Neurological/Behavioral Health Subcommittee

Decision Brief:
Scientific Evidence of Using Population Normative Values for Post-Concussive Computerized Neurocognitive Assessments

Defense Health Board
November 9, 2015

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Overview

- Membership
- Timeline
- Meetings/Briefings
- Tasking
- State of the Science
- Structure of the Written Report
- Findings & Recommendations

Neurological/Behavioral Health Subcommittee Membership

- There are 10 members of the Neurological/Behavioral Health Subcommittee, including the chair of the Subcommittee.

Timeline

October 2014: Subcommittee begins investigation.

December 2014 – October 2015: Members receive briefings from Department of Defense (DoD) and civilian subject matter experts.

February 2015 – November 2015: Members develop draft report and findings and recommendations for the Defense Health Board (DHB) consideration.

November 2015: Present Pre-decisional draft to DHB

Meetings/Briefings

- Army Automated Neuropsychological Assessment Metrics (ANAM) Program Office

- Defense and Veterans' Brain Injury Center

- U.S. Naval Academy

- U.S. Air Force School of Aerospace Medicine

- U.S. Navy Bureau of Medicine and Surgery

- Walter Reed National Military Medical Center

Meetings/Briefings

- Academic Institutions:
    - Department of Physical Medicine and Rehabilitation, Harvard Medical School
    - Medical College of Wisconsin
    - University of California, Los Angeles Brain Injury Research Center
    - Virginia Commonwealth University Department of Physical Medicine and Rehabilitation
    - Saint Joseph's University

- National Center for Medical Rehabilitation Research at the National Institute of Child Health and Human Development

Background

"The Military Services have raised concerns about the utility and logistics of continuing to collect pre-deployment baseline neurocognitive tests because emerging scientific evidence suggests that before and after comparative testing using baselines may be no more effective than using relevant population normative values for the detection of cognitive deficits associated with the concussion."

- Under Secretary of Defense (Personnel & Readiness) (USD(P&R)) Memo dated July 25, 2014

Request the Defense Health Board examine the state-of-science on neurocognitive assessment testing and consider the following questions:

1. Does the current state-of-the science demonstrate a continued need for baseline computerized neurocognitive tests to make return-to-duty/play determinations?

2. Is the current dataset of military relevant normative values of the ANAM4 (sample size 107,000) an adequately sized population to generate age, gender, education, and rank-matched military normative values, or should a larger dataset be implemented for the norms?

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3. Are population normative values (assuming an adequate number and military-relevant demographic profile) as scientifically sound as pre-deployment baseline tests for reliably detecting post-concussive neurocognitive deficits (within the limitation of ANAM4) for return-to-duty decision making and prognosis?

4. Is there any utility to expanding the use of neurocognitive assessment testing of military populations beyond the deployment cycle (pre-deployment, post-injury, post-deployment)?

5. Is any additional direction for future research in neurocognitive assessment testing needed to improve protection of the fighting force?

6. What is the cost benefit of performing baseline testing for the Military Services in a fiscally constrained environment when logistics, contracts, personnel, and equipment sustainment are taken into consideration?

- USD(P&R) Memo dated July 25, 2014

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- The field of computerized neurocognitive assessment tools (NCATs) is evolving

- No computerized NCAT appears to be clearly superior to the others

- In theory, an accurate baseline is preferred for comparison. However, evidence demonstrating the relative advantage of baseline vs normative values in the assessment of mild traumatic brain injury (mTBI) is inconsistent

- There are multiple methodologies for interpreting post-injury NCAT test scores. Context, co-morbidities, and patterns are important.

- Computerized NCATs are only one component of a comprehensive clinical evaluation of mTBI

- Research is ongoing to determine the optimum combination of modalities to assess mTBI

Structure of the Written Report

- Executive Summary

- Background and Introduction

- Automated Neuropsychological Assessment 4 Metrics History and Use

- Sensitivity, Specificity, and Reliability of Computerized Neurocognitive Testing

- Automated Neuropsychological Assessment Metrics 4 Normative Database and Data Repository

- Automated Neuropsychological Assessment Metrics Program Costs

- Areas for Future Research

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Findings 1.1 and 1.2

Finding 1.1: Current evidence is inconclusive on whether using individual baseline computerized neurocognitive assessment test results is more advantageous than using an optimally stratified normative dataset in evaluating and managing mild traumatic brain injury on a population level, including assessing return to duty decision making and prognosis.

