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TITLE: Combat Readiness Check (CRC): Development of a dual task assessment protocol to assist with return-to-duty decision-making after traumatic brain injury

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14. ABSTRACT

Large numbers of SM have experienced mild traumatic brain injury (mTBI) in OEF/OIF, many of whom require rehabilitation services. Traditional rehabilitation assessments both lack face validity for military stakeholders and sensitivity to duty-relevant vulnerabilities after mTBI. Therefore, a research team was funded to use existing research literature and stakeholder and expert input to develop a battery of dual-tasks and multitasks based on military scenarios. Initially named the Combat Readiness Check, this battery now is called the Assessment of Military Multitasking Performance (AMMP). The team also developed and will submit a funding proposal to evaluate inter-rater reliability and construct validity of the AMMP in the hope that this instrument will ultimately contribute to evidence-based return-to-duty decision-making after mTBI.

15. SUBJECT TERMS
Mild traumatic brain injury, dual-task assessment, performance-based assessment

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INTRODUCTION

A research team, led by Drs. Mary Radomski and Maggie Weightman of the Sister Kenny Research Center (SKRC), was awarded one-year funding from Army Medical Research Materiel Command to develop a test protocol for a rehabilitation assessment designed to inform return-to-duty decision-making for SM with mild traumatic brain injury (mTBI). The research team was comprised of military and civilian occupational and physical therapy researchers including Leslie Davidson PhD (Cand), MS, OTR/L (Riverbend); MAJ Sarah Goldman PhD, OTR/L, CHT (United States Army Research Institute of Environmental Medicine [USARIEM]); Karen McCulloch PhD, PT, NCS (University of North Carolina); MAJ Tanja Roy DPT, PT (USARIEM); Erica Stern PhD, OTR/L (University of Minnesota). The team was further assisted by Dr. Kristin Heaton and Amanda Antczak (USARIEM) and Marsha Finkelstein (health services researcher), Michelle Pose, and Dr. Lars Oddsson (SKRC). The proposed assessment was initially referred to as the as the Combat Readiness Check (CRC) but based on expert input, renamed the Assessment of Military Multitasking Performance (AMMP). The primary objectives of the one-year project were to develop a testable set of assessment tasks and a proposal to evaluate reliability and preliminary validity of the assessment.

BODY

Background and rationale

The need for the AMMP was first identified at a Summit convened by the Proponency for Rehabilitation & Reintegration in November 2007 to solicit feedback on preliminary guidance for occupational and physical therapists treating SM with mTBI. Clinicians and experts described need for a reliable and valid performance-based rehabilitation assessment that would adequately challenge mTBI-related vulnerabilities and not be subject to ceiling effects of most existing measures. Based on this expressed need, the AMMP research team proposed to use an iterative process involving literature review and input from experts and end-users to develop testable assessment tasks that could be validated in a subsequent study. At its inception, the AMMP protocol was envisioned as based on a dual-task paradigm in which the Soldier/patient performs a highly familiar common soldiering task simultaneously with a second cognitive task, simulating the demands of soldiering and optimizing sensitivity in detecting safety-jeopardizing impairments in Service members (SM) with mTBI/blast exposure. Administered by occupational and physical therapists and potentially other appropriate medical professionals, this performance-based measure was initially proposed to defeat memorization efforts, provide an indicator of Soldier status and progress toward return-to-duty, and measure effectiveness of novel or improved treatment methods.

