



Zika Virus

Disease Plan

Quick Links

✓ WHY IS ZIKA VIRUS IMPORTANT TO PUBLIC HEALTH?	2
✓ DISEASE AND EPIDEMIOLOGY	2
✓ PUBLIC HEALTH CONTROL MEASURES	7
✓ CASE INVESTIGATION	9
✓ REFERENCES	17
✓ VERSION CONTROL	18
✓ UT-NEDSS Minimum/Required Fields by Tab	19

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Questions about this disease plan?

Contact the Utah Department of Health Bureau of Epidemiology: 801-538-6191.

✓ WHY IS ZIKA VIRUS IMPORTANT TO PUBLIC HEALTH?

Zika virus is primarily transmitted to humans through the bite of an infected *Aedes* species mosquito. Perinatal, *in utero*, sexual and transfusion transmission events have also been reported. The Florida Department of Health reported the first cases of local transmission in the continental U.S. The number of Zika cases among travelers or returning travelers to Utah will likely increase due to recent outbreaks. An association between Zika virus and microcephaly in infants has been confirmed. This association may prove to show long term impacts beyond what the acute illness initially caused.

✓ DISEASE AND EPIDEMIOLOGY

Clinical Description

Zika is an acute, viral illness characterized by a sudden onset of fever with maculopapular rash, arthralgia (joint pain), or conjunctivitis (red eyes). Other commonly reported symptoms have included myalgia (muscle pain) and headache. Approximately 20 percent of people infected with Zika virus become symptomatic, and illness is usually mild, with symptoms lasting from 2-7 days. Hospitalization due to severe disease is uncommon. However, there have been reported cases of Guillain-Barré syndrome in patients following suspected Zika virus infection. Guillain-Barré is a rare disorder in which the immune system attacks part of the nervous system. The association between Zika virus infection during pregnancy and a reported increase in the number of babies born with microcephaly is currently being investigated.

Causative Agent

The Zika virus is a mosquito-borne flavivirus that was first identified in Uganda in 1947.

Differential Diagnosis

Flavivirus infections such as dengue and yellow fever share similar vectors, geographic distribution, and symptomology as the Zika virus. Chikungunya virus is an alphavirus with similar transmission characteristics and geographic distribution. Laboratory evidence of viral infection is accomplished by testing serum to detect viral nucleic acid or virus-specific immunoglobulin M (IgM) and neutralizing antibodies. Serological cross-reactivity can occur so a positive result on an IgM ELISA test should be followed by confirmatory testing to detect viral nucleic acid or neutralizing antibodies. Patients who have been immunized (e.g., received yellow fever or Japanese encephalitis vaccination) or infected with, another flavivirus (e.g., dengue, West Nile or St. Louis encephalitis virus) may have cross-reactive antibodies on IgM or neutralizing antibody assays.

Other differential diagnosis considerations based on symptoms include malaria, rubella, measles, parvovirus, adenovirus, enterovirus, leptospirosis, rickettsia and group A streptococcal infections.

Laboratory Identification

Testing Guidelines

Currently, diagnostic testing for Zika virus is recommended for pregnant women (regardless of symptoms), with a history of travel to an area with Zika virus transmission within. At present, the Utah Public Health Laboratory (UPHL) performs the Zika IgM MAC-ELISA serology test and RT-PCR. Equivocal, inconclusive or positive test results must be sent to the CDC Laboratory in Fort Collins, CO, for confirmation.

Testing will be performed according to the following:

- a) If a pregnant woman is within fourteen days of onset of symptoms or last exposure to Zika virus, the maternal serum will be tested for reverse transcription-polymerase chain reaction (RT-PCR).
- b) If a pregnant woman is asymptomatic and has specimen drawn after travel, her serum will be tested for anti-Zika IgM antibody.
- c) If Zika IgM antibody testing is positive, her serum will be additionally tested for dengue to rule out cross-reactive antibodies with this disease. Note: these tests will not be performed on Zika IgM-negative women.
- d) If the test results are either positive or inconclusive, fetal ultrasound(s) should be performed to detect microcephaly or intracranial calcifications.
- e) Zika virus testing is recommended for pregnant women with possible sexual transmission exposure to Zika virus if either she or her male partner developed symptoms consistent with Zika virus disease.
- f) If a symptomatic person is within fourteen days of onset of symptoms, the serum and urine will be tested for reverse transcription-polymerase chain reaction (RT-PCR).
- g) Due to the limited understanding of the duration and pattern of shedding of Zika virus in the male genitourinary tract, neither serum nor semen testing for men for the purpose of assessing risk for sexual transmission is currently recommended. The preferred recommendation is that such men abstain from sexual activity or consistently use condoms during sex for the duration of pregnancy. This is because the persistence of Zika virus in semen is not known, but in one instance was shown to be >60 days.

