



A Devastating Delay — Zika and the Implementation Gap

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The epidemic of Zika in the Americas and the virus's effects on fetal development have jolted the U.S. medical community and the broader public. Zika's relatively recent emergence has neces-

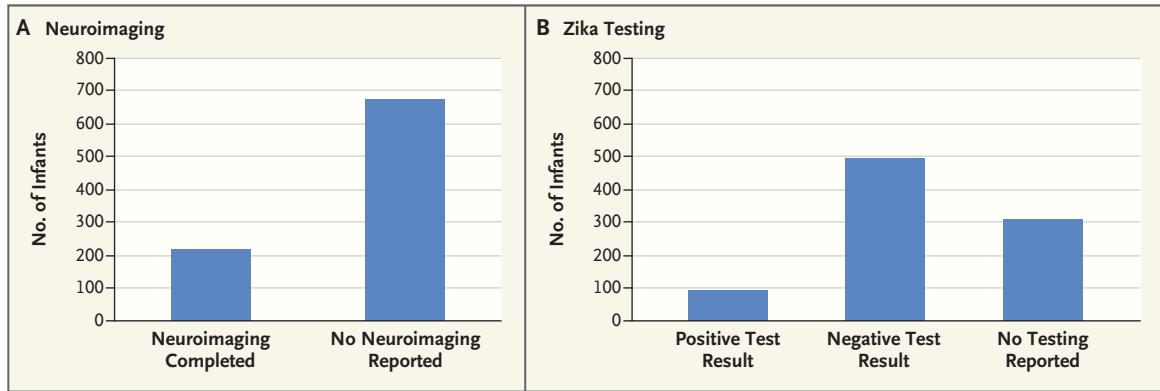
sitated rapid research on its virology and pathogenesis, transmission, clinical manifestations, and diagnosis. The medical community has risen to this challenge admirably. Though a PubMed search for articles about Zika published before the 2015 outbreak in Brazil yielded fewer than 110 results, a similar search in July 2017 yielded more than 3000. The National Institutes of Health has identified several high-priority areas of Zika research, and at least 15 related trials are actively enrolling participants, including several vaccine clinical trials.

Developing knowledge to guide prevention and clinical management of Zika virus disease is critical, and these efforts should continue. However, this focus on knowledge acquisition has over-

shadowed another critical need — namely, ensuring that new knowledge is disseminated to frontline providers and used to improve care. For example, the Centers for Disease Control and Prevention (CDC) recommends that infants whose mother had laboratory evidence of Zika virus infection during pregnancy undergo a comprehensive physical exam, head ultrasound, and Zika laboratory testing. According to a recent CDC report, however, only 25% of Zika-exposed infants had recommended brain imaging and 65% underwent Zika testing (see graph).¹ Because of such gaps, the medical community risks failing to identify infants who might benefit from follow-up or specialty care and undermines optimal care coordination.

Translational gaps are not unique to Zika; similar challenges exist throughout the health care system. According to several estimates, it takes an average of 17 years for research evidence to reach clinical practice.² One study showed that patients receive only about 55% of the recommended processes involved in medical care.³ But Zika's effect on fetal development and its potential for widespread transmission make such gaps particularly problematic. Thus, it is especially important that the rapid pace of Zika research be paralleled by similarly rapid dissemination of new knowledge and implementation of recommended practices in clinical care.

Prior research has documented a number of barriers that impede the translation of recommendations into clinical practice. These barriers range from provider-level constraints, including lack of awareness of recommendations and lack of agreement



Postnatal Neuroimaging and Zika Virus Testing Results for Infants in the U.S. Zika Pregnancy Registry, December 2015–December 2016.

Data are from the Centers for Disease Control and Prevention. Neuroimaging includes any cranial ultrasound, computed tomography, or magnetic resonance imaging reported to the registry. Positive infant tests included the presence of Zika virus RNA by a positive nucleic acid test (e.g., reverse transcriptase–polymerase chain reaction), positive or equivocal serologic results for immunoglobulin M, or both.

with them, to external barriers, such as patient preferences, lack of resources, and costs.⁴ Improving implementation of Zika-related findings will therefore require a multifaceted response.

First, to address barriers related to lack of awareness of Zika guidelines or lack of familiarity with them, provider associations such as the American Academy of Pediatrics (AAP) and the American Congress of Obstetricians and Gynecologists (ACOG) could expand the reach of their educational programming and increase their coordination efforts. These organizations have facilitated peer-based learning using various formats, including online materials, webinars, and special conference sessions. Such resources play a critical role in the sharing of new information with clinicians, particularly those who work in academic medical centers. However, they are often accessible only to paying association members — and thus may reach only a fraction of the providers in a given specialty or geographic area.

