2013

Implications of Traumatic Brain Injury in the Military

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IMPLICATIONS OF TRAUMATIC BRAIN INJURY IN THE MILITARY

by

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B.A., Southern Illinois University, 2006

A Research Paper
Submitted in Partial Fulfillment of the Requirements for the
Master of Science Degree

Department of Rehabilitation Counseling
in the Graduate School
Southern Illinois University Carbondale
February, 2013
RESEARCH PAPER APPROVAL

IMPLICATIONS OF TRAUMATIC BRAIN INJURY IN THE MILITARY

By

Jeremy A. Rosene

A Research Paper Submitted in Partial
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Master of Science
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Approved by:

Dr. Thomas Upton

Graduate School
Southern Illinois University Carbondale
February 21, 2013
Traumatic Brain Injury (TBI) is a disability that affects many different people in many different ways. The impact the TBI has on a person’s life varies considerably based on the severity of the injury and other psychosocial factors. TBI is one of the disabilities that can and does affect people from all cultures, all age groups, and all socioeconomic groups. It is also known to some as the “invisible disability” because it can present with no obvious visible manifestations and also because the nature of the disability can impact the individual with the TBI’s ability to fully understand their own disability. Recently, the US military has begun seeing an increase in the prevalence of TBI within its service members. This increase has been attributed to the type of weapons and conditions that the US military is routinely facing as well as changes in medical care for service members which makes it more likely that they will survive what, in the past, would have been a fatal injury. Brain injuries in the military create some issues that are unique to its ranks such as adjustment to civilian life, reintegration into the family unit, and others. The diagnosis and treatment of TBI has caused some unique challenges for the U.S. government; and as a result has led to the development of a new system of medical care. The military, the Department of Defense, and the US government as a whole have responded to this need by creating several new organizations, as well as passing new legislation. This paper will take a look at these issues.
DEDICATION

This paper is dedicated to the men and women of the U.S. Armed Forces who put their lives on the line every day so that we can have the freedom to take their sacrifices for granted. It is also dedicated to my beautiful wife, without whom, my success in the military and in graduate school would not have been possible.
ACKNOWLEDGMENTS

I would like to thank my advisor, Dr. Thomas Upton for his invaluable assistance, patience, and understanding leading to the writing of this paper. My sincere thanks also go to Dr. Joyce Robinson of Texas Tech for her assistance as well.
TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSTRACT</td>
<td>II</td>
</tr>
<tr>
<td>DEDICATION</td>
<td>III</td>
</tr>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>IV</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>VI</td>
</tr>
</tbody>
</table>

CHAPITERS

CHAPTER 1 – Introduction | 1

CHAPTER 2 – Traumatic Brain Injury in the military (Literature Review) | 8

CHAPTER 3 – Discussion and Implications | 33

REFERENCES | 35

VITA | 43
LIST OF FIGURES

1. Number of TBI by severity for years 2000 through 2012 18

2. Symptoms of PTSD and TBI and their overlap 27
CHAPTER 1
INTRODUCTION

Traumatic Brain Injury (TBI) as defined by Donna Falvo is “an injury to the brain from external forces…that is not degenerative, the result of disease, or congenital in origin.” (Falvo, 2009). TBI is an injury that has a tremendous impact on the healthcare industry because of the unique nature of the disability. Its constellation of symptoms and manifestations make this disability particularly difficult to treat and requires the use of a multi-disciplinary team to see maximum rehabilitation potential reached. TBI can happen to anyone and the effects will vary from person to person and situation to situation, but can include any combination of physical symptoms (e.g. ataxia, sleep disturbance, coordination impairments), cognitive symptoms (e.g. memory difficulties), communication symptoms (e.g. aphasia), or personality changes. TBI is something that although rarely noticed by the public, is an injury that is quite common throughout the world. In fact, it has been estimated that up to 1.7 million people incur a brain injury every year and every day in the United States an estimated 4,000 people sustain an externally inflicted brain injury of some type (Eden & Stevens, 2006). Of the 1.7 million individuals who sustain a head injury every year, 100,000 of them die as a result of their injury, and two thirds of them are under the age of 30. It has to be acknowledged, however, that getting a precise measure of the number of individuals with a TBI is difficult. The data that is currently available is almost certainly an undercount because most systems that are in place for counting the number of TBI draw exclusively from hospital records and not everyone who has had a TBI may seek medical care and if they do, it may be some time after the injury (Eden & Stevens, 2006). Therefore, the prevalence of TBI is only an estimate. After considering all of the emergency and first responder care, the acute care, the post-acute care, the disability payments, the lack of income tax paid due to no longer being able to work, and many other factors, the cost
of TBI in the U.S. is $76.5 billion (CDC, 2012). Much of the cost associated with TBI surrounds the rehabilitation treatment that individuals with a TBI require. A person with a TBI may require alternative residences that have been specially modified for them, various assessments or evaluations, behavioral services, case management, cognitive therapy, family education, emotional support through individual, group, or family counseling, financial assistance, housing, legal services, life skills training, medical services, personal care, prescription drugs, recreation, rehabilitation therapies, substance abuse treatment, special education, transportation, vocational rehabilitation and training, and supported employment (Eden & Stevens, 2006). The nature of TBI requires that a unique system of care be established that consists of a multidisciplinary team and in 1980 the National Head Injury Foundation (NHIF) was established in order to provide comprehensive services to those affected by head injuries. Prior to 1980 there was no federal organization that provided specialized services or gathered data specifically on head injuries ("About us," 2012). According to the Centers for Disease Control (CDC) the most common causes of TBI are falls which account for approximately 28% of all TBI’s, motor vehicle accidents which make up 20%, and being struck by or against something which represent an additional 19%. The less common causes can include things like violence, explosions, and industrial accidents which make up the remaining TBI’s that are experienced each year.