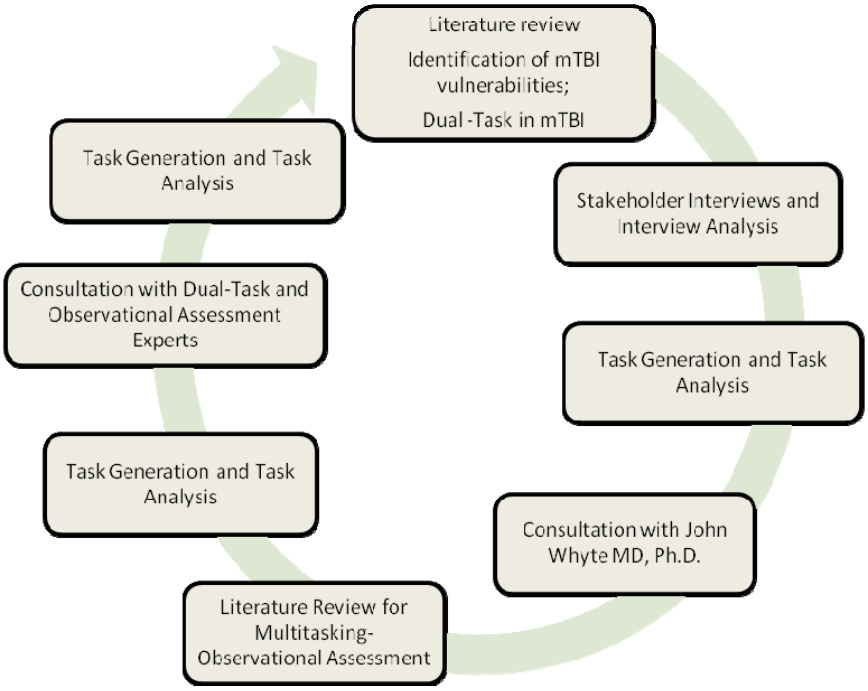
This project was funded 15 September 2009 and initiated 01 October 2009. A no-cost extension was requested and approved on 21 September 2010 such that the research period for the project would end 01 November 2010.

Process and Activities

In order to complete project deliverables (i.e., a testable set of assessment tasks and a proposal for preliminary evaluation of reliability and validity), the Research team employed an

iterative approach over a one-year period that combined literature review and input from stakeholders, end-users, and experts (see Figure 1).

Figure 1: Iterative approach to AMMP development process



Summary of Project Accomplishments Based on Aims and Tasks

Project accomplishments are described below based on Aims and Tasks specified in the approved Statement of Work.

Aim 1: Collect and analyze preliminary input from end-users - COMPLETED

- Identify key stakeholders and categories of CRC end-users and create a sampling list.
- Develop a detailed interview and survey plan to identify and obtain input from military decision-makers, subject matter experts, line commanders, and other end-users to identify CRC task components.
- Determine the optimal survey methods to employ in data gathering including log books, questionnaires, focus groups, face-to-face and telephone interviews.
- Collect input data.
- Summarize input regarding the types of tasks and protocol requirements/specifications to identify common themes with continued inquiry until no new themes are identified.

A sampling frame of 53 potential interviewees was created including military medical leaders, military/VA occupational and physical therapists, physicians who make return-to-duty decisions, line commanders, and test development experts. Thirty-five of these individuals consented to telephone interviews; thirty-three of which were conducted. Telephone interviews were audio recorded, transcribed, and analyzed by multiple members of the

research team. The research team conducted additional informal interviews but did not administer a broader email survey, appreciating that the complexity of the topic could not be adequately explored through an internet survey tool as earlier thought. Findings that informed assessment task development include the following: 1) decision-makers currently consider the SM's ability to dual-task/multitask, his/her social skills, self-reported symptoms and readiness in return to duty decision-making; 2) balance/vestibular function and cognition such as attention in the face of distracters were the most frequently-mentioned as mTBI-related vulnerabilities that the AMMP should challenge; 3) presuming that the AMMP meets psychometric requirements, use of soldiering tasks and elements of clinical utility (time to administer, materials set-up/storage) were deemed critical to adoption. See Appendix A for details of this process and findings.

Aim 2: Design CRC – Version 1.0 - COMPLETED

From findings obtained during tasks described in Aim 1 along with the *Soldiers Manual of Common Tasks:*

- Identify existing common soldiering tasks that would be a feasible component of a dual-task assessment tool.
- Develop a preliminary draft of the CRC with appropriate instructions and documentation of findings developed for user instruction.

The research team employed an array of data collection and problem solving methods to develop the first generation of AMMP assessment tasks based on common soldiering scenarios. This effort resulted from continued stakeholder input, an all-team meeting held at SKRC (March 2010), and a consultative meeting involving the research team and John Whyte, MD, PhD, expert in TBI assessment, dual task assessment, and research methods (June 2010). Subsequent consultation with other experts Tracy Morrison, OTD and Tim Wolf, OTD, MSCI, OTR/L (expert in observational assessment methods involving multitasking) and Val Kelley, PT, PhD (expert in dual task assessment methods) further informed the development of a hybrid model of assessment tasks involving dual tasks and multitasking demands, the tasks themselves, and scoring methods.

