Defining the mental health needs of returning Operation Enduring Freedom/Operation Iraqi Freedom troops in Minnesota:

A clinical survey, with special emphasis on Traumatic Brain Injury and Post-Traumatic Stress Disorder and with reference to a Veterans facility under planning by the Minnesota Veterans Homes Board in Kandiyohi County.

Presented by:

Sheehan, Thurber and Associates,

Willmar, Minnesota

Corresponding Author:

William Sheehan, M.D.
2105 Sixth Ave. S.E.
Willmar, MN 56201
320-214-1351
sheehan41@charter.net

Abstract

We present current available information on the types of neurological, psychiatric, and psychological problems shown by returning troops, with traumatic brain injury, posttraumatic stress disorder, and substance abuse being the most frequent. Generalizing this information to the state of Minnesota suggests that returning veterans may experience brain-related disorders and other adjustment problems that require professional intervention; we thus attempted to investigate the types of mental health problems evidenced by veterans in this state and the availability of appropriate services. Because returning veterans from Minnesota were not accessible for comparison, we surveyed veteran service representatives, clinical experts (board certified psychologists), and key personnel in hospitals and community mental health centers regarding symptom presentation of returning veterans, and diagnostic and treatment services. We also simulated questions likely to be posed by veterans regarding ease or difficulty in obtaining information and access to assessment and treatment modalities. In general, the results indicated outstate inadequacies in the existence, availability and/or accessibility of diagnostic and mental health treatment services for the kinds of problems that returning troops typically present. Such inadequacies are especially apparent in rural Minnesota. Of particular concern are services related to the diagnosis and treatment of sequelae of traumatic brain injuries. Recommendations focus on possibly developing a treatment center in west central Minnesota with both neuroimaging capabilities and multidisciplinary staff personnel.

Introduction:

TBI and PTSD among soldiers and returning veterans

Traumatic brain injury, or TBI, has been seen as the "signature wound" in the Iraq and Afghanistan Wars (Okie, 2005; Zoroya, 2005, Dyhouse, 2006). Because of improved body armor and rapid emergency response to troops injured in the field, they have consistently survived injuries which would formerly have been fatal. However, a dark side of these higher survival rates (8 injuries for every one death, compared to 3 injuries per death in Vietnam) has been a staggering increase in incidence of TBI among Operation Enduring Freedom and Operation Iraqi Freedom troops who have sustained blast injuries, vehicle accidents, or falls.

The existence of large numbers of troops sustaining traumatic brain injury has paralleled the emergence of the Improvised Explosive Device, or IED, an unforeseen and tragic development of the Iraq War. As of mid-July 2007, IEDs have caused nearly two-thirds of the American combat deaths in Iraq and an even higher proportion of battlefield wounds (Atkinson, 2007). At the beginning of October 2007, there were 21,071 killed or wounded Americans. The war has indeed "metastatized into something 'completely different'" from what was anticipated before the March 2003 invasion of Iraq. It is now a conflict in which "the roadside bomb in its many variants—including 'suicide-vehicle-borne'—has become ... as iconic as the machine gun in World War I or the laser-guided 'smart bomb' in the Persian Gulf War of 1991" (Atkinson, 2007).

The nature of blast injuries caused by IEDs is exceedingly problematic because, in contrast to the Vietnam experience, where most fatal injuries were due to abdominal wounds and thus readily recognized if not always successfully treated, many of the

OEF/OIF troops killed or injured present with no external signs of injury (Glasser, 2006). This makes diagnosis without specialized testing or sophisticated imaging technology difficult. Additionally, as we shall demonstrate later, traumatic brain injuries, which range from mild (concussions, which are essentially bruises to the brain) to severe and life-threatening, are exceedingly variable and unpredictable in their course; though mild brain injuries often resolve without significant problems—about 70% of people with post-concussive symptoms in general (non-military) populations no longer suffer from symptoms after 3-6 months, while 85% are symptom-free at one year (Minnesota National Guard, n.d.)—in some cases the long-term consequences even of seemingly innocuous head injuries may be serious. Moreover, blast injuries may result in changes in brain function that are not paralleled by head injuries in civilian life and are only beginning to be understood (McKhann, 2007). Initial research is rather ominous, however; notes Maria Mouratidis, head of brain injury treatment at the National Naval Medical Center in Bethesda, Maryland (Zaroya, 2007), “we’ve had patients who have been in a blast, who we tested. They looked OK. And they came back later, and they were not OK.”

A Primer on Traumatic Brain Injuries Among OEF/OIF troops; the Causes, Scope, and Nature of the Problem.

The physics of blast injuries are relatively straightforward. According to Glasser (2006), "the detonation of any powerful explosive device generates a blast wave of high pressure that spreads out from the point of explosion. The blast wave, whether out in the open or confined in a closed space, consists of an initial shock wave of very high pressure followed closely by what is called a 'secondary wind,' the result of the huge volume of displaced air flooding back into the area of the low pressure generated behind the wake of the original blast front. It is the sudden and extreme differences in pressure, particularly that caused by the initial shock wave, that leads to organ damage. Military physicians have learned that significant blast injuries should be suspected in any soldier exposed to a blast, whatever the distance from the explosion."

Blasts from IEDs and similar devices produce a wave front moving at 1,600 feet per second with a pressure gradient more than 1,000 times that of atmospheric pressure. Eardrums can be blown out from as little as a 5-pounds-per-square-inch rise above atmospheric pressure; exposure to a rapid pressure increase of less than 25 pounds per square inch can dislocate the bones of the middle ear, leading to permanent hearing loss. The lungs are also very susceptible to pressure damage and sustain injuries including rupture and bleeding; hemorrhages into solid organs such as liver, spleen and kidneys have been reported as effects of explosions, the frequency of such injuries increasing dramatically with proximity to the explosive charge. Pressure injuries (barotraumas) to the eyes include rupture of the eyeball itself, corneal lacerations, and traumatic cataracts as well as optic nerve damage.

However, with the advent of IEDs, the brain itself has become far and away the most vulnerable part of the body. No helmet so far devised can absorb the force of such an explosion; in fact, during a blast the weight of the helmet often adds insult to injury. As one Army combat engineer noted: “It’s like a pan on your head, held by shoestring webbing. When you take a hit, it rings your head like a bell” (Glasser, 2006).

Head injuries from blast injuries have proved to be the most problematic, the most disabling, and the most difficult to diagnose and treat of all the conditions affecting our returning veterans and Guardsmen.

The deployment, on a wide-scale, of IEDs against OEF/OIF troops marks the U.S. military’s “entering into an area of warfare that’s completely different” from anything seen in previous conflicts. A recent article in the Washington Post, citing Pentagon sources, notes (Atkinson, 2007): “The costly and frustrating struggle against a weapon barely on the horizon of military planners before the war in Iraq provides a unique lens for examining what some Pentagon officials now call the Long War, and for understanding how the easy victory of 2003 became the morass of 2007.” A study by the prestigious National Academy of Sciences cited in the same article concluded that “insurgents have shown a cycle of adaptation that is short relative to the ability of U.S. forces to develop and field IED countermeasures.” Indeed, though $10 billion has been spent in the past four years by the Defense Department’s main IED-fighting agency, with an additional $4.5 billion already budgeted for fiscal 2008, the IED remains and will likely remain for the foreseeable future “the single most effective weapon against our deployed forces,” as the Pentagon itself acknowledged earlier this year.