Testing capacity is limited, so the State Epidemiologist or Medical Officer at the UDOH is required to approve all testing requests prior to samples going to the CDC.

If testing is approved by the UDOH, the following instructions should be followed:

- Collect serum ($\geq 3\text{mL}$) in a large, red top tube.
- Refrigerate serum at 4°C , or maintain on ice for no longer than 24 hours.
- Samples collected and shipped with expected arrival the same day can be shipped on cold packs (4°C).
- If storage/transport will exceed 24 hours, serum should be frozen at -20°C or lower. These samples should be shipped on dry ice.
- Follow packaging and shipping instructions for Category B, Biological Substances.
- There are three forms that must be completed by the provider. These forms will be emailed directly to the provider by the Utah Public Health Laboratory (UPHL) once testing is approved by the State Epidemiologist or Medical Officer. If a provider needs assistance with completing these forms, s/he should work with local department or

UDOH staff. Samples submitted with incomplete information will experience delayed testing and reporting of results.

- Arrangements must be made with the UDOH for specimen shipping and delivery to the UPHL.
- UPHL will ship specimens to CDC on Monday, Tuesday, and Wednesday. Specimens received later in the week will not be shipped until the following week, and they should be kept frozen over weekends.

Laboratory Tests

Assays for acute specimens

RT-PCR should be performed on serum specimens collected within fourteen days of symptom onset or last known exposure in pregnant females with urine specimens. Urine specimens should always be accompanied with a serum specimen.

Assays for convalescent specimens

Patients with a compatible clinical syndrome and serum collected more than four days after illness onset should be tested by virus-specific IgM ELISA, and positive results confirmed by testing for neutralizing antibodies. Plaque-reduction neutralization tests (PRNT) can be performed to measure virus-specific neutralizing antibodies, and may be able to discriminate between cross-reacting antibodies in primary flavivirus infections. A fourfold or greater increase in virus-specific neutralizing antibodies between acute- and convalescent-phase serum specimens collected 2-3 weeks apart may be used to confirm recent infection for primary flavivirus infections.

Immunohistochemistry

Staining for viral antigens or RT-PCR on fixed tissues may be done.

Treatment

There are currently no specific treatments for Zika virus infections. Persons who think they have Zika should:

- Get plenty of rest.
- Drink fluids to prevent dehydration.
- Take medicine such as acetaminophen to relieve fever and pain. **DO NOT** take aspirin and other non-steroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen and naproxen. Aspirin and NSAIDs should be avoided until dengue can be ruled out to reduce the risk of hemorrhage (bleeding). If a person is taking medicine for another medical condition, they should talk to a healthcare provider before taking additional medicine.

Case Fatality

Death due to Zika virus is very rare at all ages.

Reservoir

Zika virus is spread to people primarily through the bite of an infected *Aedes* species mosquito. The virus replicates in the midgut of the mosquito, disseminates to other tissues, and infects the salivary glands. *Aedes* mosquitoes are found in warmer, tropical and subtropical climates and at altitudes below 6,500 feet (2000 meters).

Transmission

Zika virus is spread to humans primarily through the bite of an infected *Aedes aegypti* or *Aedes albopictus* mosquito. During the first week of infection, the Zika virus can be found in the blood and passed from an infected person to another mosquito through mosquito bites. An infected mosquito can then spread the virus to other people. These mosquitoes have not been identified in Utah, although they appear to be expanding their range due to climate change.

Other documented modes of transmission include intrauterine, resulting in congenital infection; intrapartum, from a viremic mother to her newborn; through blood transfusions or accidental laboratory exposure; and through sexual transmission from both a man and a woman to their partner(s).

