

# **Evidence-based Synthesis Program (ESP)**

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

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# Evidence-based Synthesis Program (ESP)

## Acknowledgements

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## Disclosure

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# Evidence-based Synthesis Program (ESP)

## 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.

# Evidence-based Synthesis Program (ESP)

- **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:**

<http://www.hsrd.research.va.gov/publications/esp/TopicNomination.cfm>

# Evidence-based Synthesis Program (ESP)

- **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.hsrd.research.va.gov/publications/esp/reports.cfm>

# Evidence-based Synthesis Program (ESP)

## 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.hsrd.research.va.gov/publications/esp/reports.cfm>

# Evidence-based Synthesis Program (ESP)

## 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

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## 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?

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## Methods

- Search: Medline, PsychINFO and Cochrane Register of Controlled Trials (OVID), from database inception to October 3<sup>rd</sup>, 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

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## 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

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## 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**

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## 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

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## 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

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## 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:
  - 20% rate of unemployment not significantly different than controls (1 study)
  - 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:
  - Three studies described similar, and three described significantly worse, sleep difficulties for those with versus without mTBI
  - One study reported prevalence of sleep difficulties between 13-23%
  - One study reported sleep difficulties ranging from mild to very severe depending on comorbid PTSD
- Emotional support:
  - 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

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## 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 ([http://www.commondataelements.ninds.nih.gov/TBI.aspx#tab=Data\\_Standards](http://www.commondataelements.ninds.nih.gov/TBI.aspx#tab=Data_Standards) and <http://www.ncbi.nlm.nih.gov/pubmed/21044708>), for meta-analytic purposes
- 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)

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## 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](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?

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## 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.hsrd.research.va.gov/publications/esp/>  
(currently intranet only, soon full release)