The devastating effectiveness of these weapons is illustrated in the sheer magnitude of the TBI problem among our returning OEF/OIF troops. (For more information and references, see “blast injury” on the Defense and Veterans Brain Injury Center website.) In July 2005, it was estimated that at Walter Reed Army Medical Center two-thirds of all troops wounded in Iraq and not immediately returned to active duty suffer from traumatic brain injuries (TBI). Further, blast injuries affect more widespread parts of the brain than the typical shell fragment injury. Moreover, the damage produced is exceedingly variable and unpredictable. Even mild TBI can increase the risk of incomplete troop readiness and lead to chronic unemployment, substance abuse, and suicide (NIH, 1998). In addition, though sometimes the symptoms are classic and immediately apparent (e.g., seizures, headaches, sleep disorders, impaired memory, problems with attention and concentration), often the initial symptoms are subtle and may be missed by patients, family members and doctors. Certain types of brain injury lead to a form of anosognosia (lack of awareness) of one’s own disability or disabled body parts (Lezak, Howeieson, Loring, 2004). This complicates the use of self-disclosure questionnaires which have been the standard of documentation in the diagnosis and monitoring of Post-traumatic stress disorder (Westermeyer, 2006) for TBI. Also, TBI often overlaps with PTSD, and it is often masked by it (Horton and Barrett, 1991). Many symptoms actually due to TBI—including memory loss, short attention spans, muddled reasoning, confusion, anxiety, depression, and irritability--may be mistaken for psychological difficulties including as PTSD, or just to problems with readjusting to civilian life. This produces the likelihood of misdiagnosis and attempted intervention through inappropriate kinds of treatment, since treatment for TBI is not the same as for PTSD.

Moreover, TBI and PTSD may coexist, especially in those with mild to moderate head injuries (there is evidence to suggest that severe head injuries are incompatible with the sympathetic arousal, flashbacks, and intrusive memories of PTSD). Other common problems include depression, delusional disorders, and personality disturbances, which may appear soon after the injury or be delayed in onset and often turn out to be extremely protracted in their course and resistant to treatment (Koponen, Taiminen et. al., 2002). Contrary to expectation, patients with only mild to moderate traumatic brain injuries are actually much more affected by their emotional difficulties than by their residual physical disabilities (Glasser, 2007).

Another difficulty is that these are not static but evolving conditions. A patient with mild or no symptoms at the time of discharge from military service may go on to develop serious problems later on. It is important to note that patients who have sustained one head injury have at least a 4x increased risk of sustaining subsequent head injuries (CDC, 2001). One can predict, therefore, that returning OEF/OIF troops who have sustained such injuries in military settings will remain at significantly increased risk of re-injury, and since multiple concussions have a cumulative effect, a veteran or Guardsman who is initially well-adjusted may become chronically or severely impaired after even a mild subsequent injury. In an ideal world, histories of concussion or traumatic brain injuries would be obtained even before enlistment, since prior history of head injury might result in better recognition of subtle cognitive, emotional, or other deficits that may affect a troop's preparedness and also alert medical personnel to those at greater risk of impairment from subsequent service-related injuries. Unfortunately, there are no good data to evaluate the prevalence of premorbid histories of concussion in troops;

nevertheless, some idea of this prevalence may be gleaned from a recent study of high school and college athletes which showed that 53% had a lifetime history of at least one prior concussion (Field et. al., 2003). Probably among enlisted troops the incidence is even higher, given that a disproportionate number of them come from rural areas where rates of traumatic brain injury are higher than in metropolitan areas (Kane, 2005).

Substance abuse disorders are a depressingly common and refractory complication of those with head injuries, and the toxic effects of alcohol are particularly devastating for those with head injuries. Moreover, among populations suffering from a combination of mental illness and chemical dependency issues the incidence of TBI is exceedingly high. Little information is available on these populations, though one of the authors has noted that in a population of patients with both mental illness and substance abuse in a State Operated Services facility in Willmar, which included some returned OEF/OIF troops diverted from the V.A. into the state system through the commitment process, that the incidence of TBI among men was 70% (Sheehan, 2007a). The incidence of TBI is also extremely high in corrections populations; in a so far unique survey of 800 incoming inmates conducted by the Minnesota Department of Health and the Department of Corrections in the summer, 83% of inmates were found to have had a serious TBI (Keith Oatley, Minnesota Department of Corrections, unpublished data). A number of studies have demonstrated the very high incidence of traumatic brain injuries among homeless populations (Hwang, Colentino et. al., 2007), with former military personnel consistently making up a quarter or more of all homeless persons. Given all these demographics, it is safe to say that many of our brain-damaged veterans and Guardsmen are likely to drift into these marginal groups and so receive their services not through V.A. Hospitals or

civilian health care service providers but through state-operated chemical dependency programs, prisons and jails, and homeless shelters. It is anticipated that there will be a need for residential and rehabilitation facilities to meet the needs of these ex-servicemen to prevent them from falling into such desperate straits.

Another important consideration is that TBI has been shown consistently to produce subtle pathological changes in brain tissue predisposing to early-onset dementia; a large number of studies have shown that it doubles the risk of Alzheimer's disease. (Sheehan, Thurber, and Meller, 2006; Geddes, Vowles et. al, 1999; Mehta, Ott et. al., 1999, Goittlieb, 2000, Lye and Shores, 2000, Plassman, Havlik et. al., 2002). This also has significant implications for the long-term needs likely to be encountered by TBI-injured veterans entering the health care system.

Psychiatric complications (other than PTSD and addictions) of TBI.

Because the brain is complex, every brain injury is unique. As noted earlier, some symptoms may appear right away. Others may not show up for days, weeks, or even years. As earlier noted, sometimes the injury makes it hard for those affected to recognize or admit they are having problems. Because the signs and symptoms of traumatic brain injury can be subtle (especially in mild cases or in those not affecting speech and language areas) problems may not be immediately apparent and may go unrecognized by patients, family members, and doctors.

It is important to recognize that such subtle signs and symptoms easily evade field commanders faced with difficult decisions about whether to air-vac injured personnel, when to take more conservative measures, and when to send apparently undamaged (but actually impaired) soldiers back into action. (Lacking objective means of documenting these injuries, the tendency will be to send the soldier back into action, all other things being equal.) Cognitive and neurological complications identified with standard behavioral assessments may not be immediately apparent after injury and may develop and evolve over time; thus failure to assess these personnel, or to do so without adequate information, may place them at risk for more serious re-injury. Needless to say, misdiagnosis may place other service personnel or civilians at risk.

After a traumatic brain injury, it is common for workplace performance to be disrupted, personal and professional relationships to deteriorate, and marriages to fail. It is, moreover, rarely appreciated that novel psychiatric disorders are exceedingly common following TBI. If the underlying brain injury is not recognized, the veteran or Guardsman may be inappropriately diverted into mental health (or addiction recovery)

services which fail to take into account the TBI. Apart from PTSD, the following are other common psychiatric complications of TBI:

High rates of mood, psychotic, and substance abuse disorders following TBI. This has been documented in both hospitalized and tertiary-care referral populations. (It is surmised that many veterans even of earlier conflicts may exhibit disturbed behavior not because of PTSD or "shell shock" as generally surmised but because of unrecognized TBI.)

A study in the American Journal of Psychiatry based on a survey of subjects in an adult health maintenance organization showed that among subjects with moderate to severe TBI, 49% had evidence of psychiatric illness in the year following the brain injury, compared with 34% in those with mild TBI. These rates were two to three times higher than in patients without TBI (18%). (Fann, Katin et. al., 1995). One of the authors of the present report surveyed patients admitted to a general psychiatric unit at a city-owned hospital in Willmar, Minnesota, over a two year period, and found the incidence of TBI among these patients was at least 3x that of the general population (Sheehan, 2006).

Yet another study in which patients with TBI were followed up on average 30 years after TBI showed that TBI can cause decades-long vulnerability to psychiatric illness in some individuals. According to this study, TBI makes patients particularly susceptible to depressive episodes, delusional disorders, and personality disturbances (Koponen, Taiminen et. al., 2002), any or all of which may be mistaken as primary psychiatric illnesses rather than secondary to the TBI. The right kinds of imaging studies may help to clarify the contribution of TBI to these disorders. The high rates of psychiatric disorders found in this study also emphasizes the importance of psychiatric follow-up

after traumatic brain injury. However, psychiatric follow-up is in short supply, especially in rural areas. We shall return to this point later.

