Validation of the Assessment of Military Multitasking Performance for Mild TBI

Concussed Service Members (SM) often present with sensorimotor and cognitive deficits that disrupt optimal performance of Warrior tasks. Post concussive sequelae can be subtle but sufficient to impede timely return-to-duty (RTD). Current best practices for post concussive screening rely heavily on symptom self-report and single domain impairment metrics not validated against the functional demands of the Warfighter. Dual-task and multitask methods are sensitive to subtle cognitive and sensorimotor deficits following concussion, although, these methods have not previously been used to guide military RTD decision-making. Validation of an end-user informed, performance based assessment battery will enhance, evidence-based RTD decision-making. Led by Investigators at Courage Kenny Research Center, a team of civilian and military rehabilitation scientists have developed the Assessment of Military Multitask Performance (AMMP) to meet this need. This battery of six dual-task and multitask tests can be administered and scored reliably. Components of the battery distinguish healthy control Active Duty participants (n=50) from SM with persistent post-concussive deficits (n=47). We will summarize the AMMP refinement process, the challenges of establishing reliable task metrics, and correlational findings that validate AMMP components.

Learning objectives (at least 3):  
1. Discuss challenges and successes associated with dual-task and multitask measurement approaches in the Assessment of Military Multitasking Performance.  
2. Highlighting where appropriate, the relative contributions of both instrumented and clinical metrics in each of the AMMP test tasks that are able to discriminate Active Duty healthy control participants from Soldiers with persistent symptoms following concussion.  
3. Summarize correlational findings between participant symptoms, performance on standard neurocognitive metrics, and clinical gaze stability measures with AMMP performance to demonstrate relative construct validity in AMMP test tasks.  
4. Explore the feasibility of administering AMMP test clusters to patient subjects with specific impairment profiles as a possible next-step in RTD screening or performance testing.

References:

1. [Reference 1]  
2. [Reference 2]  
3. [Reference 3]  
4. [Reference 4]  
5. [Reference 5]

5) Timed outline of content (including breaks) 120 minutes total

I. Session overview /Introduction to the problem: Valid and reliable metrics for rehabilitation providers to contribute to RTD decision-making for Service members with mTBI and persistent symptom complaints (20 minutes)
   A. Subtle deficits missed by standard assessment tools
   B. Typical dual-task metrics; application to militarized test metrics
   C. Typical multitask metrics: application to militarized test metrics.

II. AMMP validation findings
   A. Reliability findings and challenges (15 minutes)
   B. Ability to discriminate healthy versus Service Members with persistent mTBI symptoms (25 minutes)
   C. Correlation to standard neurocognitive and dynamic visual acuity tests (20 minutes)

III. Next steps in validation process—development of a new metric (10 minutes)

IV. Conclusions, lessons learned, overview of current approaches return-to-duty decision-making; an evolving process (15 minutes)

V. Q & A/Discussion (10-15 minutes)

6) Content related to differential diagnosis content (express in minutes)

not applicable
7) Speaker information, including name, degrees/credentials, institution, city, and state

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8) Biographical information for each speaker

Margaret M. Weightman (Maggie), PT, PhD. Dr. Weightman is Senior Scientific Advisor and Physical Therapist at the Courage Kenny Research Center, Abbott Northwestern Hospital, Minneapolis, MN. Her research interests focus on assessment and intervention for persons with mild traumatic brain injury and stroke. From 2009-2012 she served the Rehabilitation and Reintegration Division (Office of the Army Surgeon General) as an ORISE Fellow with the U.S. Army Center for Health Promotion and Preventive Medicine, and in that capacity developed physical therapy sections of the Rehabilitation Concussion/Mild Traumatic Brain Injury Guidance and Toolkit. She is a co-PI and project director on a Department of Defense study to develop and validate a battery of dual-task and multitask assessments for Service members with concussion/mild traumatic brain injury. She mentors clinician-led research and provides physical therapy services on a limited basis to patients at the Courage Kenny Rehabilitation Institute.

MAJ Matthew R. Scherer, PT, PhD, NCS, is the Chief of Physical Therapy and Detachment Commander at Andrew Rader US Army Health Clinic, Joint Base Fort Myer-Henderson Hall, Arlington VA. In addition to his work on the Assessment of Military Multitasking Performance and other DoD funded Return to Duty initiatives, his research interests have focused mainly on the assessment and management of Service Members with traumatic dizziness, mild TBI, and vestibular co-morbidity secondary to combat trauma. Dr. Scherer completed his Masters Degree in Physical Therapy at the US Army-Baylor University Graduate Program in Physical Therapy in 2003 and his PhD in Rehabilitation Science with an emphasis in Neuromotor Control at University of Maryland, Baltimore in 2010. Dr Scherer trained at the Johns Hopkins Laboratory of Vestibular Neurophysiology (2007-2010) and completed a post-Doctoral Research appointment at the US Army Research Institute of Environmental Medicine in 2013.

Karen McCulloch, PT, PhD, MS, NCS, Dr. McCulloch is a physical therapist and Professor at University of North Carolina at Chapel Hill. Her research and teaching focus has been on traumatic brain injury with a focus on the interaction of cognitive and motor abilities, including dual-task performance measurement spanning from moderate/severe TBI to military related concussion. From 2011-2013 she served as an
ORISE Fellow with the Rehabilitation and Reintegration Division (Army Medical Department, Office of the Surgeon General) with roles in development of evidence-based guidance for therapists who serve soldiers with mild traumatic brain injury. She has served as the coordinator of research team efforts for validation of the Assessment of Military Multitask Performance at Fort Bragg, NC, a project funded by the Department of Defense.

9) Keywords

- Concussion/mild Traumatic Brain Injury
- Return-to-Duty
- Dual-task
- Multitask
- Performance-based assessment

10) Teaching and learning assessment methods

Lecture, Discussion, Question-Answer

11) Recommended participant level

Multiple

12) Conflict of interest disclosure