In Practice

Zika Virus and Pregnancy

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Abstract
Recent outbreaks of Zika virus and reports linking infection in pregnant women with microcephaly in newborns have caused concern worldwide. Information has been evolving rapidly. Nurses and other clinicians, especially those who work with women of childbearing age, play a pivotal role in disseminating accurate information and identifying potential cases of Zika virus infection.

Keywords microcephaly, mosquito-borne illness, pregnancy, Zika virus

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Pregnancy can be an exciting time in a woman’s life but may also be a vulnerable period for both a woman and her fetus. News has been rapidly evolving about outbreaks of Zika virus and potential links to microcephaly in newborns, causing concern around the world, especially among women who are pregnant or planning to become pregnant. At time of this writing (mid-March 2016), there have not been documented outbreaks originating in the United States; however, cases of Zika virus infection have been reported in U.S. residents who have traveled abroad. It is vital that nurses and other clinicians remain current with the rapidly emerging information to appropriately inform women who are pregnant or planning to become pregnant of preventive measures and to accurately assess those who may be at risk.

History and Prevalence of Zika Virus

Zika virus was first discovered in the blood of rhesus monkeys in 1947 by a scientist at the Uganda Virus Research Institute (Green, 2016). The virus is associated with the Aedes species mosquito and is transmitted to humans though the bite of an infected mosquito (Centers for Disease Control and Prevention [CDC], 2016a). This species of mosquito also carries other infectious diseases such as Chikungunya and Dengue and is known for its daytime biting (CDC, 2016b). As opposed to other species of mosquito found in the United States, these mosquitos often hide indoors in shaded areas and feed during daytime hours. Zika virus is primarily found in countries and regions with tropical climates, such as the Caribbean, Africa, Southeast Asia, and South America. However, the presence of the Aedes mosquito in the U.S. does pose a potential threat, as it is found in the U.S. mainland and its territories (e.g., Puerto Rico, Guam, U.S. Virgin Islands, etc.). In 2014, there were 11 cases of Chikungunya reported in Florida that were believed to have been contracted locally (CDC, 2016b). In 2009, 27 cases of Dengue were documented in Key West, Florida (CDC, 2010). At the time of this writing, there have been no
reports of documented, diagnosed cases of Zika virus that were contracted in the United States via a mosquito bite (CDC, 2016c). While it is believed the U.S. Aedes mosquito does not currently carry Zika virus, the potential for it to do so is a concern.

Belluz, Zarracina, and Moore (2016) state that only 14 or 15 cases of Zika virus infection were documented before 2007, when an outbreak occurred in Micronesia. Since then, periodic outbreaks have been seen in various countries around the world. According to the CDC (2016d), Zika has been found in 31 countries. As of March 2016, there were 258 cases of travel-associated Zika infections confirmed in U.S. citizens who had travelled to Central and South America (CDC, 2016d). There are currently 283 reported cases in U.S. territories which were locally contracted in Puerto Rico, the U.S. Virgin Islands, and American Samoa. Travel alerts have been issued by the CDC for multiple areas and regions in an effort to protect people from potential infection.

**Infection, Symptoms, and Possible Comorbidities**

Of those infected with the virus, approximately one in five will become ill, usually within a few days to 1 week of being bitten. The illness is typically mild with minimal symptoms lasting approximately 1 week with very few infected individuals requiring hospitalization (CDC, 2016e). These symptoms consist of fever, rash, joint pain, conjunctivitis, muscle pain, and/or headache. Currently, there have been no reported deaths related to Zika virus (World Health Organization [WHO], 2016a) but information is emerging that links Zika virus to some devastating conditions.

There are reports indicating a link between Zika virus and the onset of Guillain-Barre syndrome (WHO, 2016c). Guillain-Barre syndrome can be a devastating disorder for any person who develops it, as it poses the threat of paralysis and death (National Institute of Neurological
Disorders and Stroke, 2015). There is no evidence indicating Guillain-Barre syndrome, developed during pregnancy, causes additional threats to a pregnant woman or her fetus, outside of the threat it poses to all individuals who develop it. According to the WHO (2016c), El Salvador reported 3,836 cases of suspected Zika virus between November and December 2015. The occurrence of Guillain-Barre Syndrome for El Salvador is approximately 169 cases annually, but WHO (2016c) has noted an increase in cases of Guillain-Barre syndrome in El Salvador, with 46 cases being recorded from December 2015 to January 2016. This increase in Guillain-Barre syndrome has been seen in both men and women.