However, it is believed that the virus can be spread before, during, and after the individual have symptoms. Although the virus can be present in sexual fluids longer than in blood, it is unknown:

- How long the virus is present in semen in men who have had Zika.
- If the virus is present in the semen of infected men who never develop symptoms.
- If the virus can be spread through oral sex.

According to the CDC, Zika virus infections have been confirmed in infants with microcephaly; however, it is not known how often microcephaly occurs after infection with Zika. Studies are underway to investigate the association of Zika virus infection and microcephaly, including the role of other contributing factors (i.e., prior or concurrent infection with other organisms, nutrition and environment). To date, there are no reports of infants getting Zika virus through breastfeeding. Because of the benefits of breastfeeding, mothers are encouraged to breastfeed, even in areas where Zika virus is present.

Susceptibility

Anyone living in, or traveling to, an area where Zika virus is found can be infected with Zika virus. Currently, the CDC has cautioned pregnant women in any trimester to postpone travel to areas where Zika virus transmission is ongoing. Pregnant women who do travel to any of these areas should consult with their healthcare provider and strictly follow steps to avoid mosquito bites during their trip. Women who are trying or thinking about becoming pregnant should consult their healthcare provider before traveling to any of these locations, and strictly follow steps to prevent mosquito bites during their trip. For up-to-date information on travel notices, see <http://wwwnc.cdc.gov/travel/page/zika-information>.

Incubation Period

The incubation period for Zika is usually 2-7 days.

Period of Communicability

After the onset of symptoms, Zika virus can be found in the blood of an ill person for about a week. The virus can be present in semen longer than in blood due to the fact the semen is shielded from the immune system. Viremia is expected to last approximately one week in the blood of patients with clinical illness. There is no evidence that a fetus conceived after Zika virus has cleared from the blood would be at risk for fetal infection. Guidelines are not provided by the CDC on the period of time virus can be found in the semen. However, one case estimates the virus to be found at least 24 days after symptoms, as long as 188 days after symptoms, and in vaginal and cervical fluids up to 3-11 days after symptoms. Current recommendations include:

- Couples in which a man had confirmed Zika virus infection or clinical illness consistent with Zika virus disease should consider using condoms or abstaining from sex for at least 6 months after onset of illness.
- Couples in which a man traveled to an area with active Zika virus transmission but did not develop symptoms of Zika virus disease should consider using condoms or abstaining from sex for at least 8 weeks after departure from the area.
- Couples in which a woman had confirmed Zika virus infection or clinical illness consistent with Zika virus disease should consider using condoms or abstaining from sex for at least 8 weeks after onset of illness or last exposure.
- Couples in which a man resides in an area with active Zika virus transmission but has not developed symptoms of Zika virus disease might consider using condoms or abstaining from sex while active transmission persists.
- If the partner of a man suspected of having Zika virus is pregnant, the couple should either use prevention techniques during sex, such as condom use, or abstain from sex for the duration of the pregnancy.

Epidemiology

Zika virus is a mosquito-borne flavivirus that was first identified in Uganda in 1947. It is transmitted by the bite of an infected *Aedes aegypti* or *Aedes albopictus* mosquito (the same mosquitoes that transmit other arboviruses, such as dengue and chikungunya), which are found throughout much of the Americas and some regions of the United States. The virus caused sporadic human infections in Africa and Asia until 2007, when the first documented Zika virus outbreak was reported in Yap State, Federated States of Micronesia. This outbreak is estimated to have impacted 73% of the population ≥ 3 years of age. In October 2013, a subsequent outbreak occurred in French Polynesia, where approximately 28,000 cases sought medical care (nearly 11% of the population). In May 2015, the first local transmission of Zika virus in the Americas was reported by the World Health Organization (WHO), with autochthonous cases identified in Brazil. The Ministry of Health estimated that 440,000-1,300,000 suspected cases of Zika virus disease occurred in Brazil by the end of 2015. As of January 20, 2016, according to the Pan American Health Organization, Puerto Rico and 20 other countries or territories in the Americas had reported locally transmitted cases.