The presence of a left anterior lesion (i.e., left dorsolateral frontal and/or left basal ganglia lesions) has proved to be by far the strongest correlate of major depression (Federoff, Starkstein et. al., 1992). Previous studies have shown that about 6% of TBI patients go on to develop psychotic disorders. A majority of these show abnormalities in the frontal and temporal abnormalities (Fujii and Ahmed, 2002).

In addition, TBI has been associated with acquired sociopathy (associated with injury to the prefrontal cortex, the "social brain") due probably to dysfunction in the neural circuitry of emotion regulation (Davidson, Putnam et. al., 2000). This type of injury is associated with increased risk of violence.

Though behavioral neurological assessments have long been regarded as the gold standard for documenting the cognitive and functional impairments of TBI patients (Sheehan, Thurber, and Meller, 2007), they are time-consuming, expensive, and not readily available owing to an extreme shortage of personnel trained to administer them. On the other hand, functional brain imaging studies represent a greatly underutilized but promising alternative approach to appreciating the deficits of these patients. However, they are almost never done.

Imaging Studies in TBI.

A number of studies have evaluated the relative effectiveness of imaging techniques for diagnosis of TBI. (We will not comment on those that are only being used for research purposes at present, such as fMRI, PET, MEG, NIRS, and others, which are expensive, experimental, and only available at large academic or tertiary-care facilities.) For our purposes we consider only those that have clinical implications for general populations, with a special emphasis on those that are readily available even in many rural settings. These are, at present: Computed Tomography (CT), Magnetic Resonance Imaging (MRI), and Single Photon Emission Computed Tomography (SPECT).

The requirement that the technology be available and accessible even in rural areas is a reflection of the fact that, by a margin of greater than 2:1 (Kane, 2006), rural enlistments exceed metropolitan enlistments. Also, the incidence of TBI is generally significantly higher in rural than in urban areas. (Parenthetically, the counties in Minnesota with the highest rates of TBI are Clearwater (25.2/100,000), Carleton (25.1), Hubbard (24.4), Kanabec (24.4), Roseau (23.5). Among counties centered on Willmar, which is proposed for a Minnesota Veterans Home/neurospychiatric center, Renville has a TBI rate of 20.4, Lyon 18.3, Lac qui Parle 16.5, **Kandiyohi 15.6**, Yellow Medicine 15.3, Swift 15.2. All of these are significantly higher than those found in the metropolitan area, where Hennepin stands at 11.8 and Ramsey at 10.9. Source: CDC, 2001.) It follows that though most of the specialized resources for dealing with TBI are currently in metropolitan areas (e.g., the Twin Cities and St. Cloud, which are home to the two V.A. Hospitals), the veterans and Guardsmen themselves are located disproportionately in outstate areas. Though the Minneapolis V.A. and St. Cloud V.A. do offer state-of-the-art care and the

V.A. system generally consistently receive higher marks on satisfaction surveys that are the envy of Medicare and Medicaid or private health insurance (University of Michigan, American Consumer Satisfaction Index, 2007), an effective response to the needs of veterans and Guardsmen is unlikely to be satisfied through such centralized facilities alone, however excellent they may be. Instead, some kind of effective, flexible, and yet highly sophisticated clinical component, with advanced diagnostic capability and treatment expertise, with outreach into rural areas, would be optimal to meet the needs of the veterans and Guardsmen in their own preferred habitat. The practical challenge to this concept is that, as we shall demonstrate, the infrastructure for addressing these complex issues in rural areas is, with few exceptions, embryonic or even non-existent.

Returning to imaging technology, at this time the standard practice paradigm is to deploy CT and MRI almost exclusively—in both metropolitan and rural settings--to evaluate traumatic brain injury. The advantage of these modalities is that they provide excellent anatomical detail. However, they do not provide information about brain function.

An advantage of SPECT—which requires a radioisotope-labeled infusion of glucose—is that allows visualization of perfusion in the brain, which is directly related to "function," both regionally and globally. Brain SPECT is similar to perfusion scans done to visualize cardiac function or to recognize increased metabolic activity of tumors in cancer patients. A number of studies have shown that SPECT is significantly more sensitive than CT or MRI in detecting abnormalities of function after TBI. It is able to visualize lesions that are not seen on static neuroimaging studies and can detect abnormalities at an earlier stage after acute TBI than either CT or MRI (Abdel-Dayem,

Sadek et. al., 1987; Abdel-Dayem, Madeu et. al., 1994; Bauliu, Fournier et. al 2001; American College of Radiology, 2002; European Association of Nuclear Medicine, 2002; Anderson, Taber, and Hurley, 2005). It appears to be particularly sensitive to lesions associated with mild TBI which are often missed using CT or MRI (Gray, Ichise, Chung et. al., 1992; Kant, Smith-Seemiller and Isaac et. al., 1997). **{See figure below; reproduced from Anderson, Taber, Hurley, 2005}** Moreover, the limited work that has been done at this time suggests that a normal SPECT scan after TBI is predictive of a good outcome (Abdel-Dayem, Sadek et. al., 1987; Oder, Goldenberg, et. al., 1992; Jacobs, Put et. al., 1994).

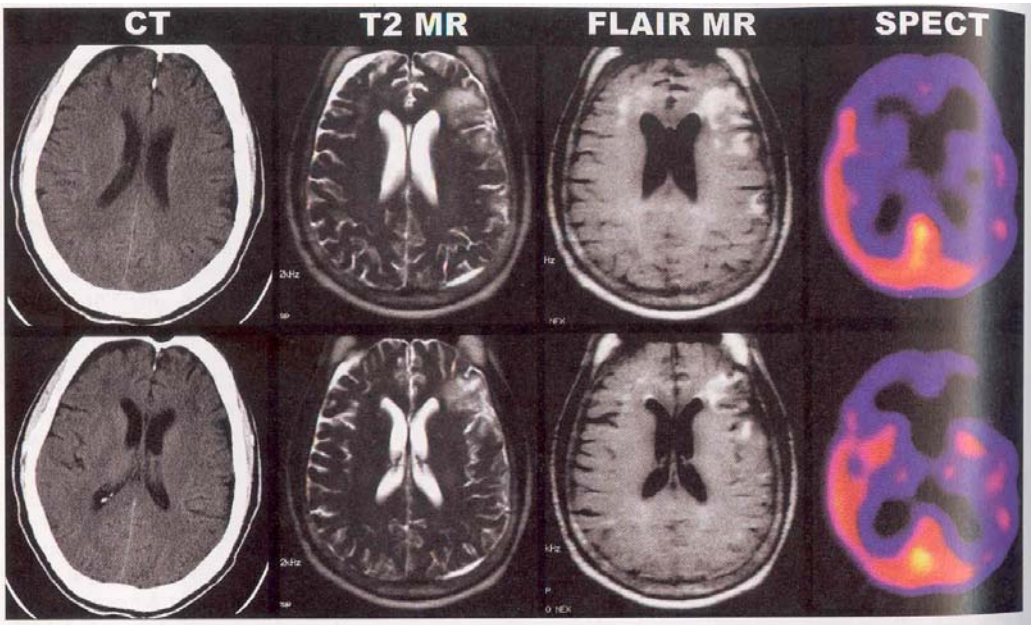

FIGURE 6–5. Early subacute presentation of traumatic brain injury on SPECT.
A 61-year-old man had a single-motor-vehicle collision with a tree. This resulted in severe trauma with loss of consciousness requiring neurosurgical interventions. After several weeks of hospitalization, the patient was released. Within a few days, the patient's family brought him to a psychiatric emergency service with agitation, incoherence, cognitive impairment, and psychosis. Two different sectional levels in the brain are illustrated with companion axial CT, T2-weighted MR, FLAIR MR, and SPECT. Note that the injury is more apparent on the FLAIR images than on the T2-weighted MR and CT images. The true extent of the injury, however, can be appreciated only on the SPECT images. FLAIR=fluid attenuated inversion recovery.

