KEY MESSAGES – ZIKA VIRUS DISEASE

Purpose: This document is for internal and external use. The document contains cleared key messages for use in developing other materials.

Updated September 21, 2016

Updated information is in blue.

CONTENTS

BACKGROUND ON ZIKA

- Zika virus was first discovered in a monkey in the Zika Forest of Uganda in 1947.
- Before 2007, at least 14 cases of Zika had been documented, although other cases were likely to have occurred and were not reported.

- Before 2015, Zika virus disease (Zika) outbreaks occurred in areas of Africa, Southeast Asia, and the Pacific Islands. Because the symptoms of Zika are similar to those of many other diseases, many cases may not have been recognized.

OUTBREAK SUMMARY

- On May 7, 2015, the Pan American Health Organization (PAHO) issued an alert regarding the first confirmed Zika virus infections in Brazil.
- Since May 2015, CDC has been responding to increased reports of Zika and has assisted in investigations with PAHO and the Brazil Ministry of Health. The first regional travel notices for Zika in South America and Mexico were posted in December 2015.
- On January 22, 2016, CDC activated its Emergency Operations Center (EOC) to respond to outbreaks of Zika occurring in the Americas and increased reports of birth defects and Guillain-Barré syndrome in areas affected by Zika. On February 8, 2016, CDC elevated its EOC activation to a Level 1, the highest level.
- On February 1, 2016, the World Health Organization (WHO) declared a Public Health Emergency of International Concern (PHEIC) because of clusters of microcephaly and other neurological disorders in some areas affected by Zika.
- On February 8, 2016, President Obama announced a request for $1.8 billion in emergency funds for several agencies to accelerate research into a vaccine and educate populations at risk for disease.
- Currently, outbreaks are occurring in many countries and territories.

SYMPTOMS

- Many people infected with Zika virus won't have symptoms or will only have mild symptoms.
- The sickness is usually mild with symptoms lasting for several days to a week.
- The most common symptoms of Zika virus disease are
    - Fever
    - Rash
    - Joint pain
    - Conjunctivitis (red eyes)
- Other symptoms include
    - Muscle pain
    - Headache
- People usually don't get sick enough to go to the hospital, and they very rarely die of Zika.

TRANSMISSION

- Zika virus is spread to people primarily through the bite of an infected *Aedes* species mosquito (*Ae. aegypti* and *Ae. albopictus*). See Mosquito (Vector) Transmission.
- A pregnant woman can pass Zika virus to her fetus during pregnancy or around the time of birth. See Periconceptional/Intrauterine/Perinatal Transmission.
- A person with Zika virus can pass it to his or her sex partners. See Sexual Transmission.
- Zika may be spread through blood transfusion. See Blood Transfusion.
- One case of Zika has been confirmed in a person in Utah with no known risk factors; however, the person did provide care to another person who had very high amounts of Zika virus in his blood. Although the route of transmission is not certain, family contacts should be aware that blood and body fluids of severely ill patients might be infectious.
- Transmission of Zika virus infection through breastfeeding has not been documented. See Breastfeeding.

- There is no evidence that Zika is spread through touching, coughing, or sneezing.
- Anyone who lives in or travels to an area where Zika virus is found and has not already been infected with Zika virus can get it from mosquito bites.
- Based on information about similar infections, once a person has been infected with Zika virus, they are likely to be protected from future Zika virus infections.
- **Local transmission** means that mosquitoes in the area have been infected with Zika virus and have spread it to people.
- A **travel-associated** (or **imported**) case means that a person with Zika became infected during travel to an area with Zika. This includes the traveler becoming infected as well as anyone infected by that traveler.

MOSQUITO (VECTOR) TRANSMISSION

- Zika virus is primarily spread through the bite of an *Aedes aegypti* or *Aedes albopictus* mosquito.
- *Aedes aegypti* mosquitoes live in tropical, subtropical, and in some temperate climates. They are the primary vector of Zika, dengue, chikungunya, and other arboviral diseases. Because *Aedes aegypti* mosquitoes live near and prefer to feed on people, they are considered highly efficient at spreading these diseases.
- *Aedes albopictus* mosquitoes live in tropical, subtropical, and temperate climates. They have adapted to survive in a broader temperature range and at cooler temperatures than *Aedes aegypti*. Because these mosquitoes feed on people and animals, they are less likely to spread viruses like Zika, dengue, or chikungunya. The strain of *Ae. albopictus* in the United States came from northern Japan in 1985 and is capable of living in more temperate climates.
- The mosquitoes that spread Zika usually do not live at elevations above 6,500 feet (2,000 meters).
- Mosquitoes that spread Zika virus bite during the day and night.
- There are many species of *Aedes* mosquitoes. Not all *Aedes* species spread Zika virus. At this time, we don't know if there are other non-*Aedes* mosquito species that could spread Zika virus.
- To produce eggs, the female mosquito bites people to feed on blood. When feeding, a mosquito will pierce the skin (like a needle) and inject saliva into a person's skin. This allows the disease-causing germ (for example, the Zika virus) into the site.
- *Aedes aegypti* or *Ae. albopictus* mosquitoes can cause an outbreak of Zika, if the following happens:
    - People get infected with the virus.
    - A mosquito bites the infected person during the period of time when the virus can be found in the person's blood, typically only through the first week of infection.
    - The infected mosquito lives long enough for the virus to multiply and for the mosquito to bite another person.
    - The cycle continues multiple times to start an outbreak.
- In addition to Zika, the most common viruses and parasites spread through mosquito bites are:
    - Chikungunya
    - Dengue
    - Japanese encephalitis
    - LaCrosse encephalitis
    - Malaria
    - Rift Valley fever
    - St. Louis encephalitis
    - Yellow fever
- Once a mosquito is infected with Zika virus, it will remain infected for life. A mosquito lifespan is up to 30 days. There is no evidence that a mosquito infected with Zika will have a shorter than expected lifespan.
- Spread of Zika virus from an infected female mosquito to her eggs has not been well studied.

- Researchers at the University of Texas Medical Branch infected adult female *Aedes aegypti* and *Aedes albopictus* mosquitoes in the laboratory to see if Zika virus could be passed from a female to her eggs.
  - Zika virus was found to be passed to *Aedes aegypti* eggs.
  - From the data, transmission of Zika virus from an adult female mosquito to her eggs occurred in approximately 1 of 290 eggs. At this rate, an infected adult female might lay 2-3 infected eggs in her lifetime.
  - In nature, we expect that the rate of transmission from a mosquito to its egg would be less.

- Changes in the environment caused by climate change can influence the spread of mosquitoes.
  - These changes can affect
    - How quickly viruses replicate in mosquitoes
    - The life cycle of mosquitoes
    - The distribution of viruses, mosquitoes, or animal hosts
  - Natural disasters in the continental United States have rarely been accompanied by outbreaks of viruses spread by mosquitoes. Flooding immediately washes away young mosquitoes, making mosquito populations temporarily decrease.
    - Following the disaster, mosquito eggs hatch and develop and mosquito populations surge (this takes about a week). New adult mosquitoes are not infected with virus until they bite an infected person or animal.
    - Studies show that nuisance mosquitoes, not mosquitoes that typically spread viruses, will likely be a big problem after flooding.
      Post-flooding mosquito-borne diseases like Zika or West Nile are unlikely to be a large problem in the United States.
  - Mosquitoes cannot survive high winds; they dry out and die. There is no evidence that high winds can successfully carry mosquitoes into new areas where they will survive.
- In the extreme southern portions of southern US states (Florida, Alabama, Mississippi, Louisiana, Arizona, New Mexico, Texas, and California) where temperatures do not fall below 10°C (50°F), adult mosquitoes and mosquito eggs will survive at least through the fall, possibly into the winter.
- In other states, where temperatures do fall below 10°C (50°F), mosquitoes search for warm places as temperatures begin to drop. They will become less active and hibernate in enclosed spaces, like garages, sheds, and under (or inside) homes to survive cold temperatures. Mosquitoes and mosquito eggs die at temperatures below 0°C (32°F). When outdoor temperatures rise above 10°C (50°F), mosquitoes will become active again.
- Mosquito eggs can survive drying out for up to 8 months. In the far south, like southern Florida and Texas, mosquitoes can be active year round. In those areas that stay warm year round, their abundance is driven by wet/dry seasons and not as much by temperature. In South Florida, the rainy season ends around the end of October/early November.
- Flies do not spread Zika. Only a small number of fly species will bite people. When a fly bites, it creates a wound and laps blood up from the site. When a fly bites, it does not directly inject saliva into the bite site like a mosquito does.
  - Flies spread some diseases but fewer germs than mosquitoes because their feeding habits are different.

PERICONCEPTIONAL/INTRAUTERINE/PERINATAL TRANSMISSION

- Zika virus can pass from a pregnant woman to her fetus during pregnancy or around the time of birth (periconceptional/intrauterine/perinatal transmission). We do not know how often this happens.
- Researchers have found evidence of Zika virus in amniotic fluid, placenta, fetal brain tissue, and products of conception from pregnancies among women with Zika virus infection.
- Zika virus infection during pregnancy can cause microcephaly and other severe brain defects. Scientists are investigating other potential health problems that Zika virus infection during pregnancy may cause.

- Congenital or intrauterine transmission of Zika virus occurs when a woman is infected with Zika virus during her pregnancy, but before delivery, and the virus passes to the fetus.
- Perinatal transmission of Zika virus occurs when a woman is infected with the Zika virus within 2 weeks of delivery, and the virus passes to the infant at or around the time of delivery.
- When an infant acquires Zika virus disease perinatally, the infant may develop symptoms such as maculopapular rash, conjunctivitis, arthralgia (joint symptoms), and fever.
- We expect that pregnant women who develop Zika will have a similar course of illness to people who are not pregnant.
- No evidence exists to suggest that pregnant women are more susceptible to Zika virus infection.
- We do not know if pregnant women are more likely to develop symptoms compared to the general population if they get infected with Zika virus.
- We do not know if pregnant women are more likely to get Guillain-Barré syndrome if infected with Zika.
- See Prevention section for information on preventing Zika during pregnancy.
- Because of the potential risks of Zika virus infection during pregnancy, CDC's top priority for the Zika response is to protect pregnant women and their fetuses.

SEXUAL TRANSMISSION

- Zika can be passed through sex from a person who has Zika to his or her sex partners.
    - Zika can be passed through sex, even if the infected person does not have symptoms at the time.
    - It can be passed from a person with Zika before their symptoms start, while they have symptoms, and after their symptoms end.
    - The virus may also be passed by a person who has been infected with the virus but never develops symptoms.
- Sexual exposure includes sex without a condom with a person who traveled to or lives in an area with Zika.
    - This includes vaginal, anal, and oral sex and the sharing of sex toys.
- Zika has been found in genital fluids, including semen and vaginal fluids. Studies are underway to find out how long Zika stays in the semen and vaginal fluids of people who have Zika and how long it can be passed to sex partners. Current research indicates that Zika can remain in semen longer than in other body fluids, including vaginal fluids, urine, and blood.
    - Infectious, live Zika virus (virus that can be spread to others) has been found in semen at least 24 days after symptoms began.
    - Pieces of Zika virus (Zika RNA) have been found in semen as many as 188 days after symptoms began, and in vaginal and cervical fluids up to 3 and 11 days after symptoms began, respectively.
- Zika RNA may indicate the presence of live virus (which can be infectious to others), or it may simply indicate leftover genetic material (dead virus) that is no longer infectious to others. Finding virus RNA does not necessarily mean live virus that can cause an infection is present or that a person can spread it to others.
    - In most cases reported to date, no follow up testing was done to determine when infected men no longer had Zika virus in their semen.
    - In one case, sexual transmission is estimated to have occurred 32-41 days after onset of the man's symptoms.
    - CDC and other public health partners continue to study Zika virus and how it is spread and will share new information as it becomes available. This continuing research may help us find out
        - How long Zika can stay in genital fluids.
        - How common it is for Zika to be passed during sex by a man or woman.
        - If Zika passed to a pregnant woman during sex has a different risk for birth defects than Zika transmitted by a mosquito bite.

- See Testing/Diagnosis for information on testing for Zika.
- See Preventing Sexual Transmission.

