Complications of mild traumatic brain injury in Veterans and military personnel: A Systematic Review

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Acknowledgements

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Disclosure

This report is based on research conducted by the Evidence-based Synthesis Program (ESP) Center located at the Portland VA Medical Center funded by the Department of Veterans Affairs, Veterans Health Administration, Office of Research and Development, Health Services Research and Development. The findings and conclusions in this document are those of the author(s) who are responsible for its contents; the findings and conclusions do not necessarily represent the views of the Department of Veterans Affairs or the United States government. Therefore, no statement in this article should be construed as an official position of the Department of Veterans Affairs. No investigators have any affiliations or financial involvement (e.g., employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties) that conflict with material presented in the report.
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VA Evidence-based Synthesis (ESP) Program Overview

- Sponsored by VA QUERI Program.
- Established to provide timely and accurate syntheses/reviews of healthcare topics identified by VA clinicians, managers and policy-makers, as they work to improve the health and healthcare of Veterans.
- Builds on staff and expertise already in place at the Evidence-based Practice Centers (EPC) designated by AHRQ. Four of these EPCs are also ESP Centers:
  - Durham VA Medical Center; VA Greater Los Angeles Health Care System; Portland VA Medical Center; and Minneapolis VA Medical Center.
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- Provides evidence syntheses on important clinical practice topics relevant to Veterans, and these reports help:
  - develop clinical policies informed by evidence,
  - the implementation of effective services to improve patient outcomes and to support VA clinical practice guidelines and performance measures, and
  - guide the direction for future research to address gaps in clinical knowledge.

- Broad topic nomination process – e.g. VACO, VISNs, field – facilitated by ESP Coordinating Center (Portland) through online process:
  
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- Steering Committee representing research and operations (PCS, OQP, ONS, and VISN) provides oversight and guides program direction.

- Technical Advisory Panel (TAP)
  - Recruited for each topic to provide content expertise.
  - Guides topic development; refines the key questions.
  - Reviews data/draft report.

- External Peer Reviewers & Policy Partners
  - Reviews and comments on draft report

- Final reports posted on VA HSR&D website and disseminated widely through the VA.

http://www.hsrdr.research.va.gov/publications/esp/reports.cfm
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Recent Reports:

- **Complications of Mild Traumatic Brain Injury in Veterans and Military Personnel: A Systematic Review** (January, 2013) intranet only
- **Group Visits Focusing on Education for the Management of Chronic Conditions in Adults** (December, 2012) intranet only
- **Mobile Applications and Internet-based Approaches for supporting Non-professional Caregivers** (November, 2012) intranet only

Full-length reports available on ESP website:

http://www.hsrdr.research.va.gov/publications/esp/reports.cfm
Overview of Today’s Presentation

• **Background**
  • Why is this topic of interest, and what was the purpose of the report?

• **Scope of the reviews and methods**
  • Synthesizing the best available and most relevant evidence

• **Results**
  • Cognitive functioning
  • Physical health
  • Mental health
  • Functional/Social
  • Service Utilization/Costs

• **Discussion**
  • Limitations of the body of literature and of this review
  • Future research needs
  • Clinical considerations
  • VA mTBI policy
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Background

- 12% to 23% of service members returning from Operations Enduring Freedom, Iraqi Freedom, and New Dawn (OEF/OIF/OND) experienced a TBI while deployed, the majority of which are classified as mild (mTBI)

- Differing accounts of mTBI recovery:
  - Some researchers suggest most individuals recover within three months
  - Others estimate that 10% to 20% of individuals continue to experience post-concussive symptoms (e.g., headaches, dizziness, balance problems) beyond this time

- Recovery may be unique for OEF/OIF/OND service members
  - Multiple mTBIs; mechanism of injury; other physical and mental health concerns
Key Questions