Of greatest concern has been the possible link between Zika virus and microcephaly in fetuses of women infected during pregnancy. In addition to the increase in Guillain-Barre syndrome, an increase in microcephaly was noted in Brazil. According to Belluz et al. (2016), from 2010 until 2014 Brazil had only reported approximately several hundred cases of microcephaly per year, but in 2015 3,500 cases were reported. The emergence of these suspected correlations of Zika virus and Guillain-Barre Syndrome with microcephaly have led to an increase in concern for Zika virus transmission and infection.

Implications for Pregnancy
Much emphasis has been focused on the potential effects that infection with Zika virus could have on women who are pregnant, in particular the rates of microcephaly in newborns born to those infected. Microcephaly is a rare neurological condition in which the head of the newborn is noticeably smaller than that of other newborns, believed to be the result of the brain developing abnormally in the womb (Mayo Clinic, 2016). The CDC (2016f) estimates an occurrence rate of 2 to 12 cases per 10,000 live births. There are multiple genetic or environmental factors believed to be associated with this condition, such as exposure to rubella, toxoplasmosis, or
cytomegalovirus. Severe malnutrition and exposure to harmful substances such as alcohol, drugs, or toxic chemicals may also be a contributing factor and, in other instances, microcephaly can be the result of traumatic brain injury or infection (Boston Children’s Hospital, 2016; CDC, 2016f). While there are currently no treatments for microcephaly, early intervention with supportive occupational and speech therapies may be helpful (Mayo Clinic, 2016).

The first case of a pregnant women in the United States infected with Zika virus and subsequent birth of a newborn with microcephaly occurred in January 2016 in Hawaii. The woman was reported to have been living Brazil at the time of infection before returning to Hawaii (Belluz et al., 2016). As of February 12, 2016 there were no microcephalic births reported in the U.S. mainland associated with Zika virus infection. There is limited research with regard to when a fetus would be most at risk of developing microcephaly in terms of gestational age, and greater investigation is needed in all areas related to pregnant women and newborns and the potential effects of maternal Zika infection.

In addition to microcephaly, reports are emerging that indicate there is some evidence to suggest that infection with Zika virus may be associated with miscarriage or stillbirth; however, there has not yet been enough research to say with certainty that Zika virus in pregnant women causes these problems (McMillen, 2016).

Pregnant women and those considering pregnancy need to have a heightened level of awareness due to potential complications if the Zika virus is contracted. Epidemiologists tracking the spread of the virus indicate that spread to the United States is inevitable; therefore, it is paramount that pregnant women and those of childbearing age are educated regarding the potential risks of contracting Zika virus and preventive measures to stop mosquito bites. The CDC (2016c) recommends that pregnant women, and those trying to conceive, avoid travel to
any area experiencing a Zika outbreak. Travel alert web pages (see Box 1) set up by the CDC provide detailed information regarding travel, Zika virus, protection measures and contact information. Experts cannot say with certainty that being infected with Zika virus while pregnant will result in the birth of an infant with microcephaly, but caution must be taken until more information is available.

**New Findings on Mode of Transmission**

While primarily transmitted through the bite of an infected mosquito, recent research indicates that Zika can be transmitted person-to-person through blood transfusions and sexual contact. The CDC (2016a) reports only two known cases of sexually transmitted Zika virus. A recent study notes that the presence of Zika virus ribonucleic acid (RNA) has been found in a semen sample and thus may suggest that Zika virus can possibly be transmitted sexually (Musso, Roche, Robin, Nhan, Teissier & Cao-Lormeau, 2015). According to Musso et al. (2015), multiple blood and semen samples were taken from an individual from Tahiti who had recovered from a Zika infection. Although the blood sample was negative for Zika virus, the semen and urine samples were positive 2 weeks after symptoms of Zika virus had subsided. The Dallas County Health and Human Services department reported the first Zika virus case in Dallas County; it was acquired via sexual intercourse with an infected partner. The infected individual had visited a country where the Zika virus is present (Neroes & Thompson, 2016). As with much of the information regarding Zika virus, limited studies are available regarding new modes of transmission; therefore, absolute conclusions cannot be reached at this time.

In light of this information, it is suggested that women engage in safe sex practices, such as using condom, when engaging in intercourse with a male who has recently traveled in an area with a high Zika incidence (CDC, 2016g). Men who travel to areas where Zika virus is present
should be informed of their risk of contraction and the potential of infecting female partners through intercourse. While the most common effects of Zika virus on an adult may be minimal, the effects on a fetus can be detrimental. There is no readily available test to screen men for their potential to transmit Zika virus through sperm. At the present time, this specialized form of testing can only be performed in limited laboratories in the United States.