BLOOD TRANSFUSION

- Zika virus may be spread through blood transfusions.
    - Because many people infected with Zika virus don't have any symptoms, blood donors may not know they have been infected.
    - There have been suspected cases of Zika transmission through blood transfusion in Brazil. During the Zika virus outbreak in French Polynesia in 2013-2014, 2.8% of blood donors tested positive for Zika. In previous outbreaks elsewhere, the virus has also been found in blood donors.
- Zika virus currently poses a low risk to the blood supply in the continental United States, but this could change depending on how many people become infected with the virus.
- To date, there have been no confirmed blood transfusion-transmission cases in the United States.
- For guidance on screening of donated blood for Zika virus, see Blood Screening.

BREASTFEEDING

- There are no reports of transmission of Zika virus infection through breastfeeding.
    - Zika virus has been detected in breast milk.
    - Based on available evidence, the benefits of breastfeeding outweigh any possible risk.
    - Because of the benefits of breastfeeding, mothers are encouraged to breastfeed even in areas where Zika virus is found.
- CDC and the World Health Organization recommend that infants born to women with suspected, probable, or confirmed Zika virus infection, or who live in or have traveled to areas with Zika, should be fed according to normal infant feeding guidelines.
    - These infants should start breastfeeding within one hour of birth, be exclusively breastfed for 6 months, and have introduction of adequate, safe, and properly fed complementary foods, while continuing breastfeeding up to 2 years old or beyond.
    - All mothers who decide to breastfeed should receive skilled support to initiate and sustain breastfeeding.
    - Mothers and families of infants born with congenital anomalies, such as microcephaly, or those presenting with feeding difficulties, should receive skilled feeding support from health professionals.
    - Multidisciplinary teams may be necessary for infants who need specialist support in infant feeding, which may be the case in particular for infants born with congenital anomalies, including microcephaly, and long-term management may be necessary.

TESTING & DIAGNOSIS

- To diagnose Zika, a doctor or other healthcare provider will ask about any recent travel and any signs and symptoms. A blood or urine test can confirm a Zika infection.
- Pregnant women who live in or have recently traveled to an area with Zika should talk to a doctor or other healthcare provider about their risk of Zika virus infection even if they don't feel sick.
    - Pregnant women should also talk to their doctor or other healthcare provider if their sex partner lives in or recently traveled to an area with Zika.
- Pregnant women should see a doctor or other healthcare provider if they develop a fever, rash, joint pain, or conjunctivitis (red eyes). They should tell the doctor or other healthcare provider where they live and where they have traveled.
- Pregnant women with possible exposure to Zika virus should be tested for Zika infection **even if they do not have symptoms**. See updated guidance on testing of pregnant women.

- People who are not pregnant should see a doctor or other healthcare provider if they develop symptoms (fever, rash, joint pain, or red eyes) and live in or have recently traveled to an area with Zika. They should tell the healthcare provider that they traveled to an area with Zika.
- CDC recommends Zika virus testing for people who may have been exposed to Zika through sex **and** who have Zika symptoms.
- A doctor or other healthcare provider may order blood or urine tests to look for Zika or other similar viral diseases like dengue or chikungunya.
- Testing blood, semen, vaginal fluids, or urine is not recommended to determine how likely a person is to pass Zika virus through sex. Because Zika virus can remain in semen longer than blood, someone might have a negative blood test but a positive semen test. The results of the tests are difficult to interpret.
- Available tests may not accurately identify the presence of Zika or a person's risk of passing it on through sex. As we learn more and as tests improve, these tests may become more helpful for determining a person's risk of passing Zika through sex.
- See Laboratory Testing section for more information on Zika testing.

TREATMENT

- There is no specific medicine or vaccine for Zika virus.
- Treat the symptoms.
  - Get plenty of rest.
  - Drink fluids to prevent dehydration.
  - Take medicine such as acetaminophen (Tylenol®) to reduce fever and pain.
  - Do not take aspirin or other non-steroidal anti-inflammatory drugs (NSAIDS) until dengue can be ruled out to reduce the risk of bleeding.
  - If you are taking medicine for another medical condition, talk to your doctor or other healthcare provider before taking additional medication.

PREVENTION

- There is no vaccine to prevent Zika virus disease.
- Main Zika virus prevention strategies include:
  - Preventing Mosquito Transmission
  - Preventing Sexual Transmission
  - Preventing Zika Infection During Pregnancy
  - Blood Screening

PREVENTING MOSQUITO TRANSMISSION

- The best way to prevent diseases spread by mosquitoes is to protect yourself and your family from mosquito bites.
  - Wear long-sleeved shirts and long pants.
  - Stay in places with air conditioning and window and door screens to keep mosquitoes outside.
  - Treat your clothing and gear with permethrin or buy pre-treated items.
  - Use Environmental Protection Agency (EPA)-registered insect repellents on exposed skin. See Insect Repellent section.
  - Sleep under a mosquito bed net if air conditioned or screened rooms are not available or if sleeping outdoors.
- For babies and children:
  - Dress your child in clothing that covers arms and legs.

  - Cover crib, stroller, and baby carrier with mosquito netting.
  - See insect repellent recommendations for children below.
- During approximately the first week of infection, Zika virus can be found in a person's blood and can pass from an infected person to a mosquito through mosquito bites. An infected mosquito can then spread the virus to other people.
  - To help prevent others from getting sick, strictly follow steps to prevent mosquito bites during the first week of illness.
- Even if they do not feel sick, travelers returning to the United States from an area with Zika should take steps to prevent mosquito bites for 3 weeks. These steps will prevent them from passing Zika to mosquitoes that could spread the virus to other people.

INSECT REPELLENT

- CDC recommends using EPA-registered insect repellents with one of the following active ingredients: DEET, picaridin, IR3535, or oil of lemon eucalyptus or para-menthane-diol.
  - Choosing an EPA-registered repellent ensures the EPA has evaluated the product for effectiveness.
  - Insect repellents registered by the EPA repel the mosquitoes that spread Zika and other viruses like dengue, chikungunya, and West Nile.
  - When used as directed, EPA-registered insect repellents are proven safe and effective even for pregnant and breastfeeding women.
  - 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 sunscreen before applying insect repellent.
- Treat clothing and gear with permethrin or buy permethrin-treated items.
  - The EPA has reviewed scientific studies on the use of permethrin-treated clothing. Based on EPA's review, there is no evidence of reproductive or developmental effects to mother or child following exposure to permethrin.
  - Treated clothing remains protective after multiple washings. See product information to learn how long the protection will last.
  - If treating items yourself, follow the product instructions carefully.
  - Do **NOT** use permethrin products directly on skin. They are intended to treat clothing.
  - In some places, such as Puerto Rico, where permethrin products have been used for years in mosquito control efforts, mosquitoes have become resistant to it. In areas with high levels of resistance, use of permethrin and related products is not likely to be effective. Contact local authorities or a mosquito control district for more information on pesticides.
- We do not know the effectiveness of non-EPA registered insect repellents, including some natural repellents.
  - Some natural insect repellents, often made with natural oils, have not been tested for effectiveness. Homemade insect repellents may not protect you from mosquito bites.
- Some natural products are EPA-registered.
  - These natural products with EPA registration include para-menthane-diol and oil of lemon eucalyptus.
- For children
  - Do not use insect repellents on babies younger than 2 months old.
    - Mosquito netting can be used to cover babies younger than 2 months old in carriers, strollers, or cribs to protect them from mosquito bites.
  - Do not use products containing oil of lemon eucalyptus or para-menthane-diol on children younger than 3 years old.

- Do not apply insect repellent onto a child's hands, eyes, mouth, and cut or irritated skin.
- Adults: Spray insect repellent onto your hands and then apply to a child's face.

CONTROLLING MOSQUITOES AT HOME

- To control mosquitoes outside your home:
  - **Once a week**, empty and scrub, turn over, cover, or throw out any items that hold water like tires, buckets, planters, toys, pools, birdbaths, flowerpot saucers, or trash containers. Mosquitoes lay eggs near water.
    - Tightly cover water storage containers (buckets, cisterns, rain barrels) so that mosquitoes cannot get inside to lay eggs.
    - For containers without lids, use wire mesh with holes smaller than an adult mosquito.
    - Use larvicides to kill young mosquitoes in large containers of water that will not be used for drinking and cannot be covered or dumped out.
  - **Use an outdoor insect spray** made to kill mosquitoes in areas where they rest.
    - Mosquitoes rest in dark, humid areas like under patio furniture, or under the carport or garage.
  - **If you have a septic tank,** repair cracks or gaps. Cover open vent or plumbing pipes. Use wire mesh with holes smaller than an adult mosquito.
- To control mosquitoes inside your home:
  - **Install or repair and use window and door screens**. Do not leave doors propped open.
  - **Use air conditioning** when possible.
  - **Once a week**, empty and scrub, turn over, cover, or throw out any items that hold water like vases and flowerpot saucers. Mosquitoes lay eggs near water.
  - **Kill mosquitoes inside your home.** Use an indoor insect fogger or indoor insect spray (see examples in table below) to kill mosquitoes and treat areas where they rest. These products work immediately, and may need to be reapplied. When using insecticides, always follow label directions. Only using insecticide will not keep your home free of mosquitoes.
    - Mosquitoes rest in dark, humid places like under the sink, in closets, under furniture, or in the laundry room.

Product	Active ingredient	Brand name examples*	How long it works
Indoor insect spray	Imidacloprid, β-Cyfluthrin	Home Pest Insect Killer, Raid, Ortho, HotShot, EcoLogic	7-10 days
Indoor insect fogger	Tetramethrin, Cypermethrin	Hot Shot, Raid, Real Kill, Spectracide	Up to 6 weeks
*Insecticide brand names are provided for your information only. The Centers for Disease Control and Prevention and the U.S. Department of Health and Human Services cannot recommend or endorse any name brand products.			

MODIFIED MOSQUITOES

- Though their role in mosquito control has not yet been determined, CDC sees the use of genetically modified (GM) mosquitoes and mosquitoes infected with *Wolbachia* (bacteria) as two promising new options for controlling mosquitoes that can spread viruses like dengue, chikungunya, and Zika.
- Use of GM mosquitoes or *Wolbachia*-infected mosquitoes requires a special facility for rearing mosquitoes. Until the facility is built and operating, these mosquitoes may not be quickly available for mosquito control during an outbreak.
- GM or *Wolbachia*-infected mosquitoes must be released in large numbers multiple times in a community during mosquito season to decrease the overall mosquito population.
  - Releases are more successful if timed at the beginning of the mosquito season.

- It takes at least 4-6 weeks to notice a reduction in local mosquito populations.

- GM mosquitoes and *Wolbachia*-infected mosquitoes are designed to reduce the overall mosquito population. These mosquitoes are designed to interrupt the mosquito life cycle by preventing the next generation of mosquitoes from surviving to become adults.
- Use of GM mosquitoes or *Wolbachia*-infected mosquitoes cannot and should not be used to replace traditional integrated mosquito management methods such as
  - Mosquito surveillance
  - Control of adult and young (larvae and pupae) mosquitoes
  - Insecticide resistance monitoring
  - Personal protection (people protecting themselves from mosquito bites)
- In an outbreak, use of insecticides may still be a priority to keep people from getting infected. It is more important to kill infected adult mosquitoes that are spreading viruses immediately. Use of GM mosquitoes or *Wolbachia*-infected mosquitoes may not work quickly enough to stop an outbreak.
- There are no data to link GM mosquitoes released by Oxitec and the Zika outbreak or cases of microcephaly in Brazil. Oxitec released mosquitoes in only a few towns in Brazil. Occurrence of the Zika outbreak and cases of microcephaly have been reported from most states in Brazil.
  - Before Oxitec could release genetically modified mosquitoes in communities, the Brazilian government had to approve. These genetically modified mosquitoes have not been associated with or expected to cause any harmful effects in people.
- The US Food and Drug Administration (FDA) released its final environmental assessment on the Oxitec mosquito on August 5, 2016. FDA's update states that the FDA has completed the environmental review for a proposed field trial to determine whether the release of Oxitec Ltd.'s genetically engineered (GE) mosquitoes (OX513A) will suppress the local *Aedes aegypti* mosquito population in the release area at Key Haven, Florida. After considering thousands of public comments, the FDA has published a final environmental assessment (EA) and finding of no significant impact (FONSI) that agrees with the EA's conclusions that the proposed field trial will not have significant impacts on the environment. FDA's finalization of the EA and FONSI does not mean that Oxitec's GE mosquitoes are approved for commercial use. Oxitec is responsible for ensuring that all other local, state, and federal requirements are met before conducting the proposed field trial, and, together with its local partner, the Florida Keys Mosquito Control District, for determining whether and when to begin the proposed field trial in Key Haven, Florida.
  - The Final Environmental Assessment on Oxitec mosquitoes
  - Additional information posted to the FDA website
  - Open field trials of Oxitec's genetically engineered mosquito have been conducted in Brazil, the Cayman Islands, Panama, and Malaysia.
  - Researchers have observed suppression of the targeted mosquito populations. They have not detected any adverse environmental or health outcomes.

