NEW YORK CITY DEPARTMENT
OF HEALTH AND MENTAL
HYGIENE
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Guidance on Counseling Pregnant Patients With or at Risk for Zika Virus

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Background

An outbreak of Zika virus infection is currently expanding in South and Central America, Mexico, Pacific Islands and the Caribbean. Zika is a single-stranded RNA flavivirus, as are dengue, West Nile, yellow fever and Japanese encephalitis viruses. Although infection with Zika virus is often asymptomatic and illness is usually mild, congenital infection with Zika virus can cause microcephaly and other severe fetal brain defects.[1, 2, 3, 4] The full spectrum of Zika virus infection in the fetus and infant has not yet been determined, but is under study.

On August 1, 2016, the first mosquito-borne, locally-acquired Zika cases in the continental United States were reported in Miami, Florida. Since then additional cases of Zika infection acquired in Florida have been reported. It is possible that other locations in the United States with *Aedes aegypti* mosquitos will also report local mosquito-borne Zika cases throughout the summer and fall. A related species, *A. albopictus* is found in the New York City (NYC) area but it is not known to be an efficient vector for Zika virus. However, mosquito and human surveillance is being conducted in NYC to rapidly detect local mosquito-borne transmission in NYC, should it occur.

Because travel between Zika-affected areas and NYC is common, health care providers in NYC will continue to encounter patients who have, or are at risk for, Zika virus infection. We recommend that providers ask **ALL** pregnant patients about travel during pregnancy, and plans for future travel, to identify patients at risk for Zika virus infection during pregnancy, and to provide guidance on prevention and testing. In addition, because Zika virus can be transmitted sexually,[5, 6, 7, 8] we recommend asking about travel among sexual partners of pregnant women. Transmission from an infected male can occur before or during the symptomatic period and after symptoms resolve. The Centers for Disease Control and Prevention (CDC) recommends that pregnant women with sexual partners infected with or potentially exposed to Zika virus either abstain from sex or use barrier protection (condoms for vaginal and anal sex, dental dams or condoms for oral sex) correctly and consistently for the duration of their pregnancy.[9]

This document includes information that providers can use when counseling pregnant patients on prevention of Zika virus infection, diagnostic testing for infection and the possible effects of infection during pregnancy. The most recent information on Zika virus infection is summarized.

We recognize that it is challenging to counsel patients when the full spectrum of effects of Zika virus infection during pregnancy remains unknown. However, providing the latest information available will enable patients to make the best decisions possible, taking into account their own values, beliefs and personal considerations.

Because information on the epidemiology and clinical spectrum of Zika virus infection is changing rapidly, providers should check the links below for updated information. This document will be revised periodically as new information becomes available.

For updated information:

- CDC information, Zika virus website: www.cdc.gov/zika/index.html:
  - Countries and territories with active Zika virus transmission: www.cdc.gov/zika/geo/active-countries.html
  - Information for Healthcare Providers, including clinical guidance for pregnant women: www.cdc.gov/zika/hc-providers/index.html
- NYC Health Department, Zika Virus website: www1.nyc.gov/site/doh/health/health-topics/zika-virus.page (Includes travel alerts, facts, guidance including for pregnant women, patient information and educational materials, and NYC response)
  - Information for Providers, including updates on testing: www.nyc.gov/zika/provider
  - Providers can also call the NYC Provider Access Line at **1-866-692-3641**
- **To obtain Zika virus testing in NYC for women at the time of delivery or pregnancy loss:** for women with laboratory evidence of Zika infection, OR women who have not yet been tested or whose test results are unavailable or negative but with potential exposure to Zika virus and with pre- or postnatal findings of microcephaly, intracranial calcifications, and other brain and eye abnormalities, call the NYC Provider Access Line immediately ***at 1-866-692-3641*** to discuss the need for testing of[10]:
  - Maternal serum and urine
  - Placental tissue
  - Infant serum and/or umbilical cord blood within 2 days of birth
  - Infant urine
  - Fetal tissue
- Providers can find detailed guidance at: www1.nyc.gov/site/doh/providers/reporting-and-services.page

Providers should monitor the following sites for updates:

- New York City Health Department's Health Alerts at https://a816-health30ssl.nyc.gov/sites/NYCHAN/webpages/home.aspx
  - To sign up to receive Health Alerts, go to https://a816-health30ssl.nyc.gov/sites/NYCHAN/webpages/home.aspx and select "Join HAN."
- www.nyc.gov/health
- www.cdc.gov

Prevention of Zika Virus Infection

1. How can infection of pregnant women be prevented?

Zika virus is primarily transmitted to humans by *Aedes* mosquitoes. Other documented modes of transmission include sexual transmission, vertical and perinatal transmission, and, possibly, blood transfusions and tissue transplantation, and laboratory exposure. However, the vast majority of cases result from mosquito-borne transmission.