Several strategies could be con-

sidered for increasing uptake of Zika-related resources. One model comes from the American Board of Obstetrics and Gynecology, which makes maintenance of certification contingent on successful completion of relevant Zika trainings. Pediatric and family practice organizations could implement similar requirements to encourage broader participation among their members. To reach beyond paying members, physician associations could consider forming creative partnerships — for example, collaborating with nurse practitioners and physician assistants on joint membership agreements or shared programming. Such collaboration may be particularly important for reaching providers in rural areas, which are often medically underserved. For example, 35 counties in Texas — many of which share a border with Mexico, a country with active Zika transmission — have no physicians of any kind, and 147 have no obstetrician.⁵ Engaging a broad range of primary care providers is therefore critical for ensuring that knowl-

edge reaches providers on the front lines of the epidemic.

New media platforms could also expand the reach of peer-to-peer learning opportunities. For example, clinicians in Zika specialty clinics in Florida and Texas have fielded phone calls from providers throughout the country and shared guidance on collecting test samples, interpreting test results, and referring patients to specialty services. Technology could be used to expand communication of this type of information. One promising model is the national Project ECHO (Extension for Community Healthcare Outcomes) Zika. This “telementoring” platform, implemented by the AAP and the Department of Health and Human Services, links pediatric community providers to each other and to academic specialists, enabling rapid, multidirectional information exchange. Such platforms could be especially useful for transmitting information to nurse practitioners or physician assistants in rural areas. Similar models could be considered for building clinician knowl-

edge and competence outside of pediatric care, such as among obstetricians and family practice physicians.

Additional strategies could address other barriers to implementation. For example, anecdotal reports from providers indicate that many don't have confidence in their ability to correctly screen and test patients for Zika. Adding decision support systems to electronic health records (EHRs) could enhance self-efficacy and help providers incorporate new knowledge into routine clinical care. Many EHR systems have travel screening functions, which were used by providers during the Ebola crisis to identify potentially exposed patients. Embedding similar travel screening support for Zika could help ensure appropriate diagnosis and referral for affected patients. Such a screening tool could be integrated into health care workflows, enabling all pregnant patients to be screened at every prenatal visit, as recommended by the CDC. EHR systems could also be programmed to provide screening reminders, also known as best-practice alerts, to encourage providers to perform appropriate diagnostic testing in patients with

risk factors for Zika exposure (such as a positive travel screen). Health system leaders should prioritize the development of appropriate EHR-based support systems and ensure they are updated to reflect evolving travel guidelines and care practices.

Finally, interventions to promote implementation of Zika-related findings must also address external barriers, including insufficient care coordination within and between obstetrics and pediatrics providers. For example, determining which infants should be tested for Zika requires information on maternal exposure, yet infant and maternal charts are rarely linked. Health systems could consider creating links between those charts in both inpatient and outpatient settings to facilitate access to information on Zika testing history and risk factors.

Responding effectively to rapidly emerging diseases requires not only rapid scientific and clinical research, but also rapid dissemination and implementation of research findings in clinical practice. Given the implications of Zika for fetal development, we don't have the luxury of waiting 17 years for practice to change. If

we want to protect the health of current and future populations, there is no time for delay.

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1. Reynolds MR, Jones AM, Petersen EE, et al. Vital signs: update on Zika virus-associated birth defects and evaluation of all U.S. infants with congenital Zika virus exposure — U.S. Zika Pregnancy Registry, 2016. *MMWR Morb Mortal Wkly Rep* 2017; 66:366-73.
2. Morris ZS, Wooding S, Grant J. The answer is 17 years, what is the question: understanding time lags in translational research. *J R Soc Med* 2011;104:510-20.
3. McGlynn EA, Asch SM, Adams J, et al. The quality of health care delivered to adults in the United States. *N Engl J Med* 2003;348:2635-45.
4. Cabana MD, Rand CS, Powe NR, et al. Why don't physicians follow clinical practice guidelines? A framework for improvement. *JAMA* 1999;282:1458-65.
5. North Texas Regional Extension Center. The physician workforce in Texas. April 2015 (http://www.merrithawkins.com/UploadedFiles/MerrittHawkins/Surveys/Merritt_Hawkins_NTREC_Physician_Workforce_Survey.pdf).

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The Power of Regret

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When we consider regret in medicine, we typically think of the feeling that follows a poor clinical outcome. For example, a friend in his late 60s had prostatitis. He did not like taking pills and after reading up on treatment options, he insisted on a once-a-day

regimen with a fluoroquinolone antibiotic. It led to prompt relief of symptoms. But several weeks later, he had a spontaneous rupture of his Achilles tendon — a recognized though rare side effect of the drug. “Why did I insist on that antibiotic?” he asked bitterly,

as he trawled over his care. His story contains two essential elements that lead to regret: imagining that the present situation would have been better if one had acted differently, and self-recrimination for having made a choice that led to a bad outcome.