosquito bites. Children (and adults) can wear clothing with long pants and long sleeves while outdoors. DEET or other repellents such as permethrin can also be applied to clothing (but is not registered for use on skin), as mosquitoes may bite through thin fabric.

Mosquito netting can be used over infant carriers.

Finally, it may be possible to reduce the number of mosquitoes in the area by getting rid of containers with standing water that provide breeding places for mosquitoes.

Q. Can insect repellents be used by pregnant or nursing women?
A. Other than the routine precautions noted earlier, EPA does not recommend any additional precautions for using registered repellents on pregnant or lactating women. Consult your health care provider if you have questions.

Insect Repellents containing DEET and Sunscreen

Q. Can I use an insect repellent and a product containing sunscreen at the same time? What are the recommendations for combination sunscreen/insect repellent products?
A. Yes. People can, and should, use both a sunscreen and an insect repellent when they are outdoors. Follow the instructions on the package for proper application of each product. In general, the recommendation is to apply sunscreen first, followed by repellent.

It is recommended NOT to use a single product that combines insect repellent containing DEET and sunscreen, because the instructions for use of insect repellents and use of sunscreen are different. In most situations, insect repellent does not need to be reapplied as frequently as sunscreen. While no recommendations are available at this time regarding products that combine other active ingredients and sunscreen, it is important to always follow the label on whatever product you are using.

To protect from sun exposure and insect bites, you can also wear long sleeves and long pants. You can also apply insect repellent to your clothing, rather than directly to your skin.

Q. Where can I get more information about repellents?
A. For more information about using repellents, please consult the Environmental Protection Agency (EPA) Web site or NPIC, which is cooperatively sponsored by Oregon State University and the U.S. EPA. NPIC can be reached at: http://npic.orst.edu/or 1-(800)-858-7378.

St. Louis encephalitis (SLE)
Questions and Answers

What is St. Louis encephalitis?
St. Louis encephalitis is a rare disease that is caused by a virus spread by infected mosquitoes. St. Louis encephalitis virus (SLEV) is one of a group of mosquito-transmitted viruses that can cause inflammation of the brain (encephalitis). Historically, Florida has from one to 10 cases of SLEV infection in an average year. Several large outbreaks involving as many as 200 cases have occurred in Florida in recent decades. Florida's last reported human case of SLE was in 2003.

How do people get infected with SLEV?
SLEV is transmitted by the bite of an infected mosquito. SLEV is not transmitted directly from person to person.

Where and when have most cases of SLEV disease occurred?
Cases have been reported throughout the country, but periodic outbreaks and epidemics have primarily occurred in the Mississippi Valley and along the Gulf Coast. In temperate areas of the United States, SLEV disease cases occur primarily in the late summer or early fall. In southern states, cases can occur year round.

Who is at risk for infection with SLEV?
Anyone bitten by a mosquito in an area where the virus is circulating can get infected with SLEV. The risk is highest for persons who engage in outdoor work and recreational activities and those living in low-income areas. Elderly persons are at increased risk of severe disease if they are infected.

How soon do people get sick after getting bitten by an infected mosquito?
It takes five to 15 days after the bite of an infected mosquito to develop symptoms of SLEV disease.

What are the symptoms of SLEV disease?
Most people who are infected with SLEV have no symptoms or only mild non-specific flu-like illness. However, in some individuals, especially the elderly, SLEV can cause serious illness that affects the central nervous system. Symptoms often include fever, headache, stiff neck, disorientation, and altered level of consciousness. Coma, convulsions, and paralysis may also occur.

How is SLEV disease diagnosed?
Diagnosis is based on tests of blood or spinal fluid. These tests typically look for antibodies that the body makes against the viral infection.

Is there a vaccine for SLEV?
No. There is no vaccine because the virus occurs in humans so infrequently.

What is the treatment for SLEV disease?
There is no specific treatment for SLEV disease. Antibiotics are not effective against viruses. Severe illnesses are treated by supportive therapy which may include hospitalization, respiratory support, IV fluids, and prevention of other infections.

How can people reduce the chance of getting infected with SLEV?
Prevention is the key. The best way to avoid infection is to avoid getting mosquito bites.

Remember "**Drain and Cover**":

DRAIN standing water to stop mosquitoes from multiplying

- Drain water from garbage cans, house gutters, buckets, pool covers, coolers, toys, flower pots or any other containers where sprinkler or rain water has collected.
- Discard old tires, drums, bottles, cans, pots and pans, broken appliances and other items that aren't being used.
- Empty and clean birdbaths and pet's water bowls at least once or twice a week.
- Protect boats and vehicles from rain with tarps that don't accumulate water.
- Maintain swimming pools in good condition and appropriately chlorinated. Empty plastic swimming pools when not in use.

COVER skin with clothing or repellent

- CLOTHING - Wear shoes, socks, and long pants and long-sleeves. This type of protection may be necessary for people who must work in areas where mosquitoes are present.
- REPELLENT - Apply mosquito repellent to bare skin and clothing.
    - Always use repellents according to the label. Repellents with DEET, picaridin, oil of lemon eucalyptus, and IR3535 are effective.
    - Use mosquito netting to protect children younger than 2 months old.

COVER doors and windows with screens to keep mosquitoes out of your house

- Repair broken screening on windows, doors, porches, and patios.

What should I do if I think a family member might have SLE?

If you or anyone in your household has symptoms that are causing you concern, consult a healthcare provider for proper diagnosis.

When was the last outbreak of SLEV in Florida?

In the fall of 1997, 9 people contracted SLEV infections. Florida's largest epidemic of SLEV occurred in 1990, with 223 cases and ten fatalities in central and southern areas of the state.

How do we know that SLEV is in an area and that people might become infected?

Mosquito Control Districts located throughout the state continually monitor the distribution and density of mosquito populations known to carry the SLEV. In many areas, these agencies and county health departments also keep chicken flocks and monitor these chickens for evidence of exposure to SLEV.

How is this information communicated to the public?

State and county agencies monitor this information regularly and issue warnings to the public when mosquito populations are large and virus activity is detected.

What parts of the State of Florida are most at risk?

Historically, SLEV has been detected throughout the state although outbreaks have tended to occur more in Central Florida from coast to coast.

What measures are government agencies taking to protect the population?

Mosquito control activities targeted against adult and larval populations have increased as a direct response to the reports of increased SLEV activity. In addition, a number of press releases and public education activities have been undertaken to increase awareness of personal protective measures.

West Nile virus (WNV) illness
Questions and Answers

What is West Nile virus?

West Nile virus (WNV) is a mosquito-borne virus that causes inflammation (swelling) of the brain. More than 300 cases have been reported since West Nile virus was first detected in the state in 2001.

What are the symptoms of WNV?

Many infections with WNV are unapparent but when symptoms occur they can range from fever with headache to coma. Other symptoms include: fatigue, dizziness, weakness and confusion.

Who is at risk of contracting WNV?

WNV is maintained in a bird-mosquito cycle. People may get the virus by being bitten by infected mosquitoes. While the virus can affect anyone, it has its greatest impact on people over the age of 50.

Is there a vaccine for WNV?

No. There is no vaccine because the virus occurs in humans so infrequently.

How can a person prevent infection?

Prevention is the key. The best way to avoid infection is to avoid getting mosquito bites. Remember "**Drain and Cover**":

DRAIN standing water to stop mosquitoes from multiplying

- Drain water from garbage cans, house gutters, buckets, pool covers, coolers, toys, flower pots or any other containers where sprinkler or rain water has collected.
- Discard old tires, drums, bottles, cans, pots and pans, broken appliances and other items that aren't being used.
- Empty and clean birdbaths and pet's water bowls at least once or twice a week.
- Protect boats and vehicles from rain with tarps that don't accumulate water.
- Maintain swimming pools in good condition and appropriately chlorinated. Empty plastic swimming pools when not in use.

COVER skin with clothing or repellent

- CLOTHING - Wear shoes, socks, and long pants and long-sleeves. This type of protection may be necessary for people who must work in areas where mosquitoes are present.
- REPELLENT - Apply mosquito repellent to bare skin and clothing.
    - Always use repellents according to the label. Repellents with DEET, picaridin, oil of lemon eucalyptus, and IR3535 are effective.
    - Use mosquito netting to protect children younger than 2 months old.

COVER doors and windows with screens to keep mosquitoes out of your house

- Repair broken screening on windows, doors, porches, and patios.

How do we know that WNV is in an area and that people might become infected?

Mosquito Control Districts located throughout the state continually monitor the distribution and density of mosquito populations known to carry WNV. In many areas, these agencies and county health departments also keep chicken flocks and monitor these chickens for evidence of exposure to WNV.

How is this information communicated to the public?

State and county agencies monitor this information regularly and issue warnings to the public when mosquito populations are large and virus activity is detected.

What parts of the State of Florida are most at risk?

WNV occurs throughout the state.

What measures are government agencies taking to protect the population?

Mosquito control activities targeted against adult and larval populations have increased as a direct response to the reports of increased WNV activity. In addition, a number of press releases and public education activities have been undertaken to increase awareness of personal protective measures.

Eastern equine encephalitis (EEE)
Questions and Answers

What is Eastern equine encephalitis (EEE)?
EEE is a rare disease that is caused by a virus spread by infected mosquitoes. EEE virus (EEEV) is one of a group of mosquito-transmitted viruses that can cause inflammation of the brain (encephalitis). In the United States, approximately 5-10 EEE cases are reported annually.

How do people get infected with EEEV?
EEEV is transmitted through the bite of an infected mosquito. Disease transmission does not occur directly from person to person.

Who is at risk for infection with EEEV?
Anyone in an area where the virus is circulating can get infected with EEEV. The risk is highest for people who live in or visit woodland habitats, and people who work outside or participate in outdoor recreational activities, because of greater exposure to potentially infected mosquitoes.

How soon do people get sick after getting bitten by an infected mosquito?
It takes four to ten days after the bite of an infected mosquito to develop symptoms of EEE.

What are the symptoms of EEE?
Severe cases of EEE (involving encephalitis, an inflammation of the brain) begin with the sudden onset of headache, high fever, chills, and vomiting. The illness may then progress into disorientation, seizures, and coma. Approximately a third of patients who develop EEE die, and many of those who survive have mild to severe brain damage.

How is EEE diagnosed?
Diagnosis is based on tests of blood or spinal fluid. These tests typically look for antibodies that the body makes against the viral infection.

What is the treatment for EEE?
There is no specific treatment for EEE. Antibiotics are not effective against viruses, and no effective anti-viral drugs have been discovered. Severe illnesses are treated by supportive therapy which may include hospitalization, respiratory support, IV fluids, and prevention of other infections.

Is there a vaccine for EEE?
No. There is no vaccine because the virus occurs in humans so infrequently.

How can people reduce the chance of getting infected with EEEV?
Prevention is the key. The best way to avoid infection is to avoid getting mosquito bites. Remember "**Drain and Cover**":

DRAIN standing water to stop mosquitoes from multiplying

- Drain water from garbage cans, house gutters, buckets, pool covers, coolers, toys, flower pots or any other containers where sprinkler or rain water has collected.

- Discard old tires, drums, bottles, cans, pots and pans, broken appliances and other items that aren't being used.
- Empty and clean birdbaths and pet's water bowls at least once or twice a week.
- Protect boats and vehicles from rain with tarps that don't accumulate water.
- Maintain swimming pools in good condition and appropriately chlorinated. Empty plastic swimming pools when not in use.

COVER skin with clothing or repellent

- CLOTHING - Wear shoes, socks, and long pants and long-sleeves. This type of protection may be necessary for people who must work in areas where mosquitoes are present.
- REPELLENT - Apply mosquito repellent to bare skin and clothing.
    - Always use repellents according to the label. Repellents with DEET, picaridin, oil of lemon eucalyptus, and IR3535 are effective.
    - Use mosquito netting to protect children younger than 2 months old.

COVER doors and windows with screens to keep mosquitoes out of your house

- Repair broken screening on windows, doors, porches, and patios.

Dengue
Questions and Answers

What is dengue?

Dengue is a disease caused by any one of four closely related dengue viruses (DENV 1, DENV 2, DENV 3, or DENV 4). The viruses are transmitted to humans by the bite of an infected mosquito.

What is dengue hemorrhagic fever (DHF)?

DHF is a more severe form of dengue infection. It can be fatal if unrecognized and not properly treated in a timely manner. DHF is caused by infection with the same viruses that cause dengue fever. With good medical management, mortality due to DHF can be less than 1%.

How are dengue and dengue hemorrhagic fever spread?

Dengue is transmitted to people by the bite of an *Aedes* mosquito that is infected with a dengue virus. Dengue cannot be spread directly from person to person.

What are the symptoms of the disease?

The principal symptoms of dengue fever are high fever, severe headache, severe pain behind the eyes, joint pain, muscle and bone pain, rash, and mild bleeding (e.g., nose or gums bleed, easy bruising). Dengue hemorrhagic fever is characterized by a fever that lasts from 2 to 7 days, with general signs and symptoms consistent with dengue fever. When the fever declines, symptoms including persistent vomiting, severe abdominal pain, and difficulty in breathing may develop. This marks the beginning of a 24- to 48-hour period when the smallest blood vessels (capillaries) become excessively permeable ("leaky"), allowing the fluid component to escape from the blood vessels into the peritoneum (causing ascites) and pleural cavity (leading to pleural effusions). This may lead to failure of the circulatory system and shock, followed by death, if circulatory failure is not corrected. In addition, the patient with DHF has a low platelet count and hemorrhagic manifestations, tendency to bruise easily or other types of skin hemorrhages, bleeding nose or gums, and possibly internal bleeding.

What is the treatment for dengue?

There is no specific medication for treatment of a dengue infection. Persons who think they have dengue should use analgesics (pain relievers) with acetaminophen and avoid those containing aspirin. They should also rest, drink plenty of fluids, and consult a health care provider. If they feel worse (e.g., develop vomiting and severe abdominal pain) in the first 24 hours after the fever declines, they should go immediately to the hospital for evaluation.

Is there an effective treatment for dengue hemorrhagic fever?

As with dengue fever, there is no specific medication for DHF. It can however be effectively treated by fluid replacement therapy if an early clinical diagnosis is made. DHF management frequently requires hospitalization. Health care providers who suspect that a patient has DHF may want to consult the Dengue Branch at CDC, for more information.

Where can outbreaks of dengue occur?

Outbreaks of dengue occur primarily in areas where *Ae. aegypti* (sometimes also *Ae. albopictus*) mosquitoes live. This includes most tropical urban areas of the world. Dengue viruses may be introduced into areas by travelers who become infected while visiting other areas of the tropics where dengue commonly exists. People who travel to a foreign country where dengue is common have the highest risk for dengue.

What can be done to reduce the risk of acquiring dengue?
Prevention is the key. There is no vaccine for preventing dengue. The best way to avoid infection is to avoid getting mosquito bites. Remember "**Drain and Cover**":

DRAIN standing water to stop mosquitoes from multiplying

- Drain water from garbage cans, house gutters, buckets, pool covers, coolers, toys, flower pots or any other containers where sprinkler or rain water has collected.
- Discard old tires, drums, bottles, cans, pots and pans, broken appliances and other items that aren't being used.
- Empty and clean birdbaths and pet's water bowls at least once or twice a week.
- Protect boats and vehicles from rain with tarps that don't accumulate water.
- Maintain swimming pools in good condition and appropriately chlorinated. Empty plastic swimming pools when not in use.