During the outbreak in Brazil, Zika virus RNA was identified in specimens (i.e., brain tissue, placenta, and amniotic fluid) from several infants with microcephaly, and from fetal losses in women infected with Zika virus during pregnancy. The Brazil Ministry of Health reported a marked increase from previous years in the number of infants born with microcephaly and

intracranial calcifications in 2015, although it is not known how many cases are due to Zika virus infection. The incidence of Zika virus infection in pregnant women is not currently known, and no evidence suggests that pregnant women are more susceptible to Zika virus infection, or experience more severe disease during pregnancy.

✓ PUBLIC HEALTH CONTROL MEASURES

Public Health Responsibility

- Investigate all suspect cases of disease, and fill out and submit appropriate disease investigation forms.
- Provide education to the general public, clinicians, and first responders regarding disease transmission and prevention.
- Identify clusters or outbreaks of disease.
- Identify sources of exposure and stop further transmission.

Prevention

There is no vaccine against Zika virus. The mosquitoes that spread the Zika virus are aggressive daytime biters, but they can also bite at night. They typically lay their eggs in or near standing water in things such as buckets, bowls, animal dishes, flower pots, old tires, and vases. When traveling to, or residing in, an area of ongoing transmission, the CDC recommends taking the following steps to avoid being bitten:

- Wear long-sleeved shirts and long pants.
- Choose a hotel or lodging with air conditioning, or that uses screens on windows and doors to keep mosquitoes outside.
- Sleep under a mosquito bed net.
- Treat clothing and gear with permethrin as described by product instructions, or purchase items treated with permethrin.
 - Do not use permethrin products directly on skin. They are intended to treat clothing.
- Use Environmental Protection Agency (EPA) registered insect repellents with active ingredients which include:
 - DEET (N,N-diethyl-m-tolua-mide). Choose a product that will provide sufficient protection for the amount of time spent outdoors. Product labels often indicate the length of time that someone can expect protection from a product. DEET is considered safe when used according to the product label.
 - Picaridin (KBR 3023), or icaridin outside of the United States. Picaridin-containing products should be used according to the product label.
 - Oil of lemon eucalyptus (OLE) or PMD (para-menthane-3,8-diol). This recommendation only applies to EPA-registered products containing the active ingredient OLE or PMD. "Pure" oil of lemon eucalyptus (essential oil not formulated as a repellent) is NOT recommended, as validation testing for efficacy and safety has not gone through similar testing.
 - IR3535 (3-[N-butyl-N-acetyl]-aminopropionic acid).
- Always follow the product label instructions.

- Reapply insect repellent as directed.
- Do not spray repellent on the skin under clothing.
- If you are also using sunscreen, apply the sunscreen before applying insect repellent. Avoid using DEET products that combine the repellent with a sunscreen. Sunscreens may need to be reapplied often, resulting in an over-application of DEET.
- For babies and children:
 - Do not use insect repellent on children less than 2 months of age.
 - Dress your children in clothing that covers arms and legs.
 - Cover crib, stroller, and baby carrier with mosquito netting.
 - Do not apply insect repellent onto a child's hands, eyes, mouth, and cut or irritated skin.
 - Adults should spray repellent onto hands, and then apply to a child's face.
- Wash hands after application to avoid accidental exposure to eyes, or ingestion.

The CDC has identified that Zika virus can also be spread by a man to his sex partner(s). Because of the potential link between Zika virus and birth defects, pregnant women should take steps to prevent infection:

- If you practice vaginal, anal, or oral sex with a male partner who lives in, or has traveled to, an area with Zika virus, use a condom the right way, every time, during your pregnancy.
- Don't have sex with your male partner during your pregnancy. Not having sex is the best way to be sure that someone does not get sexually transmitted Zika virus.
- Your male partner should also take steps to prevent mosquito bites to prevent further spread of the virus.

