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Anne Ambrose-Young

Otterbein University, anne.ambroseyoung@otterbein.edu

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Zika Virus

Anne Ambrose-Young, BSN, RN
Otterbein University, Westerville, Ohio

Introduction

The Zika virus (Zika) was first discovered in 1947 in Uganda, with only 14 cases documented before 2007 (Centers for Disease Control and Prevention, 2016). Over the last two years, however, this virus, formerly confined to the tropical regions of Africa and South East Asia, has been reported in South and Central America, Mexico, parts of the Caribbean, Polynesia, with the reports continuing to grow. In February, 2016, the World Health Organization reported that Zika has been elevated to a Public Health Emergency of International Concern.

The spread of Zika is alarming because it has been associated with severe fetal brain defects, Guillian-Barre syndrome (GBS) and encephalopathy. Transmission is primarily through the Aedes aegypti and Aedes albopictus mosquitoes and may also be spread by sexual contact. Further, many of those infected show no signs or symptoms, making accidental spread possible. As of this date, there is no vaccine or treatment (CDC, 2016).

This topic is significant because it underlines the importance of awareness and prevention for those that may be at risk of contracting or spreading Zika. It is very important that health care workers are educated on the disease process and nursing implications of this potentially devastating virus.

Signs and Symptoms

According to the Centers for Disease Control, only an estimated 20% of people infected with the Zika virus will ever show symptoms (2016). The most frequently reported symptoms are:

- Fever
- Rash
- Conjunctivitis
- Muscle and joint pain
- Headache

The illness usually presents as a mild cold or flu which can last up to a week. For this reason, many people do not realize they have been infected and do not seek medical treatment. This makes tracking nearly impossible.

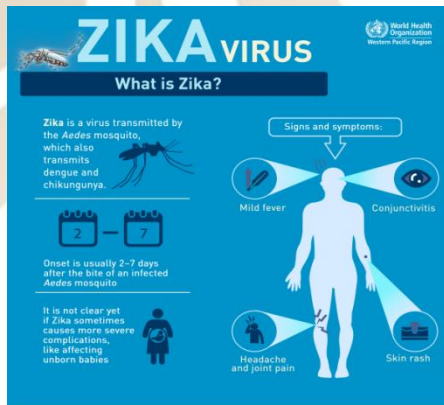


Figure 1. ZIKA Virus by World Health Organization, 2016.

Underlying Pathophysiology

Viruses are intracellular parasites that depend on host cells. The structure is a ribonucleic acid (RNA) or deoxyribonucleic acid (DNA), with a protective coating. To fight viral infections, the body will release interferons that block intracellular viral replication. It does this by recognizing the antigenic change on an infected cell's surface. However, enveloped viruses release through budding, in which viral parts are coated with the healthy cell's original plasma membrane, making recognition much more difficult.

When a mosquito with Zika bites a human, it injects the virus, through its saliva, below the epidermis. Dermal fibroblasts, keratinocytes and immature dendritic cells are all presumed targets of the virus and support their replication (Lazear, Stringer & de Silva, 2016). Zika appears to promote autophagosome formation to replicate, then triggers cell apoptosis to disseminate the virus (Kruger, 2016).

The Zika virus is:

- Enveloped, icosahedral positive strand RNA virus
- Related to yellow fever, dengue, West Nile, and Japanese encephalitis viruses
- Found mainly in the saliva of the Aedes mosquitos
- Is transmitted from mosquito to human, mother to child, through sexual contact, blood transfusion and laboratory exposure (CDC, 2016)
- Zika has also been identified in human saliva, urine and breast milk (Malone et al., 2016)

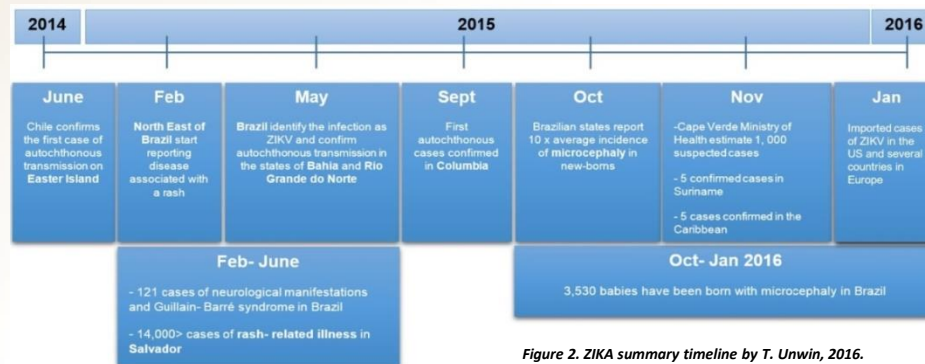


Figure 2. ZIKA summary timeline by T. Unwin, 2016.