TBI can happen to anyone but the majority of incidence of TBI is among those who are aged between 15 and 24 years, and 75 years and older ("Risk factors," 2012). This data makes sense because of the risk taking behavior that many people between age 15 and 24 engage in, and the lack of coordination and physical abilities of the elderly. Since motor vehicle accidents account for 20% of all TBIs it is understandable that the age group that is just learning to drive also has one of the highest rates of TBI.
In addition to being the source of an initial injury there is also the possibility that a TBI can exacerbate a pre-existing condition such as mental health problems (Coetzer, 2010). Often times it can be difficult to separate out the symptoms of a mental illness from the symptoms of a TBI. This complication can make diagnosis and treatment exceedingly difficult and can prolong the rehabilitation for individuals with TBI and mental illness. Individuals who have experienced a TBI will almost certainly need a comprehensive and potentially long-term system of care that is person-centered, flexible, and individualized (Eden & Stevens, 2006). Due to the long-term nature of TBI and the difficulty of its treatment there is typically a very high percentage of individuals with TBI that develop long-term disability. Selassie and colleagues (2008) found that an estimated forty-three percent of persons with TBI end up on long-term disability. This statistic has dire consequences for rehabilitation professionals including those in vocational rehabilitation as well as mental health and other sub-disciplines within rehabilitation. The financial consequences of such a fact were mentioned earlier.

There are several different ways to categorize brain injuries. Generally, brain injuries can be categorized as either open or closed. In open injuries, the skull is fractured and the brain itself may be exposed. In a closed head injury the skull remains intact but the brain is still damaged due to the forces that acted on it (Marshall & Riechers, 2012). When a detonation occurs there is a shockwave that is sent out that sometimes comes in contact with people. When it does, a person’s organs and tissues are displaced. Organs and tissues of different densities are accelerated at different rates, which can result in stretching and shearing forces. When this happens to the brain often times an diffuse axonal injury will occur (Adams, Graham, Murray & Scott, 1982). Many times when the brain is injured it also experiences secondary injuries that cause further damage. The secondary injuries that can occur, in many cases are worse than the
original injury. These secondary injuries can include things like bone fragments which are pieces of the skull that have broken off and can cause additional brain damage, edema or swelling of the brain which puts pressure on the spine and can cause death, and hemorrhage or ruptured blood vessel within the brain which can cause parts of the brain to be damaged because the blood that it is supposed to get is instead bleeding out into the skull. The brain may be injured as the result of an injury to a specific location on the skull like a gunshot wound, or to a larger less defined area like in a blow to the head or lack of oxygen. The complex interaction of physical, emotional, and cognitive consequences of TBI have been a major concern for rehabilitation professionals for years and it is clear that this is an issue of large proportions that has the potential to impact everyone.

When someone sustains a TBI one of the first steps is to measure the severity of the injury in order to determine the extent of the damage. Measuring the severity of TBI can involve a variety of instruments. One of the most common is called the Glasgow Coma Scale (GCS) (Jennett, Snoek, Bond, & Brooks, 1981). The GCS measures consciousness on a continuum, and scores range from 3 to 15, with scores from 13 and higher being considered mild, 9 to 12 being considered moderate, and 3 to 8 being considered severe. A concussion is a form of mild TBI (mTBI) that is the most common type of brain injury. The next step is determining the level of care that an individual will need based on the severity of their injury. This is no small task, and typically involves the input of medical professionals from several different disciplines including neurology, psychiatry, physical therapy, and others.

Awareness of the complexity of TBI has, over the years, caused the development of specialized programs and research within the US Department of Education, the National Institute of Health, and the Centers for Disease Control. Most recently the US Department of Defense has
begun researching TBI and developing programs to treat and prevent it within the military ranks. Since the start of Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) the number of TBIs sustained by active duty military personnel has increased dramatically. In 2011 alone, the DOD reported over 33,000 new TBIs ("Dod worldwide numbers," 2012a). This unprecedented number of TBIs in the military has been attributed to, of all things, improved armor and advances in emergency medicine, including new equipment, better medicines, faster transportation, and improved protocols. These recent improvements are allowing more military members to survive wounds that in the past would have almost certainly been fatal. (Butler, Buono, Erdtmann & Reid, 2009). Since 2000 US military personnel have sustained over a quarter million TBIs and the number keeps going up. This represents a new and unique problem for the field of rehabilitation and more specifically rehabilitation counselors, who, together with other professionals will have to address the plethora of difficulties that a military member with TBI could potential face. This is a relatively new problem for the DOD as well as the country at large and as a result, there is little literature available that provides comprehensive explanations of the unique nature of TBI within this population.

The purpose of this paper is to examine multiple sources and perspectives of data analysis in order to get a complete picture of the incidence, prognosis, and cause of TBI within the military. This paper is going to examine TBI within the military as well as the US government’s response to it. It will cover topics like the etiology of TBI within the military, treatments for TBI, as well as the future for the government in terms of response to TBI within the military. Included will be information obtained from government websites, peer reviewed journal articles, as well as books written both from a rehabilitation and neuroscience perspective and from the military’s perspective.
LIST OF TERMS

- **Aphasia** – This is the inability to communicate through speech, writing, or signs due to brain dysfunction.
- **Ataxia** – This is an impairment of muscle coordination.
- **Department of Defense (DOD)** – U.S. government organization based out of the Pentagon charged with coordinating and supervising all agencies and functions of the government concerned directly with national security and the United States Armed Forces.
- **Diffuse Axonal Injury** – This is brain damage that occurs over a more widespread area than in focal brain injury and can cause injury to multiple areas of the brain.
- **Hemorrhage** – This is the escape of large quantities of blood from a blood vessel.
- **Hypotension** – This is low blood pressure.
- **Hypoxia** – This is a decrease of oxygen to some part of the body.
- **Operation Enduring Freedom (OEF)** – This is the official name for the war in Afghanistan.
- **Operation Iraqi Freedom (OIF)** - This is the initial portion of the Iraq war.
- **Reintegration** – This describes the process that military members go through when they return from a deployment or training exercise that required them to be away from their home.
- **Traumatic Brain Injury (TBI)** – This occurs when an external force traumatically injures the brain.
- **Veterans Affairs (VA)** – The U.S. government’s second largest organization that is responsible for medical facilities, clinics, and benefits offices, as well as for administering programs of veterans’ benefits for veterans, their families, and survivors.
CHAPTER 2
TRAUMATIC BRAIN INJURY IN THE MILITARY

Traumatic brain injury is just one of many injuries that military members sustain while serving our country. There are many other injuries that are unique to military operations, however, none of them produce the combination of long term effects that TBI does. In order to fully understand the effects of TBI within the military one has to look at the number of individuals being effected, the effects of a TBI on a military member, the unique cause of TBI for the military, the difficulties that the government has in dealing with it, and the programs that the government has in place including treatments.