COVER skin with clothing or repellent

- CLOTHING - Wear shoes, socks, and long pants and long-sleeves. This type of protection may be necessary for people who must work in areas where mosquitoes are present.
- REPELLENT - Apply mosquito repellent to bare skin and clothing.
    - Always use repellents according to the label. Repellents with DEET, picaridin, oil of lemon eucalyptus, and IR3535 are effective.
    - Use mosquito netting to protect children younger than 2 months old.

COVER doors and windows with screens to keep mosquitoes out of your house

- Repair broken screening on windows, doors, porches, and patios.

How can we prevent epidemics of dengue fever and Dengue hemorrhagic fever?
The emphasis for dengue prevention is on sustainable, community-based, integrated mosquito control, with limited reliance on insecticides (chemical larvicides, and adulticides). Preventing epidemic disease requires a coordinated community effort to increase awareness about dengue fever/DHF, how to recognize it, and how to control the mosquito that transmits it.

Malaria
Questions and Answers

What is malaria?
Malaria is a serious disease caused by a parasite and carried by mosquitoes.

How do you get malaria?
You get malaria from the bite of an infected mosquito.
People who travel to a foreign country where malaria is common have the highest risk for malaria. However, it is possible to get malaria in Florida. The best way to protect yourself from malaria is to not get bitten by mosquitoes. People traveling to a malaria endemic area should take the appropriate antimalarial drug for the travel destination.

How will I know which antimalarial drug is the correct one for me?
Many effective antimalarial drugs are available. Your health care provider will decide the best drug for you based on the country you plan to visit and your health status. To allow enough time for the drug to become effective and for a pharmacy to prepare any special doses of medicine, especially doses for children and infants, visit your health-care provider 4-6 weeks before travel.

What are the signs and symptoms of malaria?
Symptoms of malaria include fever and flu-like illness, including chills, headache, muscle aches, and tiredness. Loss of appetite, nausea, vomiting, and diarrhea may also occur. Malaria may cause anemia and jaundice (yellow coloring of the skin and eyes) because the malaria parasites destroy red blood cells.

How soon will a person feel sick after being bitten by an infected mosquito?
For most people, symptoms begin ten days to four weeks after the bite of an infected mosquito.

What is the treatment for malaria?
Malaria ***CAN*** be treated and cured by the right prescription medications. A doctor ***MUST*** guide treatment.

How can lower my chances of getting malaria?
The good news is that you ***CAN*** lower your chances of getting malaria and other diseases spread by mosquitoes by remembering "**Drain and Cover**":

<u>DRAIN</u> standing water to stop mosquitoes from multiplying

- <u>Drain</u> water from garbage cans, house gutters, buckets, pool covers, coolers, toys, flower pots or any other containers where sprinkler or rain water has collected.
- <u>Discard</u> old tires, drums, bottles, cans, pots and pans, broken appliances and other items that aren't being used.
- <u>Empty and clean</u> birdbaths and pet's water bowls at least once or twice a week.
- <u>Protect</u> boats and vehicles from rain with tarps that don't accumulate water.
- <u>Maintain</u> swimming pools in good condition and appropriately chlorinated. Empty plastic swimming pools when not in use.

<u>COVER</u> skin with clothing or repellent

- CLOTHING - Wear shoes, socks, and long pants and long-sleeves. This type of protection may be necessary for people who must work in areas where mosquitoes are present.
- REPELLENT - Apply mosquito repellent to bare skin and clothing.
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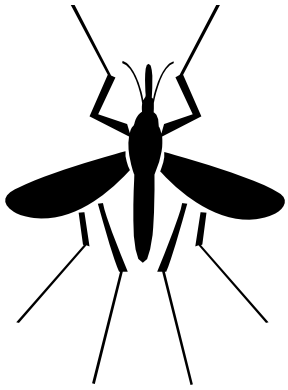
    - Use mosquito netting to protect children younger than 2 months old.

COVER doors and windows with screens to keep mosquitoes out of your house

- Repair broken screening on windows, doors, porches, and patios.

If you think you have malaria?

See a doctor. Malaria can be treated.



Malaria Fact Sheet for Immigrants

Florida Department of Health

If you are planning a return visit to your country of origin, you and your traveling family members may be at risk for malaria. Even if you were born in a country with malaria, it is still possible for you to get sick.

- You may have lost any protective immunity that you had in the past.
- Your children born in the United States have no immunity at all.
- You could become very sick with malaria now, even if you had malaria in the past and did not get seriously ill.

There are many steps you can take to protect yourself from malaria. Some will also protect you against dengue and other serious diseases spread by mosquitoes.

Prevent Mosquito Bites

- If possible, remain indoors in a screened or air-conditioned area between dusk and dawn.
- If no screening or air conditioning is available, use bug spray containing a pyrethroid in living and sleeping areas and sleep under bed nets, preferably insecticide-treated.
    - For information on ordering insecticide-treated bed nets, visit www.travmed.com, phone 1-(800)-872-8633 or www.travelhealthhelp.com
- Wear a long-sleeved shirt, long pants, and a hat when you go outdoors.
- Use insect repellent when you go outdoors. Sprays that contain DEET (N,N-diethyl-meta-toluamide) offer good protection. Follow the directions on the product label.
- Read the label instructions to make sure the repellent is age appropriate. DEET should not be used on children younger than two months of age.
- Children should not handle repellent. Adults should apply repellent first to their own hands and then transfer it to the child's skin and clothing, avoiding the child's eyes and mouth.
- Protect infants by using a carrier draped with mosquito netting with an elastic edge for a tight fit.
- Higher concentrations of DEET may last longer; however, concentrations over 50% provide no added protection. Timed-release DEET products may have a longer effect than liquid products.

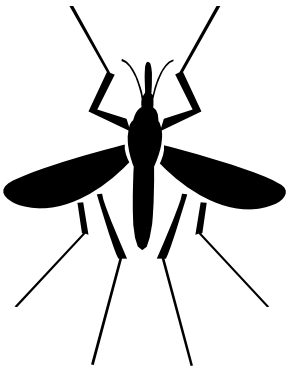
Antimalarial Drugs

- Visit your health care provider 4-6 weeks before traveling. This will allow you to get travel information, antimalarial drug prescriptions, and vaccinations for other diseases.
- Purchase your antimalarial drugs before traveling overseas. Drugs bought in other countries may not protect you from malaria. For complete protection, take all of your drugs as prescribed before your trip, while you are traveling, and after you return to the U.S. Partial treatment may result in infection.

Other Precautions

- Know the signs of a possible malaria infection, such as fever, chills, headache, muscle aches, fatigue, nausea and vomiting, diarrhea, and yellowing of the skin.
- If you or another traveler gets sick, either while traveling or even several months after you return to the U.S., seek immediate medical attention by going to your family's healthcare provider or the nearest emergency department. Tell the healthcare provider that you have been in an area where malaria occurs. If not treated promptly, malaria can quickly cause serious illness and death.

For more information on malaria, contact your county health department. The Centers for Disease Control and Prevention website (www.cdc.gov) and the CDC Health Information for International Travel book (http://wwwnc.cdc.gov/travel/page/yellowbook-2012-home.htm) are also good resources.



HOJA DE INFORMACIÓN PARA INMIGRANTES SOBRE LA MALARIA

Departamento de Salud de Florida

Si está planeando visitar su país de origen, usted y los miembros de su familia podrían correr riesgo de contraer la malaria. Aunque haya nacido en un país donde hay malaria, sigue siendo posible que contraiga la enfermedad.

- Puede que haya perdido la inmunidad protectora que solía tener.
- Sus hijos nacidos en los Estados Unidos no tienen ningún tipo de inmunidad.
- Podría enfermarse muy gravemente con malaria, aunque haya tenido malaria anteriormente y no se enfermase de gravedad.

Existen varios pasos que puede tomar para protegerse contra la malaria. Algunos también lo protegerán contra el dengue y otras enfermedades graves transmitidas por los mosquitos.

Evite las picaduras de los mosquitos

- Si fuera posible, entre el anochecer y el amanecer, permanezca dentro en un área protegida con mosquiteras o que cuente con aire acondicionado.
- Si no tuviera disponible un área protegida con mosquiteras o que cuente con aire acondicionado, use repelente de mosquitos con piretroide en las áreas habitables y para dormir, y duerma debajo de mosquiteras de cama, preferiblemente tratadas con insecticida.
    - Para obtener información sobre la compra de mosquiteras de cama tratadas con insecticida, visite www.travmed.com, teléfono 1-(800)-872-8633 o www.travelhealthhelp.com,
- Cuando se encuentre a la intemperie, use camisas de manga larga, pantalones largos y gorros.
- Cuando se encuentre al aire libre, use repelente contra insectos. Los pulverizadores con DEET (N,N-dietil-meta-toluamida) ofrecen una buena protección. Siga las instrucciones en la etiqueta del producto.
- Lea las instrucciones en la etiqueta para asegurarse de que el repelente sea adecuado para la edad de sus niños. No debe usarse DEET en niños menores de dos meses de edad.
- Los niños no deben manipular el repelente. Los adultos deben aplicarse primero el repelente en las manos y luego transferirlo a la piel y la ropa de los niños, evitando el contacto con los ojos y la boca de los niños.
- Proteja a los bebés usando un portabebés con mosquitera con bordes elásticos para obtener un buen ajuste.
- Puede que concentraciones más elevadas de DEET duren más tiempo; sin embargo, las concentraciones superiores al 50% no brindan una mayor protección. Los productos de liberación gradual con DEET pueden tener un efecto más duradero que los productos líquidos.

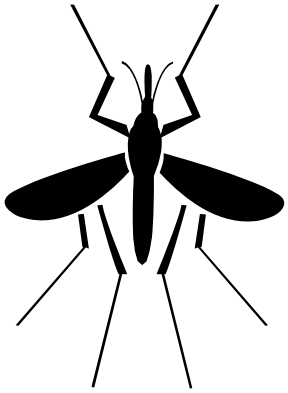
Medicamentos contra la malaria

- Visite a su médico entre 4 y 6 semanas antes de viajar. Esto le permitirá obtener información de viaje, recetas de medicamentos contra la malaria y vacunas contra otras enfermedades.
- Compre sus medicamentos contra la malaria antes de viajar al extranjero. Los medicamentos adquiridos en otros países podrían no protegerlo contra la malaria. Para obtener una protección completa, tome todos sus medicamentos según lo recetado por su médico tanto antes de su viaje, como durante su viaje y tras su regreso a los EE. UU. El tratamiento parcial podría dar como resultado una infección.

Otras precauciones

- Conozca los signos de una posible infección de malaria, como fiebre, escalofríos, dolor de cabeza, dolores musculares, fatiga, náuseas y vómitos, diarrea e ictericia.
- Si usted u otro viajero se enferma, ya sea durante su viaje o incluso varios meses después de su regreso a los EE. UU., obtenga asistencia médica inmediatamente consultando al profesional de la salud de su familia o presentándose en el departamento de emergencias más cercano. Infórmele al profesional de la salud que estuvo en un área donde hay malaria. Si no se trata de forma inmediata, la malaria puede causar rápidamente una enfermedad grave y la muerte.

Para obtener más información sobre la malaria, comuníquese con el departamento de salud de su condado. El sitio de Internet de los Centros para el Control y Prevención de Enfermedades (www.cdc.gov) y el libro sobre Información de Salud para Viajes Internacionales de los CDC (http://wwwnc.cdc.gov/travel/page/yellowbook-2012-home.htm) también constituyen buenas fuentes de información.



Fey Enfomasyon sou Malarya pou Imigran Ayisyen

Depatman Lasante Leta Florid, DOH

Si w ap planifye pou al Ayiti,ou menm ak manm fanmi ou ka an danje pou ou gen malarya. Gen Malarya nan prèske tout kote annAyiti, nan vil yo tou. Menmsi ou te fèt nan yon peyi ki gen malarya, li posib pou ou malad.

- Ou kapab pèdi tout pwoteksyon iminitè ou te genyen avan.
- Ozetazini pa gen oken defans iminite ditou.
- Ou ka vin malad grav ak malarya kounye a, menmsi ou te gen malarya avan epi ou pa t malad grav.

Gen anpil etap ou ka fè pou pwoteje tèt ou kont malarya. Kèk nan yo ap pwoteje w kont deng ak lòt maladi grav mayengwen sikile.

Pa kite Mayengwen Mòde w

- Si li posib, rete anndan kay yon kote ki fèmen ak til oubyen ki klimatizè ant lè solèy leve ak lè solèy kouche.
- Si pa genyen yon kote fèmen ak til oubyen klimatizè pa disponib, sèvi ak flit ki genyen "pyrethroid" nan kote w ap viv epi dòmi anba til, depreferans sa ki flite ak anti-ensèk.
  - Pou plis enfemasyon sou fason pou kòmande til pou kabann, vizite www.travmed.com, telefòn 1-(800)-872-8633 oubyen www.travelhealthhelp.com
- Mete chemiz manch long, pantalon long, ak chapo lè ou soti deyò.
- Flit ki genyen DEET (N,N-diethyl-meta-toluamide) bay bon pwoteksyon. Swiv enstwiksyon ki sou etikèt pwodwi a.
- Li enstwiksyon ki sou etikèt la pou ou asire pwodwi pou repouse ensèk yo apwopriye pou laj moun nan. Ou pa dwe sèvi ak DEET sou timoun ki genyen mwens pase de mwa.
- Timoun pa dwe manevrepwodui pou repouse ensèk. Granmoun dwe pase pwodwi pou repouse ensèk nan men yo dabo epi pase li sou ko ak rad timoun nan, evite zye ak bouch timoun nan.
- Sèvi ak yon til ki seze ak elastik arebò li pou ou kouvri chez ou pote tibebe pou ou ka pwoteje yo. .
- Konsantrasyon DEET ki pi fò ka dire plis tan, men, yon ki plis pase 50% pa bay oken pwoteksyon anplis. Pwodwi DEET ki pran tan pou yo deklennche kapab dire plis pase pwodui likid.

Medikaman kont malarya

- Vizite doktè ou 4 a 6 semèn avan pou ale Ayiti. Sa ap fè ou jwenn enfòmasyon sou vwayaj, preskription medikaman konn malarya, ak vaksin pou lòt maladi.
- Achte remed kont malarya avan pou vwayaje bò dlo. Medikaman ou achte nan lòt peyi ka pètèt pa pwoteje ou konn malarya. Pou pwoteksyon total, pran tout medikaman ou yo jan doktè preskri ou avan vwayaj la, pandan w ap vwayaje, epi aprè ou retounen Ozetazini. Lè w pa vin fè tretman an nèt sa ka lakoz ou fè enfeksyon.

Lòt Prekosyon

- Konnen sin ki posib pou yon enfeksyon malarya, tankou fyèv, frison, maltèt, kò fè mal, fatig, noze (kè plen) ak vomi, dyare, ak po jon.
- Si ou menm oubyen yon lot moun ka vwayaje malad, swa pandan ou t ap vwayaje oubyen menm apre plizyè mwa aprè ou retounen Ozetazini, chèche swen medikal san pèdi tan ale kay doktè fanmi ou oubyen ale nan sal dijans ki pe pre ou. Di doktè a ou te nan yon zòn ki konn genyen malarya. Si yo pa trete li la pou la, malarya ka lakoz maladi grav oubyen lanmò vit.

Pou plis enfòmasyon sou malarya, kontakte depatman sante konte ou a. Sit wèb Sant pou Kontwòl ak Prevansyon Maladi (Centers for Disease Control and Prevention) (www.cdc.gov) ak liv CDD enfomasyon sante pou vwayajè entènasyonal (http://wwwnc.cdc.gov/travel/page/yellowbook-2012-home.htm) se bon resous tou.