Men and their nonpregnant sex partners who want to reduce the risk for sexual transmission of Zika virus should use condoms consistently and correctly during sex or abstain from sex. Recommended duration of consistent condom use or abstinence from sex depends on clinical illness consistent with Zika virus disease. These include:

- Couples in which a man had confirmed Zika virus infection or clinical illness consistent with Zika virus disease should consider using condoms or abstaining from sex for at least 6 months after onset of illness.
- Couples in which a man traveled to an area with active Zika virus transmission but did not develop symptoms of Zika virus disease should consider using condoms or abstaining from sex for at least 8 weeks after departure from the area.
- Couples in which a woman had confirmed Zika virus infection or clinical illness consistent with Zika virus disease should consider using condoms or abstaining from sex for at least 8 weeks after onset of illness or last exposure.
- Couples in which a man resides in an area with active Zika virus transmission but has not developed symptoms of Zika virus disease might consider using condoms or abstaining from sex while active transmission persists.
- If the partner of a man suspected of having Zika virus is pregnant, the couple should either use prevention techniques during sex, such as condom use, or abstain from sex for the duration of the pregnancy.

Chemoprophylaxis

None.

Vaccine

None.

Isolation and Quarantine Requirements

Isolation: None.

Hospital: None.

Quarantine: None.

✓ CASE INVESTIGATION

Reporting

Table 1: Table of criteria to determine whether a case should be reported to public health authorities

Criterion	Zika Virus Disease, non-congenital	Congenital Zika Virus Disease
<i>Clinical Evidence</i>		
Rash	O	
Acute Fever (reported or measured)	O	
Arthralgia	O	
Conjunctivitis	O	
Guillain-Barré syndrome not known or associated with another diagnosed etiology	O	
Neurologic manifestations not known to be associated with another diagnosed etiology	O	
Congenital microcephaly		O
Congenital intracranial calcifications		O
Congenital structural brain or eye abnormalities		O
Congenital central nervous system abnormalities		O
Healthcare record contains a diagnosis of Zika virus disease	S	S
Death certificate lists ZIKV as a cause of death or a significant condition contributing to death	S	S
<i>Laboratory Evidence</i>		
Culture of ZIKV from blood, body fluid, or tissue	S	S
Detection of ZIKV-specific RNA in specimens of serum, CSF, tissue or other clinical specimen (e.g., amniotic fluid, umbilical cord blood, urine, semen, saliva)	S	S
Detection of ZIKV antigen by immunohistochemical staining of tissue specimen	S	S
ZIKV-specific IgM antibodies in serum or CSF	S	S

<i>Epidemiological Evidence</i>		
Residence or travel to an area with known ZIKV transmission within two weeks of symptom onset	O	
Mother lived in or traveled to an area with ongoing ZIKV transmission during pregnancy		O
Epidemiologic link to a person with laboratory evidence of recent ZIKV infection (e.g., sexual contact)	O	O (mother)
Laboratory evidence of flavivirus infection in mother during pregnancy		O
Blood transfusion within 30 days of symptom onset	O	
Organ or tissue transplant recipient within 30 days of symptom onset	O	

Notes:

S = This criterion alone is Sufficient to report a case

N = All “N” criteria in the same column are Necessary to report a case.

O = At least one of these “O” (One or more) criteria in each category (e.g., clinical evidence and laboratory evidence) in the same column—in conjunction with all “N” criteria in the same column—is required to report a case.

* A requisition or order for any of the “S” laboratory tests is sufficient to meet the reporting criteria.

Case Definition

Clinical Criteria

Zika Virus Disease, non-congenital

A person with one or more of the following not explained by another etiology:

- Clinically compatible illness that includes
 - acute onset of fever (measured or reported), or
 - maculopapular rash, or
 - arthralgia, or
 - conjunctivitis
- Complication of pregnancy
 - fetal loss; or
 - fetus or neonate with congenital microcephaly, congenital intracranial calcifications, other structural brain or eye abnormalities, or other congenital central nervous system-related abnormalities including defects such as clubfoot or multiple joint contractures
- Guillain-Barré syndrome or other neurologic manifestations

Zika Virus Disease, congenital

Liveborn infant with congenital microcephaly, or intracranial calcifications, or structural brain or eye abnormalities, or other congenital central nervous system-related abnormalities not explained by another etiology.

(As part of the complete evaluation of congenital microcephaly or other CNS birth defects, testing for other congenital infections such as syphilis, toxoplasmosis, rubella, cytomegalovirus infection, lymphocytic choriomeningitis virus infection, and herpes simplex virus infections should be considered. An assessment of potential genetic and other teratogenic causes of the congenital anomalies should also be performed.)

