Communication Disorders in OEF/OIF Veterans with Traumatic Brain Injury: Diagnosis and Rehabilitation

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Objectives

➢ A review of military TBI

➢ Impact of co-morbid conditions and aging

➢ Strategies for improving communication
What is your primary role in the VA?

1. Clinician
2. Researcher
3. Manager, Administrator, Policy-maker
4. Student, trainee, fellow
5. Other
VA/DoD Definition of TBI

A traumatically induced structural injury and/or physiological disruption of brain function as a result of an external force that is indicated by new onset or worsening of at least one of the following clinical signs, immediately following the event:

- Any period of loss of or a decreased level of consciousness (LOC)
- Any loss of memory for events immediately before or after the injury (post-traumatic amnesia)
- Any alteration in mental state at the time of the injury (confusion, disorientation, slowed thinking, etc.) (Alteration of consciousness/mental state)
- Neurological deficits (weakness, loss of balance, change in vision, praxis, paresis/plegia, sensory loss, aphasia, etc.) that may or may not be transient
- Intracranial lesion
# TBI Severity

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Imaging</td>
<td>Normal</td>
<td>Normal or abnormal</td>
<td>Normal or abnormal</td>
</tr>
<tr>
<td>Loss of Consciousness (LOC)</td>
<td>0-30 min</td>
<td>&gt;30 min and &lt;24 hours</td>
<td>&gt; 24 hours</td>
</tr>
<tr>
<td>Alteration of Consciousness (AOC)</td>
<td>a moment up to 24 hrs.</td>
<td>&gt;24 hours severity based on other conditions</td>
<td>&gt;24 hours severity based on other conditions</td>
</tr>
<tr>
<td>Post-traumatic Amnesia</td>
<td>0-1 day</td>
<td>&gt;1 and &lt; 7 days</td>
<td>&gt; 7 days</td>
</tr>
<tr>
<td>Glasgow Coma Scale</td>
<td>13-15</td>
<td>9-12</td>
<td>&lt; 9</td>
</tr>
</tbody>
</table>
Typical Recovery Pattern from TBI

Vincent et al., 2014
TBI and Military

- 22% of all combat injuries from OIF/OEF/OND conflicts are brain injuries.

- The primary causes of TBI in OEF/OIF Veterans are blasts, blast related motor vehicle accidents, MVAs, and gunshot wounds.

- People with previous brain injuries may find that it takes longer to recover from their current injury.
DoD Numbers for Traumatic Brain Injury Worldwide – Totals

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penetrating</td>
<td>4,865</td>
</tr>
<tr>
<td>Severe</td>
<td>3,422</td>
</tr>
<tr>
<td>Moderate</td>
<td>27,728</td>
</tr>
<tr>
<td>Mild</td>
<td>269,580</td>
</tr>
<tr>
<td>Not Classifiable</td>
<td>21,704</td>
</tr>
</tbody>
</table>

Total - All Severities 327,299

Source: Defense Medical Surveillance System (DMSS), Theater Medical Data Store (TMDS) provided by the Armed Forces Health Surveillance Center (AFHSC)

Prepared by the Defense and Veterans Brain Injury Center (DVBIC)
Communication
Can we localize communication?
Can we localize communication?

TBI is a diffuse injury!
Defining communication disorders
THE ANATOMY OF LANGUAGE

- Processing of speech
- Motor control and thought
- Shaping of air vibration
- Air vibration
- Air flow
- Hearing
- Facial expression
- Gestures

National Science Foundation
Classification of communication disorders

- **Expressive**: aphasia, dysarthria, fluency, voice disorders
- **Receptive**: comprehension, hearing loss, tinnitus
- **Social communication**: verbal and non-verbal

[http://www.asha.org/](http://www.asha.org/)
Why are we interested in communication disorders in veterans?