Appendix A
Acronyms/Abbreviations/Definitions

Ae.: Abbreviation for mosquitoes in the genus *Aedes*

An.: Abbreviation for mosquitoes in the genus *Anopheles*

AAP: American Academy of Pediatrics

AFP: Acute flaccid paralysis

ArboNET: CDC's National surveillance system for arboviral diseases in the United States

Arbovirus: Arthropod-borne virus

Arthropod: Animals in the phylum which includes insects (mosquitoes, flies, etc.) and arachnids (ticks, spiders, etc.)

BPHL: Bureau of Public Health Laboratories (DOH)

C: Celsius

CDC: Centers for Disease Control and Prevention

CHD: County health department

CHIK: Chikungunya fever

CHIKV: Chikungunya virus

CF test: Complement fixation test

CNS: Central nervous system

Cq.: Abbreviation for mosquitoes in the genus *Coquillettidia*

Cs.: Abbreviation for mosquitoes in the genus *Culiseta*

CSF: Cerebrospinal fluid

***Cx.*:** Abbreviation for mosquitoes in the genus *Culex*

DCHP: Division of Disease Control and Health Protection, the Bureau of Epidemiology

DEET: N,N-diethyl-meta-toluamide; the active ingredient in many insect repellent products

DEN: Dengue fever

DENV: Dengue virus

DEP: Department of Environmental Protection

DHF: Dengue hemorrhagic fever

DNA: Deoxyribonucleic acid

DOH: Department of Health

DSS: Dengue shock syndrome

EDTA: Ethylenediaminetetraacetic acid

EEE: Eastern equine encephalitis

EEEV: Eastern equine encephalitis virus

EIA/ELISA: Enzyme immunoassay/enzyme-linked immunosorbant assay

Encephalitis: Inflammation of the brain

EPA: U.S. Environmental Protection Agency

EpiCom: Provides real-time exchange of information for disease outbreaks, hurricane response or other health related incidents for use by healthcare practitioners throughout FL.

ESSENCE: Electronic Surveillance System for the Early Notification of Community-based Epidemics

EVEV: Everglades virus

F: Fahrenheit

FDACS: Florida Department of Agriculture and Consumer Services

FEMA: Federal Emergency Management Agency

FMEL: Florida Medical Entomology Laboratory

FMCARP: Florida Mosquito Control Arbovirus Response Plan

F.S.: Florida Statutes

FWC: Florida Fish and Wildlife Conservation Commission

FWVSS: Food, Water, and Vector Surveillance System database

GPS: Global Positioning System

HAN: CDC's Health Alert Network

Hemostasis: The arrest of bleeding

Hg. Mercury

HHS: U.S. Department of Health and Human Services

HI/HAI: Hemagglutination (and antibody) inhibition test used by the DOH Tampa Branch Laboratory for avian serosurveillance

HJV: Highlands J virus

IFA: Immunofluorescent antibody test

IFAS: Institute of Food and Agricultural Sciences, University of Florida

Ig: Immunoglobulin or antibody (as in IgM, IgG, IgD, IgA or IgE)

IHC Immunohistochemistry

IR3535: A synthetic insect repellent with ethyl butylacetylaminopropionate

LA/LAT: Latex agglutination test

MA: Microagglutination test

MAbs: Monoclonal antibodies

MCD: Mosquito control district

MAC-ELISA: IgM Antibody Capture ELISA

MIA: Microsphere immunoassay

MIRs: Minimum infection rates

NAT: Nucleic acid-amplification test

NOAA: National Oceanographic Atmospheric Administration

PCR: Polymerase chain reaction

PIO: Public Information Officer's

PPE: Personal Protective Equipment

PRNT: Plaque Reduction Neutralization Test

PVD: Presumptively viremic donor

RBC: Red blood cells

RDT: Rapid Diagnostic Test

RNA: Ribonucleic acid

RT PCR: Reverse Transcriptase PCR

RVF: Rift Valley fever

RVFV: Rift Valley fever virus

Serum/Sera: The liquid fraction of blood remaining after cells and fibrinogen removed

SLE: St. Louis encephalitis

SLEV: St. Louis encephalitis virus

SN: Serum neutralization test; gold standard test for arbovirus serology

Surveillance: Close observation for disease detection. The ongoing systematic collection and analysis of data and the provision of information which leads to action being taken to prevent and control a disease, usually one of an infectious nature.

TEA: Triethylamine

UF: University of Florida

ULV Ultra low volume

USF: University of South Florida

USDA: United States Department of Agriculture

Vector: A carrier which transfers infective agents from one host to another

VEEV: Venezuelan equine encephalitis virus

Venipuncture: Puncture of a vein as for drawing blood

VFR: Visiting friends and relatives

WEE: Western equine encephalitis

WEEV: Western equine encephalitis

WNF: West Nile fever

WNV: West Nile virus

WTD: Water table data

YFV: Yellow fever virus

Zoonosis: Disease of animals transmissible to people

Appendix B
Forms

Forms available in this section:

1. Florida Confidential Vector-borne Disease Infection Case Report & instructions
2. Florida Confidential Malaria Infection Case Addendum & instructions.
3. Dengue Fever- Information for Clinicians
4. Dengue Fever - Clinical Sample Submission Guidelines
5. West Nile Fever and Neuroinvasive Disease- Information for Clinicians.
6. West Nile Virus Illness - Special Considerations for Homeless Populations
7. West Nile Fever and Neuroinvasive Disease– Clinical Sample Submission Guidelines
8. Malaria Testing and Shipping Procedures
9. Arboviral Encephalitis Case Information Form – (Veterinary - FDACS)
10. Arbovirus Surveillance Serology – (Sentinel Chicken)
11. Arbovirus Surveillance: Necropsy and Virus Isolation – (Dead birds and other animals)
12. Arbovirus Surveillance – (Mosquitoes)
13. Florida Department of Health Bureau of Public Health Laboratories Clinical Laboratory Specimen Submission Form DH1847
14. Template for Agreed protocol for reporting arbovirus human cases to Mosquito Control jurisdictions by County Health Departments

FLORIDA CONFIDENTIAL VECTOR-BORNE DISEASE INFECTION CASE REPORT

(To be completed for all laboratory presumptive and confirmed cases)

☐St. Louis Encephalitis ☐Eastern Equine Encephalitis ☐West Nile virus ☐Dengue
☐LaCrosse/CA Encephalitis ☐Venezuelan Equine Encephalitis ☐Western Equine Encephalitis ☐Yellow Fever
☐Other_____ **Check one**: ☐Neuroinvasive ☐Non-neuroinvasive

IDENTIFYING DATA: County:_____ Merlin Case #:_____

Name: _____ Date of Birth: ___/___/___ Gender: ☐Male ☐Female
Last First MI mm dd yyyy

Home Address: _____
Street City State Zip

Home Phone: (_____)_____ Employer/School: _____
Name Address Zip

Race/Ethnicity: ☐White ☐Black ☐Hispanic ☐American Indian/Alaska Native ☐Asian/Pacific Islander ☐Unknown/Not specified Homeless: ☐Yes ☐No

Hospitalized: ☐ Yes ☐ No
If yes, Hospital: _____ Physician:_____ Physician Phone:(_____)_____
Date of Admission:____/____/_____ Discharge or death:____/____/_____

CLINICAL SYMPTOMS: Date of Illness Onset (**Required Field**) (mm/dd/yyyy):_____/_____/_____

	YES	NO	UNK		YES	NO	UNK		YES	NO	UNK
Fever ≥100F	☐	☐	☐	Disorientation	☐	☐	☐	Diarrhea	☐	☐	☐
Highest Temp.	_____°F			Thrombocytopenia	☐	☐	☐	Seizures	☐	☐	☐
Headache	☐	☐	☐	Nausea	☐	☐	☐	Stiff Neck	☐	☐	☐
Myalgia	☐	☐	☐	Confusion	☐	☐	☐	Paralysis	☐	☐	☐
Arthralgia	☐	☐	☐	Coma	☐	☐	☐	Muscle Weakness	☐	☐	☐
Rash	☐	☐	☐	Chills	☐	☐	☐	Hemorrhage	☐	☐	☐
Vomiting	☐	☐	☐	Retroorbital pain	☐	☐	☐	Decrease Consciousness	☐	☐	☐
Leukopenia	☐	☐	☐	Other_____							

Outcome: ☐Survived ☐Died ☐Unknown Date of death (mm/dd/yyyy)_____/_____/_____
Date of Last follow-up _____/_____/_____

LABORATORY DATA:

Acute specimens must be collected within 5 days of onset of symptoms. Convalescent specimens should be collected 10 days to 4 weeks later.

Serum or CSF (specify acute or convalescent)	Date Collected (mm/dd/yyyy)	Laboratory Name	Test Type	Lab Report Date (mm/dd/yyyy)	Results

∗ **Bureau of Public Health Laboratories – Tampa or Jacksonville Branch results are required for confirmation**

Rev. 1/13

Merlin Case #_____County:_____ Pt's initials:____

RISK FACTOR INFORMATION:

1. Does the patient's residence have screened windows? ☐ Yes ☐ No ☐ Unknown
2. During the two weeks before onset of illness does the patient recall being bitten by mosquitoes?
   ☐ Yes ☐ No If yes, dates and places _____
3. Is the patient a smoker? ☐ Yes ☐ No ☐ Unknown
   If yes, do they smoke outdoors? ☐ Yes ☐ No ☐ Unknown
4. Has the patient spent extended time outdoors in the two weeks prior to onset? ☐ Yes ☐ No ☐ Unknown
5. Does the patient use any prevention measures to avoid mosquito bites (Drain and Cover)? ☐ Yes ☐ No ☐ Unknown
   If yes, list_____
   Does the patient use mosquito repellent when outdoors: ☐Always ☐Sometimes ☐Rarely ☐Never
   Does the repellent contain DEET (N, N-diethyl-meta-toluamide, or N, Ndiethyl-3-methylbenzamide)
   ☐Yes ☐No ☐Unknown
6. During the two weeks before onset did the patient travel outside the county of residence?
   ☐Yes ☐No ☐Unk If yes, specify when and where: _____
7. Has the patient traveled outside of Florida in the two weeks prior to onset? ☐ Yes ☐ No ☐ Unknown
   If yes, specify when and where: _____
8. Has the patient traveled outside the U.S. in the two weeks prior to onset? ☐ Yes ☐ No ☐ Unknown
   If yes, specify when and where: _____
9. Has any other household member experienced a febrile illness within the month prior to or the month after onset?
   ☐ Yes ☐ No ☐ Unknown
10. Does the patient have any underlying medical conditions? ☐ Yes ☐ No ☐ Unknown
    If yes, specify _____

***For West Nile virus cases, please answer the medical history questions below**

11. What is the patient's occupation?_____

FOR FEVER CASES (NON-NEUROINVASIVE) PATIENTS:

12. Has anyone in the household or close personal contact travelled to a dengue endemic country in the month prior to onset of symptoms? ☐ Yes ☐ No ☐ Unknown
13. Has the patient ever traveled or lived in a dengue endemic country? ☐ Yes ☐ No ☐ Unknown
    If yes, what country _____ When _____
14. Has the patient ever been previously diagnosed with dengue? ☐ Yes ☐ No ☐ Unknown
    If yes, year_____ Country of origin _____
    serotype: ☐ DENV-1 ☐ DENV-2 ☐ DENV-3 ☐ DENV-4

BLOOD DONATION/TRANSFUSION/TRANSPLANT HISTORY/PREGNANCY:

15. Has the patient received transplant or blood product transfusions in the month prior to onset? ☐ Yes ☐No ☐ Unknown
    If yes, specify when and where: _____
16. Has patient donated blood products in the one month prior to onset? ☐ Yes ☐ No ☐ Unknown
    If yes, specify when and where: _____
17. Is the patient currently pregnant? ☐ Yes ☐ No ☐ Unknown ☐ Not applicable
    If yes, weeks pregnant_____ due date ___/___/_____
18. Is the patient breastfeeding or planning to breastfeed? ☐ Yes ☐ No ☐ Unknown

---

VACCINE INFORMATION

19. Has patient received yellow fever (YF) vaccine? ☐Yes (date:___/___/___) ☐No ☐Unknown

20. Has patient received Japanese encephalitis (JE) vaccine? ☐Yes (date:___/___/___) ☐No ☐Unknown

21. Has patient received Central European encephalitis (CEE) vaccine? ☐Yes (date:___/___/___) ☐No ☐Unknown

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MEDICAL HISTORY *(WEST NILE VIRUS INFECTIONS ONLY)

22. Before the patient was diagnosed with West Nile virus infection, did he/she have any of the following medical conditions?

Diabetes	☐ Yes	☐ No	☐ Unk	Kidney failure or chronic kidney disease	☐ Yes	☐ No	☐ Unk
High blood pressure	☐ Yes	☐ No	☐ Unk	Angina or coronary artery disease	☐ Yes	☐ No	☐ Unk
Heart attack	☐ Yes	☐ No	☐ Unk	Congestive heart failure	☐ Yes	☐ No	☐ Unk
Stroke	☐ Yes	☐ No	☐ Unk	Chronic obstructive pulmonary disease	☐ Yes	☐ No	☐ Unk
Chronic liver disease	☐ Yes	☐ No	☐ Unk	Kidney failure or chronic kidney disease	☐ Yes	☐ No	☐ Unk
Alcoholism	☐ Yes	☐ No	☐ Unk	Bone marrow transplant	☐ Yes	☐ No	☐ Unk

Herpes Simplex Virus (HSV)	☐ Yes	☐ No	☐ Unk	Epstein - Barr virus (EBV)	☐ Yes	☐ No	☐ Unk
Influenza	☐ Yes	☐ No	☐ Unk	Streptococcus	☐ Yes	☐ No	☐ Unk

Other current or chronic viral or bacterial infection ☐ Yes ☐ No ☐ Unk if yes, what? _____

Solid organ transplant ☐ Yes ☐ No ☐ Unknown
If yes: What organ was transplanted?: _____
What year was the transplant?: _____

Cancer ☐ Yes ☐ No ☐ Unknown
If yes: What type(s)?: _____
What year were you diagnosed?: _____
Are you currently being treated for cancer?: ☐ Yes ☐ No ☐ Unknown

23. Before the patient was diagnosed with West Nile virus infection, did he/she have a medical condition that limited the ability to fight an infection? ☐ Yes ☐ No ☐ Unknown
If yes: What condition(s)?: _____

24. At the time of diagnosis with West Nile virus infection, was the patient taking any of the following types of prescription medications or treatments?

Acyclovir	☐ Yes	☐ No	☐ Unknown
Chemotherapy	☐ Yes	☐ No	☐ Unknown
Other treatments for cancer	☐ Yes	☐ No	☐ Unknown
Hemodialysis	☐ Yes	☐ No	☐ Unknown
Other treatments for kidney disease	☐ Yes	☐ No	☐ Unknown
Oral or injected steroids (not inhaled or topical)	☐ Yes	☐ No	☐ Unknown
Insulin or other medications to treat diabetes	☐ Yes	☐ No	☐ Unknown
Medications to treat high blood pressure	☐ Yes	☐ No	☐ Unknown
Medications to treat coronary artery disease	☐ Yes	☐ No	☐ Unknown
Medications to treat congestive heart failure	☐ Yes	☐ No	☐ Unknown
Medications that suppress the immune system	☐ Yes	☐ No	☐ Unknown

25. Which of the following sources provided the information above? **(check all that apply)**

Patient	☐ Yes	☐ No	Family member/friend	☐ Yes	☐ No
Provider	☐ Yes	☐ No	Medical record	☐ Yes	☐ No

COMMENTS: _____

_____

_____

Date _____ Investigator _____ (Please print) Phone (____) _____

Please submit form to the Division of Disease Control and Health Protection, Dept. of Health by uploading electronically into Merlin.