AERIAL SPRAYING

- Aerial spraying uses airplanes to spray large areas with small amounts of insecticide. This type of spraying is safe, quick, and efficient.
- Aerial spraying is the preferred method for applying insecticide when people in a large area are getting sick with viruses mosquitoes can carry like Zika or West Nile (or dengue and chikungunya throughout the US territories) or when large numbers of infected mosquitoes are found.
  - It helps control and immediately reduce the number of mosquitoes that can spread viruses, like Zika.

- Aerial spraying has been used successfully for decades in the United States and its territories to help control and immediately reduce the number of mosquitoes that can spread viruses, like Zika, dengue, chikungunya and West Nile viruses.
- Airplanes spray insecticide that kills either young or adult mosquitoes. These products are called larvicides (to kill young mosquitoes) and adulticides (to kill adult mosquitoes).
- When a mosquito control district decides to spray wide areas of a community, it must use an EPA-registered product in accordance with label instructions, and a licensed professional must apply it.
    - Local government or mosquito control program will decide which type of insecticide to use.
- Aerial spraying occurs when mosquitoes are active, sometime between the early evening, close to sunset, and the early morning, close to sunrise.
    - This is when most insects, including honey bees, are not active, making them less likely to be affected by spraying.
        - However, adulticide sprays may kill other insects that come in contact with the spray.
        - Larvicides sprays will not kill other insects.
- During aerial spraying, a very small amount of insecticide is sprayed over the area, about 1 ounce (2 tablespoons) per acre, or about the size of some soccer fields.
    - This small amount does not pose a health risk to people or pets in the area that is sprayed.
    - You do not need to leave an area when it is sprayed. You are unlikely to breathe in or touch anything that has enough insecticide on it to cause health problems.
- Aerial spraying of adulticides and larvicides will not cause long-term harm to the environment or local ecosystems, even if spraying is repeated.

PREVENTING SEXUAL TRANSMISSION

- Not having sex eliminates the risk of getting Zika from sex.
- Condoms can reduce the chance of getting Zika from sex.
    - Condoms include male and female condoms.
    - To be effective, condoms should be used from start to finish, every time during vaginal, anal, and oral sex and the sharing of sex toys.
    - Dental dams (latex or polyurethane sheets) may also be used for certain types of oral sex (mouth to vagina or mouth to anus).
- Not sharing sex toys may also reduce the risk of spreading Zika to sex partners.
- **Anyone who is not pregnant or trying to get pregnant** who wants to avoid getting or passing Zika during sex can use condoms every time they have sex, or not have sex. The recommended period of time for taking these precautions will depend on the person's or couple's situation.
    - **Couples with a partner who lives in or has traveled to an area with Zika** should use condoms or not have sex for:
        - At least 8 weeks after a Zika diagnosis or start of symptoms if the traveling partner is female.
        - At least 6 months after a Zika diagnosis or start of symptoms if the traveling partner is male. This long period is because Zika stays in semen longer than in other body fluids.
        - At least 8 weeks after returning if the traveling partner (male or female) has no symptoms.
    - **Couples living in an area with Zika** can use condoms or not have sex. If either partner develops symptoms of Zika or has concerns, they should talk to a healthcare provider.
    - Couples who are considering condoms or abstinence should weigh the personal risks and benefits, including
        - The mild nature of the illness for many people
        - Either partner's exposure to mosquitoes while in an area with Zika

        - Plans for pregnancy (if appropriate) and access to birth control
        - Access to condoms
        - Desire for intimacy, including willingness to use condoms or not have sex
        - Ability to use condoms or not have sex
- Recommendations for condom use among pregnant couples do not change if a person with possible Zika virus exposure tests negative for Zika virus infection. See Preventing Zika Infection in Pregnancy.

PREVENTING ZIKA INFECTION IN PREGNANCY

- The risk of Zika is of greatest concern for pregnant women, who can pass Zika to their developing fetus if infected during pregnancy. Because Zika infection is a cause of microcephaly and severe brain abnormalities and has been linked to other birth defects, pregnant women should strictly follow steps to prevent mosquito bites and to protect themselves against sexual transmission throughout their entire pregnancy.
- **Pregnant couples with a partner who lives in or traveled to an area with Zika should:**
    - Use condoms from start to finish every time they have sex or not have sex during the pregnancy. This is important, even if the pregnant woman's partner does not have symptoms of Zika or feel sick.
    - Not share sex toys throughout the entire pregnancy.
- **Pregnant couples who are concerned that one of them may have Zika should** tell their healthcare provider immediately about
        - Symptoms of Zika
        - Each partner's travel history
        - How long either partner stayed in an area with Zika
        - If either partner took steps to prevent mosquito bites while in an area with Zika
        - If they had sex without a condom
- For guidance on suggested timeframes for delaying pregnancy, see Couples Interested in Conceiving.
    - Couples who would like to avoid or delay pregnancy should use the most effective birth control methods that they can use correctly and consistently. See Preventing Unintended Pregnancy During the Zika Virus Outbreak.

RECOMMENDATIONS FOR COUPLES INTERESTED IN CONCEIVING

- CDC issued guidance and information to prevent Zika virus transmission and negative health outcomes, including updated interim guidance for healthcare professionals for counseling patients about pregnancy planning and the timing of pregnancy after possible exposure to Zika virus.
    - **For women and men who have been diagnosed with Zika virus disease or who have symptoms of Zika** (fever, rash, joint pain, or red eyes) after possible exposure to Zika virus, CDC recommends that healthcare providers
        - Advise women to wait **at least 8 weeks** after their symptoms first appeared before trying to get pregnant.
        - Advise men to wait **at least 6 months** after their symptoms first appeared before trying to get their partner pregnant.
        - People with Zika should use condoms for sex or not have sex during this time period if they are concerned about the possibility of transmitting Zika virus to their sex partners. To be effective, condoms must be used every time, from start to finish during vaginal, anal, and oral sex and the sharing of sex toys.
    - **For men and women without symptoms of Zika virus but who had possible exposure to Zika from recent travel or sexual contact,** healthcare providers should recommend their patients wait **at least 8 weeks** after their possible exposure before trying to get pregnant.

- **Men and women without symptoms of Zika virus who live in an area with Zika** should talk with their healthcare providers about their pregnancy plans during a Zika virus outbreak, the potential risks of Zika, and how they can prevent Zika virus infection during the pregnancy.
- **For healthcare professionals**: Decisions about pregnancy planning are deeply personal and very complex. Each woman and her partner will have their own specific circumstances. Receiving information about Zika from a healthcare provider may be helpful in considering whether or not to become pregnant.
- **Women and couples who decide that now is not the right time to have a baby** should work with a healthcare provider to find a birth control method that is safe, effective, and works for them and their lifestyle.

PREVENTING UNINTENDED PREGNANCY DURING THE ZIKA VIRUS OUTBREAK

- Preventing unintended pregnancy during the Zika virus outbreak among people who may have been exposed is a primary strategy to reduce the number of pregnancies affected by Zika virus.
  - Sexually active women who wish to delay or avoid pregnancy should use an effective form of birth control the right way every time they have sex.
  - It is important for women and their partners to find a type of birth control that is safe and effective and meets their lifestyle needs and preferences.
  - There are many different types of birth control; some have hormones and some do not. Also, some methods are permanent while others are reversible.
  - The most effective type of reversible birth control is long-acting reversible contraception (LARC), specifically intrauterine devices (IUDs) and implants. These methods require no effort to use after insertion and can prevent unintended pregnancy for up to 3 to 10 years; however, they can also be removed at any time if a woman decides she wants to become pregnant. LARC and permanent methods (e.g. vasectomy and tubal sterilization) are known as highly effective methods: <1 in 100 women experience a pregnancy during the first year of typical use with these methods.
  - Contraceptive shots, pills, patches and rings require more effort to use correctly and consistently, and are known as moderately effective methods: 6 to 9 in 100 women experience a pregnancy during the first year of typical use with these methods.
  - Male and female condoms, withdrawal, and other methods such spermicides, sponges and fertility-awareness based methods, are known as less effective methods: more than 10 in 100 women will experience a pregnancy during their first year of typical use with these methods.
- Despite the availability of a wide range of FDA-approved contraceptives, unintended pregnancy, or a pregnancy that is mistimed or unwanted, remains common in the United States.
  - Nearly half of all pregnancies (45%) in the United States are unintended and there are high rates of unintended pregnancy in many states, including many states where mosquito-borne Zika virus transmission is possible.
  - Contraceptive use also varies by state.
    - Estimates prior to the 2016 Zika virus outbreak among states where transmission is possible show use of moderate and less effective contraception was most common; use of no contraceptive method and use of LARC varied by state, age group, and race/ethnicity.
    - CDC advises that states and local jurisdictions prepare to reduce virus impact by implementing strategies to increase access to contraceptive services.

ZIKA VIRUS BLOOD SCREENING

- In areas of active transmission, the Food and Drug Administration (FDA) recommends that blood either be screened by laboratory testing, subjected to pathogen reduction technology (PRT), or outsourced from other areas. Blood donations that test positive for Zika virus are removed from the blood supply.
- To protect the US blood supply, CDC, in collaboration with the FDA, defines areas of active Zika virus transmission as having two or more locally acquired cases of Zika virus infection within 45 days. These defined areas of risk can be different from areas for which CDC has issued travel guidance, because of concerns about potential risk for blood safety.
- On August 26, 2016, FDA issued revised guidance to prevent the spread of Zika virus through the blood supply. This new FDA guidance calls for blood collection centers in the United States to screen all donated blood for Zika virus, beginning immediately in Miami-Dade County and Palm Beach County, FL, in high-risk states within 4 weeks, and in all states within 12 weeks. See Zika & the United States.
- To date, one donation tested positive during blood donor screening in Florida; a few other suspect positive donations are under investigation. These Zika-positive donations likely reflect infections associated with travel to an area of active Zika virus transmission. Identifying a positive blood donation shows that the screening is working and is preventing Zika from entering the blood supply.
- Blood donation centers routinely ask donors a set of standard questions before they donate blood. The questions help determine if donors are in good health and free of any diseases that could be transmitted by blood transfusion. If the donor's answers indicate they are not well or are at risk for having a disease transmissible by blood transfusion, they are not allowed to donate blood.
    - Blood donor screening on the basis of a questionnaire, without a laboratory test, is insufficient for identifying Zika-infected donors in areas with active mosquito-borne transmission of Zika virus due to the high rate of asymptomatic infection.
- Although there is no FDA-licensed test for screening for Zika virus, on April 3, 2016 (Roche Molecular Systems, Inc.) and June 20, 2016 (Hologic, Inc. and Grifols), testing for Zika became available through two separate Investigational New Drug (IND) applications for blood collected in Puerto Rico and the continental United States.
    - Puerto Rico began using the Roche IND on April 3, 2016.
    - Texas, Florida, Alabama, Mississippi, Georgia, and South Carolina are currently using one of the two INDs.
    - Additional locations in the US are expected to implement testing in the coming months.

