

ABSTRACT

Congenital Zika Virus Syndrome is characterized by microcephaly, ocular irregularities, and other central nervous system abnormalities. As is the case with other viral exposures in utero, such as Cytomegalovirus and West Nile Virus, recent evidence suggests that Zika Virus constitutes a risk factor for hearing loss. The Centers for Disease Control and Prevention have published guidelines regarding follow-up care for infants with congenital Zika Virus infection. This systematic review aims to expand on those guidelines in terms of audiologic screening and follow-up protocols based on published accounts originating from high-incidence geographic locations. With this systematic review as a foundation, recommendations for families and caregivers of Zika Virus exposed infants were developed in a way to address health-literacy barriers in English, with the goal to eventually develop materials in Spanish and Haitian-Creole. The objective of these guidelines and educational, public health materials is to increase caregiver awareness of Zika Virus as a risk factor for hearing loss and encourage timely screening and identification.

LEARNING OBJECTIVES



Describe current knowledge regarding Zika Virus hearing screening and follow-up protocols.



Demonstrate relevance of Zika Virus screening and follow-up protocols to hearing healthcare professionals.



Propose guidelines and educational materials for families of Zika Virus exposed newborns in a way that addresses health-literacy barriers.

METHOD

A systematic search of records was completed using three databases: PubMed, CINAHL, and ComDisDome. The search queries were: 1. "(zika) AND (hearing)," 2. "(zika) AND (infant)," 3. "(zika) AND (hearing loss)," and 4. "(zika) AND (sensorineural)." Articles and abstracts were subjected to inclusion criteria. The record screening was followed by reading the full texts to identify required inclusion criteria. Inclusion criteria were: infant population positive to Zika virus exposure, publication in peer reviewed sources, mention of audiologic screening and/or monitoring method, and level of evidence IIIc. Level of evidence was determined by guidelines published by the Oxford Centre for Evidence-Based Medicine (Phillips et al., 2009). 553 records were identified through database searches. 400 remained after duplicates were removed. These were screened by title, and 194 were selected to be screened by abstract. 149 of these were eliminated and 44 were selected for a full text review. 36 of these were excluded as 30 did not mention audiology-specific protocols, 5 had a level of evidence lower than IIIc, and 1 publication was unavailable in full text format. Eight records were included in the qualitative synthesis. Data obtained from the selected articles were entered into a summary table and a narrative synthesis was used to describe the 8 included studies to formulate an informed recommendation for the audiologic screening and monitoring of zika exposed infants.

RESULTS

Reference	Location	Guideline	Method of Screening		Method of Monitoring		
			OAE	AABR	Click ABR	Toneburst ABR	Behavioral Audiometry
Adebanjo et al. (2017)	United States	CDC		✓			
Adhikari et al. (2017)	United States	CDC		✓			
Fleming-Dutra et al. (2016)	United States	CDC	✓	✓			
Heald-Sargent et al. (2017)	United States	CDC		✓	✓		✓
Kapogiannis et al. (2017)	Brazil	AAP JCIH	✓	✓			
Leal et al. (2016B)	Brazil	AAP JCIH & BHM		✓	✓	✓	✓
Russell et al. (2016)	United States	CDC		✓			✓
Van Der Linden et al. (2016)	Brazil	AAP JCIH & BHM		✓	✓	✓	

Note: CDC = Centers for Disease Control and Prevention; AAP JCIH = American Academy of Pediatrics' Joint Committee on Infant Hearing; BHM = Brazilian Health Ministry; OAE = Otoacoustic Emission; AABR = Automated Auditory Brainstem Response; ABR = Auditory Brainstem Response

HEALTH LITERACY

Health literacy is defined as the degree to which an individual has the capacity to obtain, communicate, process, and understand basic health information and services to make appropriate health decisions ("The Library of Congress", 2010). A study found that only 12% of adults in the US had a proficient level of health literacy needed to process and understand basic health information to make informed decisions ("Health Literacy of America's Adults", 2006). To address the discrepancy between the majority of US adults' literacy skills and the complex information given, researchers have urged the production and integration of more jargon-free materials with a focus on middle-school education level (Koh et al., 2015). Making communication clear, using plain language, and making visual communication as effective as possible in order to reach people regardless of education level or cultural background will aid in helping people reach their full health potential.