Significance of Pathophysiology

The spread of Zika has increased alarmingly over the past few years.

- Between 1947 and 2007 – 14 cases with no deaths, hospitalizations or neurological complications reported.
- 2007, 49 cases were confirmed on the island of Yap.
- 2014, 400 cases were reported in French Polynesia with outbreaks in Easter Island, the Cook Islands and New Caledonia.
- Reports now indicate an association with congenital malformations, severe neurological and autoimmune complications including microcephaly and GBS (Pocock & Rezaeian, 2016)

Experts speculate that the rise in communicability and virulence could be due to antigenic drift, extreme weather patterns, travel and/or urbanization, however, the definitive cause of the emergence remains uncertain.

In April, 2016, the CDC announced its position that Zika causes microcephaly and other birth defects. While there is no “smoking gun,” the link between Zika and birth defects is partially due to timing - dramatic increases in infants born with microcephaly appeared along with dramatic increases in confirmed Zika infections. In addition, Zika has been detected in amniotic fluid and tissues of many newborns born with microcephaly and a significant proportion of Zika infected women had fetuses that developed birth defects including microcephaly (Weaver et al., 2016).

The CDC defines microcephaly as a condition where a “...baby’s brain has not developed properly during pregnancy or has stopped growing after birth which results in a smaller head size” (2016). Problems with this condition include seizures, developmental and intellectual delays, hearing and vision problems, feeding problems and difficulty with movement and balance. The severity ranges from mild disabilities to death.

In addition to birth defects, GBS has also been linked to Zika. Again, this is partially due to timing - a cluster of GBS cases during the French Polynesia Zika outbreak in 2013, and increases in GBS in several other countries that were experiencing a Zika epidemic (Weaver et al., 2016). GBS is a rare autoimmune disease usually caused by a bacterial or viral infection. It can cause pain, weakness or progressive paralysis that moves up the body. Weakness that involves the respiratory muscles may require mechanical ventilator support and progression to cardiovascular collapse could be fatal.

Implications for Nursing Care

Because there is no treatment or vaccine for Zika, health care providers should focus their attention on education and prevention. It is important to understand the risks of traveling to Zika affected areas, how to protect yourself and your families, and what to do if you suspect you are infected.

***Prevent mosquito bites** by wearing long sleeve shirts, use effective insect repellent, when outside use barriers such as nets and screens. Stay in air conditioned places when possible – mosquitoes hate the cold.

***Involve the community** by organizing clean up campaigns. Remove standing water where mosquitos breed and lay their eggs.

***Counsel pregnant women or women of child bearing years** on the risks and precautions of traveling to areas affected by Zika or warm areas where mosquito-borne transmission may occur.

***Counsel men** on the risks of contracting Zika, GBS and possibility of transmitting the virus through sexual contact. Sexually contact that results in a pregnancy, or transmission to an already pregnant partner, could impact the health of the fetus.

***Provide information to those already infected with Zika** on how to prevent transmission to others, prenatal care, monitor infants for developmental milestones and signs of birth defects, and signs and symptoms of GBS.

***Ethical considerations** include limiting travel, contraception, delayed family planning, and other issues that may be very difficult to confront.



Figure 3. Ludmilla Hadassa Dias de Vasconcelos was born November, 2016 with microcephaly in Recife, Brazil. Getty Images, 2016.

Conclusion

Zika has been in existence for decades, however, the pandemic spread and recent links to debilitating neurological disorders and devastating birth defects has the scientific community racing to control its spread and harm. Though experts now agree that Zika causes microcephaly and GBS, the causal link has not been determined.

In the absence of facts, the public may “fill in the blanks” with inaccurate, inappropriate or agenda-driven material. As researchers continue to examine the dangers that Zika may present to the public, health care professionals should make a concerted effort to stay abreast of the most recent developments to properly educate themselves and their patients on the present and future implications of this virus.

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