Since Zika virus is primarily transmitted by mosquitoes and there is currently no vaccine or medication to prevent infection, the most important means of prevention is avoiding mosquito bites. **Therefore, CDC recommends that all pregnant women and their partners, as well as couples trying to conceive, consider postponing travel to areas where Zika virus is spreading.** If that is not possible, encourage patients to prevent mosquito bites during travel by using an Environmental Protection Agency-approved insect repellent, staying in air-conditioned or well-screened environments (or if that is not possible, using a permethrin-treated bed net), and covering up exposed skin as much as possible when outdoors. Importantly, *Aedes* mosquitoes bite all day and not only at dusk/nighttime. Many effective repellents

are safe during pregnancy. Additional information on mosquito repellents and other ways of preventing mosquito bites may be found at wwwnc.cdc.gov/travel/page/avoid-bug-bites.

Because sexual transmission of Zika virus is also possible, steps to prevent transmission from an infected partner to a pregnant woman should be taken. Pregnant women whose sexual partners live in or have traveled to a Zika-affected area should consider abstaining from sex for the duration of the pregnancy, even if they were never symptomatic, or, alternatively, using barrier precautions (e.g., condoms) correctly and consistently for every episode of vaginal, anal and oral sex for the entire pregnancy.

2. How long after traveling to areas with ongoing Zika transmission should a woman wait before trying to become pregnant?

CDC has published detailed guidance on timing of attempting to conceive for both men and women who traveled to Zika-affected areas.[11,12] CDC recommends that women with possible exposure to Zika virus (through travel or sex), with or without clinical illness, should wait at least 8 weeks after the last exposure to attempt conception, and that men with possible exposure to Zika virus (through travel or sex), with or without clinical illness, should wait at least 6 months after the last exposure to attempt conception. CDC does not recommend Zika virus testing of nonpregnant persons with possible Zika virus exposure who do not have symptoms of Zika virus disease, including persons who are planning to attempt conception, or to assess the risk for sexual transmission of Zika virus. Negative test results may not completely rule out infection and could give false reassurance depending on when the testing was done in relation to the last exposure.

After viremia has resolved in a woman attempting to conceive, there is no evidence to suggest that the pregnancy will be affected. However, data to answer this question for Zika are limited. (As updates become available, they are posted at CDC's Clinical Guidance page at www.cdc.gov/zika/hc-providers/clinical-guidance.html.)

Testing for Zika Virus Infection

1. Who should be offered testing for Zika virus?

The New York City Health Department recommends that providers offer testing to all pregnant women, whether or not they had symptoms compatible with Zika (fever, maculopapular rash, non-purulent conjunctivitis or arthralgias) who traveled to an area with ongoing Zika virus transmission while pregnant, and all pregnant women who have had any act of unprotected sex (vaginal, anal, oral) with a sexual partner who lives in or has traveled to an area with Zika virus transmission. Testing should be offered for infants born to mothers with Zika virus, persons with Guillain-Barré syndrome or other neurologic complications, and suspected Zika cases associated with sexual or local mosquito-borne transmission. Testing should also be offered to non-pregnant persons who develop at least one Zika-compatible symptom within 4 weeks of travel to an area with Zika virus transmission. For information on how to obtain testing for a patient, see www.nyc.gov/zika/provider.

2. Why should providers offer Zika virus testing for pregnant women?

It is important to diagnose Zika virus infection during pregnancy because the information may guide monitoring and clinical decision-making for the remainder of the pregnancy. Negative testing may also offer some reassurance for a pregnant woman who has traveled to a Zika affected area or has had possible sexual exposure, though the level of reassurance will depend on when the specimens were collected in relation to the exposure. Not all patients who are tested will have a definitive result. Some positive serology (IgM) results may be due to exposure to other flaviviruses (e.g., dengue, West Nile), and negative results could be due to obtaining specimens too soon or too long after exposure, or for other reasons.