One of the few studies comparing SPECT to neuropsychological test results suggested that SPECT may provide an even more sensitive measure of brain injury than neuropsychological testing, since test findings predicted the presence or absence of regional cerebral blood flow abnormalities on SPECT but SPECT findings did not predict test performance (Umile, Plotkin, et. al., 1998).

It follows that SPECT—which is available in most regional medical centers and in many rural centers serviced by mobile units, but usually used exclusively for cardiology or oncology indications —may be woefully underutilized for assessment of TBI. It is likely that perfusion deficits would be found among many brain-damaged troops and that visualizing these conditions, whenever possible, would greatly assist the better management of their disorders. On the other hand, damage due to blasts may be at a level so microscopic that it cannot be found on some imaging tests (Zaroya, 2007). It is also likely that blast injuries may aggravate brain injuries from previous TBI. Obviously, we still have a great deal to learn, but we cannot wait for all the research to come in because we are charged with meeting—to the best of our ability—the needs of our troops returning home now.

Surveys Conducted for the Minnesota Department of Veterans Affairs

The Department of Veterans Affairs commissioned us to carry out a needs survey of returning OEF/OIF troops in the state of Minnesota, with specific reference to TBI and PTSD, of the services currently available to meet their needs, and to provide information and recommendations to the Department of Veterans Affairs and to the Adjutant General of the National Guard as the basis of a report to the Legislature and the Governor.

The present study was conducted between October 1 and October 18, 2007. In responding to the RFP, we had proposed as an essential first step identifying, establishing the whereabouts, and surveying the scope of the needs of veterans and Guardsmen in the state. We were encouraged to work with the Department of Veterans Affairs and the Adjutant General of the Minnesota National Guard to test a small number of veterans and Guardsmen willing to participate in an initial voluntary randomized survey and determined that the number of veterans needed for enrollment in this study would be about 100, if they were randomly identified, which was the number needed to achieve statistical significance. The test instruments to be used were to be clinically validated, able to be completed in a reasonable period of time (an hour at most), but sensitive enough to allow detection of cognitive impairments associated with TBI, co-morbid conditions, and other impairments, risk factors, and vulnerabilities.

Unfortunately, even with the assistance of the Department of Veterans Affairs, we were not able to complete this part of the study. Returning OEF/OIF troops were simply not accessible to us, at least within the time-frame of the study. As we do not, therefore, have systematic data on the condition and needs of returning OEF/OIF troops relative to

PTSD and TBI at this time, we have included in Appendix I protocols developed for this phase of the study with the hope that they may be implemented during a future funding cycle. Obviously such a survey will be essential to identify current needs and establish a baseline of the returning troops' functioning for future monitoring of data will be essential to rational development of services to meet these needs.

Our second priority was to establish parameters for services available state-wide to meet the needs of returning troops with PTSD and TBI. This aspect of the study was completed and included:

1.) Since we were unable to study veterans and Guardsmen, we surveyed veterans' service reps across the state and questioned them about the kinds of problems they were seeing among returning OEF/OIF troops and the availability and satisfaction with services.

2.) We conducted a survey of expert psychologists in Minnesota, individuals who are certified clinical specialists (board certified by the American Board of Professional Psychology) to determine whether they worked with veterans and if so what kinds of problems they were seeing.

3.) We carried out a survey of resources (randomized across the state) including hospitals, community mental health centers, and veterans' service reps to establish the quality and accessibility of current resources for veterans with PTSD and TBI. It was felt to be especially important to determine the availability of resources in rural areas, given the disproportionate representation of veterans in these areas and the proposed situation of a Veterans Home in Kandiyohi County.

4.) We then did a follow-up study of the same facilities contacted above and asked a series of simulated patient questions to determine how easy it was for veterans or their families to obtain information, referrals, or access to services at these facilities.

Veterans Service Representatives Survey:

Fifty one veterans service reps responded, which was more than half of all contacted and the highest rate of response (over 50%) of any group surveyed in our study. A third (17) saw few—either none or less than 10% of returning OEF/OIF troops—as having mental health concerns (TBI, PTSD, depression, anxiety, alcohol or other drug issues) at this time, and tended on the whole to be quite optimistic about their ability to access suitable local resources or specialized services in the VA system and were satisfied with the care offered, in the event it were needed. Of the remainder, 12 (23%) saw from 15 to 30% and 22 (43%) more than 30% of OIE/OIF troops as having mental health issues. Significantly, of these 11 (21%) saw over 50% of them as having mental health issues; one saw 95% of them as doing so. One veterans service rep noted that there seemed to be significant differences between Guardsmen (50%) and regular troops (10%).

Most of the veterans' service reps were unrealistically optimistic about how soon the veterans would be able to get in to be seen. Many said "immediate assistance" or a week or less. This optimism was misplaced, in that our survey of the providers showed long delays—or no specialized services at all.

Some of the veterans' service reps' specific comments (all were anonymous) are of interest. A common refrain was the geographical distance needed to access VA

facilities. One noted that the closest VA was in St. Cloud, “but that is so far to drive and most of them are working so it is hard for them to get off work to go to an appointment.” Another said: “All local resources are private, VAMC Fargo is 2 ½ hours away.” And yet another: “Local VA resources are not dependable.”

Some of the veterans’ service reps noted what also emerged from the responses from providers: the fact that the VA existed as a parallel system, and that the general health care system was completely unequipped to meet the needs of OIE/OIF troops. Many reported that the general health care system did not have the people or expertise to deal with the troops’ needs (one can imagine how the health care system would fare if veterans had to go to the VA system for emergency cardiac care, for instance). One service provider admitted: “We hardly deal with them at all. If a man with a service history was referred to us, it would be no different were he a postman or a painter. There is no specialist service.”

Additional comments from veterans’ service reps:

“Too many individuals and organizations trying to be *the* source of assistance to recent veterans, many with little or no experience dealing with the issues faced by service men and women.”

“We could use a male local mental health provider. We have one good female therapist but some guys feel more comfortable talking to a male.”

“Each individual is going to handle the stress and/or transition to civilian life differently. If there is any mention of suicidal tendencies I have confidence in the VA. The reluctance of the individual to accept help is usually the problem. Alcohol

accelerates the mental health concern and things are done or said without a sound mind complicating things."

"The disconnect between the mental health unit at VAMC and the psychologists who perform the C&P exams is almost criminal. I encourage all of my clients to get into the mental health unit for an evaluation during the claims process. This helps the veterans to get a proper diagnosis so they may dispute the horrible evals the C&P examiners do."

"I think we could do a better job at unifying medical and mental health services and get a base of where they are at physically and mentally. They will feel more in the system by us outreaching and opening our doors instead of waiting for them to come to us. More local and primary specialty care in rural areas."

"We have an accessibility problem..."

"We are supposed to have a psychiatrist coming... but as yet, none has been hired."

"We live 100 miles from nowhere. We have three mental health facilities here... but none is contracted with the VA and none have any real experience with veterans' issues. I feel my only option is to call the mental health department at one of the VA hospitals, but Sioux Falls is a 2 hour drive and Minneapolis is a 3 hour drive."

"The VAMC will need to increase their Mental Health Unit capabilities to meet the ever increasing needs of our recently returned veterans."

"I see them having a lot of anxiety, depression and alcohol and other substance abuse problems. I have seen a lot with sleep disturbances... The more local help the better as they don't want to miss work or can't miss work."

"Specialty care is in short supply."

"Some VA/DOD mental health is supposed to be coming soon, but not soon enough."

"The local VA outpatient clinic has high turnover of personnel... I have had major complaints of quality of service and lack of follow up care."

"It is hard for them to take time off work.... They are trying to hold down a job and driving 85 miles one way for an appointment takes a whole day."

"Veterans have not been comfortable returning to VAMC-Fargo Mental Health after receiving care there. They are more comfortable staying in their local community receiving services where they feel as though they are treated with more compassion and understanding."

"Takes St. Cloud a very long time sometimes to return a call to make an appointment for a Veteran in need of in-take evaluation."

"We have not yet been fully informed as to the level, type and quality of services which are to be available for mental health (per Gov. Pawlenty's announcement) at local National Guard Unites.