Laboratory Criteria

Recent ZIKV infection

- Culture of ZIKV from blood, body fluid, or tissue; OR
- Detection of ZIKV antigen or viral RNA in serum, CSF, placenta, umbilical cord, fetal tissue, or other specimen (e.g., amniotic fluid, urine, semen, saliva), OR
- Positive ZIKV IgM antibody test in serum or CSF with positive ZIKV neutralizing antibody titers and negative neutralizing antibody titers against dengue or other flaviviruses endemic to the region where exposure occurred
-

Recent flavivirus infection, possible ZIKV

- Positive ZIKV IgM antibody test of serum or CSF with positive neutralizing antibody titers against ZIKV and dengue virus or other flaviviruses endemic to the region where exposure occurred
- Positive ZIKV IgM antibody test AND negative dengue virus IgM antibody test with no neutralizing antibody testing performed

Epidemiologic Linkage

- Resides in or recent travel to an area with known ZIKV transmission; OR
- Sexual contact with a confirmed or probable case within the infection transmission risk window of ZIKV infection or person with recent travel to an area with known ZIKV transmission; OR
- Receipt of blood or blood products within 30 days of symptom onset; OR
- Organ or tissue transplant recipient within 30 days of symptom onset; OR
- Association in time and place with a confirmed or probable case; OR
- Likely vector exposure in an area with suitable seasonal and ecological conditions for potential local vectorborne transmission

Case Classification

Zika Virus Disease, non-congenital

Confirmed disease case

Meets clinical criteria for non-congenital disease; AND

Has laboratory evidence of recent ZIKV infection by:

- Detection of ZIKV by culture, viral antigen or viral RNA in serum, CSF, tissue, or other specimen (e.g. amniotic fluid, urine, semen, saliva); OR
- Positive ZIKV IgM antibody test of serum or CSF with positive ZIKV neutralizing antibody titers and negative neutralizing antibody titers against dengue or other flaviviruses endemic to the region where exposure occurred.

Probable disease case

Meets clinical criteria for non-congenital disease; AND

Has an epidemiologic linkage; AND Has laboratory evidence of recent ZIKV or flavivirus infection by:

- Positive ZIKV IgM antibody test of serum or CSF with:
 - positive neutralizing antibody titers against ZIKV and dengue or other flaviviruses endemic to the region where exposure occurred; OR
 - negative dengue virus IgM antibody test and no neutralizing antibody testing performed.

Infection that Does Not Meet Clinical Criteria, non-congenital

Confirmed ZIKV Infection

A person who does not meet clinical criteria for non-congenital disease; AND

Has laboratory evidence of recent ZIKV infection by:

- Detection of ZIKV by culture, viral antigen or viral RNA in serum, CSF, tissue, or other specimen (e.g. amniotic fluid, urine, semen, saliva); OR
- Positive ZIKV IgM antibody test of serum or CSF with positive ZIKV neutralizing antibody titers and negative neutralizing antibody titers against dengue or other flaviviruses endemic to the region where exposure occurred.

Probable ZIKV Infection

A person who does not meet clinical criteria for non-congenital disease; BUT

Has an epidemiologic linkage; AND

Has laboratory evidence of recent ZIKV infection by:

- Positive ZIKV IgM antibody test of serum or CSF with:
 - positive neutralizing antibody titers against ZIKV and dengue or other flaviviruses endemic to the region where exposure occurred; OR
 - negative dengue virus IgM antibody test and no neutralizing antibody testing performed.

Zika Virus Disease, Congenital

Confirmed Congenital Disease Case

A neonate meets the clinical criteria for congenital disease AND meets one of the following laboratory criteria:

- ZIKV detection by culture, viral antigen, or viral RNA in fetal tissue, umbilical cord blood, or amniotic fluid; OR neonatal serum, CSF, or urine collected within 2 days of birth; OR
- Positive ZIKV IgM antibody test of umbilical cord blood, neonatal serum or CSF collected within 2 days of birth with positive ZIKV neutralizing antibody titers and negative neutralizing antibody titers against dengue or other flaviviruses endemic to the region where exposure occurred.