Testing of at-risk pregnant women, including asymptomatic pregnant women, is also important for anticipating

management of the newborn and infant follow-up.[13] If not obtained during pregnancy, maternal specimens should be collected perinatally for Zika testing. If the mother has laboratory evidence of Zika virus infection, or if the mother's test results are unavailable or negative but she had exposure to Zika virus and the pregnancy has pre- or postnatal findings of microcephaly, intracranial calcifications, and other brain and eye abnormalities, additional specimens are requested (i.e., placenta, umbilical cord, infant serum, cord blood, and infant urine). Therefore, pediatricians may need to manage some neonates for days to weeks without knowing their patient's infection status or whether there was prenatal exposure to Zika virus. All infants with possible congenital Zika virus infection need at a minimum: a comprehensive physical examination at birth and at 24 hours, and neurologic, hearing and ophthalmologic evaluations prior to hospital discharge or within 30 days. Zika testing of maternal and perinatal specimens requires special instructions from and pre-approval by the Health Department.

3. Which tests do I need to order for my patient?

The best type of test to confirm a diagnosis of Zika infection is a nucleic acid amplification test (NAAT), which includes real time reverse transcriptase-polymerase chain reaction (rRT-PCR), transcription-mediated amplification (TMA), and other tests that detect Zika virus-specific RNA (nucleic acid) sequences. NAAT can be performed on serum and urine specimens and also tissue and CSF specimens when appropriate. Zika virus RNA is commonly detectable up to 2 weeks after symptom onset in urine or serum.[14,15] The tests are most clinically sensitive when performed within 2 weeks of exposure. Recent evidence, however, has shown that Zika virus RNA can be detected in the serum of pregnant women as long as 10 weeks after symptom onset.[16] Therefore, the Health Department will test serum from pregnant women for Zika virus RNA, as long as the last potential Zika virus exposure or symptom onset occurred within 12 weeks of specimen collection. Zika NAAT testing is now also available commercially, through BioReference, LabCorp, Quest, and Viracor – IBT. An updated list of commercial laboratories that conduct Zika testing is available at www.nyc.gov/zika/provider.

For non-pregnant patients without unusual clinical manifestations (e.g., Guillain-Barré syndrome) or epidemiologic risk factors (e.g., suspect sexual, transfusion or local mosquito transmission), specimens should be submitted to commercial clinical laboratories for testing.

Detection of Zika RNA in a clinical specimen confirms Zika infection. However, because the presence of viral RNA in serum and urine decreases over time, negative results do not exclude the possibility of Zika infection.[17] Serological testing for Zika virus should also be ordered for all pregnant patients who may have been exposed to Zika virus by traveling to or residing in a Zika-affected area or via sexual transmission. For some patients, a follow-up serum specimen, collected approximately 3 weeks after the first serum (convalescent testing), will be necessary to complete serologic testing.

Zika virus-specific IgM antibodies develop during the first week of illness and may persist for approximately 3 months (based on limited data). Neutralizing antibodies (primarily, IgG antibodies) appear shortly after IgM antibodies and are expected to persist for years, possibly for life.[17] However, Zika infection also can lead to a brisk anamnestic immunologic response in patients infected previously with other flaviviruses, such as dengue or West Nile virus, or in persons vaccinated against yellow fever or Japanese encephalitis viruses. Because of this, serological testing presents unique interpretation challenges.

The serologic screening test is an IgM Capture Enzyme-linked Immunosorbent Assay (MAC ELISA). The assay is not specific for Zika and will detect IgM antibodies to other flaviviruses. If the Zika IgM test is negative on serum collected between 2 and 12 weeks after exposure, no further testing is needed. However, because the Zika MAC ELISA cross-reacts with other flaviviruses, recent infection with Zika, dengue or West Nile virus may result in a presumptive positive or equivocal result.

For women whose exposure was more than 12 weeks prior to specimen collection, another serologic test, the

microsphere Immunofluorescence Assay (MIA), may be performed if the Zika MAC ELISA is negative. This assay is performed at the New York State Wadsworth Laboratory and will only be done upon consultation with the New York City Health Department. It also is not specific for Zika virus and cross-reacts with IgM, IgG and IgA antibodies of all flaviviruses.