Incidence

The beginning of Operation Iraqi Freedom (OIF) was marked by the invasion of Iraq on March 20, 2003 by the United States and the United Kingdom. It officially ended December 18, 2011 after 4,800 American and approximately 100,000 Iraqi deaths ("Last us troops," 2011). Operation Enduring Freedom (OEF) began October 7, 2001 and is still going today.

The statistics on TBI in the military that are reported by the Veteran’s Administration (VA) differ from those reported by the Department of Defense (DOD) in that the VA has a much smaller amount of data in general than does the DOD. The reason for the difference is attributed to the fact that the methods for gathering data differ between the two agencies. The VA has only been gathering data on veterans of OIF/OEF that have been coming to the VA for care since April of 2007. As a result their data is much less practical for tracking long-term trends. It is for that reason that the data examined within this paper will come primarily from the DOD. One possible impact that this difference in data collection may cause is miscommunication between the two agencies who may not agree on the prevalence of TBI within the military. It could also
affect research being done if one was to rely exclusively on the DOD and its shorter history of data gathering. In gathering data, the VA asks four key questions: Did an event occur? Was there an alteration of brain function? Did symptoms develop that are consistent with a blow to the head? Were those symptoms present when the individual was screened? The VA then follows up with a medical screening and, if appropriate, makes a diagnosis of TBI. The numbers that the VA reports will never be the same as those reported by the DOD because the VA only reports the numbers of individuals coming to them for care on a regular basis for their diagnosed TBI, while the DOD is reporting the number of individuals diagnosed in the Military Health System ("Dod worldwide numbers," 2012a).

TBI, specifically mTBI has become so common within operations OEF/OIF that it is sometimes referred to as “the signature injury” of the wars in the Middle East and they account for nearly one-third of the injuries incurred by soldiers who were sent to Walter Reed Army Medical Center (WRAMC) from OIF/OEF conflicts (Butler, Buono, Erdtmann & Reid, 2009). WRAMC is the Army’s main medical facility and is located on 113 acres in Washington D.C. It provides case management, occupational therapy, physical therapy, speech therapy, conducts research, and provides education for individuals with TBI ("Traumatic brain injury," 2012). Since the beginning of OEF/OIF the military has seen a steady and consistent increase in the number of TBIs encountered by its service members. In fact, the number of TBI in the military has gone up nearly every single year since 2000. In 2000 the Department of Defense reported 10,963 new cases of diagnosed TBI in the military. That number goes up every year except one between 2000, when there was a total of approximately 10,000 new TBI’s and 2011, when there were over 33,000. In 2011 the DOD reported a total of 33,149 cases of TBI in the military, and so far this year that number is on track to be even higher than last year with 17,136 cases
reported at the end of the second quarter in 2012. Between 2000 and the end of the second quarter in 2012 there have been 253,330 total cases of TBI in the military ("Dod worldwide numbers," 2012a). The threefold increase in new TBI cases is alarming because of the implications for rehabilitation professionals and the medical community as a whole.

The three-fold increase in TBI diagnoses is alarming from a rehabilitation stand point. The amount of care that an individual with a TBI requires makes it necessary to have a large amount of infrastructure in place for addressing their needs and the number of specialists and care centers has not increased to match the increase in the number of individuals requiring services. The years from 2006 to 2008 are especially dramatic in terms of the numbers of TBI seen within the military. As Figure 2 illustrates, those years saw the highest increase of TBI diagnoses of any years on record. The DOD explains this dramatic increase by saying,

Further evaluation would have to be done to reach a conclusion as to why the numbers spiked between 2006 and 2008. Such evaluation would be difficult, and the DOD wishes to focus its efforts and funds to develop TBI treatments. Currently, the purpose of this website is to provide the number of service members diagnosed with TBI. ("Dod worldwide numbers” 2012b)

Obviously large amounts of data are needed in order to understand the mechanism of incidence increase within the military. Additionally, it seems likely that the DOD would not want the data to reflect a dramatic increase of any injury, as that is a major factor in determining the level of public support for military operations. One factor that may contribute to the data that is being seen is the fact that the DOD updates the numbers of TBI for several years after they are first reported.
The DOD tracks the numbers of TBI for each branch of the military as well as the overall incidence rate within the military as a whole. When the data are examined it is clear that the Army receives the bulk of the TBI’s by far, with the Air Force, Navy, and Marines each receiving far fewer and roughly an equal number of TBI each year since 2000. In 2000 the Army incurred 4,613 TBI while the Navy incurred 2,460 the Air Force 2,108 and the Marines 1,782. By the year 2011 the numbers had changed with the Army receiving 21,207 the Navy 3,115 the Air Force 3,604 and the Marines 5,223. While all four branches see an increase in the number of TBI during this time, the increase for the Navy, Air Force, and Marines is modest compared to the increase for the Army. It is very likely the case that the nature of the job within the Army is the leading cause of the high rate of TBI within that particular branch however there is no data to support that hypothesis. As mentioned earlier, this dramatic increase in the number of TBI isn’t fully explained and perhaps it is also not fully understood at this point. It is quite clear, however, that the Army is experiencing the bulk of TBIs and has been for some time. This information is relevant because Rehabilitation Counselors need to have an understanding of the cultural background of their clients and the military branches can easily be thought of in terms of having their own culture. For that reason, it is important for those in the mental health field to become informed about the military and perhaps, if they work in the world of TBI, the Army in particular.
As is clear from Figure 1, the most common form of TBI is mTBI, and the majority of them are closed head injuries caused by blasts from explosives such as IED’s. The cause of the majority of TBI within the active duty military is exposure to blasts like those caused by IED ("Neurological effects of," 2008). This is particularly troubling because the effects of this type of injury are not always easy to detect. There may be no visible wound and no immediately noticeable cognitive effects, as a result diagnosis may be delayed or may not occur at all. This can complicate matters when it comes to treatment.

