EDITORIAL

# Wartime neurology

## Serving the neediest in an austere environment

Mill Etienne, MD, MPH, and Jack W. Tsao, MD, DPhil

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**Correspondence**
Dr. Etienne
mill_etienne@nymc.edu

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Devastating neurologic injuries in the Syrian war
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The civil war in Syria has been recognized as possibly the greatest humanitarian crisis of the 21st century.[1] According to the British-based Syrian Observatory for Human Rights, 511,000 people (2.33% of Syria's prewar population of 22 million) have been killed in the war from March 2011 to the present,[2] and more than 1.9 million have been injured.[3] The public health infrastructure has been decimated, partly because hospitals, health workers, and medical supplies have been targeted, which has rendered a large number of health care facilities nonfunctional.[4] The magnitude of morbidity and mortality in this region has overwhelmed the local response system, which has made Syria dependent on foreign aid for medical care. Traditionally, responders to mass casualty events such as this one have included government/military physicians, trauma surgeons, intensivists, and emergency department physicians; however, over the past decade, there has been increasing awareness of the role of the neurologist in humanitarian assistance and disaster response (HADR) missions,[5,6] as well as the significant role that neurologists can play by volunteering in low- and middle-income countries.[7] The role of neurologists in both natural and man-made disasters is one that the practicing neurologist should be aware of.

Although there have been numerous publications referencing injuries that have resulted from the Syrian civil war,[8] none have focused specifically on neurologic injuries. Abdallah et al.[9] evaluated the prevalence of neurologic injuries among refugees in a major rehabilitation center located on the Turkish-Syrian border from 2013 to 2016. The data from this rehabilitation center help give the reader a glimpse of the types of neurologic injuries expected from a combat zone. Indeed, much of their demographic data was similar to previous publications documenting injuries and casualties from this war. For example, 96% of the patients were men, as compared to 93% men reported by Kocamer Simsek et al.[8] Similarly, the most common mechanism of injury was gunshot wounds as has been previously reported.[8]

Peripheral nerve injuries were the most common neurologic injury, representing 91.6% of the injuries, the most common of which was radial nerve injuries. The authors found that most of the peripheral nerve injuries resulted in functional loss of motor function associated with the injured nerve. Of note, 8.7% of the injuries were spinal cord injuries. Seventeen of the 20 spinal cord injuries required surgical intervention, so it is important for the neurologists working in combat zones to form a good working relationship with their neurosurgeon counterparts to identify and expedite patients being appropriately treated. The authors highlight the low number of patients with traumatic brain injuries who presented. It is quite likely that patients who suffered severe traumatic brain injuries that rendered them comatose would not make it to this facility, given the extraordinarily high level of resources needed to save them.

Although this study focused on neurologic injuries, when a neurologist is volunteering in austere circumstances, he or she can expect to see patients with exacerbation of common neurologic disorders, such as seizures, myasthenia gravis, and multiple sclerosis, due to both the stress of the situation and problems accessing maintenance medications. The neurologist can

Department of Neurology (M.E.), New York Medical College, Valhalla, NY; National Center for Bioethics and Research in Health Care at Tuskegee University (M.E.), AL; Department of Neurology (J.W.T.), University of Tennessee Health Science Center, Memphis, TN; Department of Neurology (J.W.T.), Memphis Veterans Affairs Medical Center, TN; and Children's Foundation Research Center (J.W.T.), Le Bonheur Children's Hospital, Memphis, TN.

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expect to have limited resources, including lack of medication, laboratory, and neurodiagnostic support. Neurologists should make a note of what resources are available in the facility and nearby facilities to provide the patients with the testing and interventions that are indicated and available. Given that there are typically limited supplies, the neurologists should bring with them a penlight/flashlight, ophthalmoscope, otoscope, reflex hammer, tuning fork, and stethoscope. It is particularly helpful if the neurologist speaks the local language; however, not speaking the language is not disqualifying because there are often interpreters available to assist.

The neurologist should be mindful of personal safety by making sure that they take the appropriate prophylactic medications and also ensure that their immunizations are up to date and appropriate for the region. There may also be particular personal protective equipment that neurologists may need to wear depending on what types of toxic exposures are expected. Neurologists should also be aware that there may be temporary or prolonged disruption of the law enforcement infrastructure, which could also put their personal safety at risk. As is the case in the Syrian conflict, medical facilities and medical personnel have been specific targets, so there can be a risk for the medical provider to suffer serious bodily harm when responding to an armed conflict.

The primary limitations of this study are that the findings reported may not be generalizable to the over 2 million people who have suffered injuries during this war. The field hospital was located distant from the central conflict regions, so it is possible that the authors did not capture the more severe life-threatening injuries, including severe traumatic brain injury. The authors were not able to differentiate between civilians and combatants because of rapid patient turnover in the facility, and it is possible that injury patterns might have differed. The authors were also not able to provide long-term follow-up details. This would have been useful to get an understanding of the long-term impact of the interventions offered by the neurologists and neurosurgeons. For example, the authors noted that although 91% of the hospitals in Syria can provide emergency surgical intervention, only 16% are able to provide the appropriate postoperative care because of limited staffing and resources.

The important take-home message from this article is that there is a great and increasing need for neurologists to volunteer in HADR missions, particularly to this current humanitarian crisis in Syria. Neurologists can have a tremendous impact by getting their feet on the ground and providing this very important care when and where it is needed most. Any amount of time the neurologist can provide to the effort will have an impact on many lives.

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M. Etienne Drafting/revising the manuscript. J.W. Tsao Drafting/revising the manuscript.


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