- Occurs in 5-10% of general population
- Veterans are working age, building families, part of our communities
- Current economy is dependent on communication skills (Ruben, 2000)
Changes in our Economy

Changes in Employment

Share of manufacturing in U.S. GDP

Source: US Bureau of Economic Analysis

Ruben, 2000
Community Reintegration

- Social life
- Academic success
- Vocational attainment
Effects of TBI

- Structural and nervous system damage that can affect “strength, accuracy, coordination and timing of speech”

(Cherney et al., 2010)
Expressive Communication

- After TBI, individuals are at risk for language disorders
- Non-aphasic in nature
- Often related to cognitive-impairment
- “language is imprecise, disorganized, tangential” (LeBlanc, 2006)
Receptive Communication

- Processing concerns
- Reading
- Hearing loss
- Subclinical hearing loss
- Tinnitus
Effect of physical and social environments
Comorbid Conditions
Definition of PTSD

- PTSD has been described as "the complex somatic, cognitive, affective, and behavioral effects of psychological trauma".

- PTSD is characterized by intrusive thoughts, nightmares and flashbacks of past traumatic events, avoidance of reminders of trauma, hypervigilance, and sleep disturbance, all of which lead to considerable social, occupational, and interpersonal dysfunction.

Effects of PTSD

- Changes in speed of information processing
- Verbal memory
- Comorbid conditions (e.g. tinnitus) are exacerbated
OVERLAP of TBI and PTSD

Co-Occurring Symptoms
Post Traumatic Stress and Traumatic Brain Injury

PTS
- Flashbacks
- Avoidance
- Hypervigilance
- Nightmares
- Re-Experiencing Phenomenon

TBI
- Fatigue
- Insomnia
- Depression
- Irritability
- Anxiety
- Headache
- Dizziness
- Nausea & Vomiting
- Vision Problems
- Sensitivity to Light/Noise
AGING

Typical aging effects on cognition:

- Information processing speed
- Working memory
- Hearing
Aging and TBI

- TBI may place individuals at greater risk for developing neurodegenerative diseases such as dementia of the Alzheimer's type and other dementias across the life span.

Vincent et al., 2014, J Alzheimer's and Dementia
Diagnosis
Diagnosing Communication Disorders in Severe TBI

- The American Speech-Language Hearing Association Functional Assessment of Communication Skills in Adults
- Behavior Rating Inventory of Executive Function
- Communication Activities of Daily Living, 2nd Ed
- Functional Independence Measure
- Repeatable Battery for the Assessment of Neuropsychological Status
- Test of Language Competence-Extended
- Western Aphasia Battery

Turkstra et al., 2005
Diagnosing Hearing Impairment

- Perform otologic examination
- Review medications for ototoxicity
- Refer to audiology for comprehensive evaluation

The comprehensive evaluation: pure tone air and bone conduction thresholds, tympanometry as well as speech reception thresholds and word discrimination.

VA/DoD Clinical Practice Guideline for Management of Concussion/mTBI (April, 2009)
Diagnosing Communication Disorders in mild TBI

- Gap in the literature

- Comprehension (Le Blanc et al, 2006)

- Increased latency for naming (Barrow et al., 2006)
Deficits are subtle and difficult to capture

Lack of appropriate instruments

“Individuals with mTBI may present as normal despite deficits in daily functioning”

(Duff et al., 2002)
Alternatives to Standardized tests

- Patient education to normalize and validate symptoms
- Assessment of co-occurring symptoms
- Problem-focused interview (Krug & Turkstra, 2015)
ORIGINAL ARTICLE

Traumatic brain injury in veterans of the wars in Iraq and Afghanistan: Communication disorders stratified by severity of brain injury

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Abstract

Objective: To describe the prevalence of communication disorders in veterans of the wars in Iraq and Afghanistan with traumatic brain injury (TBI).

Design: Retrospective study of the prevalence of aphasia, fluency and voice disorders among veterans with different severity levels of TBI. Data was obtained from the VA National repository for OEF/OIF/OND veterans who received VA care in Fiscal Years 2010 and 2011.

Results: Among the 303,716 veterans in this study, 1,848 were diagnosed with a communication disorder; 40% of these were also diagnosed with a TBI. Voice disorders were the most prevalent diagnosis (3.5 per 1000) followed by aphasia (1.9 per 1000) and fluency disorder (0.7 per 1000). Individuals with a TBI diagnosis were more likely to have a diagnosis of aphasia, followed by fluency and then voice disorder. The odds ratio (OR) of aphasia with TBI was 11.09–252.75 (95% CI = 8.78–441.52, p < 0.01). OR for fluency disorders with TBI was 3.58–10.41 (95% CI = 2.56–42.40, p < 0.01) and association of voice disorders with TBI was significant for all levels of TBI severity (OR = 1.5–6.61, 95% CI = 1.24–14.05, p < 0.01).