The effects of a TBI on a military member

At the end of all the data and the research there is the service member. For them these numbers are meaningless and for them the reality of TBI is inescapable. The challenges that a military member faces who has experienced a TBI are numerous and formidable. There are several types of challenges that veterans face when returning home from a combat mission in
which they sustained a TBI. One of those challenges, that almost everyone with a disability must face, is stigma. Military members have to face stigma not only from the general public but also from within the military itself. According to the Army’s Mental Health Advisory Team, 59% of Army personnel and 48% of Marines thought that military leaders would treat them differently if they sought mental health care. Subsequently only 42% of Army soldiers and 38% of Marines requested treatment after screening positive for mental health problems (Willis, 2007). This lack of initiative on the part of the service member could lead to a delay in treatment of a TBI which in turn can distort the data that the DOD reports, decrease rehabilitation options for the service member, and make diagnosis more difficult.

Another major challenge that service members face is reintegration into a civilian life back home after a deployment. This is the most prominent element that separates TBI within the military from TBI for civilians. Reintegration is already a difficult task for service members and their families but is made even more so when the service member developed a TBI while they were away from home. Memory issues that may be present as a result of the TBI could make remembering to pick the kids up, or paying the bills more difficult. Emotional instability could strain interactions with a spouse, friends, or children. Physical limitations could impair the service member’s ability to find work, which could lead to financial distress; it could impair the service member’s ability to help with daily activities around the house, or many other things. When all these issues occur simultaneously, as they often do, the resulting stress can be unbearable and can shatter families and other relationships. The difficulties of reintegration combined with antisocial or dangerous behavior often exhibited by individuals diagnosed with TBI are impossible to quantify but the damage these things create can be tremendous. Many combat veterans impacted by this disability are engaging in behavior resulting in legal
repercussions, such as domestic violence, child abuse, and substance abuse related issues (Burke, Degeneffe & Olney, 2009).

A third challenge that returning veterans face is the stress that it can and does put on the family unit to which that service member belongs. Personality changes that are typical in people who have sustained a TBI can make it seem as though a different person has returned home, especially to young children who may not have seen or heard from their service member parent for quite some time. A study done by Sherman (2006) found that domestic violence is much more common in veterans returning home with a diagnosis of PTSD or TBI, which obviously puts families at greater risk. Service member’s families may not know how to get help or seek the services of professionals who are qualified to deal with TBI and the related issues.

When a veteran becomes separated from the military due to their contract expiring, medical issues, or other reasons, one of the first things that many of them will try to do is find employment. Many military members believe that finding employment will be relatively easy for them since many government agencies offer preference points to qualifying veterans, and in fact, that is one major selling point that many recruiters use to help enlist people into the Armed Services. Unfortunately, with a TBI, finding employment will perhaps be made more difficult. In fact, one of the aspects that is most affected by the consequences of TBI is employment, and ironically, gainful employment post-TBI has been associated with successful rehabilitation (Arango-Lasprilla, et al. 2012). The unemployment rate for individuals with TBI is unusually high, and in fact remains at or near 40% even after successful completion of rehabilitation (Grauwmeijer, Heijenbrok-Kal, Haitsma, & Ribbers, 2012). One of the issues that many individuals face who have had a TBI when it comes to employment is their employment readiness. Many individuals who have had a TBI may not be aware of how impaired they
actually are and may perceive themselves as being either ready to work when in fact they are not. One study done by Upton, Sattley, and Wadsworth (2008) found that “persons with brain injury may have a limited awareness of one’s abilities. By extension, one would likely have diminished ability to appraise oneself.” (p. 42). This data indicate that while employment is a major contributing factor to rehabilitation success, there are many barriers that stand in the way of finding gainful employment for someone with a TBI.

**Unique Cause**

Our forces have had to face a number of unique and unprecedented challenges in these two conflicts, one of which is the frequent use of Improvised Explosive Devices (IED). An IED is a device that is comparable to a homemade bomb, and they have been in use since World War II but have not been a significant problem for our military forces until recently. Recently they have become more sophisticated and the frequency in which they are being employed has risen. As a result, the death toll inflicted by these devices has risen dramatically and today they are known as the number one killer of coalition forces in the Middle East. “They have been the largest killer of American forces in Iraq and Afghanistan.” ("Improvised explosive devices," 2012). One of the major types of injury caused by an IED is TBI, specifically mild TBI (mTBI). Blast injuries that are the result of an IED explosion cause damage in several different ways. They cause primary, secondary, tertiary, and quaternary injuries. The primary effects are caused by the shock wave itself that follows a blast which can cause damage to the lungs, bowel, brain, and other body parts. Secondary injuries are those that are caused by objects that are put into motion by the force of the blast. Tertiary injuries are those that are caused by a person hitting an object or the ground following a blast. Finally, quaternary injuries are those that are complications or worsening of existing conditions. The blast waves that are sent out from an
IED cause shearing forces within the skull that are capable of causing brain damage (Burke, Degenneffe & Olney, 2009). These shearing forces can cause damage to the brain without damaging the skull and as a result, the injury may go unnoticed for some time.

American military members have seen an increase in the number of TBI in these two conflicts due to a combination of factors including the type of weapons that the military members are facing (e.g. IEDs) and the improvement in armor as well as emergency medical treatment for wounded personnel, which means more people are surviving injuries that in the past would have been fatal (Butler, Buono, Erdtmann & Reid, 2009). The net result is an increase in the number of severely injured military members, many of which have received TBIs or other serious injury and will require long-term medical care when they return home.

In order to address the growing demand for medical services, specifically TBI, the DOD has begun work designed to address the issue of TBI within the military. In order to begin the process of designing a system of care the DOD first had to understand TBI and so they created their own unique definition for it. The DOD defines traumatic brain injury as a traumatically induced structural injury and/or physiological disruption of brain function as a result of external force that is indicated by new onset or worsening of at least one of the following clinical signs, immediately following the event: 1) Any period of loss, or a decreased level, of consciousness. 2) Any loss of memory for events immediately before or after the injury. 3) Any alteration in mental state at the time of the injury. 4) Neurological deficits (weakness, loss of balance, change in vision, aphasia, etc.) that may or may not be transient. 5) Intracranial lesion (DOD, 2007). One of the issues that some military members are facing is the element of the definition that says, “immediately following the event”. Many of the signs and symptoms of TBI don’t show up for some time following the initial injury and when they do they are often mistaken as being the
result of something else. That means that when a service member does seek medical attention they are already at a disadvantage because it is likely that the medical professionals will not consider brain damage or may mistakenly diagnose the symptoms as something else. As a result, the military member may not get the medical care that they need.