As indicated earlier, test task development was also informed by scientific literature regarding the use of dual task measures after concussion (Catena et al., 2007) and use of performance-based assessment of multitasks/complex tasks for identifying executive dysfunction in mild stroke (Shallice & Burgess, 1991; Wolf et al 2008). Dual-task assessment methods involve requiring an individual to perform a relatively familiar primary motor task while simultaneously performing a secondary cognitive task (McCulloch, 2007). Reduction in performance of one task when performed with another task is termed the "cost" (for example, cost in time or number of errors) of performing tasks simultaneously. Multitasks are believed to have the following 5 features (Burgess, 2000), which were considered in developing multitask test scenarios comprising the AMMP:

1. **Many tasks:** Numerous separate and varied tasks are completed.
2. **Interleaving**: Tasks are dovetailed (i.e., alternated).
3. **Only one task performed at a time:** Tasks are performed one at a time due to either cognitive or physical constraints, further reinforcing interleaving.

4. **Interruptions and unexpected outcomes:** Tasks are dynamic and may have unanticipated interruptions or situations where things do not go as originally planned.
5. **Delayed intentions:** Tasks require that the person remember to do a second thing, unrelated to the successful completion of the overall multitasks at hand. This is referred to as a " *prospective memory"* requirement, i.e., an action that must be performed that is not triggered by anything inherent to the required multitasking demands.

Appendix B describes the newly-developed test tasks that comprise the AMMP at the end of this project. Note that these tasks will be subjected to further evaluation and refinement during the proposed validation phase.

Aim 3: Obtain end-user feedback to assess content validity and finalize CRC Version 1.0 - COMPLETED

- Develop survey and interview tools to structure feedback about the CRC from military decision-makers.
- Use an iterative process to finalize a CRC Version 1.0.
- Convene summit meeting(s) with subject matter experts and military personnel to further refine the CRC in accordance with specifications and requirements of end-users and military decision makers.

Informal input from clinicians and test development experts was collected throughout the AMMP development process, primarily via one-on-one telephone conversations. Formal questionnaires were not employed as they limited the exploratory and open-ended information gathering characteristic of more informal data collection. This process culminated in a Summit that was convened at the National Intrepid Center of Excellence (Bethesda, MD, August 2010) involving 15 stakeholders and subject matter experts and the research team. Small group discussions were used to obtain input on proposed assessment tasks, validation plans, and dissemination and implementation activities. Appendix C describes Summit agenda, attendees, and findings.

Aim 4: Plan for Phase II (Protocol Validation) - COMPLETED

Consult experts in test validation to review CRC Version 1.0 and to advise finalization of the validation plan and the assist in refinement of the proposal development for implementing this validation plan.

The proposal for a validation study has been developed by co-PIs, Maggie Weightman, PT, PhD and Mary Vining Radomski, PhD, OTR/L, which is entitled, "The Assessment of Military Multitasking Performance: Validation of a Dual-Task and Multitask Protocol". The proposal, which will be submitted to USAMRMC, involves collaborators from USARIEM (MAJ Matt Scherer, Dr. Kristin Heaton), University of North Carolina (Dr. Karen McCulloch, Dr. Kevin

Guskiewicz), Riverbend (Leslie Davidson), Fort Bragg, Minneapolis Veterans Administration Hospital, Minnesota National Guard. The proposed 3-year non-experimental methodological research involves test construction, reliability testing and preliminary construct validation. The specific aims are as follows: 1) Refine administration and scoring procedures; 2) Evaluate inter-rater reliability using healthy control SM and those with mTBI; 3) Determine correlation between AMMP scores and tests of neurobehavioral domains; 4) Determine the ability of AMMP items to discriminate between healthy SM and SM with mTBI; 5) Evaluate reliability and validity on recently concussed/asymptomatic athletes and healthy controls to simulate in theatre timeframes; 6) Finalize AMMP procedures and disseminate findings to stakeholders.

KEY RESEARCH ACCOMPLISHMENTS

Key research accomplishments during the project include:

- Collection and analysis of stakeholder/end-user input via formal interviews, formal and informal consultation with experts, and a one-day Summit with military leaders, clinicians, and test development experts;
- Use of stakeholder input to develop novel dual task and multitask test scenarios that comprise the AMMP Version 1.0;
- Development of a funding proposal to finalize test tasks; evaluate inter-rater reliability and preliminary construct validity of the AMMP. This proposal will be submitted to USAMRMC by November 15, 2010.