Conclusions: Veterans who sustained a TBI were more likely to have a diagnosis of a communication disorder, regardless of TBI severity. Those with TBI, including mild TBI, should be screened and evaluated for communication disorders.
Logistic regression analysis for TBI and communication disorders

Table II shows adjusted odds ratios from logistic regression analyses predicting each communication disorder. After controlling for demographic characteristics, the odds of aphasia were significantly higher for those with any level of diagnosed TBI \(\text{AOR} = 11.09 - 252.75, \text{CI} = 8.78 - 441.52\). Examination of the confidence intervals for each TBI severity level indicates that there was no overlap of confidence intervals for any of the TBI severity levels. Thus, the odds of aphasia were significantly higher for penetrating TBI than for severe, moderate or mild TBI, the odds for severe TBI were significantly higher than for moderate or mild TBI and the odds for moderate TBI were significantly higher than for mild TBI.

For fluency disorder, the odds were increased for all TBI severity groups with the exception of penetrating TBI, for which there were no cases \(\text{AOR} = 3.58 - 10.41, \text{CI} = 2.56 - 42.40\). Examination of confidence intervals showed overlap for all levels of TBI, indicating that, while elevated, the odds of fluency disorder among those with severe, moderate and mild TBI were not significantly different from each other.

Compared to no TBI, the odds for voice disorder were higher for all levels except penetrating, for which there were no cases \(\text{AOR} = 1.5 - 6.61, \text{CI} = 1.24 - 14.05\). Examination of confidence intervals showed no overlap for severe TBI, but overlap of confidence intervals for mild and moderate TBI. This indicates that the odds of voice disorder for those with severe TBI were significantly higher than the odds for voice disorder with moderate and mild TBI. There was not a statistically significant difference between the odds for moderate and mild TBI (Table II).

Discussion

During the study period (FY 2010–2011), 1848 veterans (0.6%) of OEF/OIF/OND veterans were diagnosed with a communication disorder and 40% of those had a concomitant TBI diagnosis. The majority (77%) of the individuals diagnosed with aphasia were also diagnosed with a TBI of varying severity and the association of particularly the severe and penetrating TBI validates the data for the remaining communication disorders; this finding is consistent with prior literature citing language deficits with TBI [22].

Within the overall OEF/OIF/OND cohort (inclusive of those with and without TBI), voice disorder was the most prevalent communication disorder and comprised 58% of all communication disorders diagnosed, followed by Aphasia (31% of cases), fluency disorder (11% of cases) and Aphasia (n=567) No Communication Disorder (n=301,868)

(a) (b)

40.9
(n=232)

50
60
70
80
90

22.9
(n=130)

29.6
(n=168)

40.9
(n=232)

3.7
(n=21)

2.8
(n=16)

No History of TBI Mild TBI Moderate TBI Severe TBI Penetrating TBI

50
60
70
80
90

25.4
(n=52)

15.6
(n=32)

1.0
(n=2)

0.0
(n=0)

58.1
(n=119)

No History of TBI Mild TBI Moderate TBI Severe TBI Penetrating TBI

50
60
70
80
90

80.2
(n=846)

11.9
(n=126)

7.2
(n=76)

0.7
(n=7)

0.0
(n=0)

No History of TBI Mild TBI Moderate TBI Severe TBI Penetrating TBI

Figure 1. Prevalence of no communication disorder, aphasia, fluency disorder and voice disorder in OEF/OIF/OND veterans by TBI severity level. (a) Prevalence of no communication disorder among OEF/OIF/OND veterans by TBI severity; (b) Prevalence of aphasia among OEF/OIF/OND veterans by TBI severity; (c) Prevalence of fluency disorder among OEF/OIF/OND veterans by TBI severity; and (d) Prevalence of voice disorder among OEF/OIF/OND veterans by TBI severity.
Major Findings

- The greatest amount (9.2%, \( n=27,615 \)) of those with communication disorder were in the mild TBI category.