One unfortunate fact is that there is a strong correlation between the existence of a TBI and the chance that a service member will attempt suicide. This correlation becomes apparent when the numbers are examined. Army Chaplain Mark Worrell told news reporters from National Public Radio that, “This year, 2012, there have been more suicides in the Army than combat deaths” (Inskeep, 2012). Prior to Operation Iraqi Freedom Army suicide rates were lower than the general population. However, shortly after 2003 Army suicide rates began to steadily rise with 2008 having the highest suicide rate in 25 years (Warner, Appenzeller, Parker, Warner, Diebold & Grieger, 2011). When comparing the Army to other branches of the military it is clear that there is an unusually high number of suicides within the Army. In 2005 the suicide rate in the Army was 11.56 out of 100,000 and by 2007 that number had climbed to 16.37 out of 100,000. That is over a 41% increase in just two years. The Marines saw an increase of 17%, the Navy 14%, and the Air Force just 6% for that same time period (Hyman, Ireland, Frost & Cottrell, 2012). One group of researchers while studying the Army from 2005 to 2007 found that mental health diagnoses, especially TBI had a relatively high odds ratio of committing suicide (Hyman, Ireland, Frost & Cottrell, 2012). Looking at the number of suicides in the US Army it is clear that the numbers begin to go up at nearly the same time that an increase in the number of TBIs in the Army is observed. While there is no data at this point to suggest a causal link between TBI and suicide, it seems likely that the rise in the number of TBI is related in some way to the rise in number of suicides, especially given the fact that the Army
has seen the highest number of TBI as well as suicide. One possible explanation is that the development of Major Depressive Disorder is common following a TBI. Of all the psychiatric conditions which typically follow TBI, major depression is the most common (Bryant RA, O'Donnell ML, Creamer M, McFarlane, A., Clark, R., Silove, D. 2010). There is also evidence that supports the conclusion that the severity of the TBI has no bearing on the development of Major Depressive Disorder (Rapoport, 2012). Therefore, the extremely high numbers of mTBI that the military is seeing could be leading to the development of depression following their injury, and there are many studies that have linked Major Depressive Disorder to an increase in the likelihood of suicide (Hetrick, Parker, Robinson, Hall & Vance, 2012). Therefore it is reasonable to assume that if an individual has a TBI they are at an increased risk for suicide, especially if prompt and appropriate treatment is not given. Another factor to consider is the fact that psychological function can be impaired for up to three years in a person with mTBI (Stalnacke, 2007). If the TBI is not detected in the service member, he or she may have impaired psychological functioning for years and develop Major Depressive Disorder as a result. Given the fact that mTBI is difficult to detect and treat, it seems very likely that a high number of service members may fall into this category. For many service members the transition from a deployment back home is a very difficult time, and there is research which suggests that mental illness becomes more frequent during the time immediately following a deployment, during the transition back home (Milliken, Auchterlonie, & Hoge, 2007). Iraq war veterans with TBI and PTSD as well as the general military population are at greater risk for committing suicide (Harben, 2006).

Recently it has been recognized that some of the symptoms of TBI may in fact be causing military members to be involuntarily separated from the military. Some of the
symptoms of TBI can include forgetfulness, aggression, inattention, and a constellation of other things that are detrimental to the service members’ career; and if those behaviors are not recognized as symptoms of a TBI, the service member may face punitive action including involuntary separation. If, for example, a service member has an aggressive verbal outburst when talking to a commanding officer, or is repeatedly late for his duties, or perhaps can’t concentrate on the task at hand, they may be subjected to punitive action. The U.S. government recognized this and in April of 2010 acted to prevent it by making it mandatory to screen individuals prior to separation if the reason for separation is due to behavioral issues. The requirement states that the Secretaries of the military departments conduct a medical examination before administratively separating a member under less than honorable conditions if the member has been deployed overseas in support of a contingency operation ("Implementation of the," 2010).

The purpose of the examination is to determine if the behaviors which are causing the separation could in fact be due to PTSD or TBI that resulted from encounters that occurred while on duty. The report from April of 2010 mentions the possibility, and indeed the likelihood that many members may have already been separated under less than honorable conditions as a result of TBI or PTSD symptoms. In an effort to meet the needs that this requirement will place on the military, the report mentions that active duty mental health professionals are largely focused on serving those in uniform and they have placed an unprecedented number of these professionals in combat areas. The report outlines what would happen if a member is suspected of behavioral issues resulting from TBI, and states that a Medical Review Board would be established in order to make the determination as to whether or not the issue is something easily remediable or something that is more chronic in nature and likely to result in a determination of unfit for duty.
Another issue that the committee discussed was what happens to service members that have slipped through the cracks and have already been discharged from service, but who suffered a TBI that was never caught. The process in that case is described as one in which the service member will likely come in contact with a veteran’s group of some kind and be advised by them to go the VA or a review board for re-determination of eligibility for disability (Butler, Buono, Erdtmann & Reid, 2009). This scenario has dire consequences for the service member as well as their families because if they are separated under less than honorable conditions or due to disciplinary issues it is likely that they will not be eligible for medical services from the VA for the remainder of their lives if their original type of discharge is not re-examined. This would mean that their TBI would go untreated and so would any secondary or subsequent injuries or medical conditions relating to the original TBI.

**Difficulties**

The military faces several challenges when diagnosing and dealing with an individual who may have experienced a TBI. In cases of open head injuries, in which the brain has become exposed, it is pretty clear that in injury to the brain has occurred. However, in closed head injuries like concussive injuries it is not so clear. Since the start of the conflicts in Iraq and elsewhere, blast injury overwhelmingly has become the most common wound ("U.S. Department of Health and Human Services, 2009). One of the challenges is in making the initial diagnosis. The determination of whether a military member has a TBI or not starts in the field with the medical personnel who are on the front lines. They use a tool called the Military Acute Concussion Evaluation (MACE), which asks the military member several questions to determine their level of orientation to things like time, place, and self. There are several versions of this test because military members who are in areas with frequent exposure to events that may lead to
Another difficulty is the fact that the symptoms of TBI can be remarkably similar to Post Traumatic Stress Disorder (PTSD). Both of these conditions can result in change in mood, sleep patterns, ability to concentrate, they both may cause depression, anxiety, and they both may present with no symptoms at all until months after the event that caused them. This makes it very difficult for the military to make a definitive diagnosis of TBI. As can be seen in Figure 2, these two conditions can sometimes be hard to separate out.

