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 18, 2017

Updated information is in blue.

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BACKGROUND ON ZIKA

- Zika virus was first discovered in a monkey in the Zika Forest of Uganda in 1947.
- Before 2007, there were at least 14 documented human cases of Zika, 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 countries' ministries of health. CDC posted the first travel notice for Zika in Brazil in June 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 August 3, 2017, CDC transitioned to a level 2 activation.
    - On August 29, 2017, CDC transitioned to a level 3 activation.
- 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 neurologic disorders in some areas affected by Zika.
    - On November 18, 2016, WHO declared the end of the PHEIC after deciding that Zika virus and its associated consequences remain a significant enduring public health challenge requiring intense action, but no longer represent a PHEIC.
- 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.
    - On September 29, 2016, President Obama signed a continuing resolution that provides $1.1 billion in emergency funding for Zika response.
- Currently, Zika is a risk 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
    - Headache
    - Joint pain
    - Conjunctivitis (red eyes)
    - Muscle pain
- 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 or while living in an area with risk of Zika. This includes the traveler becoming infected as well as anyone directly 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.
    - An uninfected 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 larvae, 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 <u>unlikely</u> to be a large problem in the United States.
  - Mosquitoes that carry Zika 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) for long periods of time, adult mosquitoes can survive at least through the fall and possibly all winter. Mosquito eggs can survive drying out for up to 8 months.
- In other states, where temperatures do fall and stay below 10°C (50°F), *Ae. aegypti* mosquitoes search for warm places as temperatures begin to drop. Some will 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.
  - *Ae. albopictus* eggs will survive temperatures at or below 0°C (32°F). In the spring, when temperatures rise and days are longer, they hatch.
  - Exposed adult mosquitoes die at temperatures below 0°C (32°F).
- 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 (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. See Microcephaly section.
- 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 rash, conjunctivitis (red eyes), arthralgia (joint pain), 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 than the general public.
- 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 Guillain-Barré Syndrome section.
- 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 fetuses and infants.

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 his or her 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 risk of Zika.
  - This includes vaginal, anal, and oral sex and the sharing of sex toys.
  - At this time there is no evidence to suggest that Zika can be passed through saliva during deep kissing.
- 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.
  - Among four published reports of Zika virus cultured from semen, virus was reported in semen up to 69 days after symptom onset.
  - 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 14 days after symptoms began.
- Zika RNA may indicate the presence of infectious virus, or it may simply indicate leftover genetic material that is no longer able to cause an infection. Finding viral RNA does not necessarily mean the 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 virus in their semen capable of causing infection.
  - 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.
- Although sexual transmission of Zika virus is possible, the primary mode of transmission is through mosquitoes. CDC considers Zika virus infection a mosquito-borne infection, with less common modes of transmission being sexual, intrauterine, and perinatal transmission, and probably blood transfusion transmission. Rarely, Zika has been transmitted in laboratory settings.
- 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 probable 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 known 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 risk of Zika, should be fed according to established 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; a doctor or other healthcare provider may order these tests to look for Zika or other similar viral diseases like dengue or chikungunya.
- Pregnant women who live in or have recently traveled to an area with risk of 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 they have a sex partner who lives in or recently traveled to an area with risk of Zika.
- Pregnant women should see a doctor or other healthcare provider if they develop a fever, rash, headache, joint pain, conjunctivitis (red eyes), or muscle pain. They should tell the doctor or other healthcare provider where they live and where they have traveled.
- Pregnant women who traveled to an area with risk of Zika or had sex with a partner who lived in or traveled to one of these areas should be tested if they develop symptoms of Zika or if their fetus has abnormalities on an ultrasound that may be related to Zika infection.
- Pregnant women who live in or frequently travel to areas with risk of Zika should be offered testing at the first prenatal care visit, followed by two additional rounds of testing at regular prenatal care visits during the pregnancy.
- For pregnant women without Zika symptoms who were recently exposed to Zika but do not have ongoing exposure, Zika testing is no longer routinely recommended. However, testing should be considered as a shared decision between patients and providers, based on a balanced assessment of risks and expected outcomes, clinical judgement, patient preferences and values, and the jurisdiction's recommendations.
- Testing recommendations may differ for areas of the continental United States and Hawaii with current or previous risk of local mosquito-borne Zika virus transmission. See recommendations for areas with local Zika virus transmission and a previous cautionary (yellow) designation.
- CDC recommends Zika virus testing for people who are not pregnant who have been exposed to Zika **and** who also have Zika symptoms.
  - People who are not pregnant should see a doctor or other healthcare provider if they develop symptoms (fever, rash, headache, joint pain, red eyes, or muscle pain) and have potentially been exposed to Zika. Potential exposure includes living in or having recently traveled to an area with risk of Zika or having sex (vaginal, oral, or anal or sharing of sex toys) with a person who has potentially been exposed to Zika
- 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 some fluids (for example, semen) longer than blood, someone might have a negative blood test, but still carry Zika in their genital secretions. Testing semen and vaginal fluids for Zika virus is not currently available outside of the research setting. Testing is not recommended for asymptomatic men and women who are not pregnant. See Recommendations for Couples Interested in Conceiving.
- 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) like ibuprofen until dengue can be ruled out to reduce the risk of bleeding.
  - If you are taking medicine for another medical condition or if you are pregnant, 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 OF ZIKA VIRUS

- 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 (except in Puerto Rico, where permethrin is not effective).
- Use Environmental Protection Agency (EPA)-registered insect repellents on exposed skin. Use a repellent with one of the following active ingredients: DEET, picaridin, IR3535, oil of lemon eucalyptus, para-menthane-diol, or 2-undecanone. 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 generally 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 risk of Zika should continue to 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, oil of lemon eucalyptus, para-menthane-diol, or 2-undecanone.
  - 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 (except in Puerto Rico, where permethrin is not effective).
  - 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 is not likely to be effective.
  - 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.
- 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 and 2-undecanone.
- 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.

MOSQUITO CONTROL 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. Window and door screens sold at hardware stores have mesh small enough to keep mosquitoes out.
    - Use larvicides to kill larvae 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	How long it works
Indoor insect spray	Imidacloprid, β-Cyfluthrin	7-10 days
Indoor insect fogger	Tetramethrin, Cypermethrin	Up to 6 weeks

MOSQUITO CONTROL DURING AN OUTBREAK

- When infected adult mosquitoes are spreading a virus to people, acting quickly can stop further spread and protect people from getting sick. By using multiple mosquito control methods at the same time, people and communities can help stop an outbreak.
- Local government departments and mosquito control districts take the lead for large-scale mosquito control activities to immediately kill infected mosquitoes. People can also take steps to help protect themselves, their family, and community.

INTEGRATED MOSQUITO CONTROL

- Local governments and mosquito control programs often use an integrated mosquito management (IMM) or integrated vector management (IVM) approach to control mosquitoes.
- IMM uses a combination of methods to prevent and control mosquitoes that spread viruses like Zika, dengue, and chikungunya. IMM is based on an understanding of mosquito biology, the mosquito life cycle, and the way mosquitoes spread viruses. IMM uses methods that, when followed correctly, are safe and have been scientifically proven to reduce mosquito populations.
- Methods used in IMM
  - Conduct mosquito surveillance to identify location, numbers, and types of mosquitos, and any resistance to pesticides
  - Remove standing water sources where mosquitoes lay eggs
  - Control mosquito larvae
  - Control adult mosquitoes
  - Monitor control programs to make sure mosquito control activities are working.

MOSQUITO SURVEILLANCE AND CONTROL METHODS AND TOOLS

- Mosquito control plans include steps that are taken before control efforts begin and before people start getting sick with a virus spread by mosquitoes. Professionals need to understand what types and numbers of mosquitoes are in an area. In order to find out this information, mosquito control experts conduct surveillance. Surveillance activities can include
    - Monitoring places where adult mosquitoes lay eggs and where larvae can be found.
    - Tracking mosquito populations and the viruses they may be carrying
    - Determining if EPA-registered insecticides will be effective
- These activities help professionals determine if, when, and where control activities are needed to manage mosquito populations before people start getting sick. If professionals discover that local mosquitoes are carrying viruses (like dengue, Zika, or others), they start implementing other activities identified in their mosquito control plans.
- Tools used to control mosquitoes include
    - Mosquito Traps
    - Insecticide Spraying: Backpack, Truck, or Aerial Spraying
    - Common Insecticides Used during an Outbreak
    - Non-Traditional Methods of Mosquito Control

MOSQUITO TRAPS

- Mosquito traps can be used for mosquito surveillance or mosquito control. Traps should be used as part of an IMM approach that uses a combination of methods to prevent and control mosquitoes, including
    - Emptying standing water where mosquitoes lay eggs
    - Treating standing water with larvicides to kill larvae
    - Applying adulticides to control adult mosquitoes
- When used for mosquito surveillance, traps are primarily used to determine
    - What type(s) of mosquitoes are in an area
    - How many (density) mosquitoes are in an area and if the population changes after mosquito control activities begin