- **Aphasia**: majority in moderate TBI category (40.9%, \( n=232 \)), followed by mild TBI (29.6%, \( n=168 \)) and no history of TBI (22.9%, \( n=130 \)).

- **Fluency disorder**: most in ‘no history of TBI’ category (58.1%, \( n=119 \)), followed by mild TBI (25.4%, \( n=52 \)) and moderate (15.6, \( n=52 \)).

- **Voice disorders**: most in ‘no history of TBI’ (80.2%, \( n=846 \)), mild TBI (11.9%, \( n=126 \)) and moderate TBI (7.2%, \( n=76 \)).
Conclusions from Norman et al. 2013

- Capturing communication disorders in mTBI is challenging
- “aphasia” for mild word-finding
- “stuttering” for word finding or speech that is filled with revisions, false starts, etc. (Parrish, 2009)
- Currently investigating effects of PTSD & meds
Treatment
Communication

- Use short, simple sentences
- Minimize the amount that is said at one time
- Speak slowly and clearly
- Use the same words when repeating information
- Summarize key points throughout appointment
- Allow the individual extra time to respond
Communication Strategies

• Have conversations in areas with good lighting
• Limit background noise
• Gain listener’s attention
• Maintain eye contact
• Keep hands away from face
• Speak naturally
• Rephrase

www.clevelandclinic.org
Interdisciplinary Team

Behm & Gray (2012)
Treatment for Severe TBI

- Disorder-specific
- Take into consideration cognitive status
- Proceduralize treatment targets
Treatments for Severe TBI

- Alter the environment (listener training, etc)
- Use assistive technology (hearing aids, AAC, voice amplification)
Treatments for mTBI

• “out of the box” treatments

• Tailored to client

• Focus on the functional goals (e.g. communication demands of the workplace)
Affective aspects of treatment

- Therapeutic alliance
- Cultural competence
- Motivation (severe vs. mild)
32 year-old female veteran with two combat deployments to Afghanistan presents to outpatient Polytrauma clinic after screening positive on her VA TBI screen.

During her comprehensive evaluation, her major complaints include headaches, tinnitus and word-finding difficulties, particularly at her job as a full-time nurse. While at work she reports having trouble recalling medication names, lab tests and following conversations with her co-workers.

She was started on Imitrex for her migraine headaches with a decrease in frequency and duration after medication initiation.

She was referred to Audiology for her tinnitus and her audiogram evaluation results are within normal limits.

She was also referred to the SLP for evaluation of her word finding difficulties. The Western Aphasia Battery and RBANS were administered and found to be within normal limits however, the SLP notices mild word finding difficulties in conversation. The veteran seems to have trouble putting her thoughts together and requires additional processing time.
What would be an appropriate course of treatment for this veteran?

a) Share results of testing, tell her nothing is wrong
b) Validate her concerns and set up positive expectations
c) Complete patient interview for functional goals
d) Refer back to PCP
e) Both b and c
Treatment Approach

- Veteran and provider develop functional word-finding goals
- Veteran begins keeping notes on common medication names on her I-phone and refers to it as needed on the job
- Veteran modifies her work environment and begins charting in a quiet space on the floor
- Veteran uses white-noise app on her phone as needed
- Veteran educates her co-workers on communication partner strategies
Clinical Implications mTBI: Treatment

- Validation of symptoms
- Team management
- Compensation vs. Restoration
Conclusion

- Communication disorders are important factors to consider in the treatment of OEF/OIF veterans

- Important for community reentry & employment opportunities
Acknowledgements

- Kimberly Metcalf, Aud
- Sarah Baade, Aud
- Lindsey Byom, PhD
- Lyn Turkstra, PhD
- Pauline Mashima, PhD
- David X. Cifu, MD
- Carlos Jaramillo, MD, PhD
- Mary Jo Pugh, PhD

Some of the material is based upon work supported by the Department of Veterans Affairs, Veterans Health Administration, Office of Research and Development (DHI 09-237; Dr. Mary Jo Pugh, PI)
Bibliography

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