![Figure 2. Symptoms of PTSD and TBI and their overlap.](image)

Many of the service members who have a TBI also received other wounds as well and in some cases the other wounds are more life threatening. In those cases the TBI is not given the
most immediate care. When physicians do treat TBI it is primarily only the secondary effects of TBI which are addressed, such as brain swelling, bleeding in the head, and reduced cerebral blood flow. These secondary effects can lead to further neuronal damage such as hemorrhage, hypotension, hypoxia, and others. As a result, these issues are of more immediate concern and the initial TBI itself is typically not given much if any direct medical care (Butler, Buono, Erdtmann & Reid, 2009).

A disturbing trend in the military is the use of personality disorder diagnoses for individuals who may have sustained a TBI. TBI and PTSD are both classified as “service related” and therefore all medical services related to those conditions are completely covered by the VA, however, personality disorders are considered pre-existing conditions, and as a result are excluded from, coverage (Burke, Degeneffe & Olney 2009). This means that if the service member fails to report the possibility of TBI, the medical professionals misdiagnose the symptoms, or for any other reason the symptoms are classified as a personality disorder instead of TBI, the service member will not be entitled to any benefits, nor medical care from the military. This also means that if the service member has a diagnosis of a personality disorder, they are much less likely to receive appropriate care. Veterans who have been discharged, are entitled to request a discharge review or appeal any decision made regarding their discharge status or disability claims. However, this process is very complex and presents extraordinarily difficult challenges for veterans with a diagnosis of TBI to navigate independently. As a result of changes in VA rules and procedures, service members were recently granted permission to obtain legal representation when dealing with discharge procedures; however few lawyers are knowledgeable in this specialized area and many times the effort involved in such a task is enough to dissuade a service member from pursuing this option. Defining a new age of veteran
Another difficulty is the fact that many service members may not report the symptoms that they are experiencing. It is likely that service members may feel that they are being weak or disappointing their comrades if they seek medical attention, especially if there is no visible sign of injury. As mentioned earlier many service members would rather remain silent about symptoms rather than report them if they felt that they could be judged harshly or penalized in some way as a result of their symptoms. Another factor that makes diagnosing difficult is the fact that many of the symptoms of mTBI don’t show up for weeks or even months after the incident took place. If a service member begins to experience symptoms months after the incident which caused the TBI it is likely that they will not associate the even with the symptoms and may make the assumption that the symptoms are due to another cause. Diagnosing TBI may be difficult for those who are trusted to make the initial diagnosis as well because the vast majority of the service members who are responsible for making the initial diagnoses are medical corpsmen who have received little to no training in diagnosing TBI. Biases must also be taken into account because the service member giving the examination in the field has likely known the member whom he is evaluating for quite some time and therefore it is impossible to be totally objective in the assessment process. A less obvious but just as impeding issue is the fact that in order to get a clear diagnosis of mTBI there has to be a before and after look at a person’s functioning. The Army uses a neuropsychological test called the Automated Neuropsychological Assessment Matrix (ANAM) for pre-deployment assessments of service members, however, it does not authorize use of the ANAM for post-deployment but instead uses a questionnaire with some concussion-related questions added to it which service members fill out themselves. ("Blast
injuries traumatic," 2009). Implementing a DOD wide program or plan with regard to how to assess something like TBI is a daunting task and one that is not likely to be completed quickly.

Another factor that impedes the military’s ability to fully understand TBI is the fact that their system for keeping and searching medical records looks only for individual symptoms and these can overlap with other maladies. Therefore it is not easy to tell the exact cause of, nor the prevalence of TBI within the military. The fact that there is no code in the medical record for TBI also makes it impossible to determine where the incident occurred.

Military members and their families face some very tough challenges during the course of their connection with the military. The lifestyle of military members is one that is quite unique and one that often times leads to unique challenges. The fact that military members change duty stations every 3 to 4 years means that if the military member has children they will be required to change schools, make new friends, and adjust to a new setting more frequently than typical children (Lowe, Adams, Browne & Hinkle, 2012). Military service can also be difficult on families as well as the service members due to prolonged absences which can occur due to deployments, trainings, or other assigned duties. When the military member deploys or goes away for any other reason, the nonmilitary spouse may have difficulty being the sole caregiver who is responsible for the academic and behavioral development of children, especially if their family and friends are not available for support due to geographic separation which is common due to the frequency that military families have to relocate. Finally, in some instances, the non-military spouse must also cope with the fear of losing their spouse in combat (Rosen & Durand, 2000) or apprehension over the possibility that the deployed member will return with combat related mental health issues such as PTSD (Binneveld, 1997). The transition home from a deployment is one time that can be particularly difficult on a service member and
their families. Often times the frequency of mental health problems can actually increase during the first few months after a return home from the service member (Milliken, Aukterlonie, & Hoge, 2007). The non-military spouse has often times had to learn how to run the house completely independently and as a result, accepting input from what is often seen as an outsider is sometimes very stressful. With all these things in mind about the stresses that many military families have to deal with it is easy to see why also dealing with something like a TBI can be especially difficult.

**What the government is doing to help with TBI**

The Military Health System (MHS) is the part of the DOD that is responsible for providing health care to active duty as well as reserve service members. It has a budget of approximately $50 billion and operates 59 hospitals, 360 health clinics, private-sector health business partners, and the Uniformed Services University. It serves 9.6 million active duty uniformed Service Members, retirees, survivors and their families (“Mhs leadership,” 2012). The MHS is regularly gathering and reporting data on TBI and is also updating previous years’ data as new evidence and diagnoses are reported. The numbers are updated quarterly for current and immediate past years, while all other years are updated annually (“Dod worldwide numbers,” 2012a).