- Goal of the review: Examine complications of mTBI unique to members and Veterans of the military
  - 1. What is the prevalence of health problems, cognitive deficits, functional limitations, and mental health symptoms that develop or persist following mTBI?
  - 2. What factors affect outcomes for Veteran/military patients with mTBI?
    - 2A: Are there pre-injury (premorbid) risk/protective factors that affect outcomes for those with mTBI?
    - 2B: Are there post-injury risk/protective factors that affect outcomes for those with mTBI?
  - 3. What is the resource utilization over time for Veteran/military patients with mTBI?
Methods

- Search: Medline, PsychINFO and Cochrane Register of Controlled Trials (OVID), from database inception to October 3rd, 2012
- Reviewed 2,667 titles and abstracts from the electronic and hand searches, 353 articles were identified for full-text review
  - 31 primary studies met inclusion criteria.
  - All included studies were observational and had methodological limitations
- Dual quality assessment of all primary studies and systematic reviews
Inclusion Criteria

- **Population:** Veterans or members of the military who have experienced mTBI as defined by the VA/DoD
  - Studies that did not differentiate between adult and child populations, or between Veteran/military and civilian populations, were excluded.

- **Outcomes:** Health problems, cognitive deficits, functional limitations, mental health symptoms, and cost/resource utilization

- **Study design:** Systematic reviews, meta-analyses, randomized controlled trials, prospective and retrospective cohort studies, case control studies, case series, and cross-sectional studies

- **Sample size:** Minimum of 30 mTBI cases
Overview of Results:

- 31 studies meeting inclusion criteria
- Very low strength of evidence for all outcomes
  - Methodological shortcomings, observational study design
  - Diverse outcomes and populations
  - Findings are very tentative
- Cognitive, physical, and mental health symptoms are commonly reported following mTBI
  - Not significantly more common in those with mTBI than those without mTBI, with few exceptions.
- No consistent patterns of potential risk or protective factors were identified
Cognitive Functioning Results

- 17 studies reported mean scores (not proportions with impairment)

- *Mean* scores were within normal limits for all reported domains: language abilities/general fund of verbal knowledge, visuospatial abilities, memory, attention/concentration, and executive functioning.

- Non-significant differences in cognitive performance compared to similar populations without mTBI for all reported domains: language abilities/general fund of verbal knowledge, visuospatial abilities, memory, attention/concentration, processing speed, and executive functioning, with few exceptions:
  - Significantly worse performance on tests of memory, attention/concentration, and processing speed was limited to one assessment tool, and these differences in performance were only present 72 hours-5 days following injury.

- Subjective cognitive complaints were common.
Physical Health Results

- 17 studies met inclusion criteria
- One study reported average self-reported headache, vision, hearing, numbness/tingling, nausea, appetite, and vestibular symptoms in the mild-moderate range on the Neuropsychological Symptom Inventory
- One study reported prevalence of neurology referrals for headaches in a population with mTBI was 33.3%
- Single studies reported significantly worse pain and vestibular symptoms for those with mTBI compared to those without mTBI
Mental Health Results

- 20 studies met inclusion criteria
- Mean scores on measures of PTSD and anxiety suggested clinically significant impairment; studies suggested mixed results (impaired and normal range scores) for depression
- One study reported that 45% of those with mTBI experience clinically significant impairment from PTSD
- Veterans post-deployment with and without mTBI experience similar levels of PTSD and depression
- Two studies reported drug abuse/dependence in 9% of cases and another reported alcohol abuse/dependence in 28% of cases
- Prevalence of suicidal ideation (25%), suicidal intent (7%), and past suicide attempts (4%) was not significantly different from controls in one study
- Axis I disorder prevalence was 50-78% (two studies); one study reported significantly higher prevalence estimates compared to controls
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Functional/Social Outcome Results

• 12 included studies

• Employment:
  o 20% rate of unemployment not significantly different than controls (1 study)
  o Significantly worse odds of missing more than 2 days of work, difficulty carrying a heavy load in the past month, and difficulty performing physical training in the past month for those with mTBI (1 study)