"The psychiatrists in VA Mental Health Clinics need to have to relate to our soldiers based on our culture not the culture of a foreign country."

"I think we are directing the veterans in Minnesota to the best help available."

Experts Survey:

Survey materials were sent to Minnesota psychologists with board certification through the American Board of Professional Psychology. Board certification represents the highest level of clinical competence that can be attained. Individuals certified in Clinical Psychology, Rehabilitation Psychology, Clinical Neuropsychology, and Counseling Psychology wer surved. There were 11 respondants. Of these 4, or 36%, had some involvement, and 2 (18%) significant involvement with returning veterans. The most frequent diagnoses of veterans were (in order of endorsed frequency): Substance abuse; posttraumatic stress disorder, and depression. The clinical problems encountered were:

Frequently observed:

- Marital or relationship problems (50%)
- Sleep problems (50%)

Sometimes observed:

- Problems in decision-making (83%)
- Concentration difficulties (83%)
- Anger problems (67%)
- Loss of sexual interest or pleasure (67%)
- Occupational Difficulties (67%)
- Memory impairment (50%)
- Pain (50%)
- Reduction in processing speed (50%)
- Obsessions and compulsions (50%)
- Hopelessness (50%)
- Chemical usage (50%)

Providers Survey:

The survey of providers broke down as follows. There were 45 responders. This included 80% of facilities that were general hospitals, 7% that were psychiatric hospitals, and 13% community mental health centers. Only one (2%) urban or suburban facility agreed to respond to the survey, 10 (22%) were facilities located in small cities or towns within an hour of a metro location, and 32 (71%) were rural and 2 (4%) extreme rural or remote.

Among general hospitals, 7 of 42 (17%) had separate psychiatric services; of those, 6 of the 7 (86%) were public facilities and 1 (14%) private. 37 of 41 (90%) provided 24-hour care, 35 (85%) provided outpatient care. The conditions for which treatments were offered were as follows:

▪ Depression	20/34	59%
▪ Treatment of anxiety disorders including PTSD	18/34	53%
▪ Diagnosis of Traumatic Brain Injury	8/33	24%
▪ Treatment of chemical dependency	8/35	23%

In terms of specialized services, 7/31 (23%) offered neuropsychological services, 2/31 (6.5%) offered structural neuroimaging (CT or MRI), but only 1/33 (3%) offered functional neuroimaging.

The follow-up questions about accessing services showed a range of responses, from very helpful and friendly (though often with multiple transfers within hospital and long delays) to evasive, unhelpful, or downright rude. In general, this part of the survey indicated that veterans attempting to get help would most likely either be referred to the VA system (or elsewhere), told to access services through the

Emergency Room, or simply informed that services for their conditions were not available. No facility surveyed demonstrated a well-integrated multi-specialty program that could address veterans' needs in a unified and comprehensive fashion. Some programs offered brain trauma services but limited help with rehab or mental health; some offered neurologists or psychiatrists or internists or family physicians but only one offered a psychiatrist that was also specialized in traumatic brain injury. In most cases, neurologists, internists or family physicians used structural imaging studies to document brain trauma while psychiatrists—usually weeks or months out for appointments—did med management for psychiatric disorders exclusively.

In addition to quantitative information obtained, one of the phone interviewers made the following rather sobering comment: "Some calls I made were very difficult and persistence was necessary, and even then it was sometimes futile. Veterans and their families should not be put on hold 4-5 times to find out information about a facility."

Furthermore: "Very few receptionists or the first person to answer the phone knew very much about their facility, e.g., do you do tests, is there a psychiatrist? I didn't expect them to know how long it would take to get an appointment, but some general knowledge of the facility would be helpful to callers."

She stated that several facilities would not respond—even with repeated calls and talking to several people. These included, perhaps surprisingly, some of the larger and more prestigious facilities including—most interesting--the VA Medical Center in Minneapolis!

Conclusion:

The current system is very haphazard and patchwork for meeting needs of these veterans and Guardsmen, and in particular there are enormous obstacles—both logistical and institutional—to veterans seeking care in local, and especially rural, areas. Apart from the VA system, there is virtually nothing available to meet their service-related needs of brain-injured veterans.

Discussion of Survey Findings

Sadly, at present we can anticipate that traumatic brain injuries caused by blasts will remain the signature wound of veterans and Guardsmen returning from Iraq and Afghanistan for the far foreseeable future. It also follows—given the variable course and delayed effects of these injuries—that the military and civilian health care systems will bear enormous burdens in attempting to properly care for the tens of thousands who have already sustained brain injuries in Iraq and Afghanistan. Given that traumatic brain injury has been called the "silent epidemic" and that the effects thereof may not be immediately apparent, it will require the commitment of vast resources--and incredible resourcefulness and will—to create a resilient, flexible, and responsive system for identifying and caring effectively for the complex and evolving problems of brain-injured veterans, if possible in the areas where they live. This system must be designed to help them rehabilitate, to return as far as possible to productive and fulfilling lives, and to keep them from tragically drifting into broken relationships, chronic unemployment and dependence, addictions, mental institutions, nursing homes, prisons, and homeless shelters. We do owe it to them to attempt insofar as humanly possible to follow the summons to duty of Lincoln's Second Inaugural, "to bind up the nation's wounds; to care for him who has borne the battle."

The devastating effects of IEDs was not anticipated when the wars began in Iraq and Afghanistan; neither was it expected that traumatic brain injury would become the signature wound of the troops serving there. As the military has struggled—and continues to struggle—to adapt to IEDs, the VA and civilian health services charged with caring for veterans have been caught rather flat-footed in dealing with TBI.

Unfortunately, traumatic brain injury is an area that has not—despite the prevalence of the condition among both military personnel and civilians—received attention or funding priority in the past. In part, this is because the brain has long been viewed—and continues to be viewed, in many quarters—as an inscrutable black box.

For that matter, many lay people, some in the press, and even a few clinicians don't fully understand the difference between TBI, which involves injury to the brain, and mental illness. Thus:

> traumatic brain injury is not a 'psychological concern.' It is a demonstrable injury to the organ of the brain. It may have manifestations of a psychological nature—cognitive deficits such as short-term memory difficulties and problems with attention—or even of a psychiatric nature, with mood disorders, personality changes, alcohol abuse and other addictions being common in the aftermath of TBI. However, the injury can often be demonstrated on certain types of brain scans, so it is real—organic—not just "in a person's mind." It is also important to emphasize that traumatic brain injury is not the same as post-traumatic stress disorder, though in some cases they may overlap. The causes as well as the treatments are different. (Sheehan, 2007b).
>
> In addressing TBI, we need to reach beyond existing disciplines—especially those that remain wedded to long-standing distinctions between the mind and body—and be as adaptable and innovative as we can be. In face of a new and evolving foe, a new paradigm is called for which offers a new and evolving response.

As the Department of Veterans' Affairs grapples with the formidable project of identifying and meeting the needs of returning veterans and Guardsmen, the following points, which are borne out by the results of our survey and are here presented in no particular order, may be helpful to keep in mind.

1. At this point, no roster or master list of veterans and Guardsmen, with contact information, exists.
2. Given the wide variation—complexity—and subtlety of the findings associated with traumatic brain injury as well its highly variable and unpredictable course, it would appear to be extremely desirable to do a systematic—randomized—survey of returning troops, as soon as possible after their return, using appropriate validated instruments, so as to objectively document their current (possibly subtle) impairments and to establish a clinical baseline for ongoing monitoring at intervals over their lifetimes. (For reasons discussed earlier, self report questionnaires are unlikely to be adequate.) Such a survey will be of great importance but at present the lack of contact information for veterans and Guardsmen makes it difficult. Some possible instruments for such a study are included in Appendix I. It is urged that they be considered for implementation during some future funding cycle.
3. A number of comments by Veterans' Service reps indicated taht veterans and Guardsmen preferred not to go to the VA Medical Centers in St. Cloud and Minneapolis for care. This is no reflection on the quality of care at those institutions but rather a result of the fact that a disproportionate number of servicemen live in rural areas. On the other hand, our study also confirmed that local—and especially rural—services for veterans returning with mental health

issues including TBI and PTSD are primitive or non-existent; the most common direction given to those seeking help was to present to the Emergency Room, and specialized services were unlikely to be available. The implication is that many of those with needs may not seek or receive services because of a reluctance or inability to access them, or they may receive inferior services—or no services at all--when they do.