PUERTO RICO SURVEY OF BLOOD COLLECTION CENTERS

- The Puerto Rico survey of blood collection centers was conducted February 10-24, 2016.
- The results of this survey were used to guide a federally supported coordinated effort to address the blood supply and safety challenges in Puerto Rico. This effort included importing all blood components from the continental United States at a volume sufficient to meet the demand projected from the 2015 estimates, beginning March 5, 2016, until a nucleic acid screening test was implemented under IND protocol beginning April 4, 2016.
- Efforts to implement PRT for apheresis platelets and plasma collections in Puerto Rico are currently under way, and evaluation trials to determine safety and efficacy of investigational PRT for red blood cells (RBCs) are in planning stages.

HEALTH EFFECTS ASSOCIATED WITH ZIKA

- Zika virus infection during pregnancy is a cause of microcephaly and other severe brain defects, and has been linked to other problems in pregnancies and among fetuses and infants infected with Zika virus before birth, such as miscarriage, stillbirth, and birth defects including absent or poorly developed brain structures, defects of the eye, hearing deficits, limb abnormalities, and impaired growth.
- Several countries that have experienced Zika outbreaks recently have reported increases in people who have Guillain-Barré syndrome (GBS).

MICROCEPHALY

- Based on rigorous peer-reviewed evaluation of the scientific evidence, CDC and international partners have concluded that Zika virus infection during pregnancy is a cause of microcephaly and other severe brain defects.
- Microcephaly is a condition in which a baby's head is much smaller than expected. During pregnancy, a baby's head grows because the baby's brain grows. Microcephaly can occur because a baby's brain has not developed properly during pregnancy or has stopped growing after birth.
- We do not know if a newborn who gets Zika at birth will develop microcephaly after birth, which is called acquired microcephaly.
    - Babies can acquire microcephaly if their head growth slows or fails to develop after birth.
    - There have been no reports of Zika infection around the time of birth and acquired microcephaly.
    - All reports of microcephaly so far have been congenital microcephaly, meaning the microcephaly occurred before birth.
- Babies with microcephaly can have a range of other health problems, depending on how severe their microcephaly is. These problems can range from mild to severe and are often lifelong. In some cases, these problems can be life-threatening. Health problems include
    - Seizures
    - Developmental delay, such as problems with speech or other developmental milestones (like sitting, standing, and walking)
    - Intellectual disability (decreased ability to learn and function in daily life)
    - Problems with movement and balance
    - Feeding problems, such as difficulty swallowing
    - Hearing loss
    - Vision problems
- Because it is difficult to predict at birth what problems babies will have from microcephaly, they often need close follow-up through regular check-ups with a doctor or other healthcare provider to track their growth and development.
- The baseline prevalence of congenital microcephaly is difficult to determine because of underreporting, and the inconsistency of clinical criteria used to define microcephaly.
- Knowledge about Zika virus is increasing rapidly and researchers continue to work to better understand the extent of Zika virus' impact on mothers, infants, and children.
- Recognizing that Zika is a cause of certain birth defects does not mean that every pregnant woman infected with Zika will have a baby with a birth defect. It means that infection with Zika during pregnancy increases the chances for these problems.
- Scientists continue to study other potential health problems that Zika virus infection during pregnancy may cause.
    - Although studies to date have linked Zika with certain birth defects or other pregnancy problems, it's important to remember that even in places with active Zika transmission, women are delivering infants that appear to be healthy.
    - Many questions remain about the timing, absolute risk, and the spectrum of outcomes associated with Zika virus infection during pregnancy.
    - More lab testing and other studies are planned to learn more about the risks of Zika virus infection during pregnancy.
- Currently, there is no evidence to suggest that past Zika virus infection poses an increased risk of birth defects for future pregnancies once the virus has completely cleared a woman's body.

DIAGNOSIS OF MICROCEPHALY

- During pregnancy, microcephaly can sometimes be diagnosed during an ultrasound (which creates pictures of the baby). Multiple ultrasounds may be needed to detect an abnormality.
- Microcephaly might not be detectable until late in the second or early in the third trimester of pregnancy.
- CDC has interim guidelines for testing and evaluating an infant with possible congenital Zika virus infection.
    - The accuracy of the test varies depending on the type of test, the timing of the test during pregnancy, the specific equipment used for the test, and the person conducting the test.
- CDC provides information on diagnosing birth defects both during pregnancy and after birth. Some tests need to be done during a particular time in pregnancy, but others such as an ultrasound can be done at any time during pregnancy. High-resolution ultrasounds (also known as Level 2 ultrasounds) are used to look in more detail for possible birth defects and are usually completed between weeks 18 and 22 of pregnancy. They can also be performed later if risks are detected later in pregnancy.

PYRIPROXYFEN

- Several media reports in February 2016 suggested that a larvicide called pyriproxyfen might be linked with microcephaly. These media reports appear to be based on a February 3 publication authored by an Argentine physicians' organization, which claims that the use of pyriproxyfen in drinking water in Brazil is responsible for the country's increase in microcephaly cases.
- The World Health Organization (WHO) has approved the use of pyriproxyfen for the control of disease-carrying mosquitoes.
- Pyriproxyfen is a registered larvicide in Brazil and other countries, it has been used for decades, and it has not been linked with microcephaly.
- Exposure to pyriproxyfen would not explain recent study results showing the presence of Zika virus in the brains of infants born with microcephaly.

GUILLAIN-BARRÉ SYNDROME

- Current CDC research suggests that GBS is strongly associated with Zika; however, only a small proportion of people with recent Zika virus infection get GBS. CDC is continuing to investigate the link between GBS and Zika to learn more.
- GBS is an uncommon illness of the nervous system in which a person's own immune system damages the nerve cells, causing muscle weakness, and sometimes, paralysis.
- GBS symptoms include weakness of the arms and legs and, in severe cases, can affect the muscles that control breathing.
- These symptoms can last a few weeks or several months. Most people fully recover from GBS, though some people have permanent damage. Very few people die from GBS.
- Researchers do not fully understand what causes GBS. Most people with GBS report an infection before they have GBS symptoms. Rarely, vaccination has also been associated with the onset of GBS (for example, the 1976 Swine influenza vaccine).
- An estimated 3,000 to 6,000 people, or 1-2 cases for every 100,000 people, develop GBS each year in the United States. Most cases of GBS occur for no known reason, and true "clusters" of cases of GBS are very unusual.
- If you want to know more about the number of GBS cases in a certain area, contact the state or local health department in the state where the cases happen. CDC collaborates with state and local health departments to investigate reports of possibly unusually large numbers or "clusters" of GBS cases.

ZIKA & THE UNITED STATES

- Zika virus disease and Zika virus congenital infection are nationally notifiable conditions. State and territorial health departments are encouraged to report laboratory-confirmed cases to CDC through ArboNET, the national

surveillance system for arboviral diseases. Healthcare providers should report cases to their local, state or territorial health department according to the laws or regulations for reportable diseases in their jurisdiction.

- CDC is monitoring pregnancy and infant outcomes following Zika infection during pregnancy in US states and territories through the US Zika Pregnancy Registry (USZPR) and the Zika Active Pregnancy Surveillance System (also known as ZAPSS), in Puerto Rico.
- CDC watches for and reports the number of Zika cases and the areas where Zika is spreading, which will help improve our understanding of how and where Zika is spreading.
- For the most recent case counts, visit CDC's Cases in the United States webpage.
- Local transmission of Zika virus has been reported in the United States.
    - The Florida Department of Health identified a section of Miami Beach, FL, with local mosquito-borne spread of Zika virus.
    - CDC and Florida are issuing travel, testing, and other recommendations for people who traveled to or live in the designated area.
    - At Florida's request, CDC sent a CDC Emergency Response Team (CERT) with experts in Zika virus, pregnancy and birth defects, vector control, laboratory science, and risk communication to assist in the response.
    - CDC is working closely with Florida public health officials to investigate the outbreak.
    - See Advice for People Living in or Traveling to South Florida.
- CDC is not able to predict how much Zika virus will spread in the continental United States.
    - Many areas in the United States have the type of mosquitoes that can become infected with and spread Zika virus. Recent outbreaks in the continental United States of chikungunya and dengue, which are spread by the same type of mosquito, have been relatively small and limited to a small area.
    - We will maintain and improve our ability to identify and test for Zika and other mosquito-borne diseases.
- Most cases in the continental United States have been **travel-associated**.
    - Most of these have been in travelers coming from the Caribbean, Puerto Rico, and Central and South America.

ZIKA PREGNANCY REGISTRIES

- CDC established the US Zika Pregnancy Registry and is collaborating with state, tribal, local, and territorial health departments to collect information about pregnancy and infant outcomes among pregnant women with laboratory evidence of Zika virus infection and their infants.
    - CDC also developed a similar system, the Zika Active Pregnancy Surveillance System, in Puerto Rico.
- Health departments are working with healthcare providers to collect information about exposure to Zika, the presence or absence of symptoms and pregnancy complications, prenatal Zika testing, pregnancy and birth outcomes, and infant health and development.
- The data collected through these registries will provide additional, more comprehensive information to complement notifiable disease case reporting and will be used to update recommendations for clinical care, to plan for services for pregnant women and families affected by Zika virus, and to improve prevention of Zika virus infection during pregnancy.

NATIONAL REPORTING: PREGNANT WOMEN & OUTCOMES

- Starting May 20, 2016, there has been national reporting of the number of US pregnant women affected by Zika virus.
    - CDC began reporting pregnancy data from two enhanced surveillance systems: the US Zika Pregnancy Registry (USZPR) and the Puerto Rico Zika Active Pregnancy Surveillance System (ZAPSS). Both of these

systems include pregnant women with any laboratory evidence of possible Zika virus infection, with or without symptoms.

- These numbers reflect counts of pregnant women in the United States and US territories, with any laboratory evidence of possible Zika virus infection, with or without symptoms or pregnancy complications.
    - Pregnant women with laboratory evidence of possible Zika virus infection include those in whom Zika virus particles have been detected and those with evidence of an immune response to a recent virus that may be Zika infection.
    - The registries cast a broad net to ensure that CDC is monitoring pregnancies at risk for poor outcomes associated with possible Zika infection.
- Given that USZPR and ZAPSS aim to provide a complete and representative description of pregnancy and infant outcomes associated with Zika, participation by all jurisdictions is critical.
- This information will help healthcare providers as they counsel pregnant women affected by Zika and is essential for planning at the federal, state, and local levels for clinical, public health, and other services needed to support pregnant women and families affected by Zika.
- USZPR and ZAPSS are not ***real time*** estimates. They will reflect the number of pregnant women reported with any laboratory evidence of possible Zika virus infection every Thursday the week prior; numbers will be delayed one week.
- USZPR and ZAPSS align with recommendations for ongoing monitoring of pregnancies at risk for poor outcomes associated with Zika, based on scientists' current understanding of the effects of Zika infection during pregnancy.
- The registries will report two numbers that reflect the aggregated data from the US states and DC and separately from the combined total from the US territories. CDC is not reporting individual state, tribal, territorial or jurisdictional level data. Comprehensive national information will facilitate and improve the public health response.
- Starting June 16, 2016, CDC began reporting poor outcomes of pregnancies with laboratory evidence of possible Zika virus infection. CDC will report two types of outcomes:
    - Live-born infants with birth defects and
    - Pregnancy losses with birth defects
- The poor pregnancy outcomes reported include those that are known to be caused by Zika (e.g., microcephaly and other severe brain defects) as well as others associated with Zika infection during pregnancy (e.g., eye defects, hearing abnormalities) that may be linked to Zika.

ZIKA & US TERRITORIES

- In December 2015, the Commonwealth of Puerto Rico, a United States territory, reported its first confirmed locally transmitted Zika virus case.
    - Puerto Rico continues to report the highest number of Zika virus infections in the United States, including the highest number of infections among pregnant women.
- At the request of Governor Alejandro García Padilla, the US Health and Human Services Secretary Sylvia M. Burwell declared a public health emergency (PHE) for Puerto Rico on August 12, 2016.
    - Through the public health emergency declaration, the government of Puerto Rico can
        - Apply for funding to hire and train unemployed workers to assist in vector control and outreach and education efforts through the U.S. Department of Labor's National Dislocated Worker Grant program; and
        - Request the temporary reassignment of local public health department or agency personnel who are funded through Public Health Service Act programs in Puerto Rico to assist in the Zika response.
- Since local transmission of Zika virus was reported in Puerto Rico in late 2015, it has spread to all municipalities.

