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TITLE: Brain Injury Cognitive Screening (BICS): A simple, quicka dn effective application for screening mild traumatic brain injury

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ABSTRACT BODY:

Abstract: Objective: To present Brain Injury Cognitive Screening (BICS) as a mobile phone or tablet android application to quickly assess the cognitive impairment associated with mild traumatic brain injury. Introduction: According to existing data, more than 1.5 million people experience a traumatic brain injury (TBI) each year in the United States and as many as 75 percent sustain a mild traumatic brain injury—or MTBI. In addition to the human toll of these injuries, MTBI costs the nation nearly $17 billion each year. Each year in the United States 1.365 million are treated and released from an emergency department with the diagnosis of MTBI. MTBI can cause a wide range of functional changes affecting thinking, language, learning, emotions, behavior, and/or sensation. It can also cause epilepsy and increase the risk for conditions such as Alzheimer's disease, Parkinson's disease, and other brain disorders that become more prevalent with age. Approximately 5.3 million Americans currently have a long-term or lifelong need for help to perform activities of daily living as a result of a MTBI. Background: Unlike a major traumatic brain injury, concussion or mild TBI does not have overt clinical and/or radiological manifestations that make the diagnosis obvious. The radiological examination including the computerized tomography (CT) scan are usually normal and the clinical examination does not reveal any obvious abnormality. More often than not, it is the cognitive function of the brain that tends to get affected following a mild traumatic injury. The cognitive functions can be assessed in detail by several available test batteries but all of them require more than an hour and have to be administered and interpreted by qualified psychologists, who are usually not available in an emergent setting. This makes cognitive assessment of MTBI patients a challenging task in the setting of the accident site itself or even the Emergency Room. Montreal Cognitive Assessment (MoCA) is a quick screening tool that was devised by Nasreddine et al in 2005 to gauge cognitive impairment in patients with dementia. This test makes a quick assessment of 7 different functions, namely: visuo-spatial; naming; memory; attention; language; abstraction and orientation and allocates individual scores. Since then it has been validate as a reasonably reliable tool in stroke, Parkinson's disease and a variety of neurological disorders affecting cognitive functioning. Our group recently examined the validity and relevance of MoCA in 130 patients of MTBI treated at out center. We concluded that 97% of the patients of MTBI demonstrated impairment of one of the four cognitive functions, namely: visuo-spatial orientation, language, delayed recall and attention span. We therefore attempted to develop a simple and user friendly android application that could quickly assess these four cognitive functions to enable first responders to assess and suspect the extent of brain injury after concussion or mild trauma in patients. Methodology: Brain Injury cognitive Screening cell phone or tablet application has a simple interface for displaying the question and allowing the user to answer. It has audio or text interface to quickly assess the brain injury. It takes 1.5 minute to self assess or supervise the assessment of the brain injury. The application runs on all flavors of computers of relatively recent vintage: Linux, Mac OS, or Microsoft Windows. An Android device such as cellphone or tablet is useful (and of course the ultimate target for development), but is in fact not essential to getting started since the software contains virtual device emulators. The software has been written in American English language. It allots the scores of 0-12 to the patients based upon their responses to a few simple tasks. An impaired score of 9 or less should alert the assessors (first responders, EMT, ER physicians, athletic team coaches and sports physicians) to the possibility of cognitive impairment as a result of brain injury and cause them to seek detailed medical evaluation by physician with expertise in the area of TBI. Conclusions: Prevalence of Mild traumatic brain injury and its cognitive aftermaths has increased significantly in the past decade and has become the cause of increased social, economic and financial losses. MTBI is often missed as a diagnosis due to the absence of over clinical or radiological signs. A simple, quick and sensitive cell phone application like Brain Injury Cognitive Screening (BICS) will prove extremely effective in suspecting MTBI in relatively minor trauma setting and encouraging the assessing personnel to seek expert medical help for the victims.

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