Rev. 1/13

Instructions for completing the Florida Confidential Vector-borne Disease Infection Case Report form

Diagnosis- Check the appropriate disease classification at the top of the page. Check the appropriate box to indicate if the disease is neuroinvasive or non-neuroinvasive.
Identifying data- All identifying data needs to be filled out in full.
County- The county of residence. If transmission occurred elsewhere, please inform that jurisdiction and indicate such in the risk factor section of the form. However, the reporting county should be the county of residence.
Merlin case #- Information gathered after reporting to the Merlin surveillance system
Name- Last, First, Middle initial (optional)
Date of birth- Month/ day/ year
Home address- Include street, city, state, and zip code. If no home address is available because person is of transient nature, enter the closest address to current place of occupancy and check yes for homeless.
Home phone- Enter area code followed by 7 digit number or if cell phone given please indicate by writing cell phone.
Employer/School- If the patient is in high school or lower grade enter name, address, and zip code of school or daycare. If patient has an employer please list name, address, and zip code. If neither apply please just write N/A.
Race- Mark the box that the individual specifies as their race
Hospitalization- If the patient was hospitalized for this recent illness please check the yes box and enter the hospital name, health care provider seen during the hospital stay, health care provider phone number, date of admission (month/ day/ year) and date of discharge (month/ day/ year). If the patient was not hospitalized, check the no box and continue with clinical symptoms.
Date Onset of Illness- Month/ day/year that symptoms started, if patient is unsure or you are unable to contact the patient, please enter the first positive laboratory date and indicate that it is a laboratory date and not an onset date.

Definition of select clinical symptoms:
Fever- Documented cases of 101°F or above and indicate highest temperature monitored (if known)
Confusion- A mental state of being bewildered or perplexed
Disorientation- Unable to orientate oneself
Coma- A state of impaired consciousness in which one cannot be roused
Rash- Cutaneous eruption (please specify part of the body)
Paralysis- Loss of power of voluntary movement in a muscle
Hemorrhage- An escape of blood through ruptured or unruptured vessel walls

Outcome- Check outcome at time of investigation. If death occurred put month/ day/ year of expiration.

Laboratory data- Begin with the earliest laboratory test and continue down the column to the most recent laboratory test available.
Serum or CSF- Indicate specimen type and acute or convalescent.
Acute specimens are those specimens that are collected within 5 days of symptom onset.
Convalescent specimens are those specimens that are collected 10 days to 4 weeks after the acute specimen.
Date collected- Month/day/year of specimen collection
Laboratory Name- Where the test was performed (if private laboratory indicate name of laboratory)
Test type- Example: HI, ELISA, PRNT, PCR, or other (specify)
Laboratory Report Date-Date of laboratory report (month/day/year)
Results- Example: WNV, EEEV or SLEV IgM or IgG positive

Risk factor information – Answer all question

Blood Donation/Transfusion/Transplant History and Pregnancy – Answer all questions

Vaccine information-
Circle yes, no or unknown and provide a date if applicable for vaccination with yellow fever, Japanese encephalitis, or Central European encephalitis.

Comments- Please add any other comments in the comment field and feel free to add additional sheets if necessary.

Investigator's contact information- Date of investigation (month/day/year), Investigator's name, and a phone number with area code where the investigator can be reached.

**After completion please submit form to the Division of Disease Control and Health Protection, Dept. of Health by uploading electronically into Merlin.

FLORIDA CONFIDENTIAL MALARIA INFECTION CASE ADDENDUM

(To be completed for all laboratory presumptive and confirmed cases in addition to the CDC Malaria Case Surveillance CDC 54.1 11/2011 Report Form http://www.cdc.gov/malaria/resources/pdf/report/malaria_form.pdf)

☐Vivax ☐Falciparum ☐ Malariae ☐Ovale ☐Not determined

IDENTIFYING DATA: County: _____Merlin Case #: _____

Name: _____ Date of Birth: ___/___/___Country of Birth_____
Last First MI mm dd yyyy

Home Address: _____ Homeless ☐Yes ☐No
Street City State Zip

Home Phone: (_____)_____Employer/School: _____
Name Address Zip

Hospitalization: ☐ Yes ☐ No If yes, Hospital: _____

Date of Admission:___/___/____ Discharge or death:___/___/____

CLINICAL SYMPTOMS: Date of Illness Onset (**Required Field**) (mm/dd/yyyy):___/___/_____

	YES	NO	UNK		YES	NO	UNK
Fever ≥101F	☐	☐	☐	Myalgia/Muscle Pain	☐	☐	☐
Highest Temp. (If known)	_____ºF			Vomiting	☐	☐	☐
				Headaches	☐	☐	☐
Chills	☐	☐	☐	Nausea	☐	☐	☐
Sweats	☐	☐	☐				

Other_____

Outcome: ☐Survived ☐Died ☐Unknown Date of last follow-up ___/_____/_____

Risk Factor Information:

In addition to information and risk factors on CDC form

1. On the most recent trip did the patient travel with any children < 5 years of age? ☐Yes ☐No ☐Unknown

   Was the child symptomatic? ☐Yes ☐No ☐Unknown

2. Did the patient donate blood since the onset of illness? ☐Yes ☐No ☐Unknown

3. Does the patient use any prevention measures to avoid mosquito bites? ☐Yes ☐ No

   If yes, was a bed net used? ☐Yes ☐No ☐Unknown

   If yes, was a repellant used? ☐Yes ☐No ☐Unknown

4. Has the patient traveled outside of Florida in the month prior to onset? ☐Yes ☐No ☐Unknown

   If yes, specify (Please use other page if additional places need to be listed)_____

COMMENTS: _____

_____

Date _____ Investigator _____ Phone (_____)_____
(Please print)

Please submit form to the Division of Disease Control and Health Protection, Dept. of Health by uploading electronically into Merlin.

Instructions for completing the Florida Confidential Malaria Infection Case Addendum

(this is an addendum to the CDC Malaria Case Surveillance Report Form http://www.cdc.gov/malaria/resources/pdf/report/malaria_form.pdf http://www.health.state.ga.us/pdfs/epi/vbd/malaria.crf.03.pdf)

Diagnosis- Check the appropriate disease classification at the top of the page.

Identifying data- All identifying data needs to be filled out in full.
County- The county of residence. If transmission occurred elsewhere, please inform that jurisdiction and indicate such in the risk factor section of the form. However, the reporting county should be the county of residence.
Merlin case #- Information gathered after reporting to the Merlin surveillance system
Name- Last, First, Middle initial (optional)
Date of birth- Month/ day/ year
Country of birth- Country where the individual was born
Home address- Include street, city, state, and zip code if no home address is available because person is of transient nature, enter the closest address to current place of occupancy and check yes for homeless.
Home phone- Enter area code followed by 7 digit number or if cell phone given please indicate by writing cell phone.
Employer/School- If the patient is in high school or lower grade enter name, address, and zip code of school or daycare, if patient has an employer please list name, address, and zip code if neither apply please just write N/A.
Race- Mark the box that the individual specifies as their race
Hospitalization- If the patient was hospitalized for this recent illness please check the yes box and enter the hospital name, health care provider seen during the hospital stay, health care provider phone number, date of admission (month/ day/ year) and date of discharge (month/ day/ year). If no hospitalization check the no box and continue with clinical symptoms.

Clinical Symptoms
Date Onset of Illness- Month/ day/year that symptoms started. If patient is unsure or you are unable to contact the patient, please enter the first positive laboratory date and indicate that it is a laboratory date and not an onset date.

Definition of clinical symptoms on CDC form and addendum:
Fever- Documented cases of 101°F or above and indicate highest temperature monitored (if known)
Cerebral Malaria- A form of falciparum characterized by cerebral involvement
Anemia- A condition in which oxygen carrying blood cells are less than normal
ARDS-Adult respiratory distress syndrome
Renal failure- Failure of the kidneys

Outcome- Check outcome at time of investigation. If death occurred put month/ day/ year of expiration.

Blood Donation:

Transfusion/Transplant History and Pregnancy- This information should be reported on the CDC form.

Risk factor information-
Does the patient have a travel history outside of the state of Florida within the last month?
*If any travel history document location, reason for travel, and beginning and ending dates of each location

Comments- Please add any other comments in the comment field and feel free to add additional sheets if necessary.

Date of investigation (month/day/year), Investigator's name, and a phone number with area code where the investigator can be reached.

**After completion please submit form to the Division of Disease Control and Health Protection, Dept. of Health by uploading electronically into Merlin.

Dengue Fever - Information for Clinicians

Please contact XXX County Health Department (CHD) by the next business day if you suspect dengue to ensure prompt mosquito control efforts.

Dengue infection is caused by any of four distinct but closely related dengue virus (DENV) serotypes (called DENV-1, -2, -3, and -4). Dengue is currently the most frequent cause of acute febrile illness among returning U.S. travelers from the Caribbean, Central and South America, and Asia.

Transmission occurs through the bite of an infected mosquito. Dengue may also be transmitted from mother to fetus in utero or to neonate at parturition. **An infected person should avoid mosquito bites while ill to prevent infection of local mosquitoes.**

Incubation period is two to 14 days.

Clinical presentation can range from a mild non-specific febrile syndrome, to classic dengue fever or "break-bone fever", or in the most severe forms of the disease (2-4% of cases), dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS). More than > 20% of cases may be asymptomatic. Dengue should be considered when locally acquired infection is suspected, or in persons that live in or have traveled to a dengue endemic area in the two weeks prior to symptom onset **and have fever and two of the following signs and symptoms:**

- Headache or retro-orbital pain
- Myalgia, bone pain, and/or arthralgia
- Anorexia and nausea
- Rash
- Thrombocytopenia
- Leucopenia
- Hemorrhagic fever or shock symptoms may appear after a 2-7 day febrile phase and include abdominal pain or tenderness, persistent vomiting, mucosal bleeding, liver enlargement, clinical fluid accumulation, or laboratory results indicating an increase in hematocrit concurrent with a rapid decrease in platelets.

Patients at risk for severe disease:

Previously infected with another dengue virus	Diabetes mellitus
Pregnant women	Chronic renal failure
Infants	Obesity
Elderly	Sickle cell anemia

Laboratory testing

Polymerase Chain Reaction (PCR) can be used to detect viral RNA in serum samples collected during the first 5 days post symptom onset. Testing for DENV specific IgM antibodies should be requested for serum specimens taken ≥6 days after onset. XXX CHD can provide guidance on how and when to submit samples to the Department of Health (DOH) Bureau of Laboratories.

Resources:

XXX County Health Department phone number: XXXXXX
DOH Bureau of Environmental Public Health Medicine:
http://myfloridaeh.com/medicine/arboviral/index.html
Centers for Disease Control and Prevention: http://www.cdc.gov/dengue/clinicallab/clinical.html

Dengue Fever- Clinical Sample Submission Guidelines

When dengue is suspected in a patient, a sample should be promptly submitted to either the Department of Health (DOH) Bureau of Public Health Laboratories (BPHL) or a commercial laboratory. The following categories will help you determine which laboratory is appropriate:

DOH BPHL

(1) Acute sample (≤ 5 days post onset)
- Submit to BPHL-Tampa

(2) Only available sample is convalescent (≥6 days post onset) **without travel** to endemic country (suspect local transmission)
- Submit to BPHL-Tampa or BPHL-Jacksonville

Commercial Laboratory

(3) Only available sample is convalescent (≥6 days post onset) **with travel** to endemic country

To submit a sample to the DOH BPHL, first contact the local county health department for approval to sent the sample. Collect a red top or tiger top tube and follow standard packaging and shipping guidelines for diagnostic specimens. If the sample is acute (collected five or fewer days post onset), the sera should be shipped frozen on dry ice to the address below: Note: although this is best for detecting virus, viral RNA may still be detectable in freshly collected acute serum that is immediately sent overnight to the laboratory in a cooler with frozen gel ice.

DOH BPHL Tampa –Virology
3602 Spectrum Boulevard
Tampa, FL 33612
Phone: (813)974-8000
Fax: (813)974-3425

DOH BPHL Jacksonville-Virology
1217 Pearl Street
Jacksonville, FL 32202
Phone: 904-791-1540
Fax: (904)791-1567

A completed Florida DOH Clinical Laboratory Submission Form DH 1847 should accompany all specimens: http://www.doh.state.fl.us/lab/PDF_Files/DOH_Form_DH1847_1009_v12152010.pdf . The name of the contact at the County Health Department who approved sample submission to BPHL should be included on the submission form. For acute samples, indicate Arbovirus PCR and Arbovirus Antibody. For convalescent samples, indicate only Arbovirus Antibody. In both cases, the following steps should be completed:

- Write dengue in the comments section on the bottom of the form
- Fill in date of onset and travel in the mandatory arbovirus section
- Include date of specimen collection at the top of the form
- Fill in Health Care Provider Information box with the name, address, and contact phone of the person to whose attention the final laboratory report is to be sent

Prior to requesting that a commercial lab forward a specimen to DOH BPHL please consult with the Arbovirus Surveillance Coordinator. The DOH Clinical Laboratory Submission Form DH1847 should be filled out in full by the County Health Department and faxed to BPHL with a note stating from which commercial laboratory the specimen has been requested. If commercial laboratory results are already available, fax them along with the submission form.

West Nile Fever and Neuroinvasive Disease - Information for Clinicians

Please contact XXX County Health Department (CHD) by the next business day if you suspect West Nile virus infection to ensure prompt mosquito control efforts.

Transmission: West Nile virus is transmitted to humans primarily through the bites of infected mosquitoes. Other modes of transmission include blood transfusion and organ transplantation.

Incubation period: Two to15 days.

Clinical presentation: The clinical spectrum for WNV infection includes asymptomatic infection or mild illness (fever and headache), aseptic meningitis, and encephalitis that can progress to coma and death. West Nile virus infection cases are often categorized into two primary groups: neuroinvasive disease and non-neuroinvasive disease. Approximately 80% of those infected show no clinical symptoms. Twenty percent have mild symptoms, and less than 1% experience the neuroinvasive form of illness.

Neuroinvasive disease such as aseptic meningitis, encephalitis, or acute flaccid paralysis (AFP). Symptoms include

- Fever
- Stiff neck
- Altered mental status
- Seizures
- Limb weakness
- Cerebrospinal fluid (CSF) pleocytosis
- Abnormal neuroimaging.

Non-neuroinvasive disease (e.g., West Nile fever).Symptoms include

- Fever
- Headache
- Myalgias
- Arthralgias
- Rash
- Gastrointestinal symptoms

Patients at risk for severe disease:
Individuals over 50 years of age
Immunosuppressed patients

Laboratory testing

Testing for WNV specific IgM antibodies should be requested for serum specimens or CSF. XXX CHD can provide guidance on how and when to submit samples to the Department of Health (DOH) Bureau of Public Health Laboratories.