INSECTICIDE SPRAYING: BACKPACK, TRUCK, OR AERIAL SPRAYING

- Insecticide spraying by a licensed mosquito control professional following EPA guidelines is one way to safely kill mosquitoes in an area, especially when people in a community are getting sick from mosquito bites. An insecticide is either a larvicide (used to kill mosquito larvae) or an adulticide (used to kill adult mosquitoes). Mosquito control professionals choose to spray either larvicides or adulticides from three types of sprayers depending on the situation, size of the affected area, and the setting
    - Backpack sprayers are used to treat individual homes and limited public spaces.
    - Truck-mounted sprayers are used to treat a small area or to treat an area where tall buildings or landscape features (radio towers) will not permit aerial spraying.
    - Aerial spraying uses airplanes to spray large areas. When applied by a mosquito control professional and in accordance with EPA registration, this type of spraying is safe, quick, and efficient.
- **Backpack Spraying**
    - Backpack sprayers are used to apply very small amounts of larvicides or adulticides at individual homes or for limited applications in public places (e.g., around a concession stand at a stadium or in a park).
    - Professionals use backpack sprayers for targeted control activities involving home visits and will spray larvicides and adulticides.
- **Truck-mounted Spraying**

- Mosquito control trucks spray very small amounts of insecticide into the air to kill mosquitoes. This spray is a fine mist that acts as a fogger in the area.
- Mosquito control districts or local government departments will choose what type of insecticide to use in an area, either larvicides or adulticides (or both).
- Spraying takes place when mosquitoes are more active (e.g. early morning or early evening) and when weather conditions allow.
- Insecticide spraying by a licensed mosquito control professional following EPA guidelines is safe. People do not need to leave an area when truck-mounted spraying for mosquito control takes place.
- People aren't likely to breathe or touch anything that has enough insecticide to harm them. If people are having health problems, they should contact their doctor or healthcare provider.
- The spray does not harm pets, but people can choose to bring them inside when spraying occurs.

- **Aerial Spraying**
  - 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.
    - However, aerial spraying does not provide long-lasting mosquito control.
  - 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, or chikungunya viruses.
  - Airplanes spray insecticide that kills either larvae or adult mosquitoes. These products are called larvicides (to kill mosquito larvae) and adulticides (to kill adult mosquitoes).
  - When a mosquito control district decides to spray large areas of a community, it must use an EPA-registered product in accordance with label instructions, and a licensed professional must apply it with specialized equipment.
  - Aerial spraying of insecticides to kill mosquitoes is not the same as aerial spraying of insecticides used in agriculture. Doses and droplets needed to kill mosquitoes are much smaller than those used in agriculture.
    - 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.
  - During aerial spraying, a very small amount of insecticide is sprayed over the area.
    - Droplets of adulticides float in the air and kill adult mosquitoes on contact.
    - The small amount used 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.
    - If you prefer to stay inside and close windows and doors when spraying occurs you can, but it is not necessary.
  - Aerial spraying of adulticides and larvicides will not cause long-term harm to the environment or local ecosystems, even if spraying is repeated.
- **Outcomes after Spraying**

- After spraying, mosquito control districts or local government departments will track mosquito populations to evaluate the effectiveness of spraying. After evaluating the control efforts, professionals may treat an area again as necessary to reduce the chances of people getting bitten by mosquitoes that can spread viruses, like Zika.
- State and local health departments and mosquito control districts can reduce mosquito populations when an IMM approach is applied consistently.

COMMON INSECTICIDES USED DURING AN OUTBREAK

- **Insecticides** are called either larvicides (to kill mosquito larvae) or adulticides (to kill adult mosquitoes). Larvicide sprays kill larvae and last longer than adulticide sprays. Adulticide sprays immediately kill flying mosquitoes. Both products will temporarily reduce mosquito populations in an area, but will not permanently get rid of them. Mosquito control professionals use EPA-registered insecticides. EPA-registered insecticides have been studied for their effectiveness and safety when used according to label instructions.
- **Larvicides** are products used to help control mosquitoes. They work by killing mosquito larvae before they can grow into biting adults. Killing larvae reduces mosquito populations and may reduce the risk of getting infected with Zika and other viruses spread by mosquitoes. When used according to product label instructions, larvicides do not harm people, pets, or the environment. Larvicides are being used during the Zika outbreak.
- **Adulticides** are products used to help control adult mosquitoes that spread Zika and other viruses. Adulticides can be used indoors and outdoors. Some adulticides kill adult mosquitoes immediately and some continue to kill mosquitoes over longer periods of time. When used according to label instructions, adulticides do not harm people, pets, or the environment. Adulticides are being used during the Zika outbreak.

NON-TRADITIONAL METHODS FOR MOSQUITO CONTROL

- 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 will 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 will 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 GM mosquitoes in communities, the Brazilian government had to approve. These GM 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 GM mosquitoes (OX513A) will suppress the local *Aedes aegypti* mosquito population in the release area at Key Haven, Florida. FDA's finalization of the EA and FONSI does not mean that Oxitec's GM 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
    - Field releases of Oxitec's GM mosquito in Brazil, the Cayman Islands, and Panama indicate reductions of *Aedes aegypti* populations greater than 90%.
    - Researchers have observed suppression of the targeted mosquito populations. They have not detected any adverse environmental or health outcomes.

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 should consider taking precautions to avoid pregnancy, especially because nearly half of all pregnancies (45%) in the United States are unintended. See Preventing Unintended Pregnancy during the Zika Virus Outbreak.
- **Anyone who is not pregnant or trying to get pregnant** and **traveling** to an area with risk of Zika:
    - Men and women traveling in an area with risk of Zika should consider using condoms every time they have sex or not have sex while traveling.
    - If a couple has a male partner and only the male partner travels to an area with risk of Zika, the couple should consider using condoms or not having sex for at least **6 months**
        - After the male partner returns, even if he doesn't have symptoms, or
        - From the start of the male partner's symptoms or the date he was diagnosed with Zika.
    - If a couple has a female partner and only the female partner travels to an area with risk of Zika, the couple should consider using condoms or not having sex for at least **2 months**
        - After the female partner returns, even if she doesn't have symptoms, or
        - From the start of the female partner's symptoms or the date she was diagnosed with Zika.
    - If the couple contains both a male and female partner and both partners travel to an area with risk of Zika, the couple should consider using condoms or not having sex for at least **6 months**
        - After returning, even if they don't have symptoms, or

        - From the start of either partner's symptoms or from the date either were diagnosed with Zika.
    - If either partner develops symptoms of Zika or has concerns, they should talk to a healthcare provider.
- **Anyone who is not pregnant or trying to get pregnant** and **living** in an area with risk of Zika:
    - Uninfected couples living in an area with risk of Zika can use condoms or not have sex if they are concerned with passing or getting Zika through sex.
    - Decisions about having sex and using condoms depend on each person's understanding of the risks and benefits, including
        - The mild nature of the illness for many people
        - Their possible exposure to mosquitoes while in an area with Zika
        - Their plans for pregnancy (if appropriate) and access to birth control
        - Their access to condoms
        - Their desire for intimacy, including willingness to use condoms or not have sex
        - Their ability to use condoms or not have sex
    - If either partner develops symptoms of Zika or has concerns, they should talk to a healthcare provider.
- For pregnant women, see Preventing Zika Infection in Pregnancy.
- For couples trying to have a baby, see Recommendations for Couples Interested in Conceiving.

PREVENTING ZIKA INFECTION IN PREGNANCY

- The risk of Zika infection 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 in which one or both partners live in or traveled to an area with risk of Zika should:**
    - Use condoms from start to finish every time they have sex (oral, vaginal, or anal) 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 risk of 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 choose the most effective birth control methods that they can use correctly and consistently and meets their lifestyle needs and preferences. See Preventing Unintended Pregnancy During the Zika Virus Outbreak.

RECOMMENDATIONS FOR COUPLES INTERESTED IN CONCEIVING

- On September 30, 2016, CDC updated its interim guidance for pre-pregnancy counseling and prevention of sexual transmission of Zika. The updated guidance provides recommendations for people who are traveling to an area with risk of Zika and who are considering pregnancy.
    - Area with risk of Zika:
        - Women and men who are considering pregnancy in the near future should talk to their doctor or other healthcare provider about their pregnancy plans and possible Zika risk before they travel and strictly follow steps to prevent mosquito bites during the trip.