Probable Congenital Disease Case

A neonate meets clinical criteria for congenital disease; AND

The neonate's mother has an epidemiologic linkage or meets laboratory criteria for recent ZIKV or flavivirus infection; AND

The neonate has laboratory evidence of ZIKV or flavivirus infection by:

- Positive ZIKV IgM antibody test of serum or CSF collected within 2 days of birth; and
 - positive neutralizing antibody titers against ZIKV and dengue or other flaviviruses endemic to the region where exposure occurred; OR
 - negative dengue virus IgM antibody test and no neutralizing antibody testing performed.

Infection that Does Not Meet Clinical Criteria, Congenital

Confirmed Congenital Infection without disease

Neonate who does not meet clinical criteria for a congenital disease case; BUT

The neonate has laboratory evidence of recent ZIKV or flavivirus infection by:

- ZIKV detection by culture, viral antigen or viral RNA in fetal tissue, umbilical cord blood, or amniotic fluid; OR neonatal serum, CSF, or urine collected within 2 days of birth; OR
- Positive ZIKV IgM antibody test of umbilical cord blood, neonatal serum or CSF collected within 2 days of birth with positive ZIKV neutralizing antibody titers and negative neutralizing antibody titers against dengue or other flaviviruses endemic to the region where exposure occurred.

Probable Congenital Infection without disease

Neonate who does not meet clinical criteria for a congenital disease case; BUT

The neonate's mother has an epidemiologic linkage or meets laboratory criteria for recent ZIKV or flavivirus infection; AND

The neonate has laboratory evidence of ZIKV or flavivirus infection by:

- Positive ZIKV IgM antibody test of serum or CSF collected within 2 days of birth; and
 - negative dengue IgM antibody test and no neutralizing antibody testing performed; or
 - positive neutralizing antibody titers against ZIKV and dengue or other flaviviruses endemic to the region where exposure occurred.

Table 2. Criteria for defining a case of Zika virus disease or infection

Criterion	Zika Virus, Non-congenital								Congenital Zika Virus											
	Symptomatic				Asymptomatic				Symptomatic				Asymptomatic							
	Prob	Conf	Prob	Conf	Prob	Conf	Prob	Conf	Prob	Conf	Prob	Conf	Prob	Conf						
<i>Clinical Evidence</i>																				
Fever of acute onset	O	O	O	O																
Maculopapular Rash	O	O	O	O																
Arthralgia	O	O	O	O																
Conjunctivitis	O	O	O	O																
Guillain-Barré syndrome	O	O	O	O																
Neurologic manifestation	O	O	O	O																
Complications of pregnancy including fetal loss, or fetus or neonate with congenital microcephaly or intracranial calcifications	O	O	O	O																
Congenital microcephaly											O	O	O	O						
Intracranial calcifications											O	O	O	O						
Congenital structural brain or eye abnormalities											O	O	O	O						
Other congenital central nervous system abnormalities											O	O	O	O						
Absence of clinical criteria listed above					N	N	N	N							N	N	N	N		
Liveborn infant									N	N	N	N	N	N	N	N	N	N		
Illness not explained by another etiology	N	N	N	N					N	N	N	N								
<i>Laboratory Evidence</i>																				
Detection of ZIKV by culture, viral antigen or viral RNA in serum, CSF, tissue, or other specimen (e.g., amniotic fluid, urine, semen, saliva)			N								N									
Detection of ZIKV by culture, viral antigen, or viral RNA in fetal tissue, umbilical cord blood, or amniotic fluid													O						O	
Detection of ZIKV by culture or viral RNA in neonatal serum, CSF, or urine collected within 2 days of birth													O						O	
Positive ZIKV IgM antibody test of serum or CSF	N	N			N	N	N		N											