4. The inability of rural areas to recruit specialists in mental health-- especially psychiatrists--is well known (remarkably, the highest per capita incidence of psychiatrists in Minnesota is in Edina). Efforts to provide services to veterans and Guardsmen in the rural settings are likely to flounder in the face of perennial problems with recruitment of professionals and especially psychiatrists to such areas. A number of service providers indicated that they were currently recruiting or unable to recruit psychiatrists, or that they were available only on a limited basis. Appointments at outpatient facilities were usually weeks to several months out.
5. In part because of the bureaucratic inertia of medicine, there is an unacceptable time lag (amounting in many cases to decades) between the introduction of promising new clinical initiatives being researched at academic or tertiary care settings (e.g., the Minneapolis VA and the University of Minnesota) and their adoption in the field. It is desirable to decrease the shelf time between the emergence of new technologies and their deployment in settings where they can help patients. This is especially true when it comes to complex—largely unexplored—areas such as TBI. It is especially important to foster rapid transfer of technology and expertise from metropolitan centers to rural areas which may be constitutionally conservative to

begin with. Figuratively speaking, we must devise ways of moving our expertise off-base, as it were—from large research, tertiary care, and specialized settings—into the field, which is after all where the troops are. As noted, functional imaging studies, in particular, are not being used.

Recommendations:

In light of these findings, the following tentative suggestions are respectfully offered to the Commissioner of the Department of Veterans Affairs, to the Adjutant General of the Minnesota National Guard, and through them to the members of the Minnesota State Legislature. We are making these suggestions specifically with reference to the possibility of locating some kind of Veterans' facility in Kandiyohi County, as called for by the RFP.

We will therefore not comment on the services and issues involving care through the Minneapolis VA Medical Center, the St. Cloud VA, or other facilities. Instead we will confine our comments to the best means for meeting the needs of veterans and Guardsmen in outstate Minnesota—in particular, those in west central Minnesota centered on Kandiyohi County.

Clearly, the challenge in meeting the needs of these veterans and Guardsmen is that of combining flexible resources, with geographical proximity to the veterans and Guardsmen, without sacrificing quality. As a pilot, a small, highly innovative and well-resourced clinic and rehab facility—not a nursing home along traditional lines—would be based in Kandiyohi County. In considering implementation of such a strategy, it is useful to consider the attempted redesign of mental health services by the state of Minnesota, which has downsized from large state institutions built largely at the end of the 19th and beginning of the 20th century to small, rurally based, acute-care units and community-based residential facilities. In many ways this has been a successful venture; the massive late Victorian and Edwardian institutions being replaced had long since outlived their initial purpose—they were unwieldy, inefficient, and costly to

maintain. As a result of this downsizing, some have been closed or (as in Willmar) are in the process of being closed, their campuses reconfigured for other uses (e.g., the MinnWest Technology campus). The philosophy behind this massively ambitious and not pain-free process has been eloquently summed up in a white paper prepared by Frank Schiefelbein for the incoming Pawlenty Administration (Schiefelbein, 2002). We quote from it here because of its relevance to the currently contemplated Minnesota Veterans' Home in Kandiyohi County:

> The reform of mental health services in Minnesota is long overdue. Mental health needs to be fully integrated with physical health in Minnesota. They are two sides of the same coin. The Cartesian dichotomy of mind/body is no longer justified philosophically or scientifically; it should no longer serve as the basis for the state's organization of services.
>
> The long-standing incorporation of mental health into the Department of Human Services (DHS) hearkens back to the era when mental illness was very poorly understood, when it was assumed that treatments would be completely or largely ineffective, when hopes of rehabilitation were poor, and where the main response was to provide shelter and other services to provide for the basic needs of the chronically and hopelessly disabled. Today, mental health treatment is as effective as cardiac care.
>
> DHS is basically welfare and long-term care. The department's historical roots have not been in health care but in residential facilities—and then too often on a massive and inflexible scale. Mental health—under DHS—is too encumbered to

allow for the major conceptual breakthrough needed to reenergize, refocus, and recommit the mental health system. It is haunted by too many ghosts.

What Minnesota needs is a fresh new mental health philosophy that is "smarter, faster, and cheaper."

These are all noble goals. The problems with their implementation have largely been related to the decision to place sixteen-bed acute care facilities in remote rural areas. The construction of such facilities has diverted tens of millions of dollars into bricks and mortar. The state has failed to engage community resources, such as community hospitals, in collaborative ventures, and so has replaced one "separate but equal" system with another. (In Willmar, discussions between State Operated Services and Rice Memorial Hospital, the regional center, continued for more than two years; they finally broke down when Rice, which has always lost money on mental health and has instead preferred to pursue high-reimbursement areas such as surgery specialties, pulled out, ostensibly for financial reasons.) The Cartesian separation of services mentioned in the white paper quoted above thus remains large and well; thus, in Willmar, Rice Hospital continues to operate its own small inpatient unit, while the major multi-specialty medical center (Affiliated Medical Centers) has not had a psychiatrist on its medical staff for years (can't make a go of it financially, they claim). The Community Behavioral Health Unit will, when completed, be self-contained and isolated. The duplication of services has put increased pressure on all for specialists already in short supply—thus, the Community Behavioral Health Units in Willmar and even more so in other locations, such as Cold Spring, have had difficulty recruiting psychiatrists. A number of those recruited are well into retirement age—some are pushing 80. We mention these problems

because, obviously, similar problems would likely arise if a Veterans' Facility were created in Kandiyohi County with a stodgy, backward-looking, or unimaginative vision (e.g., a psychiatric "clinic" or a Nursing Home, both of which would either fail or push other services occupying similar niches in the community—like the Community Mental Health Center, Rice Hospital inpatient unit, or nursing homes and residential facilities--into failure). TBI is a new problem; it is not PTSD—it is not mental illness—it is not dementia. One cannot put new wine in old bottles; neither should we try to devise a facility for TBI with models that were developed for other needs.

Parenthetically it should be noted that Kandiyohi County, despite serving for a century as a host of the (now defunct) Willmar Regional Treatment Center, has not always been particularly receptive to mental health. Not only did Rice Hospital opt out of partnering with the state on its sixteen-bed unit but community opposition to the facility was intense; no fewer than three different locations were considered before the state chose the one where ground has broken at this time—even that occurred over community opposition. This community is agricultural, conservative and, in general, shares the attitudes that such communities do about the mentally ill. That having been said, the community is also patriotic in equal measure. Support of the troops in this area is probably second to none in the state, and the outpouring of support for the families of two troops from Willmar who were killed in Iraq was heartwarming. It follows that a facility devoted to meeting the needs of troops—and particularly those with traumatic brain injury—would almost certainly receive enthusiastic community support such as has not been forthcoming for other populations with similar issues.

Given that level of community support—and the community's strategic location in a rural area that nevertheless is within reasonable distance (two hours) of the Twin Cities metropolitan area and an hour from St. Cloud—the opportunity indeed exists for a unique demonstration project that would go far beyond traditional facilities such as Nursing Homes, domiciliaries, and rural outreach clinics and provide a regional center for research and integrated clinical services related to TBI and PTSD that could easily and quickly develop into a state-wide and indeed a national resource.

Here we are going to take literally Gov. Pawlenty's admonition on launching a special commission to address recurring care problems at the Minneapolis Veterans Home: "Be bold," he said (Mpls. Star Tribune, 2007). No one will be able to fault what follows for lack of boldness.