        - **If only the female traveler is exposed:** use condoms or do not have sex for **at least 2 months** after travel (if she doesn't have symptoms) or for **at least 2 months** from the start of her symptoms (or Zika diagnosis) before trying to conceive.
        - **If only the male traveler is exposed:** use condoms or do not have sex for **at least 6 months** after travel (if he doesn't have symptoms) or for **at least 6 months** from the start of his symptoms (or Zika diagnosis) before trying to conceive. This period is longer for men because Zika stays in semen longer than in other body fluids.
        - **If a male and female travel together and both are exposed**: use condoms or do not have sex for **at least 6 months** after travel (if they don't have symptoms) or for **at least 6 months** from the start symptoms (or Zika diagnosis) before trying to conceive.
    - Zika active transmission (red) areas in the continental United States and Hawaii:
        - Women and men who are planning to conceive in the near future should be advised to wait **at least 2 months** if a woman had Zika symptoms and/or diagnosis, and **at least 6 month**s if a man had Zika symptoms and/or diagnosis, before attempting conception.
        - Women and men who are planning to conceive in the near future who did not develop Zika symptoms should be advised to wait at least **2 months** if only the woman was exposed and at least **6 months** if the man was exposed after the end date of the last possible exposure before attempting conception.
        - Women and men who are planning to conceive in the near future and have ongoing exposure to Zika active transmission (red) areas and do not have Zika symptoms should be counseled on the possible risk for Zika virus infection during the periconceptional period and about the potential consequences of Zika virus infection to the fetus during pregnancy.
        - Women and men who live in or travel to red or yellow areas should be advised to remain aware of Zika virus transmission and strictly follow steps to prevent mosquito bites.
- Men and women who live in or frequently travel to areas with risk of Zika who are considering pregnancy in the near future 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 pregnancy. If either partner has symptoms of Zika or tests positive for Zika, they should follow the suggested timeframes above before trying to conceive.
- **Special considerations for women undergoing fertility treatment**: Zika virus transmission through assisted reproductive technology has not been reported. However, transmission through gametes (sperm or egg) or embryos is theoretically possible. Recommendations for sexually intimate couples with Zika virus infection or possible Zika virus exposure undergoing fertility treatment with their own gametes and embryos should follow the testing and timing recommendations as described above; recommendations might need to be adjusted depending on individual circumstances.
- **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.
- **Zika virus testing is not recommended for asymptomatic couples interested in attempting conception** in which one or both partner has had possible exposure to Zika virus for the following reasons:
    - A negative blood test or antibody test could be falsely reassuring. This can happen when
        - The blood test is performed after the virus is no longer in the blood but could still be present in other bodily fluids (e.g., semen).
        - The antibody test is performed early after infection when the antibody levels are not yet high enough to be detected or later after infection when the antibody levels have fallen to undetectable levels.
    - No test is 100% accurate; a test result can sometimes be negative in the setting of true infection

  - We currently have limited understanding of Zika virus shedding in genital secretions or of how to interpret the results of tests of semen or vaginal fluids. Zika shedding in these secretions may be intermittent, in which case a person could test negative at one point but still carry the virus and shed it again in the future.
- Because epidemiologic and laboratory data indicate that Zika virus IgM can persist beyond 12 weeks in a subset of infected people, CDC has guidance **for women who are not pregnant and who want to conceive in the near future and who have an ongoing risk of Zika virus exposure** (i.e., currently live in or frequently travel to areas with a CDC Zika travel notice).
- **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 and their partners 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 (that are inserted under the skin). 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, 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.
  - Condoms are the only method of birth control that can also prevent infections like Zika. Other birth control methods, including LARC, offer no protection against Zika.
- 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 contraceptive methods 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 & TISSUE SAFETY

- In February 2016, the Food and Drug Administration (FDA) recommended that blood collected in areas with active Zika virus transmission 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.
    - Under these requirements, routine blood donation screening began in Puerto Rico in April 2016.
    - In August 2016, FDA issued revised guidance calling for blood collection centers in the United States to screen all donated blood for Zika virus, beginning immediately in affected states, within 4 weeks in high-risk states, and within 12 weeks in all states. Currently, all blood collected in the United States and its territories should be screened for Zika virus.
- The requirement to test blood donations for Zika virus has resulted in interdicting contaminated collections in Puerto Rico and multiple states.
- On March 13, 2017, CDC issued a notice that it had identified the potential for increased risk to blood and tissue safety in Miami-Dade County starting on June 15, 2016. The potential risk in Miami-Dade County did not meet the threshold for designation as an area of active transmission until July 29, 2016. CDC has also identified that since June 15, 2016, there has been a potential increased risk to blood and tissue safety in Broward and Palm Beach counties because of local travel of residents of these counties to areas of active transmission in Florida.

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 can cause damage to the brain, microcephaly, and congenital Zika syndrome, a pattern of birth defects that includes brain abnormalities, eye defects, hearing loss, and limb defects. It has been linked to other problems in pregnancies and among fetuses and infants infected with Zika virus before birth, such as miscarriage and stillbirth.
    - A distinct pattern of birth defects, called congenital Zika syndrome, has emerged among fetuses and infants of women infected with Zika during pregnancy. In addition to cognitive, sensory, and motor disabilities that are shared with other birth defects, congenital Zika syndrome is associated with five types of birth defects that are either not seen or occur rarely with other infections during pregnancy:
        - Severe microcephaly (small head size) resulting in a partially collapsed skull
        - Decreased brain tissue with brain damage (as indicated by a specific pattern of calcium deposits)
        - Damage to the back of the eye with a specific pattern of scarring and increased pigment
        - Limited range of joint motion, such as clubfoot
        - Too much muscle tone restricting body movement soon after birth.
    - However, a recent report indicates that microcephaly at birth is not a necessary feature of congenital Zika syndrome. Infants with a head circumference at birth in the normal range can still have brain abnormalities consistent with congenital Zika syndrome. In addition, microcephaly from congenital infection can develop after birth.
    - Eye defects have been observed among congenitally exposed infants with and without microcephaly. The most common eye findings include
        - Macular mottling

        - Chorioretinal atrophy
        - Optic nerve hypoplasia
        - Increased cup to disk ratio
        - Optic nerve pallor
    - 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.
    - The full spectrum of poor outcomes caused by Zika virus infection during pregnancy remains unknown; 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 healthy infants.
        - 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.
    - Because of the potential risks of Zika virus infection during pregnancy, CDC's top priority for the Zika response is to protect pregnant women.
- 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.
- Zika virus infection during pregnancy can cause birth defects including damage to the brain, microcephaly, and congenital Zika syndrome, a pattern of birth defects that includes brain abnormalities, eye defects, hearing loss, and limb 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.
- Based on studies of microcephaly resulting from other prenatal infections (e.g., cytomegalovirus, rubella), 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.

- Using data from three birth defects surveillance systems in the United States—Massachusetts, North Carolina, and Georgia—scientists identified the number of births with evidence of defects like those seen in infants born to women with Zika infection during pregnancy to see how common the birth defects were before the introduction of Zika virus into the Americas.
    - The birth defects studied were brain abnormalities and/or microcephaly, neural tube defects and other early brain malformations, eye defects, and other central nervous system (CNS) problems.
    - According to the three systems, during 2013-2014 these birth defects affected about 3 per 1,000 births.
    - This new report provides a reference to help interpret the effect of Zika on the occurrence of birth defects in the United States.
- Knowledge about Zika virus is increasing rapidly and researchers continue to work to better understand the extent of Zika virus' effect on mothers, infants, and children, as well as the clinical spectrum of findings associated with congenital Zika virus infection.
- 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

- Microcephaly is a birth defect in which 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.
- 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; information for obstetric providers included below outlines guidance on when tests should be done.
- CDC has developed interim guidelines for testing and evaluating an infant with possible congenital Zika virus infection; see information for pediatric providers that outlines guidance on testing infants for potential congenital Zika virus exposure and management of the care of infants with potential exposure.

PYRIPROXYFEN

- No scientific evidence supports February 2016 media reports linking a larvicide called pyriproxyfen 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 mosquitoes carrying disease agents.
- Pyriproxyfen is a registered larvicide in Brazil and other countries. It has been used for decades, and it has not been linked 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 test results indicating possible Zika infection during pregnancy through the US Zika Pregnancy Registry (USZPR) in US states and territories and the District of Columbia and through 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 Zika case counts and data from previous years, visit CDC's Zika website.
- Local transmission of Zika virus has been reported in the United States.
    - See Domestic Travel Guidance.
- 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, in collaboration with state, local, tribal and territorial health departments, has established two surveillance systems to monitor outcomes of pregnancies among women with laboratory evidence of Zika virus infection, with or without symptoms, and the infants born to these women in US states, the District of Columbia (DC), and US territories. These two surveillance systems are:
    - The US Zika Pregnancy Registry (USZPR), which includes pregnant women and their infants in US states, DC, and all US territories except Puerto Rico.
    - The Zika Active Pregnancy Surveillance System (ZAPSS), which includes pregnant women and their infants in Puerto Rico.
- The data collected through the Zika pregnancy and infant 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.
    - US Zika Pregnancy Registry
    - Zika Active Pregnancy Surveillance System
- 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 (RNA) have been detected and those with evidence of an immune response (antibodies) 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 every Tuesday with any laboratory evidence of possible Zika virus infection the week prior; numbers will be delayed.
- 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.
- 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
- A preliminary report from the USZPR found that as of September 22, 2016, 442 women with laboratory evidence of possible Zika virus infection in the registry had completed their pregnancies.
    - Data from the USZPR showed that about 6% of fetuses or infants whose mothers had laboratory evidence of possible Zika virus infections during pregnancy are affected by birth defects.
        - There were 21 infants with birth defects among 395 live births and 5 fetuses with birth defects among 47 pregnancy losses.
        - Of the 26 fetuses or infants with birth defects, 22 had brain abnormalities, microcephaly, or both.
        - Of the 442 completed pregnancies with laboratory evidence of possible Zika virus infection, 18 infants had microcephaly, representing 4% of the completed pregnancies.
    - About 11% of pregnant women with Zika virus symptoms or exposure during the first trimester and laboratory evidence of possible Zika virus infection had a fetus or infant with a birth defect.
    - The proportion of pregnancies affected by birth defects was the same for symptomatic and asymptomatic women.
    - These findings emphasize the importance of CDC's guidance for healthcare providers caring for pregnant women, which recommends Zika virus testing for ***all*** women with possible exposure during pregnancy, regardless of whether they had symptoms.
- An update to previous estimates from the USZPR JAMA report found that as of December 27, 2016, 1,297 pregnant women from 44 states with evidence of possible Zika infection had been reported to the US Zika Pregnancy.
    - Of these, 972 pregnancies were completed by the end of the year and 51 of those resulted in a fetus or baby with birth defects.