  - The San Juan metropolitan area has the largest number of residents who have tested positive. Ponce, Bayamón, and Caguas metropolitan areas are also highly affected.
- In the coming months, it's possible that more pregnant women in Puerto Rico will become infected with Zika. A recent analysis from CDC estimates that 5,900-10,300 pregnant women might be infected during the Zika virus outbreak in Puerto Rico in 2016.
  - Because the full spectrum of health effects that might occur from Zika virus infection during pregnancy is unknown, this range reflects the number of infants at risk for health problems caused by Zika.
  - CDC scientists estimated that 100-270 of these infections in pregnant women might lead to microcephaly in infants between mid-2016 and mid-2017.
  - All pregnant women in Puerto Rico should be assessed for possible Zika virus exposure during each prenatal care visit.
  - CDC is working with Puerto Rico to provide services to protect pregnant women from Zika, support pregnant women who have been infected with Zika, increase lab testing, improve mosquito control, and provide access to contraception for women who choose to delay or avoid pregnancy.
- In February 2016, the Puerto Rico Department of Health reported the first case of Guillain-Barré syndrome (GBS) in a patient with evidence of recent infection Zika virus.
  - Monthly counts of reported cases of GBS with evidence of Zika virus infection appear to be increasing in Puerto Rico since April 2016.
- Outbreaks of mosquito-borne viruses tend to peak in the late summer and fall in Puerto Rico—in hotter months with higher rainfall—raising concern that Zika will continue to spread and increase in the coming months.
- The situation in Puerto Rico warrants urgent, comprehensive action to protect pregnant women.
  - The government of Puerto Rico and its municipalities, and everyone in the community, can implement an integrated mosquito management program that includes reducing places where mosquitoes lay eggs, keeping mosquitoes out of houses, and reducing the populations of adult mosquitoes and mosquito larvae by treating areas with Environmental Protection Agency (EPA)-approved products.
- Strategies to prevent Zika include mosquito control programs, dissemination of Zika Prevention Kits (containing health information, insect repellent, a bed net, standing water treatment tablets, and condoms), and approaches to improve access to effective birth control for women and their partners who want to avoid or delay pregnancy.
- In addition to these prevention efforts, Puerto Rico and CDC are monitoring Zika infections in pregnant women, and the outcomes of these pregnancies, to link the mothers and their infants to medical specialists and support services if needed.
- Cases of local transmission have also been confirmed in two other US territories: the United States Virgin Islands and American Samoa.

ZIKA & COLOMBIA

- Findings from *New England Journal of Medicine* paper (June 15, 2016) entitled Zika Virus Disease in Colombia: Preliminary Report:
  - Nearly 66,000 people, including nearly 12,000 pregnant women, were reported to have Zika virus disease in Colombia from August 9, 2015, through April 2, 2016.
  - The reported rate of Zika virus disease was about two times higher in women than men overall and about three times higher in women aged 15-29 years compared to men of the same age.
    - This could be the result of true increased risk or the result of other factors like reporting/testing bias or increased healthcare-seeking behavior.
  - Pregnant women infected with Zika virus during their first or second trimester were still pregnant at the time of this report (report cut-off date was May 2, 2016). Data on these pregnancy outcomes will be reported when available.

- Among a subset of the pregnant women with Zika virus disease, a majority (over 90%) of those infected in the third trimester delivered no infants with apparent birth defects, including microcephaly.
  - Although these preliminary data from Colombia suggest that Zika virus infection during the third trimester of pregnancy is not linked to birth defects like microcephaly, continued monitoring of the impact of Zika virus upon pregnancy and infant outcomes is ongoing.
- Cases of microcephaly are starting to emerge in Colombia.
  - From January 1 to April 28, 2016, four infants with microcephaly had laboratory evidence of congenital Zika infection, and all were born to women with asymptomatic Zika virus infections.
  - This suggests that poor pregnancy and infant outcomes like microcephaly can occur in women with Zika virus infection regardless of whether they have symptoms.
- CDC and Colombia's Instituto Nacional de Salud will continue to collaborate to provide critical scientific information about Zika virus infection during pregnancy.

TRAVEL RECOMMENDATIONS

- Travelers who go to areas with Zika can be infected with Zika virus.
  - See Prevention for guidance on how to prevent Zika virus transmission.
- Some travelers become infected while traveling but do not get sick until they return home. Be aware of any illness or symptoms during your trip or after you return home. Travelers should tell their doctor or other healthcare provider where and when they traveled.
- Even if they do not feel sick, travelers returning from an area with Zika should take steps to prevent mosquito bites for 3 weeks so they do not spread Zika to uninfected mosquitoes.
- The mosquitoes that spread Zika usually do not live at elevations above 6,500 feet (2,000 meters). Travelers who plan to be only in areas above this elevation are at a very low risk of getting Zika from a mosquito.
- Sexual transmission of Zika virus is possible, so travelers are encouraged to use condoms or not have sex. See Preventing Sexual Transmission.
- Until more is known, CDC recommends the following:
  - Pregnant women should not travel to areas with Zika.
  - See Preventing Zika Infection in Pregnancy.
  - Women trying to get pregnant
    - Before you or your partner travel, talk to your doctor or other healthcare provider about your plans to become pregnant and the risk of Zika virus infection.
    - You and your partner should strictly follow steps to prevent mosquito bites during the trip.
    - See Recommendations for Couples Interested in Conceiving.
- There are no restrictions for travelers entering the United States who have contracted Zika virus. CDC is not conducting enhanced entry screening of arriving travelers for Zika at this time.
  - Because many people who have Zika do not have symptoms, entry screening will not work to prevent imported cases. CDC and Customs and Border Protection are working together to assess the situation and determine necessary measures.
  - CDC has routine steps to detect sick travelers entering the United States, including requirements for ships and airplanes arriving in the United States to report certain illnesses to CDC. State and territorial health departments routinely notify CDC when cases of Zika are detected in the United States.

TRAVEL NOTICES

- CDC has issued travel notices (level 2 alert, "practice enhanced precautions") for people traveling to international destinations and overseas US territories where Zika virus is spreading. These notices include maps that show elevation levels in countries with Zika.

  - Specific areas where Zika is spreading are often difficult to determine and are likely to change over time.
  - As more information becomes available, CDC's Zika travel notices will be updated. Check back frequently for the most up-to-date recommendations.
- CDC regularly issues level 2 alert travel notices when recommending special precautions for travelers because of a specific outbreak or situation.
  - Special precautions might mean getting a certain vaccine or taking a certain medicine that would not usually be recommended for that destination. Sometimes the special precaution is that a certain group should avoid travel.
- Countries and territories where Zika is spreading are included in the travel notice.
  - Countries and territories with imported cases are not included in the travel notice. Imported cases occur when people are infected with Zika during travel to an affected area and then return to their home countries.
  - Countries with past Zika transmission are not included. CDC has had Zika travel notices in the past for several other countries, but those were removed as outbreaks ended.

TRAVEL TO FLORIDA

- Mosquito-borne spread of Zika is occurring in a 4.5-square-mile area of Miami Beach, FL.
  - Pregnant women should not travel to this area.
- Pregnant women and partners of pregnant women living in or traveling to Miami-Dade County should strictly follow steps to prevent mosquito bites.
- Pregnant women and their sex partners who are concerned about potential exposure to Zika may consider postponing nonessential travel to all parts of Miami-Dade County.
- On September 19, CDC updated guidance for the area of Wynwood previously identified as having mosquito-borne spread of Zika after no new cases of locally transmitted Zika were reported since early August.
  - Women and men living in or who traveled to the area should be aware that the location was considered to have active Zika virus transmission from June 15 to September 18, 2016.
- See the full guidance for people living in or traveling to South Florida.

CDC GUIDANCE & RECOMMENDATIONS FOR HEALTHCARE PROVIDERS

- CDC has developed guidance and recommendations on Zika for travelers, healthcare workers, and other groups. As new guidance and recommendations are developed and updated, they are posted on CDC's Zika website.
- CDC has interim guidelines for pregnant women and women of reproductive age with possible Zika virus exposure. CDC has additional Q&As about Zika virus for healthcare providers.
- CDC has interim guidelines for healthcare providers caring for infants and children with possible Zika virus exposure. Q&As on these guidelines are also available.
- CDC has interim guidance for prevention of sexual transmission of Zika virus.
- CDC has guidance on response planning for Zika for district and school administrators in the continental United States and Hawaii.
- CDC has released Health Alert Network messages on Zika.
- CDC released a report emphasizing the importance of healthcare personnel following practices, called Standard Precautions, to prevent the spread of infectious diseases such as Zika when caring for all patients, including pregnant patients in labor and delivery settings. Currently, there are no confirmed reports of Zika spreading from an infected patient to a health care provider or other patients. However, in labor and delivery units where health care personnel might come in contact with high volumes of body fluids, Standard Precautions to minimize contact with body fluids are important to reduce the possibility of spreading infectious diseases such as Zika.

- CDC continues to evaluate all available evidence and to update recommendations as new information becomes available. CDC's updated guidelines have been informed by our close collaboration with clinicians, professional organizations, state, tribal, local, and territorial health departments, and many other stakeholders.

OBSTETRICAL HEALTHCARE PROVIDERS

- CDC issued guidance and information to prevent Zika virus transmission and negative health outcomes, including updated interim guidance for healthcare professionals for counseling patients about pregnancy planning and the timing of pregnancy after possible exposure to Zika virus.
- Updated interim guidance was also issued for preventing sexual transmission with information about how long men and women should consider using condoms or not having sex after possible exposure or infection.
- CDC has updated Interim Guidelines for Health Care Providers Caring for Pregnant Women with Possible Zika Virus Exposure.
    - Extended time frame for the laboratory test that detects presence of Zika virus in the blood of pregnant women with symptoms from <7 days to <14 days.
    - Added new recommendation to test for presence of Zika virus in the blood of some pregnant women without reported symptoms.
    - Added new recommendation to use the laboratory test that detects presence of Zika virus in the blood as a follow-up test after pregnant women test positive or have an equivocal test for an immune response to an infection that is likely to be Zika.
    - The updated guidance also provides recommendations for female residents in areas with Zika virus.
- The American College of Obstetricians and Gynecologists and the Society for Maternal-Fetal Medicine (SMFM) have issued a Practice Advisory directed to obstetric providers about prevention strategies and clinical management of pregnant women.
- Healthcare providers should discuss reproductive life plans, including pregnancy intentions and timing with women of reproductive age in the context of the potential risks of Zika virus transmission.
    - A reproductive life plan helps a woman think about her goals for having or not having children and how to achieve these goals. A woman's plan depends on her personal goals. Reproductive life plan worksheets are available online.
- Healthcare providers should discuss strategies to prevent unintended pregnancy, including counseling on family planning and the correct and consistent use of effective contraceptive methods. Additionally, when choosing a contraceptive method, the prevention of sexually transmitted infections should also be considered, including the correct and consistent use of condoms.
- For women planning to become pregnant, healthcare providers should discuss the potential risk of Zika virus infection in pregnancy, the signs and symptoms associated with Zika virus disease, and when to seek care if the patient develops symptoms of Zika virus disease. They should also emphasize strategies to prevent mosquito bites.

AMNIOCENTESIS

- Consideration of amniocentesis should be individualized for each patient's clinical circumstance because data about its usefulness in diagnosing congenital Zika virus infection are limited. Healthcare providers should discuss the risks and benefits of amniocentesis with their patients.
- Similar to evaluation of other congenital infections, amniocentesis may be considered in the evaluation of potential Zika virus infection.
- It is unknown how sensitive or specific RT-PCR testing of amniotic fluid is for congenital Zika virus infection, whether a positive result is predictive of a subsequent fetal abnormality, and if it is predictive, what proportion of infants born after infection will have abnormalities. In addition, a negative result does not exclude congenital Zika virus infection.