The plaque reduction neutralization test (PRNT) is performed if Zika RNA was not detected by NAAT and the Zika MAC ELISA result is either presumptive positive or equivocal in serum from pregnant women with possible exposure. PRNT may be done on a single specimen; however, a second specimen is usually required to provide an accurate interpretation. PRNT is used to help distinguish to which flavivirus the patient was recently exposed by comparing the titer of neutralizing antibodies to a panel of flaviviruses. In patients who had a previous flavivirus infection (e.g., dengue or West Nile) or were vaccinated against yellow fever or Japanese encephalitis, it may not be possible to distinguish the specific flavivirus causing the acute infection, even when the titers in paired sera (i.e., both acute and convalescent specimens) are compared.

Providers should consider PCR testing through commercial laboratories for dengue and chikungunya viruses, serological testing for dengue and laboratory testing for other pathogens, as clinically warranted.

4. How can I arrange for my patient to get tested for Zika?

Zika testing is now available commercially through BioReference, LabCorp, Quest, and Viracor – IBT. An updated list of commercial laboratories that conduct Zika testing is available at www.nyc.gov/zika/provider.

The Health Department also offers comprehensive free testing, including Zika rRT-PCR testing (serum and urine) and Zika serologic testing, for NYC residents with indications for Zika virus testing. The Health Department requests that providers report and arrange testing through the NYC Public Health Laboratory for pregnant patients, patients with either unusual clinical manifestations (e.g., Guillain-Barré syndrome) or suspected unusual modes of exposure (e.g., sexual, transfusion or local mosquito transmission). If commercial testing is chosen for pregnant patients, providers should note the limitations of NAAT testing and request serologic testing when warranted, either through a commercial lab or the Public Health Laboratory.

Please report any positive results received from a commercial laboratory for pregnant women to the Provider Access Line (1-866-692-36411) during business hours.

To arrange for Zika testing through the Health Department, providers must call the NYC Provider Access Line at **1-866-692-3641 during business hours**. Laboratory testing guidelines can be found on **Providers** tab of the Health Department's public website (www.nyc.gov/zika/provider). Providers may be asked to collect the following from patients with indications for Zika virus testing:

Pregnant women with potential exposure to Zika virus within 12 weeks of collection
- 2 serum specimens (Zika NAAT testing and serologic testing)
- Urine specimen (Zika NAAT testing)

Pregnant women with potential exposure to Zika virus more than 12 weeks before collection
- Single serum specimen for Zika serologic testing

Non-pregnant symptomatic persons with potential exposure to Zika virus within 4 weeks of collection
- 2 serum specimens (Zika NAAT testing and serologic testing)
- Urine specimen (Zika NAAT testing)

Non-pregnant symptomatic persons with potential exposure to Zika virus more than 4 weeks before

collection

- Single serum specimen for Zika serologic testing

Providers may be asked to collect a convalescent serum specimen approximately 3 weeks later if initial serological test results are equivocal or non-diagnostic.

NOTE: information on new diagnostic tests can found at FDA's Zika Virus Response Updates website

5. How long will it take to get test results?

Zika NAAT test results should be available within approximately 1 week of the specimen arriving at the NYC Public Health Laboratory. Serologic test results may take several weeks and, for many patients, may need to be repeated (i.e., a convalescent specimen) to determine whether infection was due to Zika or another flavivirus, such as dengue or West Nile virus. It will take several additional weeks to obtain final results if a convalescent specimen is tested. If serologic test results are not received after 5-6 weeks, providers should call the NYC Provider Access Line (1-866-692-3641) for follow-up.

6. How will I receive results for Zika virus testing?

The Health Department will immediately report by telephone all positive results of Zika NAAT or serologic tests performed at the New York City Public Health Laboratory to the provider or facility listed as the submitter on the laboratory submission form. Zika test results will be faxed or mailed to the submitting facility. For tests conducted at the New York State public health laboratory, results will be mailed to the submitting facility. Each test result (NAAT on serum, NAAT on urine, MAC ELISA, and, if performed, West Nile Virus MIA and PRNT) is forwarded to the submitter as soon as it is available; thus, submitters may receive a series of multiple individual test results from both the city and state public health laboratories.

