Neurological/Behavioral Health Subcommittee

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

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Defense Health Board
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Overview

- Membership
- Tasking
- 2011 DHB Automated Neuropsychological Assessment Metrics (ANAM) Report
- Timeline
- Areas of Interest
- Way Ahead

Neurological/Behavioral Health Subcommittee Membership

- David Hovda, PhD (Chair)
- M. Ross Bullock, MD, PhD
- John Corrigan, PhD
- Timothy Elliott, PhD
- Kurt Kroenke, MD
- Brett Litz, PhD
- Una McCann, MD
- Stephanie Reid-Arndt, PhD
- Thomas Uhde, MD

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?

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

Requested that DHB examine the following:

a) Assess the <u>effectiveness of baseline</u> pre-deployment neurocognitive testing using the ANAM tool to determine the neurological deficits in function following a traumatic brain injury (TBI) event;

b) Determine the added <u>value of supplemental sections</u> on language, memory, attention, executive function, and cognition; and

c) Examine the <u>value of including</u> the symptoms and patient history, a mood and sleepiness scale, as well as, measures of response inhibition and effort.

- Memorandum, Deputy Assistant Secretary of Defense, Force Health Protection & Readiness, December, 2008

Findings Related to Current Tasking Include:

- ANAM <u>may be</u> effective tool for establishing baseline.

- ANAM useful in detecting injury and neurocognitive deficits when <u>combined</u> with clinical evaluation and compared to an individual's baseline.

- A substantial amount of military <u>population normative data</u> collected through the ANAM.

Recommendations Related to Current Tasking Include:

- Neurocognitive assessment tool (NCAT) should <u>not be used alone</u> to determine fitness for duty/deployment; must be coupled with clinical assessments.

- Other batteries <u>do not</u> provide a significant advantage over the ANAM.

Recommendations Related to Current Tasking Include (continued):

- Universal post-deployment NCAT for all Service members not recommended until further research performed and understood.

- NCAT (ANAM currently) best used as a targeted instrument to increase data available for individual-assessment compared to baseline, not as a stand-alone diagnostic tool or population measure.

- ANAM validity and reliability should continuously be tested and updated. Other NCAT tools should be considered as alternative pre-deployment neurocognitive measures.

Meetings since August 2014 Board meeting:

- October 2, 2014
  - Kick-off Teleconference

Upcoming meetings:

- December 2014 – Webcast with selected subject matter experts

Areas of Interest

- Advances in Neurocognitive Assessment Tools

- ANAM dataset analysis

- ANAM effectiveness in post-injury evaluations

- Costs associated with ANAM use

- Alternatives to ANAM

Way Ahead

- Conduct literature review

- Continue monthly teleconferences or meetings

- Information gathering through mid-2015

Questions?

Back-Up Slides

Findings:

1. ANAM is not intended to diagnose medical conditions and should not be used as a screening or diagnostic tool prior to diagnosis.

2. It is unclear how individual results indicating high levels of fatigue are used to modify the remainder of the test procedures.

3. Language problems typically not affected following mild TBI (mTBI) and moreover cannot be evaluated by computerized self-administered assessment.

4. The majority of mTBI events are not related to deployment, thus these findings and recommendations are relevant to Service members throughout their term of service.

Findings:

5. Evidence suggests ANAM may be effective pre-deployment tool for establishing baseline neurocognitive performance and providing comparison standard following individual events.

6. Memory, attention, and effort appear to be embedded in and measured by ANAM.

7. Use of ANAM after an event is useful in detecting injury and corresponding neurocognitive deficits when combined with clinical evaluation and compared to an individual's baseline ANAM results.

8. A substantial amount of military population normative data have been collected through the ANAM.

Recommendations:

1. Universal post-deployment neurocognitive assessment tool (NCAT) for all Service members not recommended until further research performed and understood.

2. NCAT (ANAM currently) best used as a targeted instrument to increase data available for individual-assessment compared to baseline, not as a stand-alone diagnostic tool or population measure.

3. Decrements in NCAT scores pre- to post-deployment should be considered together with events, symptoms, and clinical findings.

4. Clinical interpretations of NCAT findings should include other information routinely gathered post-deployment which may themselves affect or be affected by neurocognitive testing, including posttraumatic stress disorder and depression.

Recommendations:

5. NCAT should not be used alone to determine fitness for duty/deployment; must be coupled with clinical assessments.

6. Other batteries do not provide a significant advantage over the ANAM to warrant replacement.

7. There does not appear to be an urgent need to add screening measures to current neurocognitive battery

8. Analyses should be conducted to determine the importance of fatigue or sleepiness for test results.

9. Given the limitations of the brief neurocognitive test, specifically testing complex domains such as executive function and cognition is beyond the scope of the ability of the test; however, such domains appear to be embedded in, and indirectly measured, by the ANAM.

10. ANAM validity and reliability should continuously be tested and updated. Other NCAT tools should be considered as alternative pre-deployment neurocognitive measures.