        - Among 250 pregnant women with confirmed Zika infection, about 1 in 10 had a fetus or baby with birth defects.
        - Confirmed infections in the first trimester posed the highest risk – with about 15% having Zika-related birth defects.
        - About 1 in 3 babies with possible congenital Zika infection were not reported to have been tested for Zika at birth.
        - Only 1 in 4 babies with possible congenital Zika infection were reported to have received recommended brain imaging after birth.
    - These findings underscore the importance of protecting pregnant women from Zika virus infection and among affected babies, the need for continued Zika testing, care, and follow up.
- 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.
- CDC is using specific **case inclusion criteria** to monitor brain abnormalities and other adverse pregnancy outcomes potentially related to Zika virus infection during pregnancy in the US states, US territories, and freely associated states.
- Accurate reporting of the outcomes of pregnancies with Zika is needed to provide a comprehensive picture of the effects of Zika virus infection during pregnancy. CDC is committed to updating the public with current and accurate information regarding the Zika virus as quickly as possible, and will continue to do so.

ZIKA & US TERRITORIES

- In December 2015, the Commonwealth of Puerto Rico, a United States territory, reported its first confirmed locally transmitted Zika virus case.
    - In 2017, Zika transmission has substantially decreased in Puerto Rico.
    - Although there are very low levels of mosquito-borne Zika transmission now, Puerto Rico will remain vigilant to keep these numbers down and support families already affected by Zika.
    - For weekly reports on Zika virus in Puerto Rico, visit the Puerto Rico Department of Health website.
- 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 infection.
    - For weekly reports on GBS cases with evidence of Zika virus infection, visit the Puerto Rico Department of Health website.
- Puerto Rico has been committed to a strong public health response.
    - Prevention and control activities include strengthening surveillance and laboratory capacity and carrying out mosquito control.
    - The highest priorities and responsibilities include continuing to improve active surveillance systems and strengthening capacity to ensure that all pregnant women are closely monitored and screened throughout each trimester of their pregnancy for Zika and that monitoring is provided for their babies.
    - The government of Puerto Rico and its municipalities and everyone in the community, continue to 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 EPA-approved products.
    - Strategies that have been used 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.

  - CDC and Puerto Rico will also continue to collaborate on consistent case definitions and reporting of Zika virus cases in 2017 and beyond.
  - In Puerto Rico, outbreaks of mosquito-borne viruses tend to peak in the late summer and autumn — in hotter months with higher rainfall.
- In a study conducted by scientists at the Puerto Rico Department of Health and CDC, behaviors and experiences related to Zika virus prevention during pregnancy were analyzed among women in Puerto Rico who were pregnant during the Zika virus outbreak.
  - Overall, 98% of women reported using at least one measure to avoid mosquitoes in their homes.
  - About 46% reported using insect repellent daily and 12% reported wearing long-sleeved shirts and long pants daily.
  - About 39% of respondents reported either abstaining from sex or consistently using condoms to prevent sexual transmission of Zika during pregnancy.
  - More than 90% of women reported that their healthcare provider counseled them about Zika virus infection during pregnancy and 77% of women reported being tested for Zika virus infection by their healthcare provider during the first or second trimester of pregnancy.
  - These findings could be used to inform prevention messaging and interventions for pregnant women who may be exposed to Zika virus in Puerto Rico.
- In June 2017 a report was released providing new information on 2,549 cases of pregnant women with possible Zika virus infection who completed their pregnancies in the U.S. territories.
  - Data from January 1, 2016, to April 25, 2017, were reported to the US Zika Pregnancy Registry and the Puerto Rico Zika Active Pregnancy Surveillance System from American Samoa, Commonwealth of Puerto Rico, Federated States of Micronesia, Republic of the Marshall Islands, and the US Virgin Islands.
  - Of these, nearly 1,508 women had confirmed Zika virus infection and about 1 in 20 (5%) had a fetus or infant with birth defects.
    - Confirmed infections in the first trimester posed the highest risk – with about 8% having Zika-related birth defects, compared to 5% and 4% in the second and third trimesters, respectively.
    - Of live-born infants, 59% were reported to have been tested for Zika, 52% were reported to have received head imaging and 79% had a reported hearing screening at birth.
  - These findings reinforce the importance of protecting pregnant women from Zika virus infection and among affected babies, the need for continued Zika testing, care, and follow up.
- Cases of local transmission have also been confirmed in two other US territories: the United States Virgin Islands and American Samoa.
  - For the most recent case counts reported to ArboNET, visit CDC's Zika website.
  - For weekly reports on Zika virus in the US Virgin Islands, visit the US Virgin Islands Department of Health website.
  - Active Zika virus transmission in American Samoa was interrupted as of April 13, 2017; CDC no longer recommends Zika-related travel precautions for American Samoa.

ZIKA & COLOMBIA

- Findings from the *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 may not be 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 symptoms.
  - CDC and Colombia's *Instituto Nacional de Salud* will continue to collaborate to provide critical scientific information about Zika virus infection during pregnancy.
- Findings reported in the Morbidity and Mortality Weekly Report (MMWR) (December 9, 2016) titled Preliminary Report of Microcephaly Potentially Associated with Zika Virus Infection During Pregnancy- Colombia, January - November 2016:
  - Colombia has experienced a significant increase in microcephaly, with a peak about 6 months after the period in which the highest number of new Zika infections was reported.
    - 476 cases of microcephaly were reported from January 31 through mid-November in 2016, a 4-fold increase from the same period in 2015.
    - This represents approximately 9.6 cases of microcephaly per 10,000 live births during the period. In 2015, there were 2.1 cases per 10,000 live births.
  - More than 105,000 people in Colombia were reported to have Zika virus disease, including nearly 20,000 pregnant women from August 9, 2015, through November 26, 2016.
    - An ongoing national surveillance system through Colombia's *Instituto Nacional de Salud (INS)* captures information about cases in people with Zika virus disease who have symptoms (including pregnant women) and babies and fetuses with major birth defects potentially associated with Zika infection during pregnancy.
  - Colombia's INS is monitoring microcephaly cases and other birth defects in the Colombian population and is evaluating the association with Zika virus infection in pregnancy.
    - CDC is collaborating with INS in the investigation of all infants born or fetal losses with microcephaly to determine if they are related to Zika virus infection.
- CDC and Colombia's INS will continue to collaborate to provide critical scientific information about Zika virus infection during pregnancy and the range of adverse health effects it may cause.

INTERNATIONAL TRAVEL RECOMMENDATIONS

- Travelers who go to areas with risk of 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. Others do not get sick until they return home. Travelers should be aware of any symptoms during their trip or after they 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 risk of Zika should take steps to prevent mosquito bites for 3 weeks so they do not spread Zika to uninfected mosquitoes. If a mosquito bites a person while he or she has Zika virus in his or her blood, the mosquito can become infected and then infect other people.
- The mosquitoes that spread Zika usually do not live at altitudes (height above sea level) above 6,500 feet (2,000 meters). Travelers who plan to be only in areas above this altitude are not likely to get Zika from a mosquito.

- Sexual transmission of Zika virus is possible, so travelers (especially those who are pregnant or planning to become pregnant) should use condoms or not have sex – both during and after travel. See Preventing Sexual Transmission.
- Until more is known, CDC recommends the following:
  - Pregnant women should not travel to areas with a risk of Zika.
  - If a pregnant woman must travel, she should talk to her doctor and strictly follow steps to prevent mosquito bites and sexual transmission during the trip.
    - See Preventing Zika Infection in Pregnancy.
  - Travelers who have a pregnant partner or are planning to become pregnant should practice precautions. For guidance on suggested timeframes for delaying pregnancy, 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.