7. What do the results mean?

See the table on the final page of 2016 DOHMH Advisory #5 (UPDATED): Diagnostic Testing for Zika Virus and Interpretation of Results (April 28, 2016) at www1.nyc.gov/assets/doh/downloads/pdf/cd/zika-advisory5.pdf. CDC also has developed guidance on interpretation of Zika virus antibody results.[14] Providers also can call the NYC Provider Access Line (1-866-692-3641) to discuss Zika test results with Health Department medical epidemiologists.

8. What if testing is equivocal or inconclusive?

Due to the limitations of currently available diagnostic tests for Zika infection, it is possible to receive an equivocal test result for both serology and NAAT tests. For serology, additional testing may be required to distinguish whether positive results are due to Zika virus infection, infection with another flavivirus (e.g., dengue or West Nile), or previous vaccination against a flavivirus (e.g., yellow fever or Japanese encephalitis viruses). The timing of infection may be difficult to ascertain in some cases, further complicating interpretation of results. Pregnant women in whom recent flavivirus has been diagnosed should be considered potentially infected with Zika virus and offered the same follow-up during the course of their pregnancy as pregnant women with positive Zika test results.[11] Clinicians can call the NYC Provider Access Line (1-866-692-3641) to consult with the Health Department about the interpretation of Zika test results.

Inconclusive results may include patients who are tested several months or more after last exposure, when NAAT and IgM would likely be negative, or in cases when serologic cross-reactivity occurs with other flaviviruses (e.g., if the patient had a previous dengue infection).

9. If Zika virus testing has not occurred or test results are pending at the time of delivery, what additional steps should be taken?

Please call the NYC Provider Access Line at 1-866-692-3641 to obtain further guidance. In some instances, depending on whether the mother had symptoms compatible with Zika or whether there were concerning prenatal findings, the Health Department may recommend collection of additional specimens (e.g., serum and urine from the infant, umbilical cord blood, placental and umbilical cord tissue, and/or fetal specimens in cases of fetal demise) to test for congenital infection.

10. What happens if I have a patient who meets criteria for Zika virus testing over the weekend or during evening hours?

Routine requests for approval of Zika virus testing (e.g., asymptomatic pregnant woman or person with Zika-like symptoms after travel to an affected area) can only be processed during regular business hours. Call the NYC Provider Access Line at 1-866-692-3641, Monday-Friday, 9am-5pm. Consultation with the NYC Health Department for urgent matters (e.g., infant with microcephaly born to a mother who traveled to a Zika-affected area while pregnant) is available at all times, via the same number (1-866-692-3641).

Management of Pregnant Patients Following Zika Virus Testing

1. What is known about the effect of Zika virus infection during pregnancy?

There is no evidence that pregnant women are more susceptible to Zika virus infection or experience more severe symptoms during pregnancy. However, Zika virus is a cause of microcephaly and other severe fetal brain and eye defects. The full spectrum of effects of congenital Zika virus infection has not yet been described but is under study. Severe congenital neurological complications have been documented in fetuses infected throughout pregnancy; it is unknown whether the risk to the fetus changes if Zika virus infection occurs at different times during pregnancy.[1, 2, 3, 4, 18, 19]

2. What type of follow-up should be offered for a pregnant woman following a Zika virus test?

A pregnant woman with positive or equivocal Zika virus diagnostic test results may not have a fetus with congenital infection; the proportion of fetuses with congenital infection in the setting of maternal infection is unknown. The virus may also cause transient infection of the fetus, or have a teratogenic effect, even if congenital infection does not occur. Referral to a maternal fetal medicine (MFM) specialist is recommended in all cases of confirmed and probable maternal Zika virus infection. The specialist to whom the patient is referred should be informed of the patient's Zika test results, so that recommended follow-up can be performed. Ongoing clinical evaluations, such as with serial ultrasounds, interpretation of laboratory test results and guidance from the MFM specialist enable patients to arrive at appropriately informed decisions about how best to manage their pregnancies.

Continued care with a general prenatal care provider is needed in close coordination with this specialty care. The currently recommended follow-up for a pregnant woman with confirmed or probable Zika test results includes:

- Fetal anatomy scan at 18-20 weeks gestation
- Referral to an MFM specialist,
- Serial fetal ultrasounds every 3-4 weeks, and
- Test maternal and infant specimens upon delivery, or fetal tissues in the event of spontaneous or elective termination of pregnancy, to determine if congenital infection was present.

