

TRAUMATIC BRAIN INJURY A NEW CHALLENGE

FOR OPTOMETRY, NEURO-OPTOMETRIC REHABILITATION AND OUR NATION

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Abstract

Traumatic Brain Injury (TBI) may result in the need for life-long care. In times of combat TBI comprises at least 14-20% of surviving casualties, who need more acute and long-term healthcare resources. The Department of Defense and Department of Veterans Affairs have been meeting this challenge since 1992 with the Defense and Veterans Brain Injury Center (DVBIC). More recently, the Veterans Health Administration has developed a Polytrauma System of Care so that veterans receive the right care, in the right place, at the right time.

Key Words

Defense and Veterans Brain Injury Center (DVBIC), Department of Defense (DoD), Department of Veterans Affairs, Polytrauma System of Care, traumatic brain injury, Veterans Health Administration, vision rehabilitation

INTRODUCTION

There are over 1.4 million brain injuries sustained each year in the United States.¹ According to the Centers for Disease Control & Prevention (CDC), an estimated 5.3 million Americans (about 2% of the American population) live with a long-term or lifelong need for help to perform activities of daily living that are associated with Traumatic Brain Injury (TBI).² Direct medical costs and indirect costs, such as lost productivity, totaled an estimated \$60 billion in the year 2000.³

In young males, motor vehicle accidents (20%), minor blunt trauma, and blast injury are common TBI etiologic factors.^{1,4} In times of combat TBI comprises at least 14-20% of surviving casualties, who need more acute and long-term healthcare resources. Head injuries from falls are frequent causes of TBI within the aging veteran population.⁴

TBI may result in a wide range of functional changes affecting thinking, sensation, language, and/or emotions. It can cause epilepsy and increase the risk of conditions such as Alzheimer's disease, Parkinson's disease, and other brain disorders that become more prevalent with age.⁵ Mild TBI cases are not being identified and remain undiagnosed with over 40% of patients experiencing vision problems.⁴

Role of the VA and DoD in TBI Rehabilitation

Since 1992, the Defense and Veterans Brain Injury Center (DVBIC) has provided state-of-the-art medical care, conducted clinical research, and offered educational programs on TBI to active duty service members, their dependents, and veterans. The DVBIC is a unique collaboration of the Department of Defense (DoD), De-

partment of Veterans Affairs (VA) health care system and a civilian partner (Table 1). From January 2003 to January 2005, DVBIC staff evaluated and treated 437 TBI patients resulting from the conflicts in Iraq and Afghanistan.⁶

Unlike penetrating head injuries, closed head injuries may not be diagnosed immediately. The Brain Injury Guideline Reference Card, developed by DVBIC, has criteria and a series of questions designed for assessment of patients suspected of sustaining a brain injury, without definitive evidence as determined by neuro-imaging or neurosurgical intervention. See Appendix. It includes questions about sensitivity to light and other visual disturbances, including blurry vision and double vision. Additional information about TBI, DVBIC and resources available may be accessed through the DVBIC website at <http://www.dvbic.org/>.

The Veterans Health Administration (VHA) defines polytrauma as injury to several body areas or organ systems that occur at the same time, and where one or more is life threatening. Due to the severity and complexity of injuries, polytrauma may result in physical, cognitive, psychological, or psychosocial impairments and functional disabilities.⁷

TBI frequently occurs in polytrauma in combination with other disabling conditions such as amputation, auditory and visual impairments, spinal cord injury, post-traumatic stress disorder, and other medical problems.

To meet its commitment of providing the best rehabilitation care for veterans, VHA has established four Polytrauma Rehabilitation Centers (PRCs) at Richmond, Tampa, Minneapolis, and Palo Alto (Table 2). The PRCs are located within designated network sites and build upon the experiences accumulated at these sites in treat-

Table 1.

Defense & Veterans Brain Injury Center (DVBIC) and Lead Sites

- **Center Headquarters** – Walter Reed Army Medical Center, Washington, D.C.
- **DoD Lead Site** – Naval Medical Center, San Diego, CA
- **DoD Lead Site** – Wilford Hall Medical Center, Lackland Air Force Base Brooke Army Medical Center, Fort Sam Houston, TX
- **VA Lead Site** – James A. Haley Veterans Hospital, Tampa, FL
- **VA Lead Site** – Minneapolis Medical Center, Minneapolis, MN
- **VA Lead Site** – Hunter McGuire Medical Center, Richmond, VA
- **Civilian Partner** – Lakeview Virginia NeuroCare, Inc., Charlottesville, VA

Table 2.

Polytrauma Rehabilitation Network Sites.

