DVBIC Psychometric Comparison of Brief Computerized Cognitive Test Batteries (Head to Head Study)

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to

Defense Health Board

Traumatic Brain Injury External Advisory Subcommittee

Assistant Secretary of Defense Memo Regarding Neuropsychological Testing Pre-Deployment

- "Commanders and leaders at all levels look to the medical community for additional data to assess a Service member's ability to return to duty after a brain injury inducing event. Data from a neurocognitive assessment may be used to aid in this determination. To provide the the best possible support to our Service members, the Department of Defense is implementing a program to collect baseline neurocognitive data on Active and Reserve Forces before their deployments.

- Until ongoing studies to obtain evidence-based outcomes of various neurocognitive assessment tools are completed, the Services will use the Automated Neuropscyological Assessment Metrics (ANAM) to fulfill this requirement." (Dr. Casscells' Memo: May 28, 2008).

Rationale

- Pre- and post-deployment cognitive assessments believed to be most valid approach to determining effect of injury upon cognitive functioning.
- Need for data comparing computerized cognitive batteries:

  - ❖ Results of studies of individual batteries not directly comparable to each other.
  - ❖ Almost no “head to head” studies have been published.
  - ❖ Existing evidence comes from small civilian athlete samples.
  - ❖ Available data indicates that computerized batteries demonstrate poor to moderate test-retest reliability

Existing Head to Head Evidence Comparing Instruments

Test-Retest reliability coefficients from a 45 day interval†
(n=73)

Battery	Range of Coefficients
ImPACT	.23 - .39
Concussion Sentinel	.23 - .65
HeadMinder	.43 - .66

.6 is minimum acceptable reliability for a screening test‡
.8 is minimum acceptable reliability for a diagnostic test‡

†Broglio, et al, J Athl Training 2007.
‡Mitrushina, et al, Handbook of Normative Data for Neuropsychological Assessment, 1999

Existing Head to Head Evidence Comparing Instruments

Complex Reaction Time (CRT)§ Intercorrelations†
(N=30)

	ImPACT CRT	CogSport CRT
Impact CRT		
CogSport CRT	.649**	
HeadMinder CRT	.407*	.333

*p<.05; **p<.01

§Complex reaction time is a measure of reaction time for functions, such determining whether or not two shapes match whereas simple reaction time is a measure of pure nerve reactivity.

† Schatz and Putz,, Appl Neuropsychol, 2006.

Study Design

Setting:	Fort Bragg, NC
Subjects:	500 soldiers with recent mild TBI (injured group)
	500 soldiers without recent mild TBI (reliability study)
	1,000 soldiers without recent mild TBI (uninjured group)
Computerized Batteries:	ANAM 4, ImPACT, CNS Vital Signs, CogState, HeadMinder CRI
Other Instruments:	Traditional NP test battery, Demographics, TBI history, Post MTBI Symptom Checklist, consumer satisfaction questionnaire

Study Design

Methods: The reliability group will be administered computerized batteries (100 soldiers per battery) two times within a 7 day interval.

The uninjured group will be administered two randomly selected computerized batteries one time. A randomly selected subset will be administered traditional NP tests.

The injured group will be administered two randomly selected batteries as well as the battery of traditional NP tests.

Time Line for Study

- July 2008 – submit protocol to IRB
- September 2008 – begin testing
- September 2009 – submit report and paper showing first year's results
- September 2010 – complete data collection
- January 2011 – submit final report

- Peer Reviewed publications will include analyses of reliability, and validity of instruments.

Outside Advising and Monitoring

- A panel of neuropsychologists appointed by the National Academy of Neuropsychology providing guidance on study design and interpretation of results

- An independent research company will monitor data collection and perform statistical analyses.

References from DVBIC's TBI Surveillance Study at Fort Bragg

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