Zika Virus: Utah Public Health Disease Investigation Plan

Positive ZIKV IgM antibody test of umbilical cord blood, neonatal serum, or CSF collected within 2 a days of birth									N	N		N					N
Positive ZIKV neutralizing antibody titers				N				N				N					N
Negative neutralizing antibody titers against dengue or other endemic flaviviruses in region where exposure occurred				N				N				N					N
Negative dengue-specific IgM antibody test	N				N				N				N				
Positive neutralizing antibody titers against ZIKV and dengue or other flaviviruses endemic to the region where exposure occurred		N				N				N					N		
No neutralizing antibody testing performed	N				N					N				N			
<i>Epidemiological Evidence</i>																	
Resides in or has recently traveled to an area with ongoing ZIKV transmission	O	O				O	O										
Direct epidemiologic linkage to a person with laboratory evidence of recent ZIKV infection (e.g., sexual contact, in utero or perinatal transmission, blood transfusion, organ transplantation)	O	O				O	O										
Laboratory evidence of maternal infection with ZIKV or unspecified flavivirus infection during pregnancy										O	O				O	O	
Maternal history of epidemiologic risk factors associated with non-congenital disease or infection during pregnancy										O	O				O	O	
Association in time and place with a confirmed or probable case	O	O				O	O										
Vector exposure in an area with suitable seasonal and ecological conditions for potential local ZIKV vectorborne transmission	O	O				O	O										

Notes:
 S = This criterion alone is Sufficient to report a case.
 N = All "N" criteria in the same column are Necessary to report a case.
 O = At least one of "O" (Optional) criteria in each category (e.g., clinical evidence and laboratory evidence) in the same column - in conjunction with "N" criteria in the same column - is required to report a case.

Case Investigation Process

- 1) A physician or patient calls the Utah Department of Health (UDOH) or Local Health Department (LHD) about further guidance regarding approval and testing. Any questions concerning approval requests should go through the State Epidemiologist or Medical Officer to decide if testing is appropriate.
- 2) UDOH or LHD will notify the provider of the testing decision (approved or not approved).
- 3) If testing is approved, the person's information will be entered into UT-NEDSS and routed to the appropriate LHD for follow-up. UDOH or the LHD will make arrangements for transport of the specimen, and notify UPHL staff that the specimen will be arriving.
- 4) Once results are returned, public health will coordinate notification and follow-up with the LHD, provider and/or individual as needed. Initial test results are normally available within 1 week after specimen receipt. Follow on confirmatory testing takes 4-5 weeks after specimen submission to CDC.

Outbreaks

An outbreak of Zika virus would be defined as a single, confirmed case identified in Utah, without appropriate travel history, indicating transmission may have occurred in Utah.

Identifying Case Contacts

Contact investigation will only occur in laboratory confirmed, pregnant Zika virus patients in order to evaluate if infection occurred in their male partner(s). In addition to assessing outcomes of the male partner, follow-up will occur for the baby to assess if infection occurred, and impact (if any) of the infection. Identifying and testing should be considered for male sexual partners and other females that are in child bearing years who also fit the reporting criteria. CDC has initiated a case registry to follow-up Zika-positive pregnant women to determine pregnancy progress and outcomes and to follow-up infants born to these women. LHDs and UDOH epidemiologists will collaborate to collect this information.

Case Contact Management

In this event, the investigating health jurisdiction will follow-up with the patient's physician to receive updated clinical information, including pregnancy outcomes.

✓ REFERENCES

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✓ **VERSION CONTROL**

Updated Jun 2016 – Update assays for acute specimens.

Updated Apr 2016 – Created disease plan using template and updated testing guidelines.

Updated Oct 2016 – Updated case definitions and reporting criteria.

✓ UT-NEDSS Minimum/Required Fields by Tab

Demographic

- County
- State
- Date of Birth
- Birth Gender
- Ethnicity
- Race
- First Name
- Last Name
- Middle Name
- Area Code
- Email Address
- Extension
- Phone Number

Clinical

- Date Diagnosed
- Date of Death
- Disease
- Onset Date
- Pregnant
- Expected delivery date
- Microcephaly
- Fetal loss
- Guillain-Barre syndrome/acute flaccid paralysis

- Clinicians
- Diagnostic Facilities
- Asymptomatic
- Symptomatic

Laboratory

- Lab Test Date
- Organism
- Specimen Source
- Test Result

Epidemiological

- Transmission mode of interest

Investigation

- Did the patient travel outside the USA during the exposure period?

Contacts

NA

Reporting

- Date first reported to public health

Administrative

- State case status