This means that the numbers that are being reported currently could change dramatically over the next several years. This fact makes it difficult to analyze the data and draw any meaningful conclusions as to the current state of TBI in the military. Projections and estimates can be made based on past trends and the current level of operations that are occurring but there is no accurate number available that states the number of TBIs that the military has experienced in recent months. MHS is comprised of several smaller agencies including Tricare,
which is the company that offers health insurance to service members, dependents, and retirees, the Department of Veterans Affairs (VA) hospitals, and others. The Armed Forces Health Longitudinal Technology Application (AHLTA) supports technology that allows the MHS and DOD share and record medical information about service members. Currently, there is no system for sharing of information between agencies within the DOD with regard to health and medical information. The DOD is working with the VA and the Veterans Health Information Systems and Technology Architecture (VISTA) to create a unified system in which all health records for all service members is kept. Integrating these two systems will allow for a more fluid information exchange than what is available today (Versel, 2006).

In 1992 the Defense and Veterans Brain Injury Center (DVBIC) was created in order to provide information to veterans and the public, and to conduct research. The DVBIC has information available on its website that is free to download or ship to your home. They also allow access to their publications and provide a list of TBI resources. The DVBIC has developed an acronym for use by the US military to determine if a brain injury has occurred called H.E.A.D.S. It stands for Headaches, Ears ringing, Altered consciousness, Dizziness, Something not right. This acronym was designed to be used by military personnel, like Corpsmen or field medical personnel, to evaluate themselves or others anytime an incident occurred that is likely to have caused a TBI ("Heads concussion card," 2012). The Army has recently teamed up with the National Football League (NFL) to research TBI and develop ways to prevent it("Army, nfl team," 2012). There have also been congressionally mandated actions taken to combat the effects of TBI on service members. In 2007 the Psychological Health and Traumatic Brain Injury (PH/TBI) Research Program (formerly called Post Traumatic Stress Disorder and Traumatic Brain Injury Research Program) was established. This program
provided $150 million for research on PTSD and $150 million for research on TBI ("Psychological health traumatic," 2012).

The DOD has taken steps toward addressing the issue of TBI within the military itself. As of April 2010 the U.S. government had allocated $500 million to the VA, DOD, and academic institutions around the country in order to research and treat TBI within the military. Also they have invested in what they call resiliency training in order to prepare the service members for the stresses that they are likely to encounter in combat and during deployment. They have also begun using the Military Acute Concussion Evaluation (MACE) in order to evaluate any service member who sustains a head injury. The MACE is used in the combat area by trained technicians, at Landstuhl Regional Medical Center in Germany for everyone evacuated from either OEF or OIF, and upon entry into the VA (Coldren, Kelly, Parish, Dretsch & Russell, 2010).

In 1996 the Traumatic Brain Injury Act was passed, and this legislation directed the Health Resources and Services Administration (HRSA), the CDC, and the National Institute of Health (NIH) to implement several programs that all relate to TBI and also to coordinate their activities whenever doing so is appropriate (Eden & Stevens, 2006). The HRSA was directed to implement a system of grants for individual states that would enable them to improve infrastructure necessary to treat and diagnose TBI. The CDC was directed to address the idea of prevention of TBI by (1) tracking prevalence and incidence, (2) conducting research to identify prevention methods, and (3) to educate the public and increase awareness of TBI. The NIH was directed to develop programs that increase participation in academic centers in TBI treatment and rehabilitation research and training. They were both also tasked with conducting both applied and basic research on diagnosis of TBI. The results of this 1996 Act for the HRSA,
according to their website are that they have provided funding to all 50 states over the course of the last 16 years. According to their website, in 2011, they provided Illinois with $666,898 in Federal TBI Planning, Implementation, and Implementation Partnership Grants (HRSA, 2011).

The CDC has since developed a database of TBI prevalence and a large quantity of educational material that is available on their website. The NIH has funded research that relates to TBI in sports (Kelly, 1999), as well as educating the public regarding TBI and its effects (Langlois, Marr, Mitchko & Johnson, 2005).

The Department of Veterans Affairs has developed a system that is called the Polytrauma System of Care (PSC) that is designed to utilizes multiple treatment approaches in order to provide care for service members who have had a TBI (U.S. Department of Veterans Affairs, 2007a). Polytrauma is, “blast related injuries to two or more organ systems that result in physical, cognitive, psychological or psychosocial disabilities.” (Craine, 2008). Due to the unique nature of blast injuries and the complex interaction of subsequent injuries, the PSC is designed to be a more effective method for treatment of the individuals who are in need of their services. The PSC itself is composed of four Rehabilitation Centers in Richmond, Virginia, Tampa, Florida, Minneapolis, Minnesota, and PaloAlto, California, which network with 21 smaller Network Sites that are spread out throughout the country. In addition to this there are numerous Support Clinics and Points of Contact throughout the country that provide support and/or referral services for the PSC. This approach is designed to be more holistic in its approach to treatment and to be able to provide care to individuals who have had injuries to more than one body part or more than one type of injury. The Polytrauma program is made up of a number of tiered programs that communicate with one another and coordinate care for the individual being served. The PSC is an organization that keeps an interdisciplinary staff at all
times to address the specific needs of service members with TBI (Burke, Degeneffe & Olney, 2009). Each one of the National Polytrauma System Rehabilitation Centers also serves the dual purpose of being a Polytrauma Network Site (U.S. Department of Veterans Affairs, 2007b). The Polytrauma network sites are responsible for providing on-going consultation as well as providing post-acute rehabilitation needs, and they also provide case management services to those whom they serve. Each one of the Network Sites creates its own unique specialized team to treat individuals for PTSD, TBI, spinal cord injuries, amputations, soft tissue trauma, vision loss, vocational limitations, and pain management issues (Craine, 2008).

The PSC Rehabilitation Centers and Network Sites serve both veterans and active duty service members. Admission requirements say that an individual must not need one on one staffing in order to complete their therapies or for behavioral reasons, or require a ventilator. The eligible service member must also be impacted by more than one physical, cognitive and/or emotional injuries secondary to trauma, and be assessed to potentially benefit from rehabilitative care or display a need for a thorough, preliminary rehabilitation evaluation and care plan (U.S. Department of Veterans Affairs, 2007a).

**Polytrauma Rehabilitation Centers (PRC)**

The PRCs serve as regional referral centers for acute medical and rehabilitation care, and as hubs for research and education related to Polytrauma and TBI. They provide a continuum of rehabilitation services that include: specialized “emerging consciousness” programs, comprehensive acute rehabilitation care for complex and severe polytraumatic injuries, outpatient programs, and assistive technology evaluation and training, and residential transitional rehabilitation programs (PTRP) ("Traumatic brain injury:" 2010).