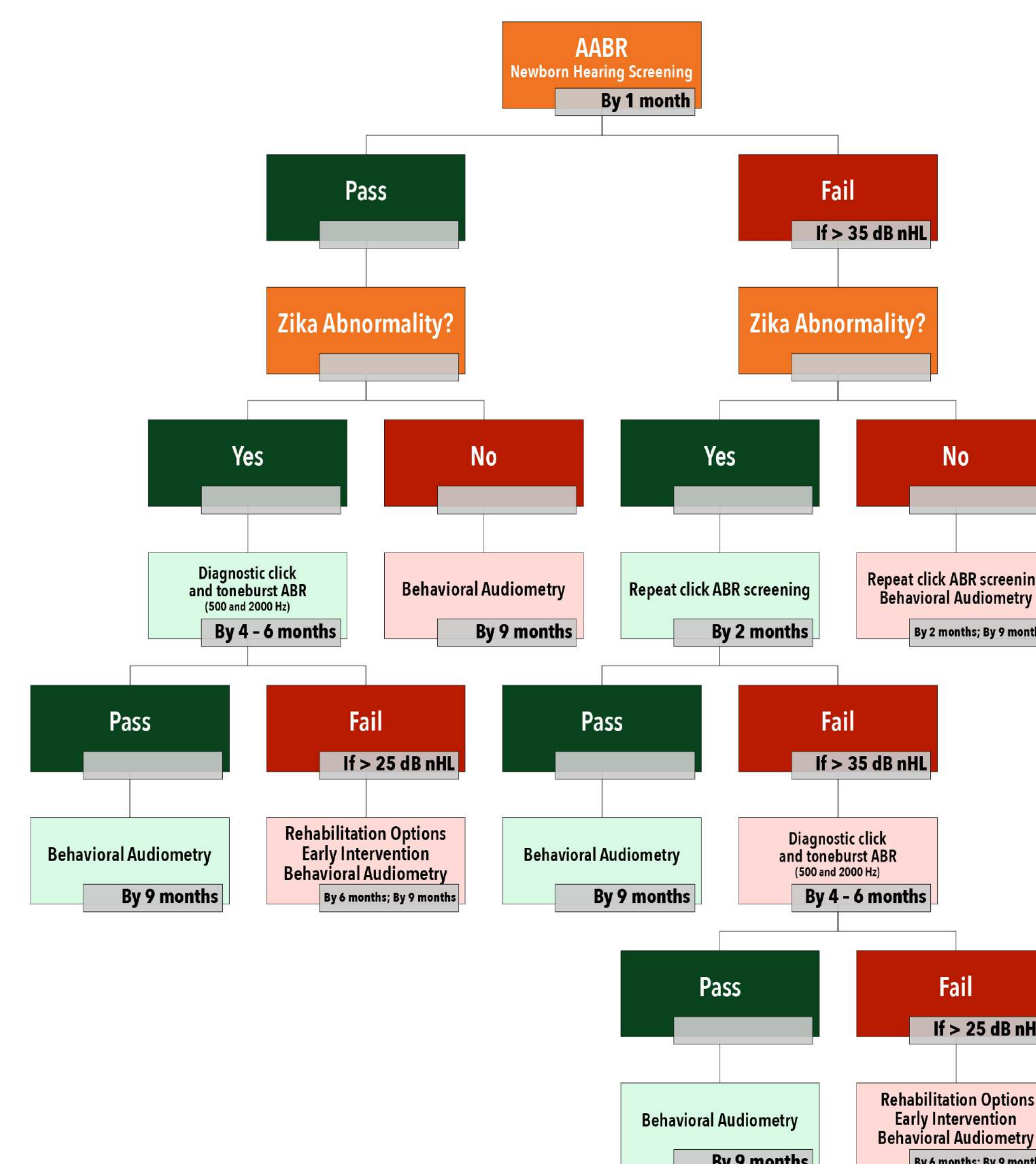
With the systematic review as a foundation, recommendations for families and caregivers of Zika Virus exposed infants were developed in a way to address health literacy barriers. The objective of this educational and public health pamphlet is to increase caregiver awareness of Zika Virus as a risk factor for hearing loss and encourage timely screening and identification. In addressing the mismatch of US adults' literacy skills and the often complex information, this pamphlet was developed with a middle-school education level focus, using plain language and supplementing instructions with visuals to increase the usability of information.



BACKGROUND

Congenital Zika Virus can now be included in a series of infectious agents known to cause abnormalities during pregnancy. As the prevalence of Zika Virus continues to increase around the world, so does the number of children born with Zika Virus related complications. According to the Centers for Disease Control and Prevention (CDC) as of mid-2017, there have been nearly 1,800 pregnancies in the United States with laboratory evidence of Zika infection. Out of those 1,800 pregnancies ("US Zika Pregnancy Registry", 2018), 91 births resulted in infants born with birth defects consistent with manifestations and symptoms of congenital Zika Virus. Fetuses and infants infected with Zika Virus before birth are described by the following five features: 1) microcephaly; 2) decreased brain tissue with a specific pattern of brain damage; 3) damage to the back of the eye, including macular scarring; 4) congenital contractures; and 5) hypertonia restricting body movement (Moore et al., 2017). Although the Zika Virus epidemic has been associated with microcephaly, central nervous system, ocular, and auditory abnormalities, the full spectrum of features has not been presented. Zika infection during pregnancy and transmission prenatally from mother to baby causes a recognizable pattern of congenital abnormalities that is both consistent and unique when compared to differential congenital infections, such as cytomegalovirus (Moore et al., 2017). Although some particular and clinical features of Zika Virus syndrome are known, the long-term development trajectory for these infants is largely not well studied.

RECOMMENDATIONS



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