- The optimal time to perform amniocentesis to diagnose congenital Zika virus infection is not known; Zika virus RNA has been detected in amniotic fluid as early as 4 weeks after maternal symptom onset, and as early as 17 weeks gestation.
- Amniocentesis performed ≥15 weeks of gestation is associated with lower rates of complications than those performed at earlier gestational ages (≤14 weeks of gestation).
- The exact timing of amniocentesis should be individualized based on the patient's clinical circumstances. Referral to a maternal-fetal medicine or infectious disease specialist with expertise in pregnancy management may be warranted. Risks and benefits of performing the amniocentesis should be discussed with the patient.

PRENATAL DIAGNOSIS OF MICROCEPHALY

- Ultrasound is performed during pregnancy when medical information is needed. It has been used during pregnancy for many years and has not been associated with adverse maternal, fetal, or neonatal outcomes.
    - Ultrasound operators are trained to use the lowest power for the minimum duration of time to obtain the needed information. There is consensus among various national and international medical organizations (American College of Radiology, American College of Obstetricians and Gynecologists, and the Society for Maternal Fetal Medicine) that ultrasound is safe for the fetus when used appropriately.
- Fetal ultrasound is generally performed in pregnancies between 18-20 weeks of gestation to assess fetal anatomy as part of routine obstetrical care.
- Ultrasounds might provide an opportunity to identify findings consistent with fetal Zika virus infection and offer pregnant women the option of amniocentesis to test for Zika virus RNA.
- Brain abnormalities reported in infants with laboratory-confirmed congenital Zika infection include microcephaly and disrupted brain growth. Some infants with possible Zika virus infection have been found to have intracranial calcifications and abnormalities of the eye.
    - In one published report of two infants with Zika virus RNA detected by RT-PCR, brain anomalies detected on ultrasound included corpus callosal and vermian dysgenesis, enlarged cisterna magna, severe unilateral ventriculomegaly, agenesis of the thalami, cataracts, intracranial and intraocular calcifications.
- Although microcephaly and intracranial calcifications are typically detected during ultrasounds in the late second and early third trimester of pregnancy, these findings might be detected as early as 18-20 weeks gestation. However, detection by prenatal ultrasound can be challenging at this gestational age due to fetal position and fetal motion artifact.
- The optimal time to perform ultrasound screening for fetal microcephaly is not known. In the absence of microcephaly, the presence of intracranial calcifications before 22 weeks gestation might suggest a risk for the future development of microcephaly.
- The accuracy of ultrasound to detect microcephaly in the setting of maternal Zika virus is not known and will depend on many factors, such as the timing of maternal infection relative to the timing of screening, severity of microcephaly, patient factors (e.g., obesity), gestational age, the equipment used, and the expertise of the person performing the ultrasound.
    - Because the absence of fetal microcephaly and intracranial calcifications on ultrasound at one point in pregnancy does not exclude future microcephaly, additional ultrasounds may be considered at the discretion of the healthcare provider. As we get more information specifically related to Zika virus infection and microcephaly, we expect that more specific guidance for women and their healthcare providers will be developed.
    - In a study of fetal microcephaly not caused by Zika virus infection, prenatally ultrasound-diagnosed microcephaly correlated with neonatal microcephaly approximately 57% of the time.

- Fetal MRI is not a screening tool and should be used only to answer specific questions raised by ultrasound or used in occasional specific high-risk situations. Interpretation of fetal MRI requires specialized expertise and has limited availability and accessibility in the United States.

PEDIATRIC HEALTHCARE PROVIDERS

- CDC has interim guidelines for healthcare providers in the United States caring for infants and children with possible congenital or perinatal Zika virus infection.
- These guidelines include recommendations for the evaluation, testing, and management of infants with possible congenital Zika virus infection. These interim guidelines will be updated as more information becomes available.
- The prognosis for infants with congenital Zika virus infection is not known.

BIRTH DEFECTS

- Care for these infants is focused on diagnosing and managing conditions that are present, monitoring the child's development over time, and addressing problems as they arise.
- From what we know about severe microcephaly, a range of neurologic sequelae has been reported (e.g., intellectual disability, hearing loss, vision loss, and seizures). These problems can range from mild to severe, are often life-long, and in some cases can be life-threatening.
- Microcephaly is diagnosed when an infant's head is smaller than expected as compared to infants of the same age (or gestational age) and sex. Postnatal (after birth) head circumference that is less than the 3rd percentile based on standard growth charts is considered microcephaly.
    - For infants diagnosed with microcephaly, head size correlates with underlying brain size. However, these measurements do not consistently predict long-term sequelae.
    - Neurologic sequelae may include seizures, vision or hearing problems, and developmental disabilities. Sequelae vary with the extent of brain disruption.
    - Causes of congenital microcephaly may include genetic conditions such as chromosomal abnormalities or maternal exposures (e.g., alcohol, mercury, or radiation) during pregnancy. In addition to Zika, other maternal infections that have been associated with microcephaly include cytomegalovirus (CMV), herpes simplex virus, rubella virus, lymphocytic choriomeningitis virus (LCMV), *Treponema pallidum* (i.e., syphilis), and *Toxoplasma gondii.*
- Head circumference (HC) and occipitofrontal circumference (OFC) are the same. These terms can be used interchangeably. CDC has information regarding how to accurately measure head circumference.

POTENTIAL OUTCOMES & PROGNOSIS

- There is limited information on neurocognitive outcomes in neonates if they are exposed to Zika virus during labor and delivery or after birth.
    - Perinatal transmission of Zika virus infection has been reported. However information is limited to two cases: one of these infants was asymptomatic and the other had thrombocytopenia and a diffuse rash.
    - The spectrum of clinical features that might be observed in infants who acquire Zika virus during the perinatal period is currently unknown.
- For infants with congenital Zika virus infection, care is focused on diagnosing and managing conditions that are present, monitoring the child's development over time, and addressing problems as they arise.
- Information on long-term outcomes among infants and children with acute Zika virus disease is limited. Thus, until more evidence is available to inform recommendations, routine pediatric care is advised for these infants and children.

- Most children infected with Zika virus are asymptomatic or have mild illness, similar to the findings seen in adults with Zika virus infection.
    - Treatment is supportive; this includes rest and fluids to prevent dehydration.
    - Non-steroidal anti-inflammatory drugs (NSAIDS) should not be used until dengue is ruled out as a cause of illness and should be avoided in children aged < 6 months.
    - Aspirin is not recommended for use with acute viral illnesses due to the risk of Reye's syndrome.
- In general, the risk for Guillain-Barré syndrome from any cause appears to increase with increasing age. GBS has been reported following Zika virus infection, although a causal link has not been established.
    - It is unclear how often GBS following Zika virus infection has occurred in children; one report from Brazil refers to 6 patients, aged 2–57 years, with neurologic syndromes (4 with GBS and 2 with acute disseminated encephalomyelitis) after laboratory-confirmed Zika virus infection; no further data are available.
    - Deaths due to Zika virus infection appear to be very rare at all ages.

CLINICAL GUIDANCE

- **Congenital Zika Virus Infection**
    - CDC updated its interim guidance for the evaluation and testing of infants with possible congenital Zika virus infection on August 19, 2016. In the new guidance, CDC also provides recommendations for the outpatient management of infants with laboratory evidence of possible Zika virus infection, with or without apparent associated birth defects and care of infants with possible congenital Zika virus infection throughout the first 12 months of life..

  Infant Testing Indication
    - Testing for Zika infection is recommended for infants born to mothers with laboratory evidence of possible Zika virus infection.
    - All infants born to mothers with laboratory evidence of Zika virus infection during pregnancy should receive a comprehensive physical exam, head ultrasound to assess the brain's structure, standard newborn hearing assessment, and lab testing for Zika virus.
    - Testing is also recommended for infants with signs of congenital Zika syndrome at birth, such as brain abnormalities, if the mother has an epidemiologic link (e.g., lived in or traveled to an area with Zika and/or had sex without a barrier method to prevent infection with a partner who lived in or traveled to an area with Zika).
        - Testing of the infant should be performed within the first 2 days of life, if possible. Delayed testing will make it difficult to determine if perinatal or postnatal infection has occurred.
    - For infants without abnormalities born to mothers with risk factors for maternal Zika virus infection (travel to or residence in an area of active Zika virus transmission or sex without a condom with a partner with travel to or residence in such an area) for whom maternal testing was not performed before delivery, or was performed outside the recommended window, assessment of the infant, including comprehensive physical exam and careful measurement of head circumference should be performed.
        - Maternal diagnostic testing should be performed and testing of the placenta for Zika virus PCR should be considered.
        - If an infant appears clinically well, further evaluation and infant testing can be deferred until maternal test results are available. However, if there is concern about infant follow-up, infant testing should be performed before hospital discharge.
    - In many cases, infant testing results will not be available before hospital discharge. If test results are not available before hospital discharge, infants should be presumed to have congenital Zika virus infection until test results are available. Infants with confirmed and probable Zika virus infection should be managed in the same way, according to guidance.

  Long-term Follow-up
    - Additional recommendations for follow-up and services for infants born to women with evidence of Zika virus infection during pregnancy depend on whether these infants have birth defects consistent with congenital Zika syndrome.

        - Although data on outcomes associated with congenital Zika virus infection are limited, experiences with other congenital infections can provide insight to guide clinical management until more data emerge. Infants with congenital infections, such as congenital cytomegalovirus and congenital rubella syndrome, can develop a range of disabilities later in life, including hearing loss, seizures, and neurodevelopmental delays, even without signs of infection at birth.
    - Families of affected infants will require support and referrals for information and services. There is likely to be a disproportionate burden on families with limited access to medical care and barriers to services.
        - Because the types of services needed to care for infants with congenital Zika syndrome are complex, CDC recommends coordinated care through a multidisciplinary team and established medical home.
        - As a critical component of patient care and early identification of any delays, families should be empowered to be active participants in their child's monitoring and care. Resources for families can be found at CDC's website.
- **Pediatric Infection**
    - Acute Zika virus disease should be suspected in an infant or child aged <18 years who
        - 1) traveled to or resided in an area with Zika virus within the past 2 weeks and
        - 2) has ≥1 of the following manifestations: fever, rash, conjunctivitis, or arthralgia.
    - Because transmission of Zika virus from mother to infant during delivery is possible, acute Zika virus disease should also be suspected in an infant during the first 2 weeks of life
        - 1) whose mother traveled to or resided in an affected area within 2 weeks of delivery and
        - 2) who has ≥1 of the following manifestations: fever, rash, conjunctivitis, or arthralgia.
- Arthralgia can be difficult to detect in infants and young children and can manifest as irritability, walking with a limp (for ambulatory children), difficulty moving or refusing to move an extremity, pain on palpation, or pain with active or passive movement of the affected joint.

LABORATORY TESTING

- Zika testing is recommended for
    - Anyone who has or recently experienced symptoms of Zika and lives in or recently traveled to an area with Zika.
    - Anyone who has or recently experienced symptoms of Zika and had unprotected sex with a partner who lived in or traveled to an area with Zika.
    - Pregnant women who live in or recently traveled to an area with Zika, with or without Zika symptoms.
- During the first two weeks after the start of illness, Zika virus disease can often be diagnosed by performing real-time reverse transcriptase polymerase chain reaction (rRT-PCR) on serum and urine.
    - Zika virus rRT-PCR should be performed on serum and urine collected <14 days after onset of symptoms in patients with suspected Zika virus disease.
    - A positive Zika virus rRT-PCR confirms Zika virus infection. However, because Zika virus RNA in serum and urine decreases over time, a negative rRT-PCR does not rule out Zika virus infection; in this case, serologic testing should be performed.
    - If Zika virus rRT-PCR results are negative for both specimens, serum should be tested by antibody detection methods.
- Serology assays can also be used to detect Zika virus-specific IgM and neutralizing antibodies, which typically develop toward the end of the first week of illness.
    - A positive IgM result does not always indicate Zika virus infection and can be difficult to interpret because cross-reactivity with related flaviviruses (e.g., dengue, Japanese encephalitis, West Nile, yellow fever) can occur.
    - A positive Zika virus IgM result may reflect previous vaccination against a flavivirus; previous infection with a related flavivirus; or current infection with a flavivirus, including Zika virus.