**Prevention and Treatment**

Clinicians working in labor and birth settings should refer to CDC’s guidance on preventing transmission of the virus in labor and birth settings, which recommends implementation of standard precautions (Olson et al., 2016).

There is currently no known vaccine or treatment for Zika virus. The primary prevention goal is to decrease the chance of being bitten by a mosquito. There are several methods that can be employed to decrease the risk of mosquito bites, such as decreasing sources of stagnant water around homes, using mosquito repellent, and choosing clothing that covers most of the exposed skin. Repellants containing DEET and Picardin are deemed safe for pregnant women (CDC, 2013). Repellant should be applied to exposed skin and clothing. People living in areas prone to mosquito infestation are probably already familiar with bite-prevention measures but may be more familiar with employing these strategies in the dusk hours rather during daytime. Reiteration of these measures is important to enhance diligence, with reminders that the mosquito species carrying Zika virus feed during the day.

As specific treatment is not available, primary treatment goals involve the management of any symptoms, such as fever, rash, joint pain, and conjunctivitis. As these signs and symptoms could be the same as other conditions, misdiagnosis is a concern. The importance of hydration and rest should be discussed and encouraged. Acetaminophen can be used to alleviate fever and
discomfort. The use of non-steroidal anti-inflammatory drugs (NSAIDS) should be avoided due to the possibility of hemorrhagic fever, which is associated with other viruses carried by this mosquito. Those infected with Zika virus should take steps to avoid being bitten by mosquitoes again, as subsequent bites could potentially spread the virus to the new biting mosquito, resulting in higher chance of transmission of the virus to others.

**Implications for Clinicians**

Nurses, physicians, midwives, and nurse practitioners remain at the forefront of disease prevention and management of public health emergencies. Educating clients continues to be the best intervention for prevention. Key educational goals must be focused on providing information regarding areas of suggested prohibited travel, asking every pregnant and childbearing woman of any potential travel plans and recent areas of travel, and providing education on mosquito bite prevention. Education on the practice of safe sex with partners who may have recently traveled to risk areas should be included for all female patients. Clinicians should consider all women of childbearing age for assessment of Zika virus infection and encourage the reporting of symptoms. If a woman presents with symptoms, whether or not she has travelled overseas, testing strategies consistent with current CDC guidelines must be considered and should be based on CDC’s algorithm (see Box 1) for testing a pregnant women with or without symptoms of Zika virus who has traveled to an area experiencing an outbreak (Petersen et al., 2016).

At the present time, testing for Zika virus can only be performed by limited clinics, with results taking 2 to 14 days. Blood and other samples should be sent to the testing site recommended by the CDC (2016g). Should a pregnant client test positive for Zika virus, clinicians should consider serial ultrasound exams and referral to a maternal-fetal medicine
specialists and/or infectious disease specialist (Petersen et al., 2016). As there is no current cure for Zika virus, counseling services for pregnant clients should be considered if ultrasound examination indicates microcephaly or intracranial calcifications. Social support for the client and family will be vital should such a diagnosis be made. Additional resources such as physical and speech therapy could be considered to assist the child after birth. Clinicians should stay up-to-date with the most accurate information from the CDC to appropriately screen and counsel patients.

Conclusion

The current spread of the Zika virus and potential implications for pregnant women and those who plan to become pregnant is becoming a global concern. Information is changing rapidly and, as the prevalence of infection increases in countries all over the world, the potential risk to the United States population cannot be neglected. Further research is needed to identify and clarify potential transmission routes and effects of the infection on pregnant and non-pregnant individuals. Health care clinicians play a key role in disseminating information to the public and must remain up to date with CDC and WHO recommendations, and monitor women for potential infection. Focused discussion should occur between clinicians and their pregnant clients who have recently traveled outside of the United States and those considering such travel. As with the spread of any infection, accurate information plays a key role in the prevention of future spread and can minimize the impact of negative health outcomes.
Box 1. Selected Resources

CDC’s main page on Zika virus:

CDC’s questions and answers for health care professionals:

CDC’s testing algorithm can be found within the article at:
http://www.cdc.gov/mmwr/volumes/65/wr/mm6502e1.htm

CDC’s travel health notices:
http://wwwnc.cdc.gov/travel/notices

WHO’s main page on Zika virus:
References