INTERNATIONAL AND OVERSEAS US TERRITORY 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 altitude 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.
  - For Zika, special precautions are recommended for women who are pregnant (do not travel to areas with risk of Zika) and their partners (use condoms or don't have sex during the pregnancy) and women who are trying to become pregnant and their partners (see Recommendations for Couples Interested in Conceiving).
  - Zika travel notices serve as advisories to travelers that Zika has been reported in a place where it has not been before or where there is an increase in the number of Zika cases above what that country usually reports. They do not necessarily indicate a higher risk for Zika as compared to countries without a travel notice where Zika is circulating but not newly introduced.
- CDC posts routine recommendations for ongoing risks a traveler is likely to encounter at the destination.
  - For Zika, routine recommendations have been posted for countries where Zika is circulating but not newly introduced. The recommendations apply to women who are pregnant and recommend that they should not travel to areas where Zika is a risk.
  - Risk of Zika may not be higher in a country with a travel notice than in a country with a routine Zika recommendation.
- Countries and territories with imported cases where local mosquitoes are not infected with Zika do not have travel notices. Imported cases occur when people are infected with Zika during travel to an area where Zika is spreading and then return to their home countries, or when a person who lives in an area where Zika is spreading is diagnosed with Zika in another country that does not have Zika.

- Countries with past Zika outbreaks and ongoing Zika transmission do not have travel notices. In a country where Zika has been newly introduced, cases will likely decrease to a stable level over time, and a travel notice will be replaced by an ongoing recommendation that pregnant women avoid travel to that area.

DOMESTIC TRAVEL GUIDANCE (APPLIES TO CONTINENTAL UNITED STATES AND HAWAII)

- Prolonged local transmission of Zika virus within the continental United States and Hawaii is unlikely due to environmental conditions (e.g., temperate climate, lower population density, widespread use of air conditioning and screens, and reduced mosquito habitat) that inhibit human-mosquito-human transmission by *Ae. aegypti* and that differ from tropical areas that have experienced prolonged and intense transmission.
- Prior experience with chikungunya and dengue suggests that single local transmission cases do occur without evidence of further spread, and while ongoing local transmission of dengue has occurred in recent decades only in South Florida (Florida Keys) and southernmost Texas, it has not expanded beyond these areas.
- In the event that Zika virus transmission occurs at an intensity that presents a significant risk to pregnant women, domestic travel guidance should be issued, ideally by states, or by CDC, for pregnant women to avoid travel to the affected area.
- Because of the low likelihood of prolonged and extensive local transmission, CDC's approach to domestic travel guidance differs from that of international travel notices.
- For purposes of publicly communicating areas where Zika virus-related domestic travel guidance applies, CDC has identified two types of geographic areas: Zika active transmission areas (designated as red on map) and Zika cautionary areas (designated as yellow on map).
    - **Zika active transmission area (red area):** A geographic area where local, state, and CDC officials have identified the presence of confirmed, multi-person local mosquito-borne transmission and have determined that the intensity of Zika virus transmission presents a significant risk of contracting mosquito-borne Zika and poses a risk to pregnant women and blood and tissue safety.
        - There are currently no red areas in the United States.
    - **Zika cautionary area (yellow area):** A geographic area where local mosquito-borne transmission has been identified and pregnant women and blood and tissue safety are at some undetermined risk, but evidence is lacking on whether the intensity of transmission is widespread and sustained.
        - **Brownsville, TX,** was previously designated as a yellow area. That designation was removed on August 29, 2017.
        - **Miami-Dade County, FL,** was previously designated as a yellow area. That designation was removed on June 2, 2017.
        - CDC has issued guidance for health departments and healthcare providers caring for people with exposure to areas where a yellow designation has been lifted.
        - Although the level of risk of Zika virus transmission after a yellow area designation is lifted is unknown, it is likely to be low; sporadic cases may still occur.
        - All women and men who live in or travel to an area that had a yellow area designation lifted should check the CDC website frequently for updates about Zika virus transmission.
        - See the full guidance for people living in or traveling to Brownsville, TX.
        - 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 interim guidelines for healthcare providers caring for infants and children with possible Zika virus exposure.
- 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 (HAN) 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 healthcare provider or other patients. However, healthcare personnel are reminded to use Standard Precautions when they might come in contact with 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 interim guidance published April 1, 2016, 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 on September 30, 2016, 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 and how long they should wait before attempting conception.
- CDC has updated (July 2017) Interim Guidance for Health Care Providers Caring for Pregnant Women with Possible Zika Virus Exposure.
    - The rationale for the updated guidance includes
        - The overall declining trend in cases of Zika infection reported in the Americas could lead to a higher proportion of positive Zika test results actually being false or inaccurate, limiting adequate interpretation of results.
        - Zika virus antibodies can persist for months in some pregnant women. Therefore, antibody test results may not be able to tell healthcare providers if the infection occurred during or before the current pregnancy, meaning results may not provide useful information about whether a pregnancy is at risk from Zika infection.
    - For the full guidance, see Testing for Pregnant Women.
- 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.
- CDC provides clinical recommendations related to providing family planning services. Healthcare providers should discuss strategies to prevent unintended pregnancy, including contraceptive counseling to help sexually active women and couples select the most effective method that meets the needs of the woman and/or couple and can be used correctly and consistently. Additionally, preventing sexually transmitted infections should be discussed, 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.
- Preconception counseling guides for men and women living in areas with risk of Zika and for travel are available here.

PRENATAL DIAGNOSIS OF CONGENITAL ZIKA VIRUS INFECTION

DIAGNOSTIC IMAGING

- 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.
    - In another series of 11 infants with lab confirmed congenital Zika infections, similar findings were reported, including cerebellar hypoplasia, lissencephaly with hydrocephalus, and arthrogryposis.
- 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 and other brain abnormalities 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 and other brain abnormalities 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.

- Serial fetal ultrasounds should be considered when a negative ZIKV test was done more than 12 weeks after exposure or symptom onset. ZIKV RNA and IgM antibodies decline over time and absence of Zika RNA or IgM does not rule out a Zika virus infection more than 12 weeks before the test.
- 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.

AMNIOCENTESIS

- Amniocentesis is a medical procedure in which a small amount of amniotic fluid is removed from the sac surrounding the fetus for testing.
- 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 RNA NAT testing of amniotic fluid is for congenital Zika virus infection and 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.

PEDIATRIC HEALTHCARE PROVIDERS

- CDC has interim guidelines for healthcare providers in the United States caring for infants 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.
- To help affected babies, healthcare providers can
    - Ask about Zika and provide all needed tests and follow-up care. Guidance is updated as more is learned about Zika so it is important to check on current recommendations. Babies with possible Zika should get a comprehensive physical exam, neuroimaging, neurologic exam, newborn hearing screening, and Zika laboratory tests (guidance as of August 2016).
    - Support babies and families: Develop a coordinated care plan for babies affected by Zika, including ongoing support, follow-up care, and linking to your local health department. Help families monitor their babies' development.
- Given the changes to the updated interim guidance for healthcare providers caring for pregnant women and the likelihood that fewer pregnant women without Zika symptoms will be tested, it is critical that pediatricians ask about potential maternal and congenital Zika exposure for every newborn.
    - Infants born to mothers with possible Zika exposure during pregnancy who were not tested for Zika should receive a comprehensive physical exam, including standardized measurement of head circumference and newborn hearing screen, as part of routine pediatric care. In addition, based on the

level of possible Zika virus exposure, the provider should consider whether further evaluation of the newborn for possible congenital Zika virus infection is warranted, in which case, a head ultrasound, and ophthalmologic assessment should be considered. Based on this evaluation, testing the infant for Zika can be considered.

- AAP and ACOG will work closely together to follow up on this guidance. Specifically, they will assess the need for additional guidance for infants and children in terms of diagnostics and developmental assessments.

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.
- A distinct pattern of birth defects, called congenital Zika syndrome, has emerged among fetuses and infants of women infected with Zika during pregnancy. See Health Effects Associated with Zika.
- From what we know about severe microcephaly in the context of other infections during pregnancy (e.g., cytomegalovirus and rubella), 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 and an instructional video for healthcare providers 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.
    - Nonsteroidal anti-inflammatory drugs (NSAIDS) are 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 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.
    - 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, even if no abnormalities are apparent at birth.
    - Imaging: A head ultrasound is recommended before hospital discharge or within 1 month of birth for infants with possible Zika virus infection. For infants with a small or absent anterior fontanelle and poor visualization of the intracranial anatomy on ultrasound, other imaging (i.e., magnetic resonance imaging or computed tomography) should be considered.
    - Maintain a level of suspicion: For infants without laboratory evidence of Zika virus infection but for whom suspicion for congenital Zika virus infection remains, healthcare providers should
        - Evaluate for other causes of congenital infection
        - Consider an ophthalmology exam and auditory brainstem response (ABR) hearing test before hospital discharge or within 1 month of birth
    - All infants born to mothers with: 1) possible Zika exposure without maternal Zika testing, 2) negative testing but who had ongoing maternal possible Zika virus exposure during pregnancy, or 3) negative test results on a specimen collected > 12 weeks after exposure should receive a
        - Comprehensive physical exam, including standardized measurement of head circumference and newborn hearing screen, as part of routine pediatric care.
        - In addition, based on the level of possible Zika virus exposure, the provider should consider whether further evaluation of the newborn for possible congenital Zika virus infection is warranted, in which case, a head ultrasound, and ophthalmologic assessment should be considered.
        - Based on this evaluation, testing the infant for Zika can be considered.
    - Consider performing other evaluation and follow up in accordance with CDC interim guidance for the evaluation and management of infants with possible congenital Zika virus infection.
- **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
        - Traveled to or resided in an area with risk of Zika within the past 2 weeks and
        - 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
        - Whose mother traveled to or resided in area with risk of Zika within 2 weeks of delivery and
        - 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.