Resources:
XXX County Health Department phone number: XXXXXX
DOH Bureau of Epidemiology: http://myfloridaeh.com/medicine/arboviral/index.html
Centers for Disease Control and Prevention: http://www.cdc.gov/ncidod/dvbid/westnile/index.htm

West Nile Virus Illness

Special Considerations for Homeless Populations[3]

West Nile virus (WNV) illness and other mosquito-borne viral diseases pose a significant risk to homeless populations due to their extensive outdoor exposure and their limited access to preventive measures, which puts them at increased risk for mosquito bites,. It is important for people who provide support and care of homeless persons to take action to prevent mosquito bites, especially for individuals over the age of 50, or persons with underlying health conditions who are most likely to develop severe infections. Special considerations include:

Cost:

- Access to insect repellents among all persons with limited financial resources is problematic.
- Community partners, such as mosquito control districts, businesses and not-for-profits may be able to assist with repellent supplies or may have recommendations for lower cost products.

Personal Hygiene:

- Repellents must be applied according to label
- If repellants are supplied the need to follow label requirements must be emphasized in a way that will be understood by the population being served
- Bathing is recommended when returning indoors after using repellants such as DEET that may be applied directly to the skin.
- Homeless populations have limited opportunities to bathe between repellent applications.

Mosquito Bite Prevention:

- Although mosquito-borne illnesses can occur year-round in Florida, highest risk is during summer and fall; mosquito bite prevention is most critical during these seasons
- Applying repellents to clothing may be useful for homeless populations.
    - Protection from one application of the repellent permethrin can last as long as six weeks. Permethrin should not be applied directly on the skin.
- Providing comfortable clothing that covers skin such as socks, long sleeve shirts and pants can further prevent mosquito bites.
- Shelters should maintain intact screens over doors and windows, and encourage staff and residents to not prop open doors and windows unless covered with intact screens.
- The homeless should be encouraged to seek indoor shelter at dawn and dusk when mosquitoes that transmit WNV are most active.
- Targeted mosquito control efforts in areas the homeless congregate may be beneficial including:
    - Maintaining vegetation and picking up debris that can harbor mosquitoes.
    - Regular adulticide and larvicide treatments by mosquito control in areas that the homeless congregate, including near parks and shelters.

For additional information visit: http://doh.state.fl.us/Environment/medicine/arboviral/index.html
http://www.cdc.gov/ncidod/dvbid/westnile/clinicians/
and http://www.cdc.gov/ncidod/dvbid/westnile/wnv_factsheet.htm

West Nile Fever and Neuroinvasive Disease - Clinical Sample Submission Guidelines

The Department of Health (DOH) Bureau of Public Health Laboratories (BPHL) provide testing services for patients with clinical signs of arboviral disease. Due to the cross-reactivity between West Nile virus (WNV) and other closely related flaviviruses, positive private laboratory test results for antibodies to WNV or other arboviruses should be confirmed by the DOH BPHL (i.e., specimens testing positive at private laboratories should be forwarded to the state laboratory for confirmation). Health care providers should submit serum and cerebrospinal fluid (CSF) samples to either the DOH BPHL-Tampa or DOH BPHL -Jacksonville state laboratories. Even though a very early acute serum may be negative it is recommended that it be collected and submitted without waiting for the convalescent specimen. The convalescent specimen (drawn 2 weeks later) should be routinely sent to confirm negative and positive results. The local County Health Department should approve the sample submission to the DOH BPHL.

Specimen Collection

When virus isolation/detection is attempted, blood serum, CSF and tissue samples are placed on dry ice immediately after collection and kept frozen on dry ice while in transit to the laboratory. Fluids are kept in standard sterile airtight tubes, and tissue in an airtight sterile container. Each specimen must be labeled with the patient's name. Hold serum in a refrigerator until shipped. When serum is to be examined only for antibody, it can be shipped at ambient temperature (do not freeze) provided it has been collected and handled aseptically. At least 2ml of serum or CSF are required for antibody testing.

NOTE: Unseparated, whole blood is an unsatisfactory specimen and therefore, should not be shipped to the laboratory

Shipping Specimens

Clinical sera are sent immediately to the assigned DOH laboratory for testing (Jacksonville or Tampa, addresses below). Ship serology specimens to either DOH BPHL. Molecular testing (PCR) is currently only available in Tampa. Follow packaging and shipping guidelines for diagnostic specimens (Biological Substance, Category B, UN3373). If viral isolation/detection is desired, sera must be shipped frozen on dry ice to the DOH BPHL in Tampa. A completed Florida DOH Clinical Laboratory Submission Form DH1847 form should accompany all specimens: http://www.doh.state.fl.us/lab/PDF_Files/DOH_Form_DH1847_1009_v12152010.pdf. The name of the contact at the County Health Department who approved sample submission to DOH BPHL should be included on the submission form. For acute samples, indicate Arbovirus PCR and Arbovirus Antibody. For convalescent samples, indicate only Arbovirus Antibody. In both cases, the following steps should be completed:

- Write West Nile virus infection in the comments section on the bottom of the form
- Fill in date of onset, travel history and clinical symptoms in the mandatory arbovirus section
- Include date of specimen collection at the top of the form
- Fill in Health Care Provider Information box with the name, address, and contact phone of the person to whose attention the final laboratory report is to be sent.

To expedite receipt of specimens at the laboratory, overnight or 2-day express shipment is suggested. If sera are shipped on Friday, the package must be clearly marked for "Saturday Morning Delivery". The following must appear on the shipping label:

DOH Bureau of Public Health
Laboratories - Virology
1217 Pearl Street
Jacksonville, FL 32202
Phone (904) 791-1539, 791-1540

OR

DOH Bureau of Public Health
Laboratories - Virology
3602 Spectrum Boulevard
Tampa, FL 33612
Phone (813)974-8000

Malaria Testing and Shipping Procedures

When malaria is suspected, blood smears should be obtained and examined without delay. For routine examination or malaria diagnosis confirmation, please submit blood and blood smears (at least 2 thick and 2 thin blood smears) and an EDTA preserved blood tube to:

Florida DOH, Bureau of Public Health Laboratories - Parasitology
1217 Pearl St
Jacksonville, FL 32202
Tel: (904)791-1600

or

DOH Bureau of Public Health Laboratories-Miami
1325 N.W. 14th Avenue Miami, FL 33125 Tel: (305) 324-2432

Type of Sample Required: Blood smears from venous blood should be prepared as soon as possible after collection. Anticoagulants added to the venous blood specimen can interfere with parasite morphology and staining characteristics making identification difficult. Capillary blood samples are preferable.

In some cases, when species identification cannot be made by microscopic examination, analysis by polymerase chain reaction (PCR) is helpful. Approximately 3-5 ml blood sample collected in Vacutainer® EDTA tubes prior to anti-parasitic therapy is needed for PCR testing.

- Whenever possible, collect specimens before any treatment is initiated.
- Since the parasitemia may fluctuate, multiple smears might be needed.
- Thick and thin smears should be prepared as soon as possible after collection.

Detailed instructions on to prepare thick and thin blood smears are described at:

http://dpd.cdc.gov/dpdx/html/Frames/DiagnosticProcedures/body_dp_bloodprocess.htm

Shipping: Notify the BPHL **directly prior to shipping of any prioritized specimens or specimens that need to be analyzed during the weekend**

1. Place labeled tube of anticoagulated (EDTA) blood in enough absorbent material to contain any leakage, and place in a sealed plastic bag or 50 ml screw cap centrifuge tube.
2. Pack this bag or container in a box, cushioned so that the blood tube doesn't break.
3. A completed Florida DOH Clinical Laboratory Submission Form DH1847 should accompany all specimens: http://www.doh.state.fl.us/lab/PDF_Files/DOH_Form_DH1847_1009_v12152010.pdf: (**Important**)
    a. Submitter's name, address and phone number
    b. Health care provider's name, address and phone number
    c. Patient's name, travel history (places and dates) and treatment information
    d. Specimen collection date
    e. What tests are requested and what organisms are suspected

Ship via courier or overnight delivery to permit optimum recovery of parasites; refrigeration during shipment (preferably at 4°C) may be necessary and should be discussed beforehand with the receiving laboratory.

Florida Department of Agriculture & Consumer Services
Division of Animal Industry
Bureau of Animal Disease Control

ADAM H. PUTNAM
COMMISSIONER

ARBOVIRAL ENCEPHALITIS CASE INFORMATION FORM

585.145, Florida Statutes

Contact:

Equine Programs Office
407 S. Calhoun St.
Tallahassee, FL 32399-0800
850/410-0900
Fax: 410-0919

www.freshfromflorida.com/ai

Note: All documents and attachments submitted with this request are subject to public review pursuant to Chapter 119, F.S.

Submitter: Please send this completed form along with collected samples to the Bronson Animal Disease Diagnostic Laboratory at:
2700 N John Young Pkwy, Kissimmee, FL 34741 Phone (321) 697-1400

FOR LAB USE ONLY

If submitting split samples, send copies of completed form (both pages) to each laboratory used. If samples are not being submitted, please send the completed form to Equine Programs Office, Division of Animal Industry, Fax 850-410-0919. Hard copies can be mailed to the address shown above.

County _____ Date Reported _____

Premises GPS (5 decimal digits)

Latitude _____ Longitude _____ Premises ID Number _____

FDACS/USDA Veterinarian(s) or Inspector(s) Assigned: _____

Reported By	Name	Title/Occupation
	Business/Affiliation	
	Mailing Address	Physical Address (if different)
	Phone #	Fax #
	Mobile #	Pager #
	Email	

Premises Information	Name	Title/Occupation
	Premises/Farm Name	
	Mailing Address	Physical Address (if different) (***Where Horse Resides***)
	Phone #	Fax #
	Mobile #	Pager #
	Email	

Arboviral Encephalitis

Case Information Form (continued)

Horse Information		
	Name/Animal Identification	Date of onset of clinical symptoms
	Breed	Age
	Sex (Male/Female/Gelding)	Vaccination Status (History)
	Status of Horse: ☐ Alive ☐ Dead ☐ Critical Recovering as of (Date):	Date of Death: Buried? ☐ Yes ☐ No
	Showing clinical symptoms? ☐ Yes ☐ No	Method of Death: _____ Natural causes _____ Euthanasia _____ Other:
	Has the horse traveled off premises, in the past 4 weeks? ☐ Yes ☐ No If Yes, describe (when and where).	

Samples		
	Number of samples taken.	Date samples taken:
	Samples submitted to FDACS Kissimmee Diagnostic Laboratory Sample type: ☐ Blood ☐ Brain ☐ Other:	Date Sent:
	Samples submitted to USDA National Veterinary Services Laboratory (NVSL) Sample type: ☐ Blood ☐ Brain ☐ Other:	Date Sent:
	Samples submitted to Florida DOH Laboratory Sample type: ☐ Blood ☐ Brain ☐ Other:	Date Sent:

Clinical Presentation/History			
	History:		
	Clinical Presentation: ☐ Apprehension ☐ Depression ☐ Elevated Temperature ☐ Head Shaking ☐ Muscle Twitching	☐ Incoordination ☐ Weakness of Hind Limbs ☐ Inability to Stand ☐ Aimless Wandering ☐ Head Pressing ☐ Listlessness	Other:

Comments/Additional Information: Attach additional pages as needed.

FDACS-09125 Rev. 09/12
Page 2 of 2

Bureau of Laboratories
Tampa Branch Laboratory
3602 Spectrum Boulevard
Tampa, FL 33612

phone: (813) 974-8078
fax: (813) 974-9076
e-mail: Holly_Hughes@doh.state.fl.us

Arbovirus Surveillance Serology – Non-Sentinels

County _____ page_____ of_____

Contact name _____

Address _____

☐ HAI (Flavi/Alpha)

☐ SN ☐ EEE ☐ HJ ☐ WN ☐ SLE

Phone ( )

Fax: ( )

E-mail:

For DOH Laboratory use only

Date Received:

Date Reported:

Specimen Collection Data

Collect. date	Bird #	Site	Species	Sex / Age	LAB Number	FLAVI SLE	FLAVI WN	ALPHA EEE	ALPHA HJ
1.									
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									
11.									
12.									

Flavi* = Flavivirus - includes SLE & WN; Alpha* = Alphavirus – includes EEE & HJ

This form must accompany all serum specimens submitted for serologic examination.

Submitter should fill out left side of form completely. **DO NOT SKIP LINES** when listing collected specimens

Please **Do not write below this line**

Bureau of Public Health Laboratories
3602 Spectrum Blvd
Tampa, FL 33612-9401
e-mail: Holly_Hughes@doh.state.fl.us
phone: (813) 974-8078
fax: (813) 974-9076

Arbovirus Surveillance: Necropsy and Virus Isolation

County _____ **Reported on** http://wld.fwc.state.fl.us/bird/ __yes ___no

Contact name _____ **E-mail:** _____

Organization _____ **Phone:** ( ) _____

Address _____ **Fax:** ( ) _____

Address _____

City/State/zip _____

For DoH Tampa Laboratory Use Only

Date Received

Specimen Collection Data

Collection date	Bird Mortality Database #	Site/Address of Collection *OR* GPS Coordinates	Species of bird	DoH LAB #	Molecular Assay Results	Virus Isolation Result

Please send birds (only recently dead within the past 24 hours) to:
Florida Department of Health, Bureau of Public Health Laboratories, 3602 Spectrum Blvd., Tampa, FL 33612-9401, Attention: Virology

Bureau of Laboratories
3602 Spectrum Blvd
Tampa, FL 33612-9401
e-mail: Holly_Hughes@doh.state.fl.us

phone: (813) 974-8078
fax: (813) 974-9076

Arbovirus Surveillance: Mosquito

County:

page ____ of ____

Submitter's name:

E-mail:

Address:

Phone: ( )

Fax: ( )

For DoH Tampa Laboratory Use Only

Date Received

Specimen Collection Data

Collection date	Vial #	Species	Site/Address of Collection *OR* GPS Coordinates	# per pool	DoH LAB #	Molecular Assay Results	Virus Isolation Result

Mosquitoes must be shipped frozen on dry ice. Send overnight to
Florida Department of Health, Bureau of Laboratories, 3602 Spectrum Blvd., Tampa, FL 33612-9401, Attention: Virology

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DH1847, 12/11

Bureau of Public Health Laboratories

FOR LAB USE ONLY

Specimen Collection Date:

Patient Information

Local Patient Identifier(Chart, Jail, Prison ID, etc.):

Last Name: First Name: MI:

DOB (MM/DD/YYYY): County:

SSN: - - Sex:

Street Address:

City: State: Zip:

Race: Ethnicity

Parent/Guardian Name:

ICD9 Diagnosis Codes:

Health Care Provider Information

HCP/DAU Number:

Provider Name: Physician UPIN:

Street Address:

City: State: Zip: County:

Contact Name: Phone:

Insurance Information

Medicare #: Medicaid #:

HMO/Ins Name #: MediPass #:

Programs

Special Project ID: Program Component:

Note: For more information or to see a complete list of available tests, visit www.doh.state.fl.us/lab

SEROLOGY

Circle Specimen Type(s):
CSF, Blood, Serum, Urine, Cervical, Urethral, Other _____

0430 ☐ Amplified GC/CT
0380 ☐ Chronic Hepatitis Panel (HBsAg, HBsAb, HBcAb, HAVAb, HCVAb)
0395 ☐ HCV RIBA
0390 ☐ HCV PCR
0350 ☐ Hepatitis A Total Ab (HAVAb)
0360 ☐ Hepatitis A Igm
0340 ☐ Hepatitis B Panel (Includes HBsAg, HBsAb, HBcAb)
0320 ☐ Hepatitis BcAb
0370 ☐ Hepatitis BcAb IgM
0310 ☐ Hepatitis BsAb
0300 ☐ Hepatitis BsAg
0330 ☐ Hepatitis C Screen
0250 ☐ RPR w/Confirmation if RPR Reactive
4000 ☐ Rubella Screen
0240 ☐ Syphilis Confirmation IgG EIA
0210 ☐ Syphilis Confirmation FTA-Abs

For HIV-1/2 related services use DH1628

MICROBIOLOGY/PARASITOLOGY

List Specimen Type(s): _____

2600 ☐ Aerobic Culture, miscellaneous
2300 ☐ Aerobic Isolate Identification
2500 ☐ Anaerobic Culture
2400 ☐ Anaerobic Isolate ID
2100 ☐ Beta Strep Culture
0700 ☐ Gonorrhea Culture
3000 ☐ Legionella Culture
2700 ☐ Pertussis Smear
2800 ☐ Pertussis Culture
2810 ☐ Pertussis PCR
1900 ☐ Stool Culture
2000 ☐ Typing, Salmonella

1200 ☐ Blood Parasite***
1000 ☐ Intestinal O & P
1410 ☐ Parasitic Microscopy
1400 ☐ Parasitic Serology
1100 ☐ Pinworm Slide

***For Malaria Testing provide recent travel history below (Include Dates):

MYCOBACTERIOLOGY

List Specimen Source: _____

3100 ☐ AFB Smear/TB Culture
3140 ☐ Nucleic Acid Amplification for TB (MTD)
3200 ☐ AFB Culture for Identification
3300 ☐ TB Drug Susceptibilities
3110 ☐ AFB SMEAR ONLY

VIROLOGY

Circle Specimen Type(s): CSF Acute Serum Convalescent Serum
Stool Swab _____ **Other** _____
(for swabs indicate specimen source, eg NP, throat, vulva, etc...)