**Polytrauma Network Sites (PNS)**

...
Polytrauma Network Sites (PNS) provide post-acute rehabilitation for Veterans and active duty Service Members with polytrauma and TBI who reside within their Veterans Integrated Service Network (VISN) catchment area. This includes inpatient rehabilitation for those transitioning closer to home, comprehensive outpatient TBI evaluations, a full range of outpatient therapy services; evaluations for durable medical equipment (DME) and assistive technology, access to other consultative specialists, and follow-up care and case management for ongoing rehabilitation needs. There is one PNS in each VISN, except VISN 8 which has two. In VISNs with a PRC, the PRC facility also operates as the PNS ("Traumatic brain injury," 2010).

Rehabilitation planning for TBI should always try to take into account the typically course of recovery while bearing in mind that each injury and individual is unique (Lynch, 1983). If a military member was to be injured in combat and develop a TBI from a blast wave, for example, the post-acute rehabilitation phase of their treatment would begin after they were medically stable and all of their immediate medical issues were resolved. Then the post-acute phase can be thought of as the step between the emergency room and going home. It is when they may live in a group home with 24 hour staff support. They may begin receiving physical therapy, speech therapy, occupational therapy, and psychological services like counseling on a regular basis as well as life skills and social skills training. This phase of rehabilitation is highly individualized and requires an interdisciplinary team working in concert to successfully complete.

**Polytrauma Support Clinic Team (PSCT)**

Polytrauma Support Clinic Teams (PSCT) provide interdisciplinary outpatient rehabilitation services in their catchment areas for Veterans and Service Members with mild and/or stable impairments from Polytrauma and TBI. Interdisciplinary outpatient services may be
an extension of the services that the client began in the post-acute phase but may be less frequent
in nature and are typically done with the client coming to a designated facility or location in
order to receive services. Services include comprehensive TBI evaluations, outpatient therapy
services, management of stable rehabilitation plans referred from PRCs and PNSs, coordinating
access to VA and non-VA services, and follow-up care and case management for ongoing

**Polytrauma Point of Contact (PPOC)**

A PPOC is identified in every VA facility that is not otherwise designated as one of the
PSC components described above. The PPOC ensures that patients with Polytrauma and TBI are
referred to a facility and/or program capable of providing the level of rehabilitation services
required. PPOCs commonly refer to the PNS and PSCTs within their VISN ("Traumatic brain
injury:" 2010).

There are several intervention strategies being used to help facilitate the rehabilitation
process for persons with TBI. One intervention that is being widely used today by the DOD as
well as civilian providers is Cognitive Behavior Therapy (CBT). This intervention can be a
combination of exposure therapy designed to help reduce anxiety or stress, and eye movement
desensitization and reprocessing (EMDR) (Kennedy, Jaffee, Leskin, Stokes, Leal, &
Fitzpatrick, 2007). Exposure therapy is a therapy that gradually exposes the individual to the
item, event, or location that induces the fear and anxiety, while keeping them in a safe and
controlled location. This technique is designed to allow the person to adjust to the fear and
anxiety provoking object in a slow and controlled manner in order to allow them time to adjust
psychologically to its presence. CBT has been shown to have benefits to combat veterans who
have panic disorders, anxiety disorders, phobias, and even PTSD (Wood, Murphy, Center,
Another treatment option that the DOD employs for service members with TBI is medication management, however, it has been noted that due to the plethora of medication options that are typically part of a treatment plan for someone with TBI, special care must be paid to the possibility of side effects. It is not uncommon for an individual with a TBI to take medication to aid with sleep, help prevent seizure activity, mood management, pain, dizziness, and a host of other things (Burke, Degenneffe & Olney, 2009). Medications have however, proven to be effective in treating things like seizures, depression, and agitation among persons with TBI (Perna, Rouselle, & Brennan, 2003).

The DOD is also trying several innovative techniques for treating service members who have TBI, PTSD, or both. One of the new techniques that is being developed by the Office of Naval Research is the use of virtual reality. They recently funded a $4 million project to study how virtual reality can be used and how effective its use will be in the treatment of persons with PTSD or TBI (Bergfeld, 2006). This particular approach consists of using the technology to immerse the participant in an environment similar to the one they were in while deployed (e.g. on patrol in Iraq). The therapist monitors the participant’s heart rate and other responses during the process and teaches them meditation techniques that are designed to help them cope with the stresses.
CHAPTER 3
DISCUSSION AND IMPLICATIONS

Traumatic brain injuries are among the most debilitating disabilities in the world and also one of the least understood. With over a quarter of a million military members with some type of TBI it is a national and a local problem and one that needs to be addressed at the national and local level. It is important for counselors, human service workers in general, and the public at large to be educated about TBI and its consequences in order to help returning service members successfully transition back to civilian life. The time when a service member comes home from the military is difficult without a disability, but is further complicated with the presence of things like physical, cognitive, and emotional issues that often accompany TBI.

This has special implications for counselors because of the unprecedented number of individuals with both PTSD and TBI who may also have issues with depression, anxiety, and a number of other conditions that require clinical attention. Counselor education and preparation is essential in order to appropriately address this unique and difficult blend of symptoms.

With over a quarter million service members having been diagnosed with a TBI since the beginning of OIF/OEF in 2003 there is a greater need for optimal specialized services within the field of rehabilitation counseling. The number of individuals who have both PTSD and TBI has grown tremendously during the last decade and this blend of disabilities creates the need for a unique approach and greater understanding on the part of the rehabilitation professional.

So the question is, do military members who have a TBI require different care than non-military individuals with TBI? The answer to that question is yes. Military personnel have many more stresses and complications in their lives than do the civilian population. The stresses that are already placed on their families, their finances, and their psychosocial adjustment to
civilian life complicate the nature of their rehabilitation process. The possible presence of PTSD or other psychological conditions also need to be taken into account, and due to the interrelatedness of the symptoms, it is impossible to know exactly how many individuals have PTSD and a TBI. Therefore it is prudent to involve experts in both areas, as well as others, to participate in a collaborative effort to treat our country’s service members who sustain a TBI while on active duty.
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Services/Surgery/Orthopaedics and Rehabilitation/Traumatic Brain Injury/SitePages/Home.aspx


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Traumatic Brain Injury in the United States Military

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