We believe that, in addition to needing the usual funding for bricks and mortar, a state-of-the-art facility/center of excellence would require an adequate budget for research, technology (such as SPECT, MRI and other imaging technology), a staff including psychiatrists and other physicians with a strong interest in TBI, neuropsychologists, clinical, counseling, and rehabilitation psychologists, rehabilitation therapists and others with an interest in reaching across disciplinary lines to create a truly innovative and evolving paradigm for meeting the complex needs of our brain-injured veterans and Guardsmen. The range of professionals would reflect the fact that, more than any other condition known to us, TBI crosses over Cartesian coordinates of health care that separate mind from body and rather demands broad cross-disciplinary collaboration: the brain is an organ, clearly of the body, yet it is also unarguably the basis of mind. The treatments devised for it must similarly be many-sided.

Such a facility would attract high-level professionals and experts to a rural area by combining intellectual and clinical challenges with the attractions of rural living and serving an admired and appreciated patient population. In this age of high-tech information transfer, it should be possible to partner with the University of Minnesota, the Minneapolis VA, and even national centers of excellence in a way that would overcome the formerly insuperable obstacles of geographical distance. (Professionals based in the center, if qualified, would be appointed to academic or clinical positions at the University of Minnesota as those at the Mpls. VA currently are.) On the other side, they could serve as a resource and referral center for rural facilities. Instead of duplicating other VA Medical Centers, like those at Mpls., St. Cloud, Fargo, or Sioux Falls, it would take a leading role in devising and supporting a service model to meet the needs of rural veterans without compromising quality of care. A well-funded research and clinical facility would compete for grants; it would attract innovators and highly energetic and qualified clinicians; it would encourage bio-technology development and the implementation of such technology that would complement Kandiyohi County's quest to increase its economic competitiveness. The facility envisaged would also include educational and outreach activities that would benefit surrounding rural areas where returning troops will be residing for here. Instead of a nursing home or long-term care facility, which hearkens to the institutional legacy of the past, a more flexible unit—that might include 40 or 50 beds and would include intense and active rehabilitation and treatment—would be attached or located in proximity to the clinical and research center of excellence. Veterans and Guardsmen from rural areas could come for as long as they needed—but probably typically from six weeks to 3 months—and receive the most

advanced care available in a congenial rural setting. The goal would be to return them to active and productive lives. There will, of course, be some veterans needing long-term care; but they would be housed and cared for elsewhere.

The serenity and natural beauty of woods and lakes should not be underestimated for its ability to soothe and heal. Kandiyohi County has those in abundance. Such an idyllic and picturesque setting would also support our vision that these Veterans and Guardsmen who have served us so well deserve nothing but the best.

This document was prepared by:

William Sheehan, M.D.

Board Certified in Adult Psychiatry by the American Board of Neurology and Psychiatry, William Sheehan, M.D. is recognized across the state of Minnesota as a leader in the area of traumatic brain injury. In 2007 received the prestigious biennial career-service award of the Minnesota Brain Injury Association. Among other activities, he has presented on his functional imaging work with traumatic brain injury to the Minneapolis VA Hospital (November 2006) and to the Neurosurgery Department of Hennepin County Medical Center (August 2007). In June 2007, he started an innovative TBI program at Swift County-Benson Hospital in Benson, Minnesota, the first program in rural Minnesota of its kind. He was previously employed as consulting psychiatrist to the MI/CD unit at Community Addiction Recovery Enterprise—Willmar; as a staff psychiatrist at Rice Memorial Hospital in Willmar; as a psychiatrist for PACT-4 families, a SAMHSA funded collaborative to improve the mental health system for children in a four-county area in West-Central Minnesota, between 2000 and 2004 (for which he received the organization's Distinguished Service Award). He spent 1999-2000 as a psychiatrist at Kensington Centre, in Timaru, New Zealand. Other professional positions held include: Head of Psychiatry—Department of Neurosciences, University of North Dakota; Medical Director, Woodland Centers, a community mental health center in Willmar, Minnesota; staff psychiatrist at Hutchinson Community Hospital. He received his M.D. degree at the University of Minnesota (in 1987), and his training in psychiatry

was completed at the Minneapolis VA Medical Center and at the University of Minnesota Hospital and Clinics.

Steven Thurber, Ph.D., LP, ABPP

Board Certified in Psychological Assessment by the American Board of Assessment Psychology (Section 9 Society of Clinical Psychology, American Psychological Association), for demonstrating competence in multivariate statistics, including structural equation modeling and factor analysis via published articles and comprehensive examination.

Contributing author to *Statistical Thinking* and *Learning to Think about Statistics*, both published by Prentice-Hall.

Multivariate statistician for Populus Marketing Research, Boise, Idaho; instructor in statistical analysis for medical students, University of California-San Francisco, 1990-1992 and Professor and instructor of introductory and advanced statistic courses at Boise State University, 15 years.

Recent peer-refereed publications by Drs. Sheehan and Thurber:

"Coarse Brain Disease" in G. Winokur and P. Clayton, editors, The Medical Basis of Psychiatry, 3rd ed.; in press.

"John Couch Adams's Asperger Syndrome and the British non-discovery of Neptune." Notes and Records of the Royal Society of London 2007, 61, 285-299.

"Autism Spectrum Conditions from a Piagetian Perspective: a case study." Psychology Journal 2007, 4(1):28-39.

"Psychosis or Temporal Lobotomy: SPECT findings in a paraplegic patient with chronic mental illness," Acta Psychiatrica Scandinavica 2006, 114:140-143.

"Dissociative Identity Disorder and Temporal Lobe Involvement: replication and a cautionary note," Australian and New Zealand Journal of Psychiatry 2006, 40(4):374-375.

"SPECT and neuropsychological measures of lithium toxicity," Australian and New Zealand Journal of Psychiatry 2006, 40(3):277.

"Severe cognitive deficits in a patient with lithium toxicity: a comparison of SPECT and neuropsychological findings." Psychiatry Online.

"Anorexia Nervosa: a suggestion for an altruistic paradigm from an evolutionary perspective." Psychiatry Online.

"Low Serum Cholesterol Levels, Depression, and Violence in Adolescents: a pilot study in rural Minnesota." Psychiatry Online.

Bibliography

Abdel-Dayem HM, Sadek SA, Kouris K et. al. (1987). Changes in cerebral perfusion after acute head injury: comparison of CT with TC-99m-HMPAO SPECT. Radiology, 165:221-226.

Abdel-Dayem HM, Masdeu J, O'Connell R et. al. (1994). Brain perfusion abnormalities following minor/moderate closed head injury: comparison between early and late imaging in two groups of patients. European Journal of Nuclear Medicine, 21:750.

American College of Radiology. (2002). ACR Practice Guideline for the Performance of Single-Photon Computed Tomography (SPECT) Brain Perfusion Imaging. ACT Practice Guideline, 19:487-491.

Anderson KE, Taber KH, and Hurley RA. (2005). Functional Imaging. In: Textbook of Traumatic Brain Injury, Jonathan M. Silver, Thomas W. McAllister, and Stuart C. Yudofsky, editors. Washington, D.C.: American Psychiatric Association, pp. 107-133.

Atkinson R. (2007). IEDs: the weapons that changed everything. Minneapolis Star-Tribune, October 7, 2007.

Baulieu F, Fournier P et. Al. (2001). Technitium-99m ECD Single Photon Emission Computed Tomography of Brain Trauma : comparison of early scintigraphic findings with long-term neuropsychological outcome. Journal of Neuroimaging, 11(2):112-120.

Basu S. (2006). Brain Injury Center Helps Troops Recover. U.S. Medicine, May 2006.

Centers for Disease Control. (2001). Traumatic Brain Injury in the U.S. A report to Congress.

Davidson RJ, Putnam KM, Larson CL. (2000). Dysfunction in the neural circuitry of emotional regulation—a possible prelude to violence. Science, 289:591-594.

Dyhouse T. (2006). VFW vehemently oppose slashing brain center budget. VFW Magazine, October 2006, p. 14.