- Plaque-reduction neutralization testing (PRNT) can be performed to measure virus-specific neutralizing antibodies to confirm primary flavivirus infections and differentiate from other viral illnesses.
    - PRNT can be performed to measure virus-specific neutralizing antibodies to Zika virus, but neutralizing antibodies may still yield cross-reactive results in a person who was previously infected with another flavivirus, such as dengue, or has been vaccinated against yellow fever or Japanese encephalitis.
- Zika virus testing is performed at CDC, at some state and territorial health departments, and at some commercial laboratories. Healthcare providers should contact their state and local health department to facilitate testing. See the Testing for Zika Virus webpage for information on how to obtain Zika testing.
- Healthcare providers should work closely with the state or local health department to ensure that the appropriate test is ordered and interpreted correctly.
    - For specific testing recommendations, see Testing for Pregnant Women and Testing for Infants and Children.
- Laboratories processing clinical specimens for Zika virus diagnostic testing should, at a minimum, adhere to BSL2 (biosafety level 2) precautions. All laboratories should perform a risk assessment to determine if there are certain procedures or specimens that may require higher levels of biocontainment. Suspicion that the specimen may contain a pathogen that requires BSL3 precautions (e.g., chikungunya virus), should be considered a significant risk factor.
- CDC is working to expand diagnostic testing capacity with both public and commercial partners in the United States.
- Each clinical scenario is unique, and healthcare providers should consider all available information when ordering a test for Zika virus infection including patient travel history, history of flavivirus infection, vaccination history, ultrasound findings, and the presence of symptoms. They should work with their state, local, and territorial health departments for assistance ordering laboratory tests and interpreting test results.

TYPES OF TESTS

- On February 26, 2016, the Food and Drug Administration (FDA) issued an Emergency Use Authorization (EUA) for a diagnostic tool for Zika virus that is being distributed to qualified laboratories and, in the United States, those that are certified to perform high-complexity tests.
    - The test, called the CDC Zika IgM Antibody Capture Enzyme-Linked Immunosorbent Assay (Zika MAC-ELISA), is intended to be used on serum and cerebrospinal fluid samples from people with a history of symptoms associated with Zika and/or people who meet the CDC Zika virus epidemiologic criteria (e.g., pregnant women with a history of residence in or travel to a geographic region with active Zika virus transmission at the time of travel, or other epidemiologic criteria for which Zika virus testing may be indicated).
    - CDC has and continues to distribute the test to qualified laboratories in the Laboratory Response Network (LRN). The test is not available in US hospitals or primary care settings.
- On March 17, 2016, FDA issued an EUA for a diagnostic tool for the qualitative detection and differentiation of RNA from Zika virus, dengue virus, and chikungunya virus in human sera or cerebrospinal fluid, and for the qualitative detection of Zika virus RNA in urine and amniotic fluid.
    - The test, called the Trioplex Real-time RT-PCR Assay (Trioplex rRT-PCR), is intended to be used on specimens collected from people with a recent history of symptoms associated with Zika and/or people who meet the CDC Zika virus epidemiologic criteria (e.g., pregnant women with a history of residence in or travel to a geographic region with active Zika virus transmission at the time of travel, or other epidemiologic criteria for which Zika virus testing may be indicated).
    - Testing is being performed by qualified laboratories designated by CDC and, in the United States, certified to perform high-complexity tests.

  - Because Trioplex rRT-PCR combines three tests (for Zika, dengue, and chikungunya) into one, it reduces costs and increases efficiency. Trioplex rRT-PCR has been adapted to be run on equipment that is common in public health labs in the United States and abroad.
- On April 28, 2016, FDA issued an EUA for a commercial assay for the qualitative detection of Zika virus RNA.
  - This test is the Focus Diagnostics, Inc., Zika Virus RNA Qualitative Real-time RT-PCR for use on acute serum only.
  - Unlike the Trioplex assay which tests for three viruses, the Focus Diagnostics RT-PCR is for the detection of Zika RNA in serum only.
- On May 13, 2016 the FDA issued an EUA for a commercial assay for the qualitative detection of RNA from Zika virus.
  - This test is the Altona Diagnostics RealStar® Zika Virus RT-PCR Kit U.S. for the qualitative detection of RNA from Zika virus in serum or urine (collected alongside a patient-matched serum specimen).
  - Unlike the Trioplex assay which tests for three viruses, the Altona Diagnostics RealStar® Zika Virus RT-PCR Kit is for the detection of Zika RNA in serum or urine.
- On June 17, 2016 the FDA issued an EUA for a commercial assay for the qualitative detection of RNA from Zika virus.
  - This test is Hologic, Inc. Aptima® Zika Virus assay for the qualitative detection of RNA from Zika virus in human serum and plasma specimens.
  - Unlike the Trioplex assay which tests for three viruses, the Aptima® Zika Virus assay is for the detection of Zika RNA in serum or plasma.

TESTING FOR PREGNANT WOMEN

- All pregnant women should be assessed for Zika virus exposure at each prenatal care visit. They should be asked if they:
  - Traveled to or live in an area with active Zika virus transmission during their pregnancy or periconceptional period (the 6 weeks prior to last menstrual period or 8 weeks prior to conception).
  - Had sex without a condom with a partner who has traveled to or lives in an area with active Zika virus transmission. Condoms include male and female condoms.
- Possible exposure to Zika virus that warrants testing include:
  - Travel to or residence in an area with active Zika virus transmission, or
  - Sex (vaginal, anal, and oral sex) without a condom, or sharing sex toys with a person who traveled to, or lives in an area with Zika.
- Pregnant women who have a possible exposure to Zika virus are eligible for testing for Zika virus infection.
  - The type of testing recommended varies according to when a woman visits a provider relative to when her symptoms began or, if she is asymptomatic, the date of her last possible exposure to Zika virus.
- See details regarding recommendations for testing pregnant women with exposure to Zika virus and who do and do not have symptoms.

TESTING FOR INFANTS & CHILDREN

- CDC recommends laboratory testing for
  - Infants born to mothers with laboratory evidence of Zika virus infection during pregnancy, AND
  - Infants who have abnormal clinical or neuroimaging finds suggestive of congenital Zika syndrome and a mother with a possible exposure to Zika virus, regardless of maternal Zika virus testing results.
- See detailed guidance on the clinical and laboratory evaluation and management of infants with possible congenital Zika virus infection.
- Recommended infant laboratory evaluation includes both molecular (rRT-PCR) and serologic (IgM) testing.

- Infant laboratory testing should be performed within the first 2 days after birth.
  - If testing is performed later, distinguishing between congenital, perinatal and postnatal infection will be difficult.
- A Zika virus rRT-PCR test should be performed on both infant serum and urine, and Zika virus immunoglobulin M (IgM) antibody enzyme-linked immunosorbent assay (ELISA) should be performed on infant serum.
- Testing should be performed on infant specimens; testing of cord blood is no longer recommended.

- A positive rRT-PCR in an infant sample confirms the diagnosis of congenital Zika virus infection is used to confirm a positive or equivocal IgM test and rule out false positive tests.
  - If the infant's initial sample is IgM positive, but PRNT was not performed on the mother's sample, PRNT should be performed on the infant's initial sample. However, PRNT cannot distinguish between maternal or infant antibodies.
  - Maternal antibodies in the infant are expected to wane by 18 months.
  - To confirm a congenital infection, PRNT should be performed on a sample collected from an infant aged 18 months whose initial sample is IgM positive, when neutralizing antibodies were detected by PRNT in either the infant's or mother's sample.
  - If PRNT at 18 months is negative the child is considered to not have congenital Zika virus infection
  - If PRNT at 18 months is positive, congential Zika virus infection is presumed, however postnatal infection cannot be excluded, especially in children living in areas with active Zika transmission.
- Histopathologic evaluation of the placenta and umbilical cord, immunohistochemical staining on fixed tissue, and Zika virus rRT-PCR on fixed and frozen tissue can be performed.
- Zika virus infection can be confirmed in infants and children by performing reverse transcriptase-polymerase chain reaction (rRT-PCR) on serum within 7 days of symptoms onset.
  - Serologic assays can also be used to detect Zika virus-specific IgM and neutralizing antibodies soon after symptom onset.
  - Evaluation of infants and children for acute Zika virus infection should include testing of serum and urine and may include cerebrospinal fluid (CSF) testing for Zika viral RNA, if samples were obtained as part of routine care. A CSF sample collected for the sole purpose of Zika rRT-PCR testing is not recommended.
- Laboratory evidence of Zika virus infection in an infant or child would include, in any clinical specimen, detectable Zika virus in culture, Zika virus RNA (by rRT-PCR) or antigen, or a clinical specimen positive for Zika virus IgM with confirmatory neutralizing antibody titers detected for Zika virus.
- Zika virus testing in newborns has several challenges.
  - rRT-PCR tests may not detect Zika virus RNA in an infant or child who had Zika virus infection *in utero* if the period of viremia has passed.
  - Serologic tests for Zika virus can often be falsely positive because of general cross reactivity of IgM.
  - Plaque-reduction neutralization testing (PRNT) can be performed to measure virus-specific neutralizing antibodies to Zika virus, but maternal neutralizing antibodies (IgG) may cross the placenta. Because of this, PRNT testing cannot distinguish maternal from infant antibodies.
  - It is important to work closely with state or territorial health departments to ensure the appropriate test is ordered and interpreted correctly.
  - antibodies (IgG) may cross the placenta. Because of this, PRNT testing cannot distinguish maternal from infant antibodies.

WHAT CDC IS DOING

- CDC's Emergency Operations Center (EOC) was activated January 22, 2016, and moved to a level 1 activation—the highest level – on February 8, 2016. The EOC is the command center for monitoring and coordinating the emergency response to Zika, bringing together CDC scientists with expertise in arboviruses like Zika, reproductive health, birth defects, developmental disabilities, and travel health. Their work includes:
    - Developing laboratory tests to diagnose Zika.
    - Conducting studies to learn more about learn more about Zika and its effects during pregnancy and the potential link between Zika and Guillain-Barré syndrome.
    - Conducting a study to evaluate persistence of Zika virus in semen and urine among male residents of the United States.
    - Publishing and disseminating a new report providing state-level estimates of contraceptive use among adult women at risk for unintended pregnancy, and sexually active adolescents.
    - Publishing and disseminating a new report estimating contraceptive use among sexually active US women of reproductive age where mosquito-borne Zika virus transmission is possible.
    - Monitoring and reporting cases of Zika, which will help improve our understanding of how and where Zika is spreading.
    - Providing guidance to travelers and Americans living in areas with current outbreaks.
    - Providing on-the-ground support in American Samoa, Brazil, Colombia, Guam, the Marshall Islands, Panama, Puerto Rico, Trinidad and Tobago, and the US Virgin Islands.
- CDC's EOC is currently home to hundreds of CDC staff working in collaboration with local, national, and international response partners to analyze, validate, and efficiently exchange information about the outbreak.
- The EOC has resources to rapidly transport diagnostic kits, clinical specimens that will be tested for Zika virus, and personnel.
    - The EOC is serving as CDC's command center for monitoring and coordinating the emergency response to Zika, including sending CDC staff and the procurement and management of all equipment and supplies that CDC responders may need during deployment.
    - CDC is sending staff to assist with the response - senior leaders, vector control, emergency management, logistician, epidemiology/surveillance, data entry, pregnancy and birth defects, blood safety specialists, etc.