3. What are the recommendations regarding amniocentesis?

Much remains unknown: the sensitivity and specificity of NAAT testing of amniotic fluid for congenital Zika virus infection; whether a positive maternal NAAT result is predictive of subsequent fetal abnormality; and, if predictive, the proportion of infants that will have abnormalities following intrauterine exposure. For pregnant women with a positive travel history or possible sexual exposure; those with positive or equivocal Zika virus testing; or those with ultrasound findings consistent with Zika-related effects, such as microcephaly or calcifications, amniocentesis for Zika rRT-PCR testing can be considered on a case-by-case basis.[11] Amniocentesis should not be performed before 15 weeks gestation. If amniocentesis is done for other reasons, amniotic fluid may be sent for Zika virus NAAT testing, after consultation with the DOH.[11] For testing of amniotic fluid, providers should contact the NYC Provider Access Line at 1-866-692-3641 before obtaining fluid for guidance on how to collect and submit specimens to the NYC Public Health Laboratory.

4. What does a positive result of NAAT testing on amniotic fluid mean?

It is not yet known what a positive Zika NAAT test on amniotic fluid means. The sensitivity and specificity of NAAT testing for the detection of Zika virus in amniotic fluid is currently unknown. It is also unknown whether serious fetal anomalies or other poor outcomes are most likely when Zika RNA has been detected in amniotic fluid, compared with pregnant women in whom Zika RNA was not detected in amniotic fluid.[11]

5. What are the recommendations for ultrasound?

Ultrasound imaging is recommended to detect possible fetal anomalies that may be associated with Zika virus infection, including brain abnormalities. Serial ultrasounds are recommended to assess fetal growth and anatomy every 3-4 weeks in pregnant women with confirmed or probable Zika infection (i.e., positive PCR or Zika MAC ELISA/PRNT) .[11] Women who have traveled to an area with Zika virus transmission but have negative Zika virus testing are advised to have an ultrasound, and if normal, to continue with routine testing.

6. How should providers arrange for testing of the fetus or neonate from a Zika virus positive or inconclusive pregnancy?

The Health Department will actively follow up with providers of pregnant women who have confirmed or probable Zika infections to determine the outcome of the pregnancy and whether the fetus or infant was diagnosed with any abnormalities. The Health Department will also work with providers to facilitate proper collection and testing of perinatal and infant specimens at the end of the pregnancy.

Please notify the Health Department by calling the NYC Provider Access Line (1-866-692-3641) so that the Health Department can help coordinate collection, proper storage, labeling and submission of specimens at the end of the pregnancy. In all cases, you **must** contact the NYC Provider Access Line before sending specimens and tissue to the New York City Public Health Laboratory.

i. If a live birth—collect infant serum, infant urine, cord blood, umbilical cord tissue and placental tissue, as directed by the Health Department.

ii. If a spontaneous or induced abortion—collect placental, cord and/or fetal tissue, as directed by the Health Department.

iii. Both formalin-fixed and fresh-frozen tissue should be collected. If this is not possible, formalin-fixed tissue should be prioritized.

Additional information on testing in New York City may be found at:
www1.nyc.gov/assets/doh/downloads/pdf/cd/zika-advisory7.pdf.

Additional information on testing fetal tissue may be found at:
http://www.cdc.gov/zika/hc-providers/tissue-collection-submission.html.

7. What information can I provide my pregnant patients with Zika virus infection if ultrasound results are normal?

Normal results from fetal ultrasounds may be used to reassure a patient that no gross anatomical defects were likely to be present at the time of the ultrasound. However, the sensitivity of fetal ultrasounds for microcephaly and other birth defects is limited, particularly during early pregnancy. Therefore, serial fetal ultrasounds are recommended to increase the likelihood of detecting abnormalities. Additionally, fetal microcephaly is most easily detected in the late second and early third trimesters of pregnancy.

8. What guidance can I provide pregnant patients with Zika virus infection who are considering pregnancy termination?

A woman may consult her provider, partner, or other trusted persons while making the decision to continue or terminate a pregnancy. Providers should avoid making assumptions about the woman's pregnancy intentions and should offer the most updated information available about the possible effects of Zika virus infection on pregnancy and provide timely referrals. It is critical to communicate that we do not know much about the short- and long-term effects of Zika virus infection on fetal development or pregnancy outcomes. We do not know the proportion of Zika-affected pregnancies that will result in adverse outcomes for the fetus or neonate.