Finding 1.2: The current ANAM4 military normative dataset is only stratified by age and sex and does not accurately estimate baseline neurocognitive function in individuals who score at the high or low ends of neurocognitive function. Efforts are currently underway to expand and further stratify this dataset to improve accuracy in estimating cognitive deficits related to mild traumatic brain injury.

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Recommendation 1

DoD should continue analysis of existing ANAM4 data to determine whether an optimally stratified normative dataset may be developed that is capable of accurately estimating baseline neurocognitive function, including for individuals who score at the high or low ends of neurocognitive function. Specific stratification variables to consider adding include education, rank, standardized test scores, race/ethnicity, and environmental factors such as socioeconomic status.

Finding and Recommendation 2

Finding 2: It is not apparent that an adequate overall assessment of the utility of the current ANAM4 testing program in evaluating and managing mild traumatic brain injury has been accomplished. It is not apparent that clinical evaluation and disposition data has been centrally compiled to accomplish this analysis.

Recommendation 2: DoD should analyze current data from mild traumatic brain injury clinical evaluations to determine in what proportion of cases ANAM4 testing provided information of clinical value that was a contributing factor in overall management and disposition of the patient. As part of this analysis, the value of having an individual baseline for comparison should be assessed.

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Finding and Recommendation 3

Finding 3: Current evidence is inconclusive regarding the value of routine pre-deployment baseline ANAM4 testing.

Recommendation 3: DoD should request that legislation requiring routine pre-deployment neurological cognitive assessments be rescinded to allow discontinuation of routine pre-deployment ANAM4 baseline testing. DoD should instead conduct prospective research using neurocognitive or other assessment tools to evaluate their usefulness in the management of mild traumatic brain injury and return to duty decision-making.

Finding and Recommendation 4

Finding 4: ANAM4 testing has yet to be shown to consistently or significantly contribute to assessing long-term prognosis after a mild traumatic brain injury.

Recommendation 4: DoD should analyze post-injury test scores and long-term data documenting the recovery of Service members after a mild traumatic brain injury to determine if post-injury ANAM4 scores consistently or significantly contribute to the assessment of prognosis.

Finding and Recommendation 5

Finding 5: Currently, there is insufficient evidence to support expanding baseline testing outside of the deployment cycle.

Recommendation 5: DoD should defer a decision to expand ANAM4 baseline testing outside of the deployment cycle until additional research demonstrates that baseline testing improves the evaluation and management of mild traumatic brain injury.

Finding and Recommendation 6

Finding 6: DoD is currently using at least two NCATs (ANAM and ImPACT) to assess neurocognitive function. There are significant differences in the pricing structure for these tools and studies have not shown either tool to have a distinct overall advantage in contributing to the management of mild traumatic brain injury.

Recommendation 6: DoD should conduct a competitive bidding process to select the most cost-effective approach to meet requirements for all non-specialized neurocognitive assessments for the management of mild traumatic brain injury.

Finding and Recommendation 7

Finding 7: There is evidence, academic and from DoD, that multimodal approaches including assessments, such as imaging, biomarkers, and physical diagnostic techniques, may be more effective than NCATs alone in evaluating and managing mild traumatic brain injury.

Recommendation 7: DoD should sustain and advance research to determine if a multimodal approach may be developed which is cost-effective and superior to NCAT testing alone in assessing and managing mild traumatic brain injury.

Finding and Recommendation 8

Finding 8: Individuals with persistent symptoms following mild traumatic brain injury are often found to have comorbidities such as post-traumatic stress, depression, sleep disturbances, pain, and anxiety. There is insufficient research on the impact of these comorbidities on ANAM4 test performance.

Recommendation 8: DoD should conduct additional research to determine the effects of comorbidities on ANAM4 test performance.

Finding and Recommendation 9

Finding 9: DoD has collected over 1.8 million baseline, clinical, and other ANAM4 test results.

Recommendation 9: DoD should make a deidentified version of these data available to civilian researchers to leverage those resources in accomplishing additional analyses.

Finding and Recommendation 10

Finding 10: DoD currently administers ANAM4 baseline tests in group settings, however, research indicates that administering computerized neurocognitive tests in a group setting may affect an individual's test score.

Recommendation 10: DoD should determine whether and to what extent the group testing environment affects ANAM4 baseline tests scores, as compared to individual ANAM4 testing.

Questions?