INFECTION CONTROL

- Standard Precautions should be used to protect healthcare personnel from all infectious disease transmission, including Zika virus. Standard Precautions are based on the fact that all blood, body fluids, secretions, excretions, non-intact skin, and mucous membranes might contain transmissible infectious agents.
- Occupational exposure that requires evaluation includes percutaneous exposure or exposure of non-intact skin or mucous membranes to any of the following: blood, body fluids, secretions, and excretions.
- Healthcare personnel working in labor and delivery units should assess the likelihood of the presence of body fluids or other infectious material based on the condition of the patient, the type of anticipated contact, and the nature of the procedure or activity that is being performed, and apply practices and personal protective equipment to prevent exposure as indicated.
- Healthcare personnel who think an occupational exposure has occurred should report the exposure immediately to their supervisor and follow their employer's procedures that usually involve contacting the occupational health office for an assessment of the exposure with consideration of all relevant pathogens including Zika, HIV, and hepatitis.
- In the absence of an occupational exposure, healthcare personnel with potential Zika exposure should be evaluated for testing following the same guidance as for the general public.
- See more information on preventing exposure in healthcare settings.

LABORATORY TESTING

- CDC's Guidance for US Laboratories Testing for Zika Virus Infection was updated on July 24, 2017, and is available on the CDC website.
- Zika testing is recommended for
  - Anyone who has or recently experienced symptoms of Zika **and** lives in or recently traveled to an area with risk of 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 risk of Zika.
  - Pregnant women with ongoing possible Zika virus exposure (i.e., live in or frequently travel to areas with risk of Zika), regardless of symptoms.
  - Pregnant women who live in or traveled to an area with risk of Zika, or who had sex with a partner who lives in or traveled to an area with risk of Zika, **and** who have a fetus with prenatal ultrasound findings consistent with congenital Zika infection.
- Zika testing is no longer routinely recommended for pregnant women without symptoms who have recent possible but no ongoing exposure to Zika (i.e., travelers). However, it should be considered as a shared decision between patients and providers, based on a balanced assessment of risks and expected outcomes, clinical judgement, patient preferences and values, and the jurisdiction's recommendations.
- Zika virus testing is not recommended for non-pregnant asymptomatic individuals and pre-conception screening.
- 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

- Multiple nucleic acid tests (NATs) have received Emergency Use Authorization (EUA) from FDA. FDA maintains a list on its website of all Zika virus EUAs. Please refer to the FDA website for a current list of available assays and associated letters of authorization, fact sheets, and product labeling. Additional assay-specific information (e.g., performance characteristics) is included in the labeling. (http://www.fda.gov/MedicalDevices/Safety/EmergencySituations/ucm161496.htm)
- 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.

TESTING FOR NON-PREGNANT WOMEN AND MEN

- During the first two weeks after symptom onset, Zika virus disease can be diagnosed by performing RNA nucleic acid testing (NAT) on serum and urine, and possibly whole blood, cerebral spinal fluid, or amniotic fluid in accordance with EUA labeling.
    - Zika virus RNA NAT 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 RNA NAT confirms Zika virus infection. However, because Zika virus RNA in serum and urine decreases over time, a negative RNA NAT does not rule out Zika virus infection; in this case, serologic testing should be performed.
    - If Zika virus RNA NAT 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. Serologic testing should be performed on specimens collected more than 2 weeks after symptom onset or if the Zika virus RNA NAT is negative.
    - 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.
    - A negative result more than 12 weeks after exposure or symptom onset does not rule out recent Zika virus infection because Zika virus RNA and IgM antibodies decline over time. Therefore, a Zika virus IgM test performed more than 12 weeks after the earliest possible exposure or symptom onset may not detect a Zika virus infection that occurred shortly after that exposure or symptom onset.
- Plaque-reduction neutralization testing (PRNT) can be performed to measure virus-specific neutralizing antibodies to confirm prior flavivirus infections and differentiate from other viral illnesses. However, it cannot be used to determine timing of Zika virus infection.
    - PRNT is recommended for serum specimens that yield a non-negative IgM serology result.

- 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.
- PRNT confirmation is not currently routinely recommended for Puerto Rico due to high levels of circulating flaviviruses (e.g., dengue). If all IgM tests are negative, no further testing is required.

TESTING FOR PREGNANT WOMEN

- All pregnant women should be assessed for possible Zika virus exposure before and during the current pregnancy, a diagnosis of laboratory-confirmed Zika virus disease, and the presence of Zika symptoms at each prenatal care visit. They should be asked if they
  - Traveled to or live in an area with risk of Zika, during their pregnancy or periconceptional period (the 6 weeks before last menstrual period or 8 weeks before conception).
  - Had sex without a condom with a partner who has possible exposure to Zika. Condoms include male and female condoms.
- Knowledge of a pregnant woman's possible exposure to Zika virus before and during pregnancy is critical contextual information that should be used to tailor pre- and post-test counseling and interpretation of test results.
- They should also ask about a diagnosis of laboratory-confirmed Zika virus infection before the current pregnancy. Based on experience with other flaviviruses, previous Zika virus infection is likely to confer prolonged, possibly lifelong, immunity. Testing is not routinely recommended for pregnant women with a previous diagnosis of laboratory–confirmed Zika virus infection by either NAT or serology.
- Possible exposure to Zika virus that warrants testing includes
  - Travel to or residence in an area with risk of Zika, 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 risk of Zika.
- For pregnant women exposed to Zika who have symptoms
  - Testing for Zika RNA and Zika antibodies is recommended at the same time, as soon as possible up through 12 weeks after symptoms began. The previous recommendation was to conduct sequential testing (testing with one test then another).
- For pregnant women without symptoms of Zika who have on going exposure to Zika (meaning they live in an area where Zika is being spread by mosquitoes or frequently travel to such an area)
  - Testing for Zika RNA is recommended at the first prenatal care visit, followed by two additional rounds of testing during routine prenatal care visits. For this group, testing for Zika antibodies is no longer recommended because of emerging evidence indicating challenges in determining whether positive results represent a recent Zika infection, or if infection occurred before pregnancy.
- For pregnant women without symptoms of Zika who were recently exposed to Zika but do not have ongoing exposure
  - Routine testing is no longer recommended. However, it should be considered as a shared decision between patients and providers, based on a balanced assessment of risks and expected outcomes, clinical judgement, patient preferences and values, and the jurisdiction's recommendations. If the decision is made to test, then follow the testing recommendations for symptomatic pregnant women.
- For pregnant women exposed to Zika whose fetus shows indications of defects potentially associated with Zika
  - Routine testing for Zika continues to be recommended.
  - In addition to testing recommendations for the designated areas with risk of Zika virus infection, Texas Department of State and Health Services issued a health alert on April 7, 2017, recommending Zika virus testing of pregnant women and symptomatic residents of counties in the Lower Rio Grande Valley.