REPORTABLE OUTCOMES

1. **Presentations**
   The research team presented information on the AMMP Version 1.0 and the development process to military leaders and clinicians and test development experts at the Summit (National Intrepid Center of Excellence, August 19, 2010).
2. **Proposed presentations**
   A poster entitled, “Development of a functional assessment to detect performance deficits under dual-task conditions for military personnel with mild traumatic brain injury: A multidisciplinary collaboration” was accepted for presentation at the American Occupational Therapy Association Conference, April 2011.

   A proposal was submitted to present a symposium entitled, “Development of a performance-based rehabilitation assessment to inform return to duty decision-making for military personnel with mild traumatic brain injury”, at the Federal Interagency Conference on TBI (June 2011).

3. **Funding proposals**

A funding proposal entitled, “The Assessment of Military Multitasking Performance: Validation of a Dual-Task and Multitask Protocol”, was developed and will be submitted to USAMRMC. The proposed 3-year project involves non-experimental methodological research involving test construction, reliability testing and preliminary construct validation.

CONCLUSION

Large numbers of SM have experienced mTBI in OEF/OIF, many of whom require rehabilitation services. Traditional rehabilitation assessments both lack face validity for military stakeholders and sensitivity to duty-relevant vulnerabilities after mTBI. Therefore, a research team was funded to use existing research literature and stakeholder and expert input to develop a battery of dual-tasks and multitasks based on military scenarios; this battery is called the Assessment of Military Multitasking Performance. A proposal to evaluate inter-rater reliability and construct validity of the AMMP has been developed in the hope that this instrument will ultimately contribute to evidence-based return-to-duty decision-making after mTBI.

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APPENDICES

APPENDIX A

STAKEHOLDER INQUIRY REPORT

STAKEHOLDER INQUIRY REPORT
Executive Summary

Funds were awarded in Fall 2009 by the Army Medical Research Materiel Command to develop a performance-based rehabilitation test protocol to be used to inform return-to-duty decision-making after mild traumatic brain injury (mTBI). The assessment was initially referred to as the Combat Readiness Check (CRC) and subsequently renamed, the Assessment of Military Multitasking Performance (AMMP). There were 4 aims to the Phase I project: 1) collect and analyze stakeholder input; 2) develop an array of possible assessment tasks that comprise the AMMP; 3) obtain expert feedback on proposed assessment tasks; and 4) develop a validation plan. The Stakeholder Inquiry Report describes the methods and outcomes of the first aim.

Semi-structured telephone interviews were conducted to gain insights into return to duty protocols, dual task and functional assessment procedures, military rehabilitation programs and logistics, as well as military command procedures regarding current return-to duty decision-making. Fifty-three individuals were invited to participate in a telephone interview; 35 individuals from a variety of backgrounds consented to interview and 33 interviews were completed. Interviewees included members of the Military and Veterans Administration staff, occupational / physical therapists, neuropsychologist, line commanders, members of the Army medical board, Army medical leadership / stakeholders, as well as military medical staff. Several interview protocols were developed to inform domains of inquiry and interviewees were matched with interviews based on their area of expertise. Interviews were transcribed and analyzed by multiple members of the research team. Five key impressions emerged from analyses of transcripts.

1. Clinicians currently use a variety of assessments and methods to inform return-to-duty decision-making. Some interviewees reported that no formal assessments are performed as part of return-to-duty decision-making and that some of the methods used are not informed by research evidence.

2. Decision-makers consider a number of factors when determining duty readiness after mTBI, including the SM's ability to dual task/multi-task, his/her social skills, and the SM's own appraisal of his/her readiness.

3. AMMP should challenge performance vulnerabilities associated with mTBI symptom-complex that potentially interfere with duty-readiness. The most frequently cited vulnerabilities that interviewees suggested should be challenged by the AMMP included balance/vestibular function and cognition such as attention in the presence of distracters.

4. Key factors pertaining to test development, test composition, psychometrics, instrumentation must be considered if the AMMP is to be successfully adopted by the military to inform return to duty status.

5. In future phases of test development, researchers are advised to utilize existing expertise, facilities, and already validated tests and tasks.

These over-arching impressions as well as specific suggestions offered by individual interviewees were used to guide development of tasks that comprise the AMMP, validation planning, and the longer term strategy to continue to use expertise of key stakeholders.

