

## **Overlap of mild TBI and mental health conditions in returning OIF/OEF service members and veterans**

### **INTRODUCTION**

Since October 2001, approximately 1.64 million U.S. troops have been deployed to Operations Iraqi Freedom and Enduring Freedom (OIF/OEF) in Iraq and Afghanistan, with many exposed to prolonged periods of deployment-related stress and traumatic events. The RAND Corporation recently conducted a survey of 1,965 service members from 24 communities across the country to assess their exposure to traumatic events and possible brain injury while deployed and to evaluate their current symptoms of psychological illness [1]. Exposure to significant trauma was common. At least 50 percent reported that they had a friend who was seriously wounded or killed, 45 percent reported that they saw dead or seriously injured noncombatants, and over 10 percent reported that they were injured and required hospitalization. Frequency of trauma events was found to be even more common in a *New England Journal of Medicine* study [2], in which over 90 percent of service members returning from Iraq reported seeing dead bodies or human remains and over 50 percent reported being responsible for the death of an enemy combatant. The RAND survey found that 18.5 percent of all returning service members met criteria for either posttraumatic stress disorder (PTSD) or depression; these numbers are similar to those reported by Hoge and colleagues [3]. In addition, the RAND survey found that 19.5 percent reported experiencing a probable mild traumatic brain injury (TBI) during deployment; of those experiencing TBI, over a third also had overlapping PTSD or depression. Based on these survey results, the RAND Corporation estimated that approximately 300,000 service members who have returned from Iraq and Afghanistan are currently experiencing from PTSD or major depression and about 320,000 may have experienced at least a mild TBI during deployment.

An influx of young OIF/OEF combat veterans with these disorders has been presenting to Department of Veterans (VA) medical centers for care. In December 2005, partially in response to the extent of this phenomenon, the Veterans Health Administration (VHA) implemented a series of national clinical reminders in the Computerized Patient Record System (CPRS) for screening veterans who upon their return from OIF/OEF seek care within the VHA after September 11, 2001. These reminders target problems in the areas of PTSD, depression, alcohol abuse, infectious diseases, and chronic symptoms. In April 2007, an additional mandatory clinical reminder for TBI was added to this CPRS-based postdeployment screening process. Nationally mandated clinical reminders help clinicians identify populations at risk and standardize care.

Generally, VHA patients who screen positive on any of these clinical reminders have presented to VA clinics from several months to as long as a year or more following deployment. The frequency of positive clinical reminders is similar to that reported in the RAND and other survey studies. Most of the patients screening positive on the TBI clinical reminder present with multiple postconcussion symptoms, many of which overlap with symptoms of PTSD, other anxiety disorders, and depression. Common accompanying symptoms include various musculoskeletal pain complaints. This overlapping constellation of symptoms challenges clinicians' ability to achieve accurate diagnoses and consequently the most appropriate and beneficial clinical treatment. Clinicians and researchers are greatly interested in improving their understanding of the relationships among these disorders, which they expect will lead to the development of the most effective treatment approaches.

### **MILD TRAUMATIC BRAIN INJURY: RECOVERY COURSE AND COMPLICATIONS**

Mild TBI undoubtedly causes acute disruption of brain functioning. The individual who sustains mild TBI initially is, at best, dazed, confused, and temporarily disoriented and often has memory gaps for the injury itself and for some time thereafter (seconds to hours). At worst, the individual is clearly unconscious for up to 30 minutes. Still unresolved, however, are questions about the normal course of recovery and percentage of individuals with more enduring sequelae.

Following sports-related mild TBI, most individuals who sustain a single uncomplicated concussion recover within 1 week of injury [4]. However, changes in cerebral blood flow in response to cognitive demands have been reported up to 1 month postinjury [5]. Neuropsychological recovery from non-sports-related concussions is generally complete within 1 month [6–7].

Nevertheless, approximately 10 to 20 percent of individuals continue to report distressing symptoms for months [8–11] or years postinjury [12–14].

These ongoing complaints involve a range of physical, emotional, and cognitive symptoms collectively referred to as postconcussion syndrome (PCS). Symptoms include headaches, dizziness, depression, irritability, fatigue, and cognitive complaints, typically without demonstrable structural changes to the brain on conventional clinical imaging [15]. However, within the initial 6 days following mild TBI, diffusion tensor imaging (DTI) has shown increased fractional anisotropy, which is correlated with the severity of postconcussion symptoms [15]. This finding clearly underscores a neurological basis for these symptoms, at least in the acute phase of recovery. In addition, subtle long-term cognitive deficits in attention have been reported in a small percentage of individuals who sustained a mild TBI [16] and in those with these neuropsychological difficulties; 40 percent also had persistent PCS [14].

The etiology for persistent PCS symptoms, particularly in the absence of objective findings, remains to be determined and is likely multifactorial. In part, this finding is because preexisting or comorbid psychiatric difficulties have been shown to be important moderators of persistent PCS [17–21]. Complicating these issues are findings that mild TBI also increases the risk for subsequent psychiatric conditions [14,22]. Also complicating the clinical presentation and treatment considerations is that pain syndromes and sleep problems are significantly associated with PCS [23–24].

In the postacute and chronic phases of recovery, no symptom exists that is unique to or pathognomonic of mild TBI. Similarly, no current diagnostic test can retrospectively diagnose mild TBI or determine that current symptoms or problems are due to a remote mild TBI [25]. Conventional, structural neuroimaging studies are typically normal in mild TBI. Anomalous findings on functional neuroimaging studies or other promising techniques cannot be definitively attributed to a remote mild TBI versus other conditions such as depression, anxiety, PTSD, or even deception [26]. Similarly, poor performance on neuropsychological tests cannot be uniquely attributed to mild TBI, as opposed to overlapping mental health conditions, poor effort, or fatigue.