If a woman is considering terminating her pregnancy and her regular provider does not perform induced abortions, referral to physicians who perform pregnancy termination should be provided. Pregnancy termination is legal, safe and available in NYC up to 23 6/7 weeks of pregnancy. Pregnant patients can be referred to www.bookofchoices.org for information on abortion services across New York State. Pregnancy termination after 24 weeks gestation is available for specific circumstances. For more information on where to refer patients for abortions past 24 weeks gestation, call the National Abortion Federation (NAF) hotline, 1-877-257-0012.[20] Providers should call the NYC Provider Access Line at 1-866-692-3641 to arrange testing of the fetal tissue/products of conception after an elective abortion in a Zika-positive or inconclusive pregnant woman.

9. Are there potential risks to the pregnancy for women who have traveled to areas with ongoing Zika transmission right before or right after they became pregnant?

It is not known how timing of Zika virus infection during or immediately before pregnancy affects an embryo.[11]

10. Is there any evidence that Zika virus infection during pregnancy will pose a risk for future pregnancies?

Currently, there is no evidence that previous, resolved Zika virus infection poses a risk for future pregnancies. However, data to answer this question for Zika are limited.

11. Is breastfeeding recommended with Zika virus infection?

The CDC currently recommends breastfeeding for mothers with Zika virus infection. No cases of Zika virus infection associated with breastfeeding have been reported.[11]

12. Are there any infection control guidelines for prevention of Zika virus transmission during labor and delivery?

The CDC urges use of standard precautions in any health care setting including during labor and delivery (see www.cdc.gov/mmwr/volumes/65/wr/mm6511e3.htm).

13. What follow-up is recommended for infants of mothers with Zika virus infection?

The CDC has published interim guidelines for health care providers caring for infants and children with possible Zika infection: http://www.cdc.gov/mmwr/volumes/65/wr/pdfs/mm6533e2.pdf. [13] The follow-up care for affected neonates and children will evolve as more data are collected on short- and long-term outcomes. Updated recommendations based on these data will further guide care.

To better understand the effects of Zika virus during pregnancy and infant outcomes, CDC has established the U.S. Zika pregnancy registry. This registry will provide information about the effects of Zika virus on pregnant women and their children. Information about the registry can be found at: http://www.cdc.gov/zika/hc-providers/registry.html. The NYC Health Department is collaborating with CDC and collecting information about pregnant women with laboratory evidence of Zika virus infection during pregnancy, as well as information about their infants through the first 12 months of life. The Health Department will submit de-identified epidemiologic and clinical data to CDC. Preliminary data on outcomes of pregnancies with laboratory evidence of possible Zika virus infection in the United States are available at http://www.cdc.gov/zika/geo/pregnancy-outcomes.html.

Checklist: What Services do I Offer a Pregnant Woman at Risk for Having Zika Virus Infection?

- ☐ Review patient's travel history and ask about her sexual activity and travel by her sex partners and other potential exposures to Zika virus at every visit.
- ☐ Offer and arrange testing for Zika virus for all pregnant women who traveled to areas with Zika virus transmission while pregnant or who may have had sexual exposure. If clinical specimens are sent to commercial laboratories for Zika NAAT testing, arrange for serologic testing and urine NAAT testing (if this test is not performed at the commercial laboratory) through the Health Department.
- ☐ Report test results to patients as they are received and assist patients in interpreting these results using the most up-to-date information available.
- ☐ If Zika positive, equivocal, or inconclusive:
  - Arrange additional laboratory testing, as recommended by the Health Department.
  - Counsel regarding the current knowledge and data on Zika and pregnancy.
  - Provide counseling and timely referrals based upon your patient's decision to continue or terminate the pregnancy.
  - Offer fetal anatomy scan at 18-20 weeks gestation, arrange serial fetal ultrasounds every 3-4 weeks during pregnancy, and refer to a maternal-fetal medicine specialist.
  - Call the Health Department at 1-866-692-3641 to arrange for testing of maternal, fetal, or infant specimens for Zika upon delivery, or of fetal and maternal tissues in the event of spontaneous or elective termination of pregnancy.

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