STAKEHOLDER INQUIRY REPORT
Process and Findings

Introduction

The Assessment of Military Multitasking Performance (AMMP) is intended to be an assessment protocol to inform return-to-duty decision-making during the rehabilitation process for soldiers with mild traumatic brain injury (mTBI). The AMMP represents a new concept in mTBI assessment based on research regarding assessment of dual task performance after concussion and observational assessment strategies that emphasize performance of real life complex tasks. Because the AMMP development process is aimed at producing a clinically useful and feasible tool, the research team incorporated numerous opportunities for guidance and input from test development and mTBI experts, military stakeholders, and clinicians throughout the development process. Conducting stakeholder interviews (Aim 1) is one of three methods used to inform the development of the AMMP protocol. The results of this stakeholder inquiry, along with a comprehensive literature review and recommendations by consultants and subject matter experts (SME), were used to develop a testable AMMP protocol, optimize content validity, inform the validation process, and facilitate long term adoption of the AMMP.

This Appendix of the Final Report describes the methods, analysis, results, discussion, and conclusion of the Aim 1 objectives, which are detailed as follows.

Collect and analyze preliminary input from end-users involved a number of key objectives.

- Identify key stakeholders and categories of AMMP end-users and create a sampling list.
- Develop a detailed interview and survey plan to identify and obtain input from military decision-makers, subject matter experts, line commanders, and other end-users to identify AMMP task components.
- Determine the optimal survey methods to employ in data gathering including log books, questionnaires, focus groups, face-to-face and telephone interviews.
- Collect input data.
- Summarize input regarding the types of tasks and protocol requirements/specifications to identify common themes with continued inquiry until no new themes are identified.

Methods

The research team conducted semi-structured telephone interviews with nine categories of stakeholders, the results of which were transcribed and analyzed.

Selection of interviewees

The research team specified categories of stakeholders, experts, and clinicians whose input was deemed important to the development and implementation of the AMMP. Names of potential interviewees were assembled based on their known experience with issues surrounding test development, return to duty (RTD) and/or mTBI, as shown in Table 2.1. Interviewees gave written informed consent prior to their participation. Participants were asked if they preferred that their names not be recorded in documents related to the study. As some participants indicated their preference for

anonymity; only those interviewees who consented to have their names used are provided in this report (Appendix A-1).

Table 2.1 Interviewees

Background Category	Number Invited	Number Consented	Number Interviewed
Return to Duty Expert **(RTDE)**	**1**	**1**	1
Occupational/Physical Therapist **(OTPT)**	**12**	**9**	9
Dual Task Experts **(DTE)**	**8**	**4**	4 (2 interviewed together)
Functional Assessment Expert **(FAE)**	**6**	**3**	3
Line Command **(LC)**	**4**	**3**	3
Medical Board **(MEBPEB)**	**4**	**3**	3
Medical Stakeholders/ Medical Leadership **(MML)**	**14**	**8**	7
Military Medical* **MM**	**2**	**2**	2
Neuropsychologist **(NPSY)**	**2**	**2**	1

*Expertise in multiple categories

Interview Structure and Administration

Seven 30-45 minute semi-structured interview scripts were developed and questions were generated based on various participant-groups' background and expertise (Appendix A-2). The scripts included an overview of the AMMP and the study objectives. Some questions were consistent across stakeholder groups and some questions reflected the domain of expertise of the interviewee. For example, dual task experts were asked questions that primarily focused on potential tasks, measurements for error, and critical considerations such as level of complexity while military leaders were asked about other related initiatives and test adoption issues.

Consistent with the semi-structured interview process, interviewers followed the script and, depending on the flow of the interview and the information provided, posed follow-up questions (designed by the interviewer) in order to gain more in depth and specific information. Interviews were audio-recorded and then transcribed by Civicom™. Transcripts were checked for errors prior to analysis.

Analysis

Transcripts went through multiple phases of analysis.

- Research team members read the interview transcripts with two individuals assigned to perform in-depth analysis of each interview and then present impressions to the rest of the team.
- A health services researcher was engaged to structure/guide aggregate analyses of transcripts. An analysis template was created based on key areas of input ; researchers used this template to organize transcript contents by template categories. An aggregate analysis was performed where multiple reviews were consolidated and frequency of codes within categories was tracked. There was then a third iteration of analysis where codes and categories were reviewed, consolidated and at times recoded based on overarching themes. The health services researcher drafted a preliminary Stakeholder Interview Report based on these findings.
- Three members of the research team modified the Stakeholder Inquiry Report and it was reviewed and approved by the entire Research team as accurately reflecting process and findings of the stakeholder interviews.

