

guest columnist



# Traumatic Brain Injury: Epidemic or Pandemic?

By Ricardo G. Senno, M.D., M.S., FAAPMR

Traumatic brain injury (TBI) is an unrecognized epidemic that has reached levels never before seen. Depending on the study, the national incidence ranges from 95/100,000 to 400/100,000 with a prevalence of 7.8 million. In other words, 2.6% of the United States' population lives with disabilities related to TBIs. Placed in the appropriate perspective, in the United States, a TBI occurs every 21 seconds. The worldwide rate is even more staggering, with a TBI occurring every 15 seconds. In the amount of time it will take to read these paragraphs, approximately 15 TBIs will have occurred in this country and 20 will have occurred

worldwide. Keep in mind that the number of diseases and illnesses that affect the human brain are even greater than those caused by trauma. By way of example, some of the other disorders that affect the brain are strokes, Parkinson's and Alzheimer's disease, vascular dementias, anoxic injuries and viral and bacterial encephalopathies.

Our brain is our master organ; within its frontal lobes we plan, reason and modify our behavior based on environmental stimuli and feedback. Inside the limbic system and hippocampus, emotions and memories are stored and available in a split nanosecond. In the occipital lobe, visual

interpretation takes place. Our presensory, sensory, premotor and motor strips account for muscular actions, while our basal ganglia and cerebellum maintain equilibrium. At the same time, language is coordinated by Wernicke's and Broca's area. Overall, a magnificent set of neural pathways and networks shape, coordinate and balance our thoughts and actions.

It is therefore devastating when the brain is injured and our neural networks are disrupted. The medical, social and economical consequences are numerous and serious. Patho-physiologically, these are manifested as neuromuscular,

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endocrine and cognitive issues. More specifically, there are difficulties with seizures, spasticity, rigidity and contractions. From an endocrine point of view, a person can present with hypo or hyperthyroidism, as well as issues with other hormones. Cognitive deficits can manifest themselves as short- or long-term memory problems, mood instability, personality changes, irritability and disorientation.

Based on a patients' emergency department Glasgow Coma Scale score, TBIs are classified into severe, moderate or mild. A score of 3 to 8 is indicative of a severe TBI, while a score of 9 to 12 indicates a moderate brain injury and 13 to 15 a mild injury. This nomenclature, however, falls short, as there is nothing mild about a "mild" TBI. People diagnosed with mild brain injuries face serious issues ranging from headaches to lack of focus and concentration, problems with multitasking, increased confusion and disorientation as well as having difficulties with reintegration into the workplace and school systems. Collectively, these problems are known as postconcussion syndrome. Whereas severe TBI can be detected on MRI or CT scans, mild brain injury cannot be visualized on current available imaging studies, hence a negative or "normal" MRI or CT scan does not exclude a brain injury. For this reason, to diagnose a mild brain injury, the clinician has to rely on his or her clinical acumen.

Currently, the emergency departments are performing excellent work in diagnosing and treating patients quickly and proficiently within the "golden hour." The "golden hour" is that extremely important initial hour when brain edema has to be treated. Although brain edema is part of the secondary mechanism of injury (the primary mechanism being the initial ac-

celeration/deceleration and rotational forces), it can account for the majority of the damage to the brain parenchyma. Modern neurosurgery and intensive care departments have done a superb job in preventing secondary complications such as pneumonia, skin ulcerations and organ failure. There has also been a trend by internal medicine and family practitioners, as well as sports coaches, toward early recognition and referral to a brain injury specialist.

Per the Centers for Disease Control (CDC) data collected from 1995 to 2001, there are at least 1.4 million TBIs occurring per year in the United States. This results in 50,000 deaths, 235,000 hospitalizations and 1,111,000 emergency department visits. There is also a significant and unknown number of TBIs that go unrecognized and therefore not treated. Per the CDC report, the male-to-female ratio is 1.5 to 1. Falls are the overall leading cause of TBIs and the primary cause of TBIs in the young

(0-4) and elderly (older than 65). Motor vehicle accidents continue to be the principal cause of TBI in the adolescent population (15-19).

As a brain injury specialist, I deal with the medical complications and sequelae of severe, moderate and mild TBI. Severe complications may include hydrocephalus, spasticity, heterotrophic ossification and failure to thrive. Moreover, as a physical medicine and rehabilitation physician, I also focus on increasing the person's functional status with the ultimate goal of reintegration into the home, community, school and workplace.

Perhaps, when discussing the injuries, illnesses, diseases and complications that affect the human brain, the use of the word pandemic would be more appropriate than epidemic.

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