TESTING FOR CONGENITAL ZIKA VIRUS INFECTION

- CDC recommends laboratory testing for
  - All infants born to mothers with laboratory evidence of Zika virus infection during pregnancy.
  - Infants who have abnormal clinical or neuroimaging findings suggestive of congenital Zika syndrome and a mother with a possible exposure to Zika virus, regardless of maternal Zika virus testing results.
- Infant samples for Zika virus testing should be collected ideally within the first 2 days of life; if testing is performed later, distinguishing between congenital, perinatal, and postnatal infection will be difficult. Despite this limitation, testing specimens collected within the first few weeks to months after birth may still be useful in the evaluation for possible congenital Zika virus infection, especially among infants born in areas without risk of Zika.
  - Infants born to mothers with risk factors for maternal Zika virus infection (travel to or residence in an area with risk of Zika 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 negative maternal testing in the setting of ZIKV testing performed more than 12 weeks after maternal exposure or symptoms, should receive a comprehensive assessment, including a physical exam, careful measurement of head circumference, head ultrasound to assess the brain's structure, and standard newborn screening. If no infant abnormalities are detected, further evaluation should proceed based on the following scenarios:
    - If maternal testing was not performed during pregnancy, maternal diagnostic testing with Zika virus IgM antibody should be performed if all of maternal exposure if within 12 weeks of presentation.
      - If maternal samples are collected around the time of delivery and fall within 12 weeks of symptom onset or possible exposure, and maternal test results are negative, infant samples should not be tested for Zika.
    - However if some or all of maternal exposure is more than 12 weeks before delivery, maternal testing may be considered; however, a negative test > 12 weeks after symptom onset or possible exposure does not rule out recent maternal Zika virus infection because IgM antibody levels decline over time, and the decision to test the infant should be considered.
    - If maternal samples are collected around the time of delivery and some or all of maternal exposure is more than 12 weeks before delivery, samples from the mother and infant should be collected within the first 2 days of life, if possible. If maternal IgM is negative, infant testing should be considered because a negative IgM result does not rule out recent maternal Zika virus infection. If maternal IgM is positive or equivocal, infant testing should be based on maternal PRNT results (if neutralizing antibodies to Zika are detected, infant testing should be pursued).
    - If there are concerns about the family not returning for future medical appointments or if management of the infant will be negatively affected by delays in obtaining infant results, health departments and clinicians should consider head ultrasound, ophthalmologic assessment, and infant Zika virus testing before hospital discharge.
    - Testing of placental tissues for Zika virus by RNA NAT testing can be considered. Placental testing cannot distinguish between maternal and infant Zika virus infection but can provide further maternal diagnostic information. See Pathology Testing for more details.
- Testing of cerebrospinal fluid (CSF): CDC interim infant testing guidance recommends that Zika virus testing be performed on CSF if it is/was collected for other reasons. However, there are limited reports of congenital Zika virus infection in which CSF was the only sample testing positive. Therefore, healthcare providers should consider obtaining CSF for Zika virus RNA and IgM antibody testing in infants with clinical findings of possible congenital Zika syndrome but whose initial laboratory tests are negative on serum and urine.
- 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.
- See detailed guidance on the clinical and laboratory evaluation and management of infants with possible congenital Zika virus infection.

- CDC has a tool for implementing CDC guidance for infant neuroimaging and infant Zika virus testing based on maternal Zika virus exposure and laboratory testing.

PATHOLOGY TESTING

- Pathology testing is an important diagnostic tool to establish the presence of Zika virus infection because prolonged detection of Zika virus RNA has been reported in tissue specimens including placenta and fetal brain.
- Pathology testing for Zika virus infection is performed in the CDC's Infectious Diseases Pathology Branch (IDPB) and can be performed on formalin-fixed or formalin-fixed paraffin-embedded placental tissue (placental disk, umbilical cord, and fetal membranes), fetal or infant autopsy tissue in the event of a fetal loss or infant death, or products of conception. At this time, fresh and frozen tissues are not being accepted.
- CDC's Infectious Diseases Pathology Branch performs pathologic testing not only for Zika virus but many other pathogens and requires pre-approval for all specimen submissions to its laboratory for diagnostic testing. See contact information below.
- The approach to Zika virus testing on fixed placental and fetal tissue specimens continues to evolve as more is learned regarding this emerging virus.
- Pathology testing currently includes
  - Zika virus RT-PCR (a nucleic acid test, or NAT) which detects viral RNA
  - Zika virus immunohistochemistry (IHC) which detects viral antigen and is performed for pregnancy losses occurring prior to the early 2nd trimester and on fetal or infant brain or spinal cord tissue
  - Microscopic evaluation of tissues, in selected cases, to identify potential pathologic changes
- A positive Zika virus RT-PCR on placental tissues indicates the presence of maternal infection; it cannot distinguish between maternal and congenital infection.
- A negative Zika virus RT-PCR on placental tissues does not exclude maternal or infant Zika virus infection.
- Pathology testing is not indicated in all clinical situations for women with possible Zika virus exposure during pregnancy. However, it may be considered for diagnostic purposes for symptomatic pregnant women and women with infants with possible Zika virus-associated birth defects without a definitive diagnosis of laboratory confirmed Zika virus infection during pregnancy.
  - For asymptomatic pregnant women who have recent possible Zika virus exposure, but without ongoing exposure, and an infant without possible Zika-virus associated birth defects, testing of placental tissues is not routinely recommended. Testing may also be considered in selected scenarios for pregnancies resulting in a miscarriage or fetal loss/stillbirth, or for an infant death. All requests need to undergo an approval process by CDC. See contact information below.
  - For guidance regarding scenarios for which Zika virus testing on placental, fetal, and infant autopsy tissues may be considered, please see Update: Interim Guidance for Health Care Providers Caring for Pregnant Women with Possible Zika Virus (MMWR, July 24, 2017).
- For pre-approval, health departments should contact pathology@cdc.gov. Specimens should ONLY be sent to CDC from health departments. In the interim, during the approval process, the tissues can be fixed (see description below).
- For placenta, umbilical cord, and fetal membranes, the following fixed specimens should be collected:
  - Two full thickness pieces (~2-3 cm in diameter each) from middle third of placental disk and at least 1 from the placental disk margin (~2-3 cm in diameter)
  - Two 2 cm segments of umbilical cord (one from each end, placental and fetal)
  - A broad strip (5x12cm) of fetal membranes taken from the point of rupture and including a small "bite" of the edge of the disc.
- For information on the collection of products of conception and fetal or infant tissue in the event of a fetal loss or infant death, please see Collecting and Submitting Placental and Fetal Tissue Specimens for Zika Virus Testing.

- Label all specimens to identify location of sample.
- Instructions for fixation and storage:
  - Tissue collection should occur as soon as possible after delivery, and specimens should be placed in formalin as soon as possible after collection to prevent viral RNA degradation, which can occur rapidly in fresh tissues. Collecting tissues with the dimensions provided above will allow formalin to penetrate the specimen and increase the chances for appropriate tissue fixation. The volume of formalin used to fix tissues should be 10x the volume of tissue. Place tissue in 10% buffered formalin for 3 days (72 hours). After 3 days (72 hours) of fixation, tissue should be transferred to 70% ethanol for long-term storage or for shipping. If tissue is left in formalin for >72 hours, it can also lead to viral RNA degradation.
  - Formalin-fixed paraffin-embedded tissue blocks are preferred if formalin-fixation of the wet tissues has exceeded two weeks. Wet tissues fixed in formalin for more than four weeks are not acceptable for Zika virus testing.
  - Fixed tissues should be stored and shipped at room temperature. DO NOT FREEZE samples that have been fixed in formalin.

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.
  - On November 18, 2016, WHO declared the end of the PHEIC after deciding that Zika virus and its associated consequences remain a significant enduring public health challenge requiring intense action, but no longer represent a PHEIC.
  - On August 3, 2017, CDC's EOC transitioned to a level 2 activation.
  - On August 29, 2017, CDC's EOC transitioned to a level 3 activation.
- 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 report providing state-level estimates of contraceptive use among adult women at risk for unintended pregnancy, and sexually active adolescents.
  - 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.
- 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 updated its Zika Interim Response Plan on May 5, 2017.
    - Zika Communication Planning Guide for States
    - Interim CDC Recommendations for Zika Vector Control in the Continental United States
    - Toolkit for Investigating Possible Local Mosquito-Borne Transmission of Zika Virus
- 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.
    - Monitor and report Zika-associated birth defects using consistent case definitions.
    - Publish and disseminate guidelines to inform testing and treatment of people with suspected or confirmed Zika.
    - Monitor cases of infections among pregnant women to identify the long-term consequences of congenital Zika infection.
    - Collaborate with clinical experts and organizations to update guidance as needed for healthcare providers on clinical management of pregnant women and babies affected by Zika.
    - Research factors that might affect birth defects in fetuses and babies, including the timing of Zika infection during pregnancy.
    - Improve laboratory testing for Zika and providing state, tribal, local, and territorial health laboratories with diagnostic tests.
    - Accelerate the development of a vaccine.
- In response to local transmission of Zika 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.
    - As of July 18, 2017, there have been 90 CDC staff deployments to Florida since the beginning of the response.
    - Since January 2016, CDC has sent materials to Florida for approximately 25,000 Zika virus antibody tests, including enough materials for approximately 6,000 tests sent in August in response to a request from Governor Scott.
    - CDC's Atlanta, GA, and Fort Collins, CO, laboratories are testing specimens from pregnant women and are working with Florida on other possible support for Zika laboratory testing.