European Association of Nuclear Medicine (2002). Procedure Guidelines for Brain Perfusion SPET using 99mTC-labelled radiopharmaceuticals. European Journal of Nuclear Medicine, 29(10):BP36-BP42.

Fann JR, Katon WJ, Uomoto JM, Esselman PC. (1995). Psychiatric disorders and functional disability in outpatients with traumatic brain injuries. American Journal of Psychiatry, 152:1493-1499.

Federoff JP, Starkstein SE, Forrester AW, Geisler FH, Jorge RE, Arndt SV, and Robinson RG. (1992). Depression in patients with acute traumatic brain injury. American Journal of Psychiatry, 149:918-923.

Field M, Collins MW, Lovell MR, and Maroon J. (2003). Does Age Play a Role in Recovery from Sports-related Concussion: A Comparison of High School and Collegiate Athletes. Journal of Pediatrics, 142:546-553.

Frommer, F. (2007).Coleman, Pawlenty want military to revise “hands off” policy. International Falls Daily Journal, July 25, 2007.

Fujii D, Ahmed I. Characteristics of psychotic disorder due to traumatic brain injury: an analysis of case studies in the literature. Journal of Clinical Neuroscience, 14:130-140.

Geddes JF, Vowels GH, Nicoll JA, and Revesz T. (1999). Neuronal cytoskeletal changes are an early consequence of repetitive head injury. Acta Neuropathologie, 98:171-178.

Glasser RJ. (2006). Wounded: Vietnam/Iraq. Minnesota Monthly, pp. 68-71.

Gottlieb S. (2000). Head injury doubles the risk of Alzheimer's disease. British Medical Journal, 321:1000.

Gray BG, Ichise M, Chung DG, Kirsh JC, and Franks W (1992). Technetium 99m-HMPAO SPECT in the evaluation of patients with a remote history of traumatic brain injury: a comparison with X-ray computed tomography. Journal of Nuclear Medicine, 33:52-58.

Horton AM and Barrett D (1991). Posttraumatic Stress Disorder masking head injury: a case report. Archives Clinical Neuropsychology, 6:195 (abstract).

Hwang, SW, Colantonio A, Chiu Set. al. (2007). Traumatic Brain Injury Among Homeless Persons. American Public Health Association (abstract).

Jacobs A, Put E, Ingels M et. al. (1994). Prospective evaluation of technetium-99m-HMPAO SPECT in mild and moderate traumatic brain injury. Journal of Nuclear Medicine, 35:942-947.

Kane T. (2005). Who Bears the Burden? Demographic Characteristics of U.S. Military Recruits Before and After 9/11. Heritage Foundation Center for Data Analysis Report No. 05-08, November 7, 2005, at *www.heritage.org/Research/NationalSecurity/upload/95512_1.pdf*

Kant R, Smith-Seemiller L, Isaac G, and Duffy J. (1997). Tc-HMPAO SPECT in persistent post-concussion syndrome after mild head injury: comparison with MRI/CT. Brain Injury, 11:115-124.

Kimerling R, Ouimette P, Prins A, Nisco P, Lawler C, Cronkite R, Moos R. (2006). Brief Report: Utility of a Short Screening Scale for DSM-IV PTSD in Primary Care. Journal of General Internal Medicine, 21:65-67.

Koponen S, Taiminen T, Portin R et. al. (2002). Axis I and Axis II Psychiatric Disorders after Traumatic Brain Injury: a 30-year follow-up study. American Journal of Psychiatry, 159:1315-1321.

Lezak MD, Howieson D, and Loring DW. (2004). Neuropsychological Assessment, 4th ed. Oxford: Oxford University Press, p. 288.

Lovell MR. (1999). Evaluation of the professional athlete. In: Bailes JE. Lovell MR, Maroon, JC, editors. Sports-related concussion. St. Louis (Mo): Quality Medical Publishing Inc., pp. 200-214.

Lye TC, Shores EA. (2000). Traumatic brain injury as a risk factor for Alzheimer's disease: a review. Neuropsychological Review, 10:115-1129.

McKhann G. (2007). Severe Brain Injuries Deserve Intense Study. Brain in the News, October 2007, p. 3.

Mehta KM, OttA, Kalmijn S, Slooter AJ, van Duijn CM, Hofinan A, Breteler MM. (1999). Head trauma and risk of dementia and Alzheimer's disease: the Rotterdam Study. Neurology, 53:1959-1962.

Minneapolis Star Tribune (2007). A 21st-century vision for care of veterans. Editorial, October 22, 2007.

Minnesota National Guard (n.d.). Traumatic Brain Injury and Post-Concussion Syndrome: an often overlooked problem in combat and mobilization. (Pamphlet).

National Institutes of Health. (1998). Rehabilitation of Persons with Traumatic Brain Injury. Consensus Statement 10/26-28/98; 16(1), 1-41.

Oder W, Goldenberg G, Spatt J et. al. (1992). Behavioural and psychological sequelae of severe closed head injury and regional cerebral blood flow: a SPECT study. Journal Neurology, Neurosurgery, and Psychiatry, 55:475-480.

Okie S. (2005). Traumatic brain injury in the war zone. New England Journal of Medicine, 353:1-5.

Plassman BA, Havlik BA, Steffens BAet. al. (2002). Documented head injury in early adulthod and risk of Alzheimer's disease and other dementias. Neurology, 55:1158-1166.

Schiefelbein F. (2002). Reconfiguring Mental Health in Minnesota: a possible blueprint for the incoming administration. Unpublished white paper.

Sheehan W. (2006). Two years of SPECT experience in an inpatient unit in rural Minnesota. Unpublished paper.

Sheehan W, Thurber S, and Meller W. (2006). Phenomenology of Coarse Brain Disease, in Clayton P and Winokur G, Textbook of Medical Psychiatry; in press.

Sheehan W and Thurber S. (2006). Low serum cholesterol levels, depression and violence in adolescents: a pilot study in rural Minnesota. Psychiatry Online.

Sheehan W. (2007a). Incidence of Traumatic Brain Injury on a unit for mentally ill/chemically dependent patients in rural Minnesota. Unpublished paper.

Sheehan W. (2007b). Brain injury not only in the “mind.” West Central Tribune, May 16, 20007.

Umile EM, Plotkin RC, and Sandel ME. (1998). Functional assessment of traumatic brain injury using SPECT and neuropsychological testing. Brain Injury, 12:577-594.

Westermeyer, Joseph (2006). Post-traumatic Life Charting in Traumatic Brain Injury: A Controlled Study.” Unpublished response to VHA R&D Combat Casualty Neurotrauma.

Zaroya G. (2005). Key Iraq War Wound: Brain Trauma. USA Today, March 3, 2005.

Appendix I

*TBI Clinical Reminder (a VA-generated instrument; see Vanderploeg, 2007)

*Repeatable Battery for the Assessment of Neurological Status (RBANS):

A. Subtests include immediate memory, visuo-spatial abilities, language, attention and delayed memory.

B. Standardized on individuals 20 to 89 years of age, with excellent psychometric characteristics (C. Randolph, RBANS Manual. San Antonio: Psychological Corporation, 1998)

*Trauma Symptoms Inventory (TSI). (J. Briere, Trauma Symptoms Inventory: Professional Manual Professional Manual. Odessa: Psychological Assessment Resources, 1995)

A. Administration time: 20 minutes

B. Self-report inventory of symptoms of PTSD

C. Normed on persons 18 years of age and older

D. Validity scales to assess response biases

E. Clinical scales include:

1. Anxiety

2. Depression

3. Anger

4. Intrusive experiences

5. Dissociation

6. Tension reduction behavior

*Wechsler Test of Adult Reading (WTAR), an estimate of premorbid intellectual functioning for participants demonstrating impairment on the RBANS.

In addition to these psychological assessments, Total Serum Cholesterol levels were to be obtained through local medical clinics. This data were seen as important owing to the well-established correlation between low serum cholesterol and aggression and violence (see Sheehan and Thurber, 2006 for a useful bibliography).