The Madonna Minute

A briefing about the programs and innovations at Madonna Rehabilitation Hospital

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Updates on mild traumatic brain injury

Have you noticed that the words Mild Traumatic Brain Injury (mTBI) and Concussion are being heard a lot more frequently than they used to be? Although we used to think that mTBI and concussion were minor injuries and that most individuals did not require treatment, emerging research has indicated that mTBI, particularly repetitive mTBI, may have long-lasting consequences.

Several states including Nebraska have recently passed legislation to help reduce concussive injuries that occur in the context of youth sports. Much attention is being paid to the importance of identifying injuries immediately and managing all forms of mTBI and concussion. In particular, there is now a focus on preventing repetitive injuries and providing effective treatment when these injuries do not resolve in the expected manner.

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The issue of accurately diagnosing mTBI has been under debate for a number of years because only a small portion of those with injuries show any intracranial abnormalities on typical neuroimaging studies, such as CT or MRI. Typically these diagnoses are based on symptom report and abrupt onset coinciding with a suspected blow to the head or whiplash type injury, but considerable new research is investigating ways to more definitively identify concussion and mTBI when it occurs.

Diffusion Tensor Imaging (DTI) is a newer neuroimaging technique that measures the molecular diffusion of water throughout the pathways of the brain, and in particular, in the white matter pathways in the central portion of the brain. DTI is sensitive to microstructural axonal injury, the type of injury that is thought to be present in mTBI, but not evident on traditional structural neuroimaging. DTI appears particularly promising in identifying those individuals who have normal MRI and CT scans, but continue to exhibit persistent cognitive symptoms/deficits. It may well serve as a future screening method for cognitive rehabilitation as it appears to have the potential to predict persistent cognitive deficits that are unlikely to resolve without intervention.

Research to locate a blood or serum marker that would help with diagnosis and has detected a protein, called S100B, which has been shown to correlate with the presence of neurological disorders and, particularly intracranial complications. S100B appears to be limited to assisting with immediate diagnosis since it has a short half-life of only 30-90 minutes, and does not show much promise when individuals seek diagnosis and/or treatment several days or weeks post-injury. A recent meta-analysis indicated that S100B levels could be used to accurately rule out the need for CT in the emergency room therefore reducing costs and unnecessary exposure to radiation[2]. Several countries, including Sweden and Germany, are already utilizing S100B as a screening tool.

The Dynavision 2000 is a computerized board used by occupational therapists to improve visual motor skills in patients with limitations from brain injury.

Quantitative electroencephalograms (QEEGs) are being investigated as a tool for the diagnosis and monitoring of recovery following concussive injury. Results suggest that improvements are noted in QEEG patterns that correlate with clinical recovery and decreasing symptoms, although the QEEG remains abnormal for longer than the patient is symptomatic, suggesting that patients may take longer to fully recover than is suggested by symptom reporting along.[1]

Several studies utilizing various types of electrophysiological measures including EEG and transcranial magnetic stimulation (TMS), are

continued on reverse

finding evidence of long-term deficits in neural processing after multiple mild TBIs. Although research in this area is only beginning, interest is growing rapidly in this area because of the ramifications for some types of professional athletes and others who may suffer numerous mild TBIs throughout the course of a career.

Although there is a rapid evolution of new diagnostic tools, the most effective treatment modalities still appear to arise from prevention of reinjury and individualized rehabilitation programming for those who do not recover in the anticipated time frame.

At Madonna Rehabilitation Hospital, we look forward to the day when diagnosis is more easily obtained through objective measures of changes in brain functioning and we are able to focus our efforts on the effective management and treatment of these injuries. Each year approximately 75 adults and children are seen for Madonna's Mild TBI Comprehensive Assessment. Here, individuals are evaluated by a multidisciplinary team of experts, reviewing communication, cognition, vision, vestibular issues, and head/neck pain, as well as their ability to perform activities including those related to being successful at work, school, family and community.

For more information about the Mild TBI Comprehensive Assessment, contact Kim Grabouski, Outpatient Clinic & Assessment Coordinator at (402) 486-8649 or email kgrabouski@madonna.org.

References

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