DOMESTIC ACTIVITIES

- CDC supports state and local efforts to prepare and respond to Zika virus.
- CDC recommends using the National Response Framework in response to emergencies.
- CDC guidance to state and local jurisdictions recommends that Zika action plans be developed to guide response activities through a phased, risk-based continuum.
- When a case of locally acquired Zika virus infection is identified, state and local health departments should initiate interventions and target these interventions appropriately.
    - Based on available epidemiologic, entomologic, and environmental information, states will define geographic areas for targeted Zika virus interventions.
    - Health departments should determine the risk and extent of ongoing local transmission through enhanced surveillance and expanded vector assessment activities.
- CDC advises state and local health departments continue monitoring areas with locally acquired cases of Zika for any new evidence of active Zika transmission.
- CDC developed guidance documents to assist in preparedness and response planning for state, local, and territorial public health officials.
    - CDC's Zika Interim Response Plan
    - Zika Communication Planning Guide for States

- Interim CDC Recommendations for Zika Vector Control in the Continental United States
- CDC is working with public health partners and with state health departments to
  - Alert healthcare providers and the public about Zika.
  - Post travel guidance.
  - Provide state health laboratories with diagnostic tests.
  - Monitor and report cases of Zika, including in pregnant women.
  - Publish and disseminate guidelines to inform testing and treatment of people with suspected or confirmed Zika.
- In response to local transmission of Zika transmission in Florida, at Florida's request, CDC sent a CDC Emergency Response Team (CERT) with experts in Zika virus, pregnancy and birth defects, vector control, laboratory science, and risk communication to assist in the response.
- On April 1, 2016, CDC hosted the Zika Action Plan Summit for state and local health officials. The Summit aimed to
  - Provide officials with information and tools to improve Zika preparedness and response within their states and jurisdictions.
  - Increase knowledge on the latest Zika science, including implications for pregnant women.
  - Increase knowledge of best communication practices, including crisis and risk communication principles.
  - Accelerate readiness for local Zika transmission through training and technical assistance to states to help establish and support surveillance and share best practices for vector control.
  - Identify possible gaps in preparedness and response at the federal, state, and local levels, and to help begin to address possible gaps.
- CDC's health security plans are designed to effectively monitor for disease, equip diagnostic laboratories, and support mosquito control programs both in the United States and around the world.

ACTIVITIES IN PUERTO RICO

- CDC continues to deploy staff to Puerto Rico to support all aspects of the Zika outbreak including:
  - Evaluating vector control interventions and implementing an island-wide vector control program
  - Improving diagnostic tests
  - Supporting active surveillance of pregnant women infected with Zika virus in Puerto Rico, and follow-up efforts for infants born to these women for up to 3 years
  - Establishing the first surveillance system for cases of Guillain-Barré syndrome, as well as an investigation to better determine the association between Zika virus infection and the neurologic condition
  - Conducting community engagement activities with the purpose of and implementing mosquito control programs at the local level
  - Educating pregnant women about Zika virus infection prevention and distributing Zika prevention kits
  - Conducting research on Zika virus, such as the persistence of the virus in different bodily fluids
  - Evaluating four Zika prevention interventions (mass media, community outreach, Zika prevention kit, and vector control) among pregnant women recruited from Women, Infants, and Children (WIC) program across Puerto Rico
- CDC supports the development of health education campaigns for Puerto Rico:
    - "This is How We Stop Zika" or "Deten el Zika", a multi-media communication campaign that provides steps for pregnant women and communities to follow to protect themselves from Zika virus infection, mainly by taking actions to prevent mosquito bites and avoiding potential sexual transmission of the virus. The campaign includes 2 websites (English – www.helpstopzika.org and Spanish www.detenelzika.org), a 30 sec- TV PSA, radio PSAs, billboards, posters, newspaper ads, community engagement toolkit and social media content.

        - Through the domestic readiness campaign, CDC has placed ads (some using PRDH logos, and some Gates campaign logos) focusing on the four protective behaviors people can take on billboards, in shopping malls, bar and restaurant restrooms, on buses, bus/metro stops, movie theaters, newspapers, and panel displays in grocery stores to reach pregnant women and their families.
- The CDC Foundation collaborates with CDC and multiple organizations to provide a range of contraceptive options to women and their partners who want to delay or avoid pregnancy during the Zika outbreak in Puerto Rico.

INTERNATIONAL ACTIVITIES

- CDC is working in laboratories and in dozens of countries, with ministries of health, and with partners around the world to develop a deeper understanding of Zika virus. We are also helping to prevent, control, and respond to the Zika outbreak, along with outbreaks of other diseases like chikungunya, dengue fever, malaria, yellow fever, and other vector-borne diseases. CDC is working through our country offices, our programs, and with international partners to
    - Alert healthcare providers and the public about Zika.
    - Provide health laboratories with diagnostic tests. Through the CDC's Emergency Operations Center, CDC is assisting countries with Zika testing by supplying them with reagents for molecular diagnostic lab testing.
    - Monitor and report cases of Zika, which will help improve our understanding of how and where Zika is spreading.
    - Learn more about Zika and its effects on pregnancy and infants as well as potential link between Zika and Guillain-Barré syndrome.
- CDC is committed to global health security. We help build the capacity of even the most vulnerable countries to detect, prevent, and respond to public health emergencies within their own borders.
- CDC staff are providing essential lab assistance, including
    - Organizing and triaging requests for Zika virus PCR reagents, needed for Zika diagnostics testing, from CDC's 10 Global Disease Detection Regional Centers and around the world.
    - Standing up and operating regional Zika virus laboratory diagnostic capabilities at two of the most critical Global Disease Detection Regional Centers - the Central America Regional Center in Guatemala and the SE Asia Regional Center in Thailand.
    - Developing a next-generation diagnostics card for acute febrile illness that tests samples of up to 8 people for 30 pathogens simultaneously, including Zika, delivering results in less than 3 hours.
- Through its 24/7 Global Disease Detection Operations Center, regional Global Disease Detection Centers, Country Offices, and global Field Epidemiology and Laboratory Training Programs, CDC is working with governments, ministries of health, and international partners to conduct rigorous surveillance for new and emerging infections, identify and characterize new pathogens, develop and evaluate new laboratory methods, and train disease detectives in the countries in which they operate.
- CDC's Global Disease Detection (GDD) Operations Center operates 24/7 and is continually carrying out event-based surveillance to monitor this outbreak globally.
    - This center, in collaboration with Zika subject matter experts and international partners and governments, has been conducting event-based surveillance to monitor spread of Zika from Brazil to other areas in the Americas since May 2015, sharing this information to coordinate the response.
    - The GDD program, launched in 2004, was one of the first ways CDC systematically began helping countries build the systems they need to prevent, detect and respond to health threats. Its regional centers are currently working with governments and international partners to provide data from the field back to CDC's Global Disease Detection Operations Center for global surveillance.
        - Because of this work we are able to know:
            - Where Zika is spreading in the Americas
            - Where (in what regions) we are seeing increased numbers of microcephalic babies

        - Where there are significant upticks in Guillain-Barré syndrome.
    - CDC's GDD Center, part of the Central America Region office located in Guatemala City has been critical in:
        - Ensuring that emergency operations centers in countries with Zika in Central America and beyond are equipped and ready to activate and perform, and that different government agencies in each country know how to collaborate across programs and agencies on the response.
        - Helping Colombia, El Salvador, Guatemala, Honduras, and Panama with lab testing for Zika and chikungunya.
        - Instituting four functions vital to disease detection and surveillance in the countries it serves:
            - Developing a common testing platform and protocol for influenza;
            - Drafting and testing of national emergency action plans;
            - Training field epidemiologists and lab technicians through the Field Epidemiology and Lab Training Programs (FETP and FELTP)
            - Strengthening laboratory capabilities by:
                - Supporting Zika virus testing in Guatemala, laboratory diagnostic training in South and Central America, and specimen transport in the Latin American region; and sharing protocols and procedures with labs in Lima, Peru to strengthen overall ability to accurately and quickly test for selected diseases.
                - Supporting countries with Zika in vector surveillance, control strategies, and insecticide resistance testing in coordination with the Pan American Health Organization (PAHO)
- CDC is collaborating with Colombia's Instituto Nacional de Salud (INS) on a project called Proyecto Vigilancia de Embarazadas con Zika (VEZ), which involves close follow-up of pregnant women and their infants in sites with the highest number of Zika-infected pregnant women. Through this collaboration, CDC and INS hope to better understand the full range of potential health problems that congenital Zika virus infection may cause, the risk of poor outcomes among fetuses/infants of women infected with Zika virus during pregnancy, and the time of pregnancy during which Zika virus infection poses the highest risk to the fetus.
- In an effort to better understand Zika and its effects during pregnancy, the Brazilian Ministry of Health (MOH) and PAHO are conducting investigations.
    - PAHO invited CDC to provide technical assistance to the Brazil MOH for its investigation of microcephaly and the possible association with Zika virus infection by collaborating on studies.
    - CDC regularly communicates with representatives from PAHO and the Brazil MOH to discuss the investigation and laboratory testing options.
    - CDC has offered to test samples from the microcephaly cases for serologic evidence of Zika virus infection until in-country capacity can be established.
- CDC's FETP and FELTP programs provide real-time training to capable "disease detectives" and laboratory specialists in these countries who can identify and target disease.
- CDC's Central America Field Epidemiology Training Program (CA FETP) includes national field epidemiology training programs in Belize, Costa Rica, Dominican Republic, El Salvador, Haiti, Guatemala, Honduras, and Panama.
    - These countries are coordinated through REDCEC (Red Centroamericana de Epidemiologia de Campo; Central American Network of Field Epidemiology), under the umbrella organization of the Council of Health Ministers of Central America and the Dominican Republic (COMISCA).
    - Brazil, Mexico, Colombia, and additional South American countries have independent FETPs.

CDC FOUNDATION

- At CDC's request, the CDC Foundation activated two funds on February 10, 2016, to help with the Zika response: the U.S. Emergency Response Fund and the Global Disaster Response Fund.
- These funds allow CDC to better prepare for and respond to crisis situations, such as Zika, by providing flexibility to meet needs that would not otherwise be met through federally appropriated funds.
- Financial support raised through these funds will enhance CDC's response in a number of ways, such as extend the agency's ability to alert healthcare providers and the public about Zika; fund Zika prevention kits with educational materials for pregnant women in Puerto Rico and other high-risk areas; protect travelers with guidance and information; support state health laboratories with diagnostic tests; and detect and report cases to help prevent further spread.
- Earlier this year, the CDC Foundation announced a partnership with CDC and multiple donors to create Zika prevention kits for pregnant women in the US territories of the Commonwealth of Puerto Rico, the US Virgin Islands (USVI), and American Samoa. The purpose of these Zika prevention kits is to inform pregnant women about Zika, its risks, and how to avoid infection, while providing an initial supply of prevention tools. The initial donations included mosquito repellent, mosquito dunks, and condoms.
- Educating communities and empowering women on how to prevent Zika virus transmission is the focus of a new collaborative effort by CDC, the Pan American Health Organization (PAHO) and the CDC Foundation, aimed mainly at pregnant women in U.S. territories and the Americas. The Bill & Melinda Gates Foundation is supporting these efforts, which include a comprehensive health campaign on Zika prevention and surveys on risk perception and knowledge gaps in the Americas, as well as community engagement on mosquito control especially to protect pregnant women from Zika. These initiatives will be funded by a $1.5 million grant to the CDC Foundation and PAHO.
- This summer, the CDC Foundation announced the launch of the Zika prevention communication campaign in Puerto Rico. The campaign, titled "This is How We Stop Zika," provides steps for pregnant women and communities to follow to protect themselves from Zika virus infection, mainly by taking actions to prevent mosquito bites and avoiding potential sexual transmission of the virus. However, as mosquito season is expected to continue into December, the CDC Foundation urgently needs $1.5 million in funding to continue this vitally important campaign in Puerto Rico.
- On August 25, the CDC Foundation announced that the Zika Contraception Access Network (Z-CAN) is now operational. The Network is providing women in Puerto Rico with a full range of contraceptive options free of charge on the same day of their healthcare service. Z-CAN was established by the CDC Foundation to address an urgent need to improve contraception access in Puerto Rico during the Zika outbreak. The program gives women who want to delay or avoid pregnancy an effective means to do so, and the option to prevent the devastating, life-long consequences of severe birth defects Zika virus can cause.
    - To date, the Z-CAN team has trained a network of physicians and ancillary staff in Puerto Rico to counsel and provide a full range of contraception to women wanting to delay or avoid pregnancy during the Zika outbreak. In addition, the CDC Foundation team has secured contraceptive product donations, established a supply chain for distribution of contraceptive products across the island, as well as created a system to reimburse physicians.
    - Donations of funding and contraceptive product commitments have been crucial to reduce program implementation costs, but additional funding is required to fully execute this effort at the speed and scale required for the Zika response. The CDC Foundation currently has funding to reach approximately 14,000 women in Puerto Rico. With a goal of $18 million in funding, which is the estimated cost of caring for two infants with microcephaly, this effort could be expanded to serve tens of thousands of more women during the time of Zika.