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NEWS FROM THE BATTLEFRONT: ZIKA VIRUS-ASSOCIATED GUILLAIN-BARRÉ SYNDROME IN BRAZIL

In the wake of the Zika virus (ZIKV) epidemic, international resources have been dedicated to combating the increasing rates of ZIKV-associated microcephaly. However, other severe neurologic complications, such as Guillain-Barré syndrome (GBS), have received less attention and funding. In July 2015, 76 patients with recent symptoms suggestive of ZIKV infection with neurologic syndromes were identified in the state of Bahia, northeast Brazil, of which 42 (55%) were confirmed GBS.¹ In November 2015, the Aggeu Magalhães Research Center of the Oswaldo Cruz Foundation reported that ZIKV infection was found in 10 out of 224 suspected dengue cases.¹ Seven of the 10 positive samples belonged to patients with a neurologic syndrome.

In November 2015, we created a self-funded study group in Rio de Janeiro, Brazil, involving neurologists, radiologists, and critical care and emergency medicine specialists to gather more precise epidemiologic information regarding ZIKV-associated neurologic illnesses in adults (including GBS, meningoencephalitis, and transverse myelitis) and to help coordinate care of these patients (the RIO GBS-ZIKV Research Network).

The utilization of new, wireless technologies has been instrumental to information sharing for this network, particularly within underdeveloped regions of our catchment area, where infrastructure can be rudimentary. Short message service has been used during outbreaks of Ebola² and H1N1,³ but our utilization of encrypted group messaging with smartphone apps (WhatsApp) allows groups of neurologists and researchers to instantly identify new cases and review and evaluate diagnostic tests such as nerve conduction studies, EMG, CSF analyses, and MRI. Because WhatsApp utilizes end-to-end encryption,⁴ all patient data are confidential and this communication technique has been sanctioned by our hospital network. We have also standardized data collection and protocolized treatment strategies within our network. In regions without a neurologic specialist, our group has

been able to offer remote consultation. Social media has been used as well to propagate information on ZIKV-associated neurologic complications. The Brazilian Ministry of Health (BMH) created a YouTube channel to publish videos explaining the most common symptoms of ZIKV infection, how to detect and extinguish foci of *Aedes aegypti*, as well as the current evidence on microcephaly and GBS. In addition, a Facebook page and Twitter account were created to disseminate information. Google has also partnered with United Nations Children's Emergency Fund to create a platform to map and anticipate potential outbreaks.

Between December 5, 2015, and March 18, 2016, we identified 20 confirmed GBS cases referred to our university through our network, located in the state of Rio de Janeiro, Brazil. This volume of patients with GBS exceeds the 16 cases reported at our center over 24 months in 2013 and 2014 (prior to the ZIKV outbreak). This represents an increase from an average of 0.67 GBS cases per month to 5.4 cases per month. Of these 20 GBS cases, 17 were associated with a viral prodrome consistent with ZIKV (pruritic rash, fever, or arthralgias). Of note, only 20% of patients with ZIKV infection are thought to develop florid symptoms.⁵ The association of GBS and ZIKV has also been observed in French Polynesia,⁶ where the predominant form of GBS reported was acute motor axonal neuropathy (AMAN). In our genetically distinct population, we have observed ZIKV-related AMAN, acute motor sensory polyneuropathy, acute inflammatory demyelinating polyradiculoneuropathy, chronic inflammatory demyelinating polyradiculoneuropathy, and Miller Fisher variant. In addition, cases of encephalitis, transverse myelitis, and acute disseminated encephalomyelitis following a ZIKV prodrome have presented to our facility.

The RIO GBS-ZIKV Research Network has increased transfers to our central, tertiary hospital, as well as referrals to our outpatient neurology subspecialty clinics. Though most local hospitals have intensive care units (ICUs) with ventilator capability, we have found that specialized neurocritical and neuromuscular care offers more rapid assessment (EMG/nerve conduction

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studies, MRI, ZIKV molecular and serologic testing) and aggressive management of these patients (e.g., IV immunoglobulin, plasmapheresis, steroids). A consequence of the increased rate of ZIKV-related neurologic illnesses has been the strain this has placed on ICU bed capacity (which is already limited in developing nations). In some circumstances, patients are managed in the emergency department or regular floor by intensivists until an ICU bed becomes available. Because GBS can be incapacitating, often requiring ICU admission and mechanical ventilation, increased efforts directed toward prevention and early intervention are merited.

Our next step, in collaboration with the State of Rio de Janeiro Health Department and the BMH, is the creation of a hotline where physicians can discuss, refer, and transfer possible cases to tertiary centers for further analysis and treatment. As part of this effort, a national registry of patients with neurologic complications deemed secondary to ZIKV infections is being developed.

We have been able to harness low-cost, instant communication and mass media to develop a technology-based system for combating the ZIKV epidemic. Such a network could potentially be replicated in other countries affected by similar outbreaks.

AUTHOR CONTRIBUTIONS

Ivan Rocha Ferreira da Silva: study design, data collection, manuscript writing. Jennifer Ann Frontera: study design, data collection, manu-

script writing. Osvaldo Jose Moreira do Nascimento: study design, manuscript writing.

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