VIEWPOINT

What Pediatricians and Other Clinicians Should Know About Zika Virus

Mark W. Kline, MD
Department of Pediatrics, Baylor College of Medicine, Texas Children’s Hospital, Houston.

Zika virus is the latest, but likely not the last, formerly obscure and geographically isolated virus to suddenly exhibit the potential for pandemic spread. Human immunodeficiency virus, Ebola virus, dengue virus, and chikungunya virus are examples of other viruses that have spread widely at least in part as a consequence of growing trends of urbanization and globalization. During the past 10 months, the explosive growth in recognized cases of Zika virus disease across much of South and Central America and the Caribbean as well as a purported association between Zika virus disease in pregnancy and fetal and neonatal microcephaly has produced concern among public health authorities and the lay public about the possibility of Zika virus transmission in the United States.

Virology and Epidemiology

A member of the Flavivirus family, related to the viruses that cause yellow fever, West Nile disease, St Louis encephalitis, dengue, and Japanese encephalitis, Zika virus first was isolated from a rhesus monkey in the Zika forest region of Uganda in 1947. The first human cases of Zika virus disease were reported from Uganda and Tanzania in 1952. Only sporadic disease was observed during the next 55 years until 2007, when an outbreak was reported in Micronesia, the first time that Zika virus disease had been found outside Africa and Asia. Since then, the virus has appeared in a number of other locations across the Pacific; in May 2015, the Ministry of Health of Brazil confirmed the first known transmission of Zika virus in Brazil and the Americas. As of February 2016, active Zika virus transmission was occurring in 26 countries in the Americas and the Caribbean, as well as in American Samoa, Samoa and Tonga in the South Pacific, and Cape Verde off the west coast of Africa. Brazil was the most affected country, with estimates between 440,000 and 1.3 million cases of Zika virus disease through December 2015.

Zika virus is transmitted to humans primarily through the bite of an infected Aedes mosquito. These are the same mosquitoes that can transmit dengue virus and chikungunya virus. Unlike St Louis encephalitis and West Nile virus, the Zika virus life cycle involves only the mosquito vector and a human reservoir (ie, no avian reservoir). Rare modes of Zika virus transmission may include blood transfusion or sexual intercourse.1 Recent information suggests that Zika virus can be passed by an infected mother to her fetus or newborn either in utero or at the time of delivery. To date, there are no reports of Zika virus transmission through breast milk.

Clinical Manifestations

It has been estimated that about 80% of Zika virus infections in humans are asymptomatic. The incubation period for Zika virus disease is thought to be between several days and 1 week. Compatible signs and symptoms include fever, maculopapular rash, headache, conjunctivitis, arthralgias, and myalgias. The nonspecific nature of the signs and symptoms hampers clinical diagnosis. Zika virus disease usually is mild, with symptoms lasting up to 1 week.

A temporal and spatial link between Zika virus disease and an increased incidence rate of Guillain–Barré syndrome and other autoimmune neurologic syndromes has been reported from French Polynesia and Brazil. A marked increase in the number of infants born with microcephaly and an association of those cases with presumed Zika virus disease have been reported from Brazil.2,4 About 4000 cases of microcephaly were reported in Brazil between mid-2015 and January 2016, compared with an average of 163 cases of microcephaly annually between 2010 and 2014.2,3 Imaging studies of these patients have demonstrated intracranial calcifications in the periventricular, parenchymal, and thalamic regions, similar to other congenital infections (eg, cytomegalovirus and toxoplasmosis). Vision-threatening ocular findings (eg, focal pigment motting of the retina, chorioretinal atrophy, and optic nerve abnormalities) also have been reported among infants with microcephaly and presumed congenital Zika virus infection.5

Prevention

As with other pathogens transmitted by mosquitoes, mosquito control and avoidance are the cornerstones of disease prevention. Aedes mosquitoes bite mostly during daylight hours. Residents or travelers to areas where Zika virus transmission is occurring should use N,N-diethyl-meta-toluamide (DEET) or picaridin-containing insect repellent. These preparations are safe for use during pregnancy when used according to the product label. Other measures that can be used to avoid mosquito bites include wearing long pants, long-sleeved shirts, socks, shoes, and permethrin-treated clothing. A vaccine or antiviral agent for prevention of Zika virus infection is not available at this time.

Diagnosis

Zika virus diagnostic testing is recommended for pregnant women who have traveled to areas with active Zika virus transmission.6 Infants with microcephaly or intracranial calcifications born to women who traveled to or resided in an area with Zika virus transmission while pregnant, and infants born to mothers with positive or inconclusive Zika virus test results.7 Testing ordinarily consists of reverse transcription–polymerase chain reaction for symptomatic patients or those who are thought to have been exposed to the virus within the past 2 weeks. Because viremia decreases and disappears over time,
a negative test result on blood collected more than 5 to 7 days after symptom onset cannot definitively exclude infection.

An antibody-based serologic assay is available for individuals who were ill or exposed 2 to 12 weeks prior to testing. Unfortunately, false-positive test results can be observed in individuals infected with other Flaviviruses, and a negative test result does not definitively exclude Zika virus infection.

Does Zika Virus Pose a Threat to Children and Pregnant Women Outside of Endemic Regions?

Thanks to the ease of global travel, the world effectively is smaller than ever before. Diseases like Zika virus that in years past might have remained isolated to the remote areas of equatorial Africa or South America can be in Houston, Chicago, London, or Paris within a matter of hours. As of February 10, 2016, the United States already had reported 52 travel-associated Zika virus disease cases.

Perhaps two-thirds of the US population resides in areas where Aedes mosquitoes exist for at least part of the year, and climate change may only increase that number. Risk of transmission will be present particularly in poor communities where mosquito control measures are suboptimal and many individuals lack air conditioning or intact screens on their windows. On the other hand, despite dire predictions, 2 other related Flaviviruses that lack avian reservoirs, dengue virus and chikungunya virus, have as yet not produced widespread disease epidemics in the United States.

Summer and peak Aedes mosquito activity will be here soon enough. The Zika virus story is unfolding on almost a daily basis. Pediatricians and other clinicians should visit the websites of the US Centers for Disease Control and Prevention (http://www.cdc.gov/zika/) and the World Health Organization (http://www.who.int/topics/zika/en/) to stay apprised of the latest developments.

ARTICLE INFORMATION
Conflict of Interest Disclosures: None reported.

REFERENCES