1510 ☐ Arbovirus Antibody**
1670 ☐ Arbovirus Culture**
1500 ☐ Arbovirus IgM**
1680 ☐ Arbovirus PCR**
0940 ☐ Bartonella (Cat Scratch Disease)**
1530 ☐ CMV IgG
1870 ☐ CNS Panel (Arbovirus/Enterovirus) CSF
1500 ☐ Dengue
1800 ☐ Enterovirus Culture
1810 ☐ Enterovirus PCR
7210 ☐ Hantavirus IgG*
0838 ☐ Herpes Simplex Type 1/2 IgG
0900 ☐ Herpes Simplex Culture
0800 ☐ Herpes Simplex Smear DFA
0836 ☐ Herpes Simplex Smear DFA Type 1/2
1610 ☐ Influenza Culture

9100 ☐ Influenza AB RT-PCR
1700 ☐ Lyme**
1740 ☐ Measles (Rubeola) IgG
1750 ☐ Measles (Rubeola) IgM*
1660 ☐ Mumps IgG
1830 ☐ Norovirus PCR
0980 ☐ Q Fever*
1620 ☐ Respiratory Virus Culture
1770 ☐ Respiratory Virus PCR
1710 ☐ Rickettsia/Ehrlichia**
1780 ☐ Rubella IgM*
1300 ☐ Toxoplasma IgG
1570 ☐ Varicella Zoster IgG
0920 ☐ Varicella Zoster PCR*
0910 ☐ Varicella Zoster Smear
Other: _____

*** Tests are only available through prior arrangement with the Virology Laboratory**
**** Complete the following Mandatory Information:**

Date of Onset: ____/____/____ **Tick Bite?** ☐ **Yes** ☐ **No Mosquito Bites?** ☐ **Yes** ☐ **No**

Clinical Symptoms:

Recent Travel History (Include Dates):

MYCOLOGY

List Specimen Source: _____

3500 ☐ Mycology Referred Isolate ID
3510 ☐ Mycology Serology

Comments/ Additional Information:

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DH1847, 12/11

FLORIDA DEPARTMENT OF HEALTH

Bureau of Public Health Laboratories

FOR LAB USE ONLY

Specimen Collection Date:

Patient Information

Local Patient Identifier(Chart, Jail, Prison ID, etc.):

Last Name: First Name: MI:

DOB (MM/DD/YYYY): County:

SSN: Sex:

Street Address:

City: State: Zip:

Race: Ethnicity

Parent/Guardian Name:

ICD9 Diagnosis Codes:

Health Care Provider Information

HCP/DAU Number:

Provider Name: Physician UPIN:

Street Address:

City: State: Zip: County:

Contact Name: Phone:

Insurance Information

Medicare #: Medicaid #:

HMO/Ins Name #: MediPass #:

Programs

Special Project ID: Program Component:

Note: For more information or to see a complete list of available tests, visit www.doh.state.fl.us/lab

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Circle Specimen Type(s):
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0395 ☐ HCV RIBA
0390 ☐ HCV PCR
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0360 ☐ Hepatitis A Igm
0340 ☐ Hepatitis B Panel (Includes HBsAg, HBsAb, HBcAb)
0320 ☐ Hepatitis BcAb
0370 ☐ Hepatitis BcAb IgM
0310 ☐ Hepatitis BsAb
0300 ☐ Hepatitis BsAg
0330 ☐ Hepatitis C Screen
0250 ☐ RPR w/Confirmation if RPR Reactive
4000 ☐ Rubella Screen
0240 ☐ Syphilis Confirmation IgG EIA
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2100 ☐ Beta Strep Culture
0700 ☐ Gonorrhea Culture
3000 ☐ Legionella Culture
2700 ☐ Pertussis Smear
2800 ☐ Pertussis Culture
2810 ☐ Pertussis PCR
1900 ☐ Stool Culture
2000 ☐ Typing, Salmonella

1200 ☐ Blood Parasite***
1000 ☐ Intestinal O & P
1410 ☐ Parasitic Microscopy
1400 ☐ Parasitic Serology
1100 ☐ Pinworm Slide

***For Malaria Testing provide recent travel history below (Include Dates):

_____

_____

MYCOBACTERIOLOGY

List Specimen Source: _____

3100 ☐ AFB Smear/TB Culture
3140 ☐ Nucleic Acid Amplification for TB (MTD)
3200 ☐ AFB Culture for Identification
3300 ☐ TB Drug Susceptibilities
3110 ☐ AFB SMEAR ONLY

VIROLOGY

Circle Specimen Type(s): CSF Acute Serum Convalescent Serum
Stool Swab _____ **Other** _____
(for swabs indicate specimen source, eg NP, throat, vulva, etc...)

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1670 ☐ Arbovirus Culture**
1500 ☐ Arbovirus IgM**
1680 ☐ Arbovirus PCR**
0940 ☐ Bartonella (Cat Scratch Disease)**
1530 ☐ CMV IgG
1870 ☐ CNS Panel (Arbovirus/Enterovirus) CSF
1500 ☐ Dengue
1800 ☐ Enterovirus Culture
1810 ☐ Enterovirus PCR
7210 ☐ Hantavirus IgG*
0838 ☐ Herpes Simplex Type 1/2 IgG
0900 ☐ Herpes Simplex Culture
0800 ☐ Herpes Simplex Smear DFA
0836 ☐ Herpes Simplex Smear DFA Type 1/2
1610 ☐ Influenza Culture

9100 ☐ Influenza AB RT-PCR
1700 ☐ Lyme**
1740 ☐ Measles (Rubeola) IgG
1750 ☐ Measles (Rubeola) IgM*
1660 ☐ Mumps IgG
1830 ☐ Norovirus PCR
0980 ☐ Q Fever*
1620 ☐ Respiratory Virus Culture
1770 ☐ Respiratory Virus PCR
1710 ☐ Rickettsia/Ehrlichia**
1780 ☐ Rubella IgM*
1300 ☐ Toxoplasma IgG
1570 ☐ Varicella Zoster IgG
0920 ☐ Varicella Zoster PCR*
0910 ☐ Varicella Zoster Smear
Other: _____

*** Tests are only available through prior arrangement with the Virology Laboratory**
**** Complete the following Mandatory Information:**

Date of Onset: ____/____/____ **Tick Bite?** ☐ **Yes** ☐ **No Mosquito Bites?** ☐ **Yes** ☐ **No**

Clinical Symptoms:

_____

_____

Recent Travel History (Include Dates):

_____

_____

MYCOLOGY

List Specimen Source: _____

3500 ☐ Mycology Referred Isolate ID
3510 ☐ Mycology Serology

Comments/ Additional Information:

_____

_____

_____

_____

_____

General Laboratory Inquiries

Bureau of Public Health Laboratories
Jacksonville
1217 Pearl Street
Jacksonville, FL 32202

Telephone: (904) 791-1500
Fax: (904) 791-1723

Bureau of Public Health Laboratories
Miami
1325 NW 14th Avenue
Miami, FL 33125

Telephone: (305) 324-2432
Fax: (305) 324-2429

Bureau of Public Health Laboratories
Pensacola
50 West Maxwell Street
Pensacola, FL 32501

Telephone: (850) 595-8895
Fax: (850) 595-6380

Bureau of Public Health Laboratories
Tampa
William G. (Doc) Myers Building
3602 Spectrum Boulevard
Tampa, FL 33612

Telephone: (813) 974-8000
Fax: (813) 974-3425

For After Hours Emergencies or Bio/Chem Terrorism Contact:

866-FLA-LABS (866-352-5227)

Because some location information is needed for an effective public health response, most CHD's share some location (but not patient) information with mosquito control as need to know information for public health purposes. Some CHDs prefer to have an agreement in writing for this type of partnering. Below is a suggested template for those CHDs and MCs that wish to have a written agreement.

Agreed protocol for reporting arbovirus human cases to Mosquito Control jurisdictions by County Health Departments

HIPAA BUSINESS ASSOCIATE AGREEMENT

The Florida Department of Health and its xxxxxxxxx COUNTY HEALTH DEPARTMENT, hereinafter Covered Entity, and xxxxxxxxxxx (mosquito control), hereinafter Business Associate agree to the following terms and conditions in addition to an existing agreement to perform services that involve the temporary possession of protected health information to develop a product for the use and possession of Business Associate. After completion of the contracted work all protected health information is returned to the Covered Entity or destroyed as directed by the Covered Entity.

Obligations and Activities of Business Associate

(a) Business Associate agrees to not use or further disclose Protected Health Information other than as permitted or required by the Agreement or as required by law.
(b) Business Associate agrees to use appropriate safeguards to prevent use or disclosure of the Protected Health Information other than as provided for by this Agreement.
(c) Business Associate agrees to report to Covered Entity any use or disclosure of the Protected Health Information not provided for by this Agreement.
(d) Business Associate agrees to ensure that any agent, including a subcontractor, to whom it provides Protected Health Information received from, or created or received by Business Associate on behalf of Covered Entity agrees to these same restrictions and conditions.
(e) Business Associate agrees to make internal practices, books, and records relating to the use and disclosure of Protected Health Information received from, or created or received by Business Associate on behalf of, Covered Entity available to the Covered Entity, or at the request of the Covered Entity to the Secretary of HHS, in a time and manner designated by the Covered Entity or the Secretary of HHS, for purposes of the Secretary determining Covered Entity's compliance with the Privacy Rule.
(f) Business Associate agrees to document disclosures of Protected Health Information and information related to such disclosures as would be required for Covered Entity to respond to a request by an Individual for an accounting of disclosures of Protected Health Information.
(g) Business Associate agrees to provide to Covered Entity as disclosures of protected health information occurs information collected in accordance with Section (f) of this Agreement, to permit Covered Entity to respond to a request by an Individual for an accounting of disclosures of Protected Health Information.

Obligations of Covered Entity

Covered Entity shall provide Business Associate with the notice of privacy practices that Covered Entity produces in accordance with 45 CFR 164.520, as well as any changes to such notice.

Permissible Requests by Covered Entity

Covered Entity shall not request Business Associate to use or disclose Protected Health Information in any manner that would not be permissible under the Privacy Rule if done by Covered Entity.

Term and Termination

The Term of this Agreement shall be effective upon the date of signature of the undersigned principles for the respective parties and shall terminate when Business Associate no longer possesses Protected Health Information from Covered Entity.

Xxxxxxxxxxxxxxxxxx (Mosquito Control)

FLORIDA DEPARTMENT OF HEALTH
xxxxxxxx County Health Department

_____
Signature Date

_____
Print Name / Title

_____
xxxxxxxxxxxxx, Director Date

Approved as to Form and Legality:

_____
xxxxxxxxxxx, Counsel, Fl. Dept. of Health Date

Appendix C
Contacts for Establishing Sentinel Chicken Flocks

(*Note: Listing does not necessarily denote endorsement. Contact established sentinel sites for more information.)*

Florida Department of Agriculture (Division of Animal Industry)

- Jennifer Jennings-Glover, Poultry Program (850) 251-1226
  jennifer.jennin@freshfromflorida.com

- Dr. Thomas J. Holt, Division of Animal Industry (850) 410-0900
  thomas.holt@freshfromflorida.com

Chicken Suppliers (White Leghorn or Rhode Island Reds suggested)

- Clyde Mizell, Inc. (904) 879-1196
- Twenty-Four Rivers, LLC. (813) 754-6078

Wing/Leg Bands

- National Band and Tag Company: (859) 261-2035 or http://www.nationalband.com/

Serum Separator Tubes

- Fisher Scientific: 1-(800)-766-7000, catalog # 02-65714 (13x75mm)

Chicken Cages, Feeders and Waterers

- Stromberg's: 1-(800)-720-1134
- Call DCHP for plans to construct self-feeders, self-waterers, and for building cages

Chicken Feed

- Available at local feed store

Appendix D

Infection Control and Personal Protective Equipment Guidelines for persons involved in surveillance, eradication and control of avian influenza outbreaks in birds in Florida.

From the Florida Department of Health Emergency Operations Plan, Pandemic Influenza Annex, October 2006. Appendix 5: Zoonotic Avian Influenza Surveillance and Response Protocol.

i. Basic Infection Control

Strict adherence to and proper use of hand hygiene after contact with wild and domestic birds, contact with contaminated surfaces, and after removing gloves is very important. Hand hygiene should consist of washing with soap and water for 15-20 seconds or the use of hand-disinfectants with 70% alcohol. Hand disinfectants are less effective when hands are soiled. Soiled hands should be washed with soap and water. Gloves should be changed between procedures.

ii. Specific Guidelines for Animal Workers Handling :

Apparently Healthy Birds in Areas Where highly pathogenic avian influenza (HPAI) H5N1 virus is Not Suspected Should:

- When possible, work in well-ventilated areas if working indoors. When working outdoors work upwind of animals, to the extent practical, to decrease the risk of inhaling aerosols such as dust, feathers, or dander.
- Wear rubber, nitrile or latex gloves that can be disinfected or disposed of and protective eyewear or a face shield while handling animals.
- Wash hands with soap and water often and disinfect work surfaces and equipment between sites.
- Use protective clothing (such as a protective coverall or apron) that can be disinfected or disposed when there is extensive physical contact with the bird.
- Wear a dust mask to protect against respiratory irritants when performing work with significant dust levels such as cleaning cages.
- Carry a bottle of hand sanitizer for hand hygiene when hand washing stations are not readily accessible.
- Not eat, drink, smoke, apply cosmetics or lip balm while handling animals.
- Not place laboratory specimens in coolers or refrigerators holding food.
- Disinfect or wash protective clothing at the end of the day.