  - As of May 17, 2017, CDC has received 2,910 specimens from Florida and has performed 1,563 rRT-PCR tests, 1,132 anti-Zika IgM tests, and 1,155 Plaque Reduction Neutralization Tests (PRNT).
  - As of April 30, 2017, CDC has provided Florida with nearly $50 million in Zika-specific funding and more than $29 million in Public Health Emergency Program (PHEP) funding that can be used toward Zika response efforts.
  - CDC has supported paid media for education and outreach to help residents and visitors in Florida understand how to protect themselves and their communities from Zika virus. These materials include digital, radio, and outdoor advertisements such as billboards, bus shelters, metro stops, mobile LED trucks and aerial banners placed in Miami-Dade County between July and November.
- 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.
- The outbreak of Zika virus in the Americas has highlighted the challenges in adequately monitoring and documenting adverse health effects in fetuses and infants following prenatal infection. It also emphasizes the importance of birth defects surveillance programs to evaluate prevention efforts and progress toward eliminating the effects of Zika virus infection during pregnancy.
  - CDC has funded 45 jurisdictions in the US to establish or enhance Zika-related birth defects surveillance systems that monitor brain abnormalities, including microcephaly, and central nervous system defects, to better understand Zika exposure during pregnancy and adverse outcomes.
- 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 staff continues to support Puerto Rico in all aspects of the Zika outbreak including:
  - Evaluating vector control interventions and implementing an island-wide vector control program
  - Improving diagnostic tests
  - 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
  - Assessing whether testing for the presence of Zika virus by using Trioplex rRT-PCR test for Zika, dengue, and chikungunya viruses in whole blood rather than serum or urine improves diagnostic capacity among pregnant women in Puerto Rico through a partnership between the Puerto Rico Department of Health and CDC. Whole blood testing among pregnant women would require less blood, provide quicker results, and would potentially have improved sensitivity for detecting recent Zika virus infection.
  - 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.
  - CDC has completed an analysis showing the cost-effectiveness of increasing access to contraception in the context of the Zika outbreak in Puerto Rico.

- Supporting the development of health education campaigns in Puerto Rico in collaboration with CDC Foundation, such as the "This is How We Stop Zika (Detén el Zika)" campaign, a multimedia communication campaign that provides steps for pregnant women and communities to follow to protect themselves from Zika virus infection.

INTERNATIONAL ACTIVITIES

- CDC is working 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 laboratory 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.
- CDC is building capacity for enhanced vector surveillance and control throughout Central America, South America, and the Caribbean. Activities include building capacity for GIS within vector surveillance and control programs, developing robust systems to monitor and manage insecticide resistance, and the evaluation of novel tools and strategies for improved vector surveillance and control.
- Through an interagency agreement, CDC and the United States Agency for International Development (USAID) are working to minimize the number of pregnancies affected by Zika virus infection and to develop a deeper understanding of Zika virus.
    - Improving our understanding of Zika virus will help us to predict the long-term consequences of Zika virus on affected countries and at-risk populations, including the United States.
    - The interagency agreement supports 25 Zika research and response-related Statements of Work in Zika prevention, detection and response areas including: surveillance for Zika virus infection, pregnancy and infant outcomes and Guillain-Barre syndrome; innovations and capacity building for vector control and vector surveillance; prevention and early detection of mosquito transmitted and sexually transmitted infections that impact pregnancy; strengthening of laboratory, diagnostics, epidemiological, emergency response and risk communications capacities; development of new Zika diagnostics and testing approaches; and rapid monitoring and evaluation of Zika public health interventions.
- Through its 24/7 Global Disease Detection Operations Center (GDDOC), 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 Rapid Response Team (Global RRT) enhances global health security by increasing CDC's emergency response capacity as well as that of the global emergency workforce through collaboration with CDC country offices, ministries of health, and international public health organizations.
    - The Global RRT maintains resources and a multidisciplinary roster of CDC staff, both of which can rapidly mobilize to support CDC experts and partners responding to global public health concerns, within the US and abroad.
    - The Global RRT maintains its operations from CDC Headquarters in Atlanta, Georgia with a dedicated team of full-time staff from across the agency. There are more than 300 senior and junior surge staff representing almost all centers and the Office of the Director, with more than 50 ready to deploy at short notice each month. Global RRT staff can remain in the field during an emergency response for up to 6 months. Many staff from the Global RRT are supporting the Zika response.
- The Global Disease Detection (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.
- CDC staff are currently working globally with ministries of health and agriculture, universities, US government agencies, and other research partners to
    - Determine incidence of Zika infection and monitor pregnancy and birth outcomes
    - Determine risk factors for severe outcomes (i.e., Guillain-Barré syndrome or other neurologic disorders)
    - Describe non-human vertebrate and vector ecology at the animal-human interface
    - Describe geographic distribution and transmission dynamics
    - Establish diagnostic capabilities and evaluate novel diagnostics including multi-pathogen assays and point-of-care diagnostics
- CDC's Global Disease Detection Operations Center (GDDOC) operates 24/7 and is continually carrying out event-based surveillance to monitor this outbreak globally. The GDDOC, in collaboration with Zika subject matter experts and international partners and governments, has been conducting event-based surveillance to monitor the spread of Zika from Brazil to other areas in the Americas since May 2015 and sharing this information to coordinate the response. The GDD regional centers are currently working with governments and international partners to provide data from the field back to CDC's GDDOC for global surveillance. Because of this work we are able to know:
    - Where Zika is spreading in the Americas and elsewhere in the world
    - Where (in what regions) we are seeing increased numbers of 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:
        - Drafting and testing of national emergency action plans
        - Training field epidemiologists through the Field Epidemiology Training Programs (FETP)
        - Strengthening laboratory capabilities by
            - Supporting Zika virus testing in South and Central America, and specimen transport in the Latin American region; and sharing protocols and procedures with laboratories throughout the Caribbean and Latin America regions to strengthen overall ability to accurately and quickly test for selected diseases.

- Supporting countries with Zika in vector surveillance and control activities, 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 several projects, including 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, and Zika en Embarazadas y Niños (ZEN), a prospective cohort study that will enroll 5,000 women in their first trimester of pregnancy, their partners, and follow up on their infants. 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. CDC's National Public Health Institute program is also supporting overall strengthening of Colombia's INS. The project is focused on building communications, data and information sharing, and laboratory safety capacity.
- In an effort to better understand Zika and its effects during pregnancy, PAHO invited CDC to provide technical assistance to the Brazil Ministry of Health (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, and has offered to test samples from the microcephaly cases for 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" in-country who can identify and target disease threats. FETP Frontline is a 3 month in-service program focusing on detecting and responding to diseases and events of public health importance. By building surveillance capacity at the forefront, FETP-Frontline strengthens a country's ability to respond to Zika and other outbreaks of international concern.
- 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. Conducted under the umbrella organization of the Council of Health Ministers of Central America and the Dominican Republic (COMISCA), FETP activities include implementing Frontline and Intermediate training programs and proving minigrants to support Zika activities. CDC is also working to enhance the capacities of the FELTP program in the Dominican Republic (DR) and to develop curriculum modules for surveillance, risk communication, laboratory and vector surveillance/resistance monitoring, and entomology for epidemiologists.
- CDC is collaborating with independent FETPs in Brazil, Colombia, Paraguay, and Peru to provide technical advice for implementing FETP Frontline and Intermediate training in these countries, supporting Zika-related field investigations, and hiring a resident advisor to coordinate and facilitate the field activities.
- CDC is supporting the regional FETP in the Caribbean, located within the Caribbean Public Health Agency (CARPHA), to strengthen field activities related to Zika.
- FETP-GB (Guinea-Bissau) worked with Dakar Pasteur Institute and WAHO on a Zika outbreak investigation in Bijagos Islands in July-August, 2016. The team interviewed and collected samples from 136 suspected cases and contacts. FETP-GB also conducted a descriptive case study on microcephaly cases in Bissau in 2015.
- In an effort to increase public health risk communication knowledge in the Americas, CGH is conducting various trainings. Risk communication is essential for an effective response to a health threat. These trainings will increase country capacity to implement effective risk communication strategies in support of the Zika response as well as other emergent issues. These strategies can reduce and mitigate the impact of health hazards before, during, and after public health emergencies. The first risk communication training was held in Trinidad and Tobago in May with 23 participants from English speaking Caribbean countries attending. The second was held in Haiti in French with 20 participants attending. A third one is planned for Spanish speaking countries in Central and South America by the end of September.

CDC FOUNDATION

- At CDC's request, the CDC Foundation activated its emergency response funds on February 10, 2016, to help with the Zika response.
- 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.
- To see all 2016 press releases from the CDC Foundation related to the Zika response, visit this page.
- The CDC Foundation's work with CDC and partner organizations includes a number of efforts, including a communication campaign for individuals, families and communities in U.S. territories about how to protect pregnant women from the dangers of Zika; and providing educational materials and products—through packets called Zika Prevention Kits—that pregnant women use to learn about Zika and protect themselves from the virus.
- In August of 2016, the CDC Foundation announced that the Zika Contraception Access Network (Z-CAN) was operational. The Network is providing women in Puerto Rico with a range of FDA-approved, reversible contraceptive methods 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 reversible 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.
    - Based on funding availability from private donors, Z-CAN aims to provide contraceptive services to women in Puerto Rico at no cost to them through December 2017.
- As Zika evolves and spreads, the CDC Foundation is striving to help CDC meet urgent needs that require philanthropic and private sector support to address gaps in government funding that may not be available or quickly accessible for the Zika response. Some of the needs are:
    - Building capacity and strengthening diagnostic capabilities around insecticide-resistance and developing innovative approaches to advance vector/mosquito control.
    - Providing a full range of reversible contraception to women in Puerto Rico wanting to delay or avoid pregnancy during the Zika outbreak through ongoing support to the Zika Contraception Access Network.
    - Responding to emerging needs as they arise with swift, timely support.