• Sleep:
  o Three studies described similar, and three described significantly worse, sleep difficulties for those with versus without mTBI
  o One study reported prevalence of sleep difficulties between 13-23%
  o One study reported sleep difficulties ranging from mild to very severe depending on comorbid PTSD

• Emotional support:
  o One study reported prevalence of lack of emotional support to be 26%.
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Service Utilization/Cost Results

- 7 studies described service utilization; no studies described costs
- Non-significant differences in rates of service utilization compared to controls (4 studies)
  - However, one study reported that those with mTBI were prescribed an average of 18 medications compared to 5 for those without mTBI, though statistical significance was not reported
- Prevalence of current counseling reported to be 4-6% and current mental health medications 4-5% in one study
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Overall Findings

- Very low strength of evidence for all outcomes
- Cognitive complaints, physical and mental health problems are common among those with mTBI
  - Objective cognitive deficits and mental health problems are not significantly worse compared to similar Veteran groups without mTBI
- Little to no evidence for functional, social, service utilization, and cost outcomes
- Findings are relatively consistent with civilian literature:
  - Though some cognitive impairment within a week of injury is common, these effects are no longer present after seven days and most functional impairment resolves within a month
Limitations of the Body of Evidence

- Observational studies with methodological flaws
- Number and mechanism of injuries often not accounted for
- Time since injury not accounted for in most cases
- Lack of prevalence estimates limits accurate population description and service utilization/cost estimates
- Cognitive results did not report prevalence of impairment
- Diversity of populations, outcomes, assessment tools
- Potential for selective reporting bias
- Lack of assessor blinding to mTBI status
- Lack of patient blinding to study hypotheses; self-reported outcomes
- Potential confounders (e.g., effort and motivation) not included
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Limitations of this Review

- Limited inclusion to studies using VA/DoD mTBI definition
- Did not apply imaging exclusion criteria as recommended by the VA/DoD
- Due to diversity in outcomes, we report statistically significant results within studies rather than mathematically combining results across studies
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Future Research Needs

- Clear, consistent reporting of mTBI definition/criteria including imaging results
- Validated assessment tools, replication studies, common data elements
- Report and analyze impact of multiple mTBI events, mechanism of injury, and time since injury, as well as other potential moderating/mediating factors such as demographic characteristics and comorbid health problems
- Adjust for the effects of possible confounders such as PTSD, effort/motivation
- Report prevalence estimates as well as clinically significant impairment rather than only mean scores
- Reduce risk of bias by using blinded outcome assessors, patient blinding to study hypotheses, and a priori reporting of included outcomes
- Large, prospective cohort studies, though challenging, are needed to improve the quality of evidence for Veterans and members of the military
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Implications for Clinical Care

• Some symptoms that patients ascribe to mTBI may be related to comorbid mental or physical health concerns, or to other factors such as combat stress, and post-deployment readjustment.

• Engagement in services to identify potential health problems and appropriate, evidence-based treatment for these concerns (e.g., treatment for PTSD, sleep disorders, etc.).

• Because objective cognitive deficits are not common, particularly after three months, individuals experiencing ongoing cognitive deficits following first-line treatment for co-occurring symptoms and disorders may need further testing (e.g., neuropsychological or neurological evaluation, imaging).
Discussants:
David Cifu, Robert Ruff, Joel Scholten

• Overview of mTBI policy in the VA
  • VA/DoD Clinical Practice Guidelines: http://www.healthquality.va.gov/mtbi/concussion_mtbi_full_1_0.pdf

• How can the current, limited evidence guide best practices in policy, research, and clinical care?
  • What do clinicians need to know now to treat those with mTBI (PCPs, neurologists, neuropsychologists, etc.)?
  • How should we design research to address the gaps in our knowledge?
  • What does VA leadership need to do to encourage VA work that builds the evidence base in important and meaningful ways?
  • What mTBI research is ongoing in VA/military settings?
Questions?

If you have further questions, feel free to contact:

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The full report and cyberseminar presentation is available on the ESP website:

http://www.hsrdr.research.va.gov/publications/esp/
(currently intranet only, soon full release)