Wild Birds or Poultry That Are Sick or Associated With an Undiagnosed Mortality Event in Areas Where HPAI H5N1 is Not Suspected Should**:**

- Follow the recommendations above and at a minimum wear protective clothing, including coveralls, rubber boots, latex, nitrile or rubber gloves that can be disinfected or disposed. Personnel working in a poultry house should wear disposable coveralls (such as Tyvek® suits).
- Minimize exposure to mucosal membranes by wearing protective eyewear (goggles) and a particulate respirator (NIOSH N95 respirator or higher).

- Disposable particulate respirators (e.g., N-95, N-99, or N-100) are the minimum level of respiratory protection that should be worn. Workers must be fit-tested to the respirator model that they will wear and also know how to check the face-piece to face seal. Workers who cannot wear a disposable particulate respirator because of facial hair or other fit limitations should wear a loose-fitting (i.e., helmeted or hooded) powered air purifying respirator equipped with high-efficiency filters.
- Decontaminate and properly dispose of potentially infectious material including carcasses per DOH and DEP guidelines.
- Decontaminate, remove and properly dispose of all Personal Protective Equipment (PPE) except eyewear and respirator. Wash hands thoroughly. Remove protective eyewear and respirators.
- Wash hand again after removing all PPE.

Wild Birds or Backyard Flocks of Poultry That Are Sick or Associated With an Undiagnosed Mortality Event in Areas Where HPAI Has Been Detected Should,

- Follow the recommendations above.
- Wear a fluid resistant apron over protective clothing.
- Get vaccinated with the seasonal influenza vaccine
- Unvaccinated workers should receive the current season's influenza vaccine to reduce the possibility of dual infection with avian and human influenza viruses. There is a small possibility that dual infection could occur and result in reassortment. The resultant hybrid virus could be highly transmissible among people and lead to widespread infections. Vaccination of all residents of affected areas is not supported by current epidemiologic data.
- Consult with a health care provider regarding any health concern
- If avian influenza infection is suspected, report to the local CHD.
- Follow the latest guidelines from CDC and the WHO for prophylactic medications and precautions for persons involved in avian influenza disease control:

Adapted from joint USDA and CDC recommendations posted at:
http://www.cdc.gov/flu/avian/professional/protect-guid.htm

Commercial Poultry Flocks That Are Sick or Associated With an Undiagnosed Mortality Event in Areas Where HPAI Has Been Detected:

iii. Personal Protective Equipment (PPE)

Disposable gloves made of lightweight nitrile or vinyl or heavy duty rubber work gloves that can be disinfected should be worn. To protect against dermatitis, which can occur from prolonged exposure of the skin to moisture in gloves caused by perspiration, a thin cotton glove can be worn inside the external glove. Gloves should be changed if torn or otherwise damaged. Remove gloves promptly after use, before touching non-contaminated items and environmental surfaces.

Personnel should carry a bottle of hand sanitizer and use it, at a minimum, before changing gloves. The bottle should be disposed with other PPE at the end of the day.

Protective clothing, preferably disposable outer garments or coveralls such as Tyvex® suits, an impermeable apron or surgical gowns with long cuffed sleeves, plus an impermeable apron should be worn.

Rubber or polyurethane boots with shallow treads that can be cleaned and disinfected should be worn.

Non-vented snug fitting safety goggles should be worn to protect the mucous membranes of eyes.

Disposable particulate respirators (e.g., N-95, N-99, or N-100) are the minimum level of respiratory protection that should be worn. This level or higher respiratory protection [negative or positive pressure respirators] may already be in use in poultry operations due to other hazards that exist in the environment (e.g., other vapors, manure, dust) and for improved vision or comfort. Workers must be fit-tested to the respirator model that they will wear and also know how to check the face-piece to face seal. Workers who cannot wear a disposable particulate respirator because of facial hair or other fit limitations should wear a loose-fitting (i.e., helmeted or hooded) powered air purifying respirator equipped with high-efficiency filters.

Personnel should receive appropriate personal protective equipment, instructions and training in PPE use, and respirator fit-testing.

Disposable PPE should be properly discarded, and non-disposable PPE and underwear should be cleaned and disinfected as specified in the Department of Agriculture and Consumer Services Avian Influenza Response Plan.

Protective clothing and gloves should be removed and discarded before removing respirators and goggles. Thorough hand hygiene measures should be performed before removing the respirator and goggles and after removal of all PPE.

Personnel should shower, and put on clean clothing before leaving the premises at the end of the day.

iv. Administration of Antiviral Drugs for Prophylaxis

Workers participating in the eradication and control of an avian influenza outbreak should receive an influenza antiviral drug daily for the duration of time during which direct contact with infected poultry or contaminated surfaces occurs and 7 days post exposure. The choice of antiviral drug should be based on sensitivity testing when possible. In the absence of sensitivity testing, a neuraminidase inhibitor (oseltamavir) is the first choice since the likelihood is smaller that the virus will be resistant to this class of antiviral drugs than to amantadine or rimantadine.

Appendix E
Florida Mosquito Control
Arbovirus Response Plan – West Nile Virus (FMCARP-WNV)

Guidelines for Mosquito Control Responses
2003

Walter J. Tabachnick
Florida Medical Entomology Laboratory,
Institute of Food and Agricultural Sciences, University of Florida

This response plan was developed for the Florida Coordinating Council for Mosquito Control in order to provide additional guidance to mosquito control districts dealing with West Nile virus events. The Florida Mosquito Control Response Levels outlined here are intended to guide mosquito control districts on appropriate responses based on their professional evaluation of real time local mosquito surveillance data. When appropriate, mosquito control districts have an obligation to make necessary vector control responses to rapidly developing arboviral threats, even if the responses differ from existing Florida DOH guidelines. Public information should be coordinated between health departments and mosquito control districts. However, it is ultimately the responsibility of the CHD administrator or director to issue public health advisories and alerts.

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Florida Department of Health Mosquito Illness Response Plan

- **Level 1 - No activity**
  - Absence of detectable arbovirus transmission.

- **Level 2 - Background Activity**
  - Native viruses below historic levels, i.e., EEEV, SLEV, WNV.

- **Level 3 - Mosquito-borne Illness Advisory**
  - Surveillance indicates a rise in virus transmission activity.
  - 10% rise in sentinel chickens or corvidae mortality or mosquito infection rates or two or more confirmed horse cases.

- **Level 4 - Mosquito-borne Illness Alert**
  - A confirmed human case.
  - 50% increase in sentinel chicken seroconversions in county or single flock.
  - 50% increase in corvidae mortality above background.

- **Level 5 - Mosquito-borne Illness Threat**
  - Widespread distribution of large numbers of human cases.

Florida Mosquito Control Arbovirus Response Plan – West Nile Virus (FMCARP - WNV)

PURPOSE/OVERVIEW

The purpose of the following plan is to provide guidelines to assist Florida mosquito control organizations in providing appropriate mosquito control operational responses to West Nile virus (WNV). The guidelines are presented as a starting basis for mosquito control organizations to use to assess information on the risk for WN in their jurisdictions and apply mosquito control operations commensurate with risk of human disease.

These are recommended guidelines only, and are intended for the use of professional mosquito control organizations. Each mosquito control organization must use all available information and the best professional assessment in using the recommended guidelines. For example, the guidelines provide a framework to assess surveillance information. Depending on the time of year that the surveillance information is collected, local circumstances, and other information, the recommended surveillance levels used to make an assessment in the guidelines may have to be changed. This requires the best professional judgment of the local mosquito control organization.

I. Introduction

Florida mosquito control organizations have the responsibility to mitigate the impact of mosquito borne disease on human health and well-being through the efficient, effective, and environmentally proper use of mosquito control methods. The objective of this document is to provide guidelines for mosquito control organizations to assist them in interpreting mosquito borne disease information that may be available to their local jurisdictions. These guidelines provide a framework for mosquito control agencies to use available arthropod borne pathogen and disease information to apply mosquito control efforts commensurate with the extent of arthropod borne disease and/or the risk of disease to their human clientele.

The Florida Mosquito Control Arbovirus Response Plan – West Nile virus (FMCARP-WNV) must take into account the great diversity in mosquito control organizations in Florida and the diversity of the issues each faces due to the variety of ecologies in different regions, and the variety of available resources for mosquito control in the state. The FMCARP-WNV attempts to integrate guidelines for mosquito control agencies in Florida with the companion Florida Department of Health (DOH) Mosquito Illness Response Plan (Chapter 8). Florida mosquito control agencies require a FMCARP-WNV containing specific guidelines for mosquito control efforts commensurate with public health risks from mosquitoes. The Department of Health Illness Response Plan is not meant to provide such guidelines.

The FMCARP-WNV plan considers the following factors in interpreting the status of WNV transmission and disease prevalence that will impact any mosquito control program's assessment of how to respond:

A. Human Population Size

The absolute size of the human population in any jurisdiction is a critical factor in determining the problem for human health from an arthropod borne disease. It must be understood that even with precisely the same risk of mosquito borne human disease,

districts or counties with large numbers of humans will likely report a larger number of human cases compared to smaller counties. This is illustrated simply by using the incidence of disease per human population as the measure of disease in an area. For example, if Indian River County and Miami Dade County have the same disease incidence for West Nile (for example, the actual incidence is 10 cases per 100,000 people in each county), there is no difference in the transmission risk in the two counties. The chance of someone getting West Nile is the same in both counties. A Miami-Dade resident has the same likelihood of getting West Nile as in Indian River resident. However this means that there are 12.5 cases in Indian River (population size 120,000) but 230 cases will be reported in Miami Dade (population size 2,300,000). It is important to consider population difference when evaluating actual case numbers.

The above consideration of risk contingent on the numbers of the exposed human population is also relevant within jurisdictions. Surveillance information and/or disease information may be useful only for specific regions within larger jurisdictions such as counties or mosquito control districts. For example, the at risk human population in Miami during the late summer of 2004 was the ca. 60,000 people living in the Coconut-Coral Gables neighborhoods and not the entire 2.3 million people living in Dade County. Likewise, sentinel chicken surveillance information is relevant to the immediate local human population living close to the sentinel chicken flock and not to district or county wide populations.

The mosquito control guidelines recognize that the absolute number of human cases that occur in any area will be an important consideration in determining the need for increased mosquito control responses. It could be acceptable for any mosquito control program to respond aggressively to the appearance of 20 human cases during a surveillance week. However this does mean that a very populous district might expend greater resources at a lower level of risk than a less populous county.

The guidelines address this issue by using two different measures of the numbers of human West Nile cases in establishing response recommendations. Incidence of disease in the population is used which gives the equivalent risk to humans regardless of the population size of the at risk population. The absolute number of human cases is used but note that this number depends on the size of the at risk population and will result in more aggressive responses in some jurisdictions, likely those with large human populations, although there is no difference in actual risk compared to areas with small human population size.

B. Time of the Year

Information addressed in the guidelines must be viewed with consideration to the time of the year that the surveillance data are collected. Mosquito control organizations recognize that the same surveillance information collected early in the transmission season (May-August) may demand a more aggressive response than this same data collected later in the year (September-December).

C. Risk of Disease vs. Actual Occurrence of Disease

The FMCARP-WNV provides guidance for the “risk” for human disease when the numbers of human cases are not known, or have not yet occurred, but is projected on the basis of other information. In addition guidance is provided based on the actual “occurrence” of human cases. The other information used to determine “risk” may be any, some, or all of the following: surveillance information (mosquitoes, wild birds, sentinel

chickens, equines) in the local jurisdiction or in the absence of surveillance information, information obtained from a geographically adjacent county that has surveillance information. The risk of human cases is provided in terms of incidence and the absolute number of cases in order to provide large and small jurisdictions the option of reacting where and when the data indicate that a response is necessary. Once human cases are reported, mosquito control responses are provided commensurate with these numbers using both incidence and the absolute numbers of human cases.

Note: A DOH Medical Alert is triggered by the appearance of a single human case regardless of other surveillance indicators. The FMCARP-WNV provides guidance for various situations with the occurrence of more than 1 human case. Since the appearance of a single human case establishes a Medical Alert by itself, the FMCARP-WNV provides guidance for the appearance (actual occurrence) of more than the single human case, also taking account for the appearance of cases during different time intervals. The Mosquito Alert B and Mosquito Emergency levels are the two levels that pertain to more than a single human case.

D. Reporting Interval

The FMCARP-WNV provides guidance to account for specific reporting periods. For example, surveillance information is only appropriate for the specific time period in which the information is collected. It is important for agencies to recognize that a 20% rise in surveillance positives totaled over the course of the entire year could be the result of substantial activity reported during a short time period. In this case mosquito control responses should be focused in the actual periods of transmission risk. The surveillance information used in the FMCARP-WNV is based on the shortest surveillance time period, which is usually a one week reporting period. Therefore all surveillance indicators in the FMCARP-WNV plan are based on a one week surveillance data reporting period. A 30% annual seropositive rate in sentinel chickens provides little information concerning the temporal changes in risk to the human population that occurred during the year. However, a 30% increase in the number of WNV-positive sentinel chickens reported in a one week surveillance period may indicate a significant increase in the local transmission rate of WNV.

E. Surveillance Information

There is a wide diversity in the abundance and quality of arboviral surveillance data collected in jurisdictions throughout Florida. A variety of information may be available that can be used to assess WNV transmission risk in different Florida localities. Some localities have well developed surveillance information that can be used prior to and during the occurrence of human West Nile cases to assess risk and apply appropriate mosquito and disease control strategies. Each of the different surveillance tools provide different information which needs to be assessed and evaluated by knowledgeable mosquito control and mosquito borne disease epidemiologists.

The most precise surveillance tools are those that provide direct associations with actual mosquito transmission frequencies. Dead bird reports and the percent of WN positive wild birds are dependent on collection effort and the original infection site for these wild birds is usually unknown. Therefore, this type of information is less useful then mosquito infection rates and sentinel chicken surveillance data where the location of infection is more clearly defined.

No matter what surveillance technique is used, the utility of the resulting surveillance data is critically dependent on the timeliness of the data collection and the summary reports.

Surveillance information must be provided in the most efficient, effective, and quickest means possible. It is critical that mosquito control and public health agencies have information on WN positive samples within days of their submission for testing. Information that is based on infections that occurred 2-3 or more weeks prior to final positive diagnostic test may be too late for appropriate intervening actions on the part of the responsible agencies. Surveillance data must be collected in a way that minimizes the time between actual infection and the issuing of a positive report. Any significant gaps between infection and reporting severely compromise the effectiveness of an arboviral surveillance program.

The FMCARP-WNV assumes timely and accurate reporting of surveillance information to make full use of the information for risk assessment. Delays in reporting of diagnostic results will serve to increase confusion on the risks due to WNV transmission in a location.

F. Surveillance Information, Human Population Size, and Estimating Risk

It is possible to obtain crude estimates of the risk of human West Nile cases by using sentinel chicken seroconversion rates to estimate the frequency of mosquito transmission of WNV in a specific area. Weekly sentinel chicken seroconversion rates can be used to gauge the magnitude of overall risk. Of course, any estimates of risk are likely to be more accurate if the risk estimate is confined to the smallest local human population that is near the sentinel chicken flocks. Also information about mosquito abundance and mosquito age structure will greatly improve these estimates. Finally information about the mosquito attack rates on humans will also improve the estimate.

Despite having to use estimates of some parameters, the sentinel chicken information can be used to assess the magnitude of WNV transmission risk. By using a variety of estimates for mosquito biting intensities the magnitude of the risk can be discerned.