(The Richmond, Tampa, Minneapolis, and Palo Alto VA facilities also serve as Polytrauma Rehabilitation Centers)

- VISN 1, VA Boston Health Care System – West Roxbury Campus
- VISN 2, Syracuse VA Medical Center
- VISN 3, Bronx VA Medical Center
- VISN 4, Philadelphia VA Medical Center
- VISN 5, Washington DC VA Medical Center
- **VISN 6, Richmond VA Medical Center**
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- VISN 7, Augusta VA Medical Center
- **VISN 8, Tampa VA Medical Center**
- VISN 9, Lexington VA Medical Center
- VISN 16, Houston VA Medical Center
- VISN 17, VA North Texas Health Care System – Dallas VA Medical Center
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- VISN 10, Cleveland VA Medical Center
- VISN 11, Indianapolis VA Medical Center
- VISN 12, Hines VA Medical Center
- VISN 15, St. Louis VA Medical Center
- **VISN 23, Minneapolis VA Medical Center**
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- VISN 18, VA Southern Arizona Health System - Tucson VA Medical Center
- VISN 19, VA Eastern Colorado Health Care System – Denver VA Medical Center
- VISN 20, VA Puget Sound Health Care System – Seattle VA Medical Center
- **VISN 21, VA Palo Alto Health Care System – Palo Alto VA Medical Center**
- VISN 22, VA Greater Los Angeles Health Care System – West Los Angeles VA Medical Center

other providers to acquire clinical skills and needed equipment.

From the onset, clinical research will be incorporated to document findings, analyze data, and publish results.

Current challenges and future goals include:

- Development of an accurate TBI database or registry of individuals with mild, moderate, and severe head injuries;
- Providing excellence in vision rehabilitation care to maximize outcomes for patients with TBI;
- Publishing evidence-based TBI vision research results;
- Standardizing a validated TBI outcomes measure, and
- Creation of national clinical practice guidelines for optometric care of the patient with TBI.

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ing service members and veterans with moderate to severe TBI.

The Polytrauma System of Care serves to meet the life-long medical and psychosocial needs of persons with polytraumatic injuries through coordination and integration of a broad range of specialized services, including optometry. This system includes the PRCs which provide acute comprehensive medical and rehabilitation care for complex and severe polytraumatic injuries, and the Polytrauma Rehabilitation Network Sites that manage veterans with severe and lasting injuries who return to their Veterans Integrated Service Network (VISN) area (Table 2).

Each of VA's 21 regional health care networks is establishing polytrauma support clinic teams to further improve case man-

agement for veterans with TBI as they return home from the hospital, and to help them transition to their communities.⁸

The Polytrauma System of Care (<http://www.polytrauma.va.gov/index.asp>) recognizes the need for patients to be near their homes and families. VHA's overall intent is to provide the right care, in the right place, at the right time.

To better meet the VA/DoD optometric TBI rehabilitation needs, a proposal has been jointly developed that will provide education and consultation for optometrists to obtain the necessary skills to diagnose, treat, and provide vision rehabilitation services. One component will include clinical hands-on training with clinical care delivery for optometrists and

Appendix: DVBIC Brain Injury Reference Card
Brain Injury Guideline Reference Card
 (Developed by the Defense & Veterans Brain Injury Center
 at Walter Reed Army Medical Center)

The following guidelines should be used for patients whom you suspect may have sustained a brain injury, but do not have definitive evidence (i.e., neuro-imaging, neuro-surgical intervention).

Step 1: Identify those patients at risk for brain injury based upon the mechanism of injury

Mechanism of Injury	Examples
Blast	IED, RPG, Land Mine, Grenade, etc.
Vehicular Crashes	Land, Sea, Air
Blunt Force Trauma	Impact to head and/or head impacting object e.g., falls, assaults
Superficial wounds to head/neck/face	Shrapnel, other flying debris

Step 2: Screen Identified Patients through clinical interview

1. Query any loss of consciousness or alteration of consciousness (i.e., dazed, disoriented, confused) at the time of injury or loss of memory for events immediately before (retrograde amnesia) or after the accident (Post Traumatic Amnesia).
 - **Question 1: Were you knocked out?** Yes or No
If Yes, for approximately how long?
 - **Question 2: What do you remember about your injury?**
 - Query last memory before injury and first memory following injury
 - Have patient give complete narrative about the events relating to the injury, such as his/her recollection of the injury, medical treatment following injury, transportation details, hospitalization, etc.
 - Query when the patient recalls having continuous memory for day-to-day events after the injury