Details of this process are provided.

Team analyzes of interviews

As mentioned above, a review template was designed to guide the transcript analysis and summarization process. The structure of the template mirrored that of the interview questions and their sequence. Six areas of inquiry were identified along with related categories. Areas of inquiry and their corresponding categories were generated from the research team's key questions. A number of categories emerged during the analysis phase of the project and these were added to the template. Areas of inquiry and categories are outlined in Table 2.2.

Table 2.2 Areas of Interest/Categories

Area of Inquiry	Category
• Assessment of readiness for return to duty after mTBI	• Soldier characteristics, capacities, and performance abilities that decision-makers consider in forming return-to-duty decisions • mTBI –relevant body-structures/functions that the AMMP should challenge • Indicators that soldiers with mTBI are **not ready** to return to duty • Assessment methods that the interviewee now uses to assess return to duty after mTBI
• Test construction: tasks, environment, person factors	• Recommendations about the **overall construction** of the AMMP • Recommendations about **task composition** of the AMMP • Recommendations about **environmental factors** associated with the AMMP • Recommendations about qualifying **person factors** associated with the AMMP
• Test construction: test development, measurement/metrics, instrumentation	• Recommendations related to **psychometrics, measurement** aspects of the AMMP • Recommendations regarding **how results/findings of AMMP are reported** • Recommendations regarding **instrumentation of AMMP**
• Test dissemination and adoption	• Recommendations or critical requirements related to **logistics of the AMMP** • Who are the key stakeholders that are central to widespread dissemination and adoption and how should we keep them engaged? • What can we do during the development/validation phase to optimize that the AMMP is adopted?
• Preparation for Phase II: Validation	• Finding soldiers and/or sites to participate in validation testing • Possible tasks/tests to use to validate AMMP • Possible partners for Phase II
• Miscellaneous	• Working groups to be considered for consults • What has worked and not worked in determining readiness for return to duty

Each transcribed interview was distributed to two reviewers (Table 2.3) who were responsible for identifying and extracting contents of the transcript specific to the areas of interest specified by the analysis template. Data identified by the reviewers were placed in analysis template categories.

(Appendix A-3). Reviewers did not analyze interviews they had conducted during the interview process.

Table 2.3 Investigators: Interviewers / Reviewers

Name	Interviewer	Reviewer	Location
Amanda Antczak	X		USARIEM
Leslie Davidson	X	X	Riverbend Therapeutics LLC
Karen McCulloch	X	X	University of North Carolina
Tanja Roy	X	X	USARIEM
Mary Radomski	X	X	Sister Kenny Research Center
Erica Stern	X	X	University of Minnesota
Maggie Weightman	X	X	Sister Kenny Research Center

On average, each team member reviewed eight transcribed interviews. Parallel reviews were conducted to provide a level of quality control for the review process. Assigned identification (ID) codes were used in place of the reviewers' and interviewees' names for confidentiality and objectivity.

Aggregate analyses

Text from completed review templates were merged into a customized EXCEL™ file. Each response item was tagged with the interviewee's assigned ID. To ensure that interviewees were not counted more than once in any specific code, a '1' was placed next to the comment. The numbers of comments per code were summed to produce a count. Where appropriate, results for each of the categories were reported in descending order by count. Tables reflecting aggregate analyses are provided in Appendix A-4 and are listed below.

Data tables in Appendix A-4

Table 2.4	Characteristics, capacities, performance abilities considered in forming return to duty decisions
Table 2.5	Relevant body structures/functions that the AMMP should challenge
Table 2.6	Indicators that SM is not ready to return to duty
Table 2.7	Assessment methods currently in use
Table 2.8	Test construction: Overall construct
Table 2.9.A	Test construction: General task types
Table 2.9.B	Test construction: Specific tasks
Table 2.9.C	Test construction: Task considerations
Table 2.10	Environmental factors
Table 2.11	Person factors
Table 2.12	Psychometrics
Table 2.13	Reporting
Table 2.14	Instrumentation
Table 2.15	Dissemination/adoption: Stakeholders
Table 2.16	Critical factors for adoption
Table 2.17	Identification of test sites
Table 2.18	Suggested tasks/tests
Table 2.19	Possible partnering sites
Table 2.20	Miscellaneous

It should be noted that topic-specific categories for transcript extraction were not consistently used in a similar manner across transcript reviewers. For example, one reviewer may assign interviewee comments about barriers to RTD after mTBI to the "Characteristics, capacities, and performance abilities that decision-makers use to inform RTD decision" category on the analysis template whereas the second reviewer may assign the same comments to the "Relevant body structures/functions the CRC should challenge" category.