A simple spread sheet using Pinellas County sentinel chicken information to gauge the risk of human WN infection based on sentinel chicken seroconversion rates and the size of the human population at risk.

The spreadsheet can be used by any mosquito control jurisdiction and is available for use through request to the Florida Medical Entomology Laboratory, University of Florida IFAS.

II. Issues Considered in developing the Florida Mosquito Control Arbovirus Response Plan – West Nile virus

a. Integration with DOH Response Plan for Mosquito-borne Diseases.
b. Appropriate control responses commensurate with human risk of disease.
c. Dynamic and flexible responses appropriate for variations in the human population size and WNV transmission risk for specific counties.
d. Consideration for public and media perception of the observed “absolute numbers” of human cases and perception of the appropriate vector control efforts commensurate with the absolute number.
e. Assume that, where available, surveillance data will precede human cases.
f. Incorporate regional surveillance data to allow for risk assessment in regions with little or no arboviral sentinel surveillance.
g. Conservative use of surveillance data in the absence of human cases. The conservative use of surveillance data in the absence of human cases allows mosquito control to conserve resources when WNV transmission is reported, but human risk is at a minimum due to seasonal and environmental factors.
h. Conservative use of mosquito control resources in the absence of indicators of human transmission risk.
i. An emphasis on the early impact of mosquito control efforts at the Mosquito Advisory level to minimize human cases.
j. Integration with public policy at Mosquito Emergency level.

III. Mosquito Control Arbovirus Response Levels

- **Level 1 - No activity.**

- **Level 2 – Background.** Many regions of Florida are likely to be at level 2 for much of the year. Occasional sentinel chicken seroconversions are frequently reported and these sporadic seroconversion rates do not indicate an elevated human WNV transmission risk.

- **Level 3 – Mosquito Advisory.** Elevated detection in surveillance during any weekly testing period. Any of the following might trigger an advisory:
  - √ 10% above historical background percent levels for sentinel chickens, i.e. if sentinel background is 15%, 25% would be an advisory.
  - √ 20% above WN positives of total birds or three-fold increase in dead birds above previous years for the same period. Example; previous year level was 2% WN positive birds tested, 20% would be an advisory; previous year 50 dead birds reported then 150 dead bird reports would be medical advisory.
  - √ 50% of any individual sentinel flock.
  - √ Mosquito transmission levels of ca.1/10,000.
  - √ Risk of more then 10 human cases based on human population size and mosquito transmission frequency estimates.
  - √ Risk of 10-50/100,000 humans during any week or reporting period based on mosquito transmission frequency estimates.
  - √ Status of adjoining counties and region if no local surveillance information is available. If surveillance information in adjoining county(s) is appropriate for issuing an advisory, an advisory should be considered in the absence of surveillance information indicated no risk.

- **Level 4 – Mosquito Alert.**
  - **Mosquito Alert A – single human case**
  - **Mosquito Alert B –** Elevated detection in sentinels. Any of the following might trigger level 4.
    - √ 20% above historical background percent levels for sentinel chickens, i.e. if sentinel background is 15%, 35% would be "Mosquito Alert B."
    - √ 30% increase of WN positives percent of total birds compared to previous year(s) for the same period, example 10% seroconversions in previous years are considered background for reporting period, then 40% seropositive birds would be a medical danger..
    - √ 75% of any individual sentinel chicken flock.
    - √ Mosquito transmission levels estimated 1/1,000.

- √ Risk of 50-100/100,000 humans based on estimates of mosquito transmission frequency.
- √ Risk of 50+ human cases based on the total at risk human population size and the mosquito transmission frequency.
- √ The occurrence of 3 or more human cases with disease onset showing infection during the same 1-2 week period.
- √ Status of adjoining counties and region if no local surveillance information is available. If surveillance information in adjoining county(s) is appropriate for issuing an alert, an alert should be considered in the absence of surveillance information indicating no risk.

- **<u>Level 5</u> - <u>Mosquito Emergency.</u>** Elevated detection in sentinels. Any of the following might trigger a medical threat or emergency.
  - √ 50% above historical background percent levels for sentinel chickens for the same reporting period, i.e. if sentinel background is 15%, 65% would be an emergency/threat.
  - i. 75% increase in WN positive of total birds compared to previous years for the same period.
  - ii. 100% of the individuals in two or more individual sentinel chicken flocks.
  - iii. Mosquito transmission frequency greater than 1/1,000.
  - iv. Risk of 100/100,000 humans based on estimates of the mosquito transmission frequency.
  - v. Risk of 200+ human cases based on the human population size at risk and estimates of the mosquito transmission frequency.
  - vi. Occurrence of 20 human cases during any week or reporting period showing that the date of onset or infection occurred during the same 1-2 week period.
  - vii. Status of adjoining counties and region if no local surveillance information is available. If surveillance information in adjoining county(s) is appropriate for issuing an emergency/threat, an emergency/threat should be issued in the absence of surveillance information indicated no risk.

IV. Mosquito Control Responses at Response Plan Levels

1. <u>Level 1</u>

- ➢ Mosquito operations targeting nuisance and/or disease carrying mosquitoes.
- ➢ Surveillance – sentinel chickens, mosquitoes, birds.

2. <u>Level 2</u>

a. Continued Surveillance.

b. Mosquito control operations targeting nuisance and/or disease carrying mosquitoes.

c. Monitoring potential hot spots using surveillance tools.

d. Coordinate communication with county health department regarding real time surveillance results.

e. Coordinated Public Announcements with the county health department – personal protection.

- **Level 3** –**Mosquito Advisory**
  - Mosquito control targeting high risk vector mosquito populations and areas commensurate with arbovirus indicators for risk by performing repetitive nightly spraying operations in high risk areas until vector is suppressed to background levels.
  - Consideration for increased surveillance using sentinels in high risk areas with attention to measuring mosquito transmission frequencies using chicken baited mosquito traps.
  - Preventive ULV and aerial post-epic rainfall brood reduction, and control of nuisance mosquitoes as a lower priority.
  - Coordinate communication with county health department regarding real time surveillance results.
  - Coordinated Public Announcements with the county health department – avoid mosquitoes and use personal protection.

- **Level 4** –**Mosquito Alert**
  - **Mosquito Alert A** – as Level 3.
  - **Mosquito Alert B**
    - Focus mosquito control efforts to high risk mosquito populations and areas commensurate with arbovirus indicators for risk, adulticiding hot spots
    - Consideration for aerial adulticiding if not already in place with focus in high risk areas where wide area control measures are required to respond to the increased level of risk in a timely manner.
    - Increased surveillance to obtain estimates of mosquito transmission frequency in targeted areas.
    - Coordinate communication with county health department regarding real time surveillance results.
    - Coordinated Public Announcements with the county health department – avoid mosquitoes and use personal protection.

V. Level 5 – Mosquito Emergency

- Public Announcements – personal protection
- Mosquito control remains in close contact with local County Health Departments and other responsible government agencies providing them timely information about the increased public health risk for mosquito-borne diseases and advising them about potential strategies for increased disease prevention efforts (such as canceling outdoor events/activities, closing parks to overnight campers, etc.).
- Aggressive aerial, truck adulticiding, consideration for control on protected lands with approval from FDACS, DEP, Fish and Wildlife, private owners etc. as needed, based on justified wide spread danger to public health.
- Regional inter-County/District and FDACS support as indicated for Counties in Emergency status.

- Increased surveillance to obtain estimates of mosquito transmission frequency in targeted areas.
- Coordinate communication with county health department regarding real time surveillance results.
- Request for state (FDACS) and federal emergency (FEMA) support for mosquito control operations
- Coordinated Public Announcements with the county health department – avoid mosquitoes and use personal protection.

V. Examples.

The following examples are based on historical West Nile information from selected Florida counties. It is meant to illustrate how the proposed guidelines might have been used in specific realistic situations.

I. Lee County 2003

A. Background – In 2003 Lee County (pop. ca. 450,000) had 3 human West Nile cases reported on July 28 (incidence 1 case/150,000). The following represents the dates of reports from the Lee County sentinel chicken surveillance system (18 flocks X 6 birds ea. = 108 birds) indicating the number of positive birds and the date of report:

1/7 - 1	7/29 - 9
1/9 - 4	8/4 - 12
1/21 - 1	8/10 - 9
2/12 - 1	8/18 - 6
4/8 - 1	8/25-26 - 12
4/29 - 1	9/8-9 – 16
6/17 - 1	9/16 - 3
7/8 - 3	9/23 - 7
7/14 - 4	
7/21 - 4	

B. Temporal use of the Guidelines per Lee County Information

1. January – June 2003.
   a. Lee County surveillance showed some West Nile transmission activity at a low level, likely background (ca. 1%-4% of total sentinel population). Level 2, although concern that the numbers of mosquitoes per chicken is likely lower than later in the year. Activity at this time cause for concern for later in the season.

2. July 2003
   a. West Nile transmission activity increased from 1-4% per week to 4-8%. Estimated incidence of cases based on ca. 1000 mosquitoes biting each sentinel bird is Level 2.
   b. First Human Cases onset 7/15. This is Level 3 a Mosquito Alert A.

3. August 2003 - 2 additional human cases (date of onset: 8/22 and 8/29) Mosquito Alert A.
   a. West Nile activity similar to July levels, 6 -15% weekly sentinel seroconversions. Predicted disease incidence based on 1,000 mosquitoes biting each sentinel per week on average gives

mosquito transmission of ca. 1/6750 with 15% highest sentinel seroconversion.

b. Predicted no. of human cases with avg. max. 1-10 bites per person throughout Lee County for 10 bites per person (450,000 X 10 X 0.00015 = 675 infections) with 4.5 – 135 cases depending on whether infected: cases are 1:150 or 1:5. At 1 bite per person during a week (450,000 X 1 X 0.00015 = 67.5 infections) with 0 – 13.5 cases depending on whether infected: cases are 1:150 or 1:5.
c. Still mosquito alert based on surveillance
d. Mosquito alert A based on 2 human cases reported in 1 week.

4. September 2003.
   a. No change from August.

5. October 2003
   i. Consider reducing to mosquito advisory based on surveillance and absence of human cases in September.

II. Miami Dade 2004

A. Background - In 2004 Miami Dade County had a total of 20 WN human cases (incidence 1 case/115,000). The following represents the dates of reports from Miami-Dade surveillance through the Florida Department of Health including human cases, dead bird reports, WN positives in dead birds, the Miami-Dade County sentinel chicken surveillance system (initiated in late July with 5 flocks of 5 birds = 25 birds, changed to 5 flocks of 6 birds each = 30 birds in August). Surveillance information by week with number of individuals:

Human Cases (date of onset)

Jun 16	1
Jun 27	1
Jun 30	1
Jul 3	1
Jul 5	1
Jul 7	1
Jul 8	1
Jul 12	1
Jul 20	1
Jul 29	1
Aug	3
Aug 7	1

Dead Bird Reports

May 29	2	Aug 14	4
June 12	12	Aug 21	3
June 19	23	Sept 4	2
July 3	43	Sept 11	3
July 10	66	Sept 25	0
July 24	81	Oct	0
July 31	15		

Wild Bird positives for WN

Jan 14	1
Jun 19	1
Jul 10	2
Jul 16	1
Jul 19	6
Jul 21	4
Jul 22	1
Aug 2	1
Aug 4	2
Aug 5	3
Aug 9	1

Sentinel Chickens

Jul 26	1
Aug 2	1
Aug 9	1
Aug 13	2
Aug 24	2
Sep 13	1
Sep 28	1

B. Temporal use of the Guidelines per Miami Dade County Information on a county wide level (note consideration should be made using surveillance and population size focused in the Coral Gables/Coconut Grove area as well)
    1. January – June 2004.
        a. Miami Dade County surveillance in WN positive dead birds showed some West Nile transmission activity at a low level, likely background (ca. 1%-4% of total sentinel population). Level 2.

    2. June 1 –Jul 3, 2004
        a. 78 dead birds were reported. 1 WN positive of ?? (data unavailable at this time) tested. In the same period in 2003, Miami Dade County had 28 dead birds tested for WNV (4 were positive).
        b. Three human cases, 2 with onset in the same week. Note reporting did not have both cases in a timely fashion – but this would have triggered a medical alert if this information had been known.

    3. July 5 -12
        a. Several human cases within a 1-2 week period. This is Level 4, a Mosquito Alert B.

    4. July 5-30
        a. Continued human cases at level 4 Mosquito Alert B.
        b. 14 WN positive birds of ?? (data unavailable at this time) tested.
        c. 1 Sentinel chicken positive
        d. Human cases are maintaining the medical alert
        e. A total of 47 birds were tested for WN in this period in 2003 of which 4 were positive (8.5%).

f. Note without human cases dead bird positives would be a mosquito advisory based on three-fold increase from previous year

5. August 2004
   a. Additional human cases (date of onset: 8/4 and 8/29x2) Mosquito Alert B.
   b. 7 dead bird reports; in Aug. 2003, 81 dead birds tested for WN (3 positives).
   c. 6 sentinel chicken positives (max of 2 per reporting week) Predicted disease incidence based on 1,000 mosquitoes biting each sentinel per week on average gives mosquito transmission of ca. 1/15000 with 7% highest sentinel seroconversion.
   d. Predicted no. of human cases with avg. max. 1-10 bites per person throughout Miami-Dade County for 10 bites per person (2,300,000 X 10 X 0.00007 = 1610 infections) with 11 – 322 cases depending on whether infected: cases are 1:150 or 1:5. At 1 bite per person during a week (2,300,000 X 1 X 0.00007 = 161infections) with 1 – 32 cases depending on whether infected: cases are 1:150 or 1:5.
   e. Mosquito advisory or alert based on surveillance from chickens.
   f. Mosquito advisory based on WN positives in wild birds (7) of ?? (data unavailable at this time) compared to 3 of 81 (4%) tested in 2003 for same period
   g. Mosquito Alert B based on 3 more human cases with onset reported in 1-2 week.

6. September 2004.
   a. No change from August.
   b. Dead bird reports, WN positive wild birds suggest reduction in transmission.

5. October 2004
   ii. Consider reducing to mosquito advisory based on surveillance and absence of human cases in September.

VI. Spreadsheet to Estimate Human Risk – Pinellas County as an example

Pop.Size	# Sent Chick.	Est. bites/ chicken/week	Total # bites	# serocon.	Transmission Freq.	Avg # bites / person	Expect # WN Fever Cases	Expected # WN Enceph.
926716	56	1000	56000	3	0.00005	10	99.291	4.96455
926716	56	1000	56000	3	0.00005	1	9.9291	0.496455
926716	56	1000	56000	10	0.00018	10	330.97	16.5485
926716	56	1000	56000	10	0.00018	1	33.097	1.65485
926716	56	1000	56000	25	0.00045	10	827.425	41.37125
926716	56	1000	56000	25	0.00045	1	82.7425	4.137125
926716	56	1000	56000	42	0.00075	10	1390.074	69.5037
926716	56	1000	56000	42	0.00075	1	139.0074	6.95037

926716	56	500	28000	3	0.00011	10	198.582	9.9291
926716	56	500	28000	3	0.00011	1	19.8582	0.99291
926716	56	500	28000	10	0.00036	10	661.94	33.097
926716	56	500	28000	10	0.00036	1	66.194	3.3097
926716	56	500	28000	25	0.00089	10	1654.85	82.7425
926716	56	500	28000	25	0.00089	1	165.485	8.27425
926716	56	500	28000	42	0.00150	10	2780.148	139.0074
926716	56	500	28000	42	0.00150	1	278.0148	13.90074

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