 2. If patient experienced a blast injury, please ask these additional questions:
 - **Question 1: Do you recall feeling the blast wave?** Yes or No
 - **Question 2: Did you feel any heat or pressure?** Yes or No
 - **Question 3: Did you hear any high frequency or loud noise at the time of the blast?** Yes or No
 - If yes, **Has this noise affected your hearing?** Yes or No
 - If yes, **Has this affected one ear or both?**
 - **Question 4: Are you more sensitive to noise since your injury?**
 - **Question 5: Are you experiencing any ringing in your ear(s)?**

 3. Query cognitive symptoms patient has been experiencing since the injury (or that others around the patient have noticed):
 - Attention/Concentration
 - **Question 1: Are you having problems with attention or concentration?**
 - **Question 2: Does your mind wander while you are reading or do you have difficulty recalling what you have read?**
 - **Question 3: Does your mind wander during conversations with others?**
 - Memory
 - **Question 1: Are you currently having difficulties remembering things, such as events, appointments, names, etc.?**
 - **Question 2: Do you have difficulty recalling conversations with people?**
 - **Question 3: Are you forgetful?**
 - **Question 4: Do you lose or misplace things?**
 - Cognitive Processing
 - **Question 1: Do you feel as if your thinking has slowed down?**
 - **Question 2: Does it take you long/longer to figure out things than it did before?**
 - Language
 - **Question 1: Are you having any difficulty finding the words you want to say during conversations?**
 - **Question 2: Have you ever said one word, but meant to say another?**
- *Important:** If the patient has not noticed any of the above cognitive symptoms then ask the patient if others around them have noticed that they are exhibiting these problems. In addition, if at all possible please query a collateral source (e.g., close relative/friend, hospital/clinic staff) directly about any cognitive symptoms the patient may be exhibiting since the injury.

4. Query physical symptoms patient has been experiencing since the injury

Headaches

- **Question 1: Are you having any headaches?** Yes or No
If yes, **How often are you having them?**
- **How severe are they on a scale of 1 to 10, with 10 being the worst?**

Fatigue

- **Question 1: Are you experiencing fatigue or tiredness during the day even when you haven't been working very hard?** Yes or No
- **Question 2: Are you feeling less energetic?**

Sleep Disturbance

- **Question 1: Have you experienced any changes in sleep?** That is, are you sleeping more or less than you used to?
- **Question 2: Do you have trouble falling asleep?**
- **Question 3: Do you feel rested after waking up?**
- **Question 4: Do you wake in the middle of the night?** Yes or No
If yes, do you have difficulty falling back asleep?

Sensitivity to light

- **Question 1: Are you more sensitive to light?** Yes or No

Visual Disturbances (e.g., blurry vision)

- **Question 1: Are you experiencing any blurry or double-vision?**

If not queried above:

Sensitivity to noise

- **Question 4: Are you more sensitive to noise since your injury?**
Changes in hearing (e.g., ringing in ears, decreased acuity)
- **Question 5: Are you experiencing any ringing in your ear(s)?**
- **Question 6: Has your hearing decreased? If yes, which ear(s) - right, left, or both?**

Query emotional symptoms patient has experienced (or others have noticed since the injury):

Irritability

- **Question 1: Are you more irritable?**
- **Question 2: Do little things bother you more than they would have previously?**
- **Question 3: Are you more short-tempered? Or have a short fuse? Or are you shouting, quarrelling, throwing or breaking things?**

Anxiety

- **Question 1: Do you feel anxious, nervous, tense, or worry a lot?**
- **Question 2: Do you feel restless, fidgety, or jumpy?**

Mood

- **Question 1: Have you felt sad, down, depressed (beyond just not wanting to be in the hospital)?**
- **Question 2: Have you experienced mood swings? Do your moods change rapidly from sad/angry to happy and vice versa?**
- **Question 3: Do you feel that you cannot control your emotions? Or that you are more emotional? For example, do you easily become sad/tearful or angry?**

Stress

- **Question 1: Are you bothered or troubled by thoughts, memories or dreams of your injury or of past events (i.e., things you saw while deployed)?**
- **Question 2: Have you had the sense that you feel numb, detached and/or is it harder to feel close to people around you?**

***Important:** If the patient has not noticed any of the above emotional problems then ask the patient if others around them have noticed that they are exhibiting these problems. In addition, if at all possible please query a collateral source (e.g., close relative/friend, hospital/clinic staff) directly about any emotional changes the patient may be exhibiting since the injury.

Other considerations to keep in mind

Check patient's medical record to be certain that there are not alternate factors contributing to the symptoms the patient is experiencing (i.e., medication side effects, concurrent medical illness, significant psychiatric problems, such as acute stress disorder from war experiences)

If there is evidence of brain injury and cognitive dysfunction from this screening, consider a more comprehensive TBI assessment. The VHA TBI Centers are available for consultation. For more information about TBI, you can refer to the Veterans Health Initiative on TBI distributed by EES.