However, a neurological component to persistent PCS is also not ruled out by these findings.

## POST-OIF/OEF CLINICAL PRESENTATION

In contrast to mild TBI in civilian settings, recovery from combat-related concussions is complicated by at least four factors:

1. The physically and emotionally traumatic circumstances in which many concussions are sustained.
2. The potentially repetitive and cumulative nature of concussions sustained over a tour (or multiple tours) of combat duty.
3. The high incidence of comorbid mental health conditions [1,27].
4. The difficulty in following typical recommendations for postconcussion care (e.g., rest).

The symptoms of comorbid mental health conditions such as PTSD or depression (associated with intrusive thoughts, concentration difficulty, and poor sleep) interfere with normal cognitive functioning. On the other hand, the cognitive impairment and emotional control problems associated with TBI are likely detrimental to the resilience essential to overcome PTSD. Thus, in the comorbid OIF/OEF veteran, assuming that the overall recovery process is complicated and prolonged by this cycle is reasonable.

The increasing number of patients presenting with these overlapping clinical problems challenges the VA healthcare system's capability to achieve the best treatment outcome. In the recent RAND study [1], 37.4 percent of those individuals with a mild TBI history also had either PTSD or depression. These findings are similar to a VA study in which 42 percent of OIF/OEF veterans with a mild TBI history also had PTSD symptoms [28]. Other complications are frequent pain conditions, auditory and visual dysfunction, or exacerbations of preexisting conditions [28–30].

In addition to PTSD, depression, and mild TBI, returning service members and veterans with these comorbid conditions presenting to military or VA healthcare facilities have numerous psychosocial and financial stressors. Readjusting from a “Battle-

mind” state that is highly adaptive in a combat environment to a civilian mind-set and environment is neither instantaneous nor easy for individuals returning home. Married couples are required to readjust roles and responsibilities after many months of separation. Child care issues and differences in disciplinary styles after months of single parenting often create significant family tension. Younger individuals discharged from active duty service may be unemployed and facing significant financial stresses, in the context of uncertainty regarding future vocational or academic options. Older Reserve or National Guard veterans may have difficulty returning to their previous employment or be placed in new positions with different responsibilities from those they had before deployment. Any of these possibilities can potentially cause major emotional, financial, and marital stress.

## TREATMENT MODELS AND PROGRAMS

VHA is challenged to fully provide comprehensive and integrated programs required for optimal treatment of this cluster of medical, psychiatric, and psychosocial conditions. VHA polytrauma rehabilitation centers were designed to focus on moderate to severe TBI, associated medical comorbidities, and patient and family adjustments to these polytraumatic conditions. Polytrauma programs are placed administratively in physical medicine and rehabilitation service lines, and historically, their staff has not had significant training in PTSD treatment. In contrast, existing VHA PTSD programs are placed administratively in mental health service lines and lack expertise in TBI management and treatment. Most existing VHA PTSD programs have been adapted to and designed for the more chronic type of PTSD found in veterans from earlier eras, such as the Vietnam war. Mixing cohorts from different military eras may be problematic, at best, because of differences not only in chronicity of PTSD symptoms and current levels of arousal and hypervigilance but also in life stages and interests. Finally, no empirically validated therapies exist to treat comorbid PTSD, depression, and postconcussive disorders, which

may be confounded by self-medicated alcohol misuse, abuse, or dependence.

While many facilities are developing treatment protocols based on their unique areas of expertise, they tend to focus either on the emotional (PTSD, depression, substance misuse, or some combination thereof) or on the cognitive (mild TBI) component. Divergent issues, needs, and resources will likely dictate different approaches to this comorbid clinical challenge between military and VA healthcare systems and between major urban medical centers and rurally located facilities.

## FUTURE DIRECTIONS AND RESEARCH OPPORTUNITIES

Intuitively, a combined approach seems reasonable to employ in which both cognitive and emotional/behavioral combat-related consequences are cotreated. However, without rigorous research, we cannot know which approaches or models are more efficacious. The contribution of blast injury, understanding and development of treatment approaches, and successful management of TBI and deployment adjustment issues raise several research questions:

- What are the best methods of diagnosis to determine the biopsychosocial basis of these conditions?
- Will functional magnetic resonance imaging, DTI, or other approaches yield new targets?
- Which pharmacological and other treatments reduce intrusive memories, encourage neuroplasticity, or encourage neuroregeneration?
- Is integrated cotreatment superior to sequential treatment of comorbid conditions?
- Do cognitive problems need to be treated before PTSD interventions can be effective?
- Is a generalized reduction in acute distress, arousal, hypervigilance, and suspiciousness necessary before either cognitive or PTSD interventions can be effectively implemented?
- Will current empirically supported treatments for PTSD need to be modified (and how) for this comorbid population?

- When can potentially more cost-effective group interventions be reliably implemented?
- Is entry into treatment through a TBI rehabilitation program going to increase use and enhance outcomes more than entry through a designated mental health program because of the stigma associated with mental health programs?

The breadth of TBI and deployment mental health questions call for a vigorous and interdisciplinary research effort. Important efforts have begun in the VA, Department of Defense, National Institutes of Health, and Defense Veterans Brain Injury Center, and continued efforts are needed.

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