Analysis: Final iteration

A final iteration of data analysis was completed by reviewing codes and their respective categories. Modifications were made to reflect consistency of analysis and data was consolidated. Threads existing across categories were identified.

Results

Results of the stakeholder inquiry informed ongoing development and refinement of AMMP test tasks (Aim 2) and development of the research proposal to examine reliability and validity (Aim 4). Utilization of specific recommendations was based on alignment with AMMP purpose, practicality, scientific merit, and consultation with experts.

Five key findings have been identified from the analyses of the interview transcript templates and are discussed below. Because transcript reviewers were inconsistent in use of template categories, findings were assembled based on integration of key themes reflected both within and across data summary tables. Raw data tables are included in the appendix of this chapter of the final report. The tables used to inform each of the findings are cited.

Finding 1: Clinicians currently use a variety of assessments and methods to inform return-to-duty decision-making (Table 2.7). Some interviewees reported that no formal assessments are performed as part of RTD decision-making and that some of the methods used are not informed by research evidence. Further, some interviewees recommended that the AMMP would be used to complement these methods rather than replace them.

Examples of commonly-used physical assessments:

- Balance Error Scoring System (BESS)
- Computerized posturography
- High Level Mobility Assessment Tool (HiMAT)
- Dynamic Gait Index
- Dynamic visual acuity and gait stabilization
- Army Physical Fitness Test
- Manual muscle testing
- Jebsen-Taylor Hand Function Test (coordination)
- Endurance testing (sometimes including the treadmill)

Examples of commonly-used cognitive and/or neuropsychological assessments:

- Automated Neuropsychological Assessment Measure (ANAM)

- MMPI
- Test of Memory Malingering
- WAIS
- Wisconsin Card Sort
- California Verbal Learning Test
- Trailmaking Test
- Repeatable Battery for the Assessment of Neuropsychological Status (RBANS)
- Cognistat
- Executive Function Performance Test
- Allen Cognitive Levels Test
- Rancho scale

Examples of task observation:

- Informal examination of dual task performance such as balance while naming states
- Unspecified multi-step tasks
- Land navigation or map reading tasks
- Obstacle course
- Clinician-designed simulations (bouncing on a large gym ball to simulate dropping to the ground on 1 knee; combat simulations in which the SM is instructed to perform complex visual and motoric tasks)
- Knot tying
- Firearms Training Simulator (FATS)
- Driving (actual or simulated)
- Appointment management which may involve using various calendar systems

Examples of interviews or questionnaires:

- Canadian Occupational Performance Measure
- CAGE (alcohol use screen)
- Self-awareness questioning

Finding 2: Decision-makers consider a number of factors when determining duty readiness after mTBI, including the SM's ability to dual task/multi-task, his/her social skills, and the SM's own appraisal of his/her readiness (Tables 2.4, 2.6, 2.11).

Specifically, the following indicators appear to inform return-to-duty decision-making process.

- Self-reported symptoms that include headaches, pain, and poor sleep;
- Extent to which SM can perform required soldiering tasks;
- Evidence of poor concentration/short attention span;
- Poor problem solving;
- Poor memory (i.e., cannot remember instructions)
- Evidence of poor anger management and / or decreased frustration tolerance;
- Poor judgment, impulsivity;
- Hyper-reactivity to loud and sudden noise;
- Evidence of combat stress;
- Impaired balance;
- Impaired vision or hearing;
- Social, interpersonal, marital concerns.

Finding 3: AMMP should challenge performance vulnerabilities associated with mTBI symptom-complex that potentially interfere with duty-readiness (Table 2.5). The most frequently cited vulnerabilities that interviewees suggested should be challenged by the AMMP included balance/vestibular function, cognition, and attention in the presence of distracters.

Cognitive-processing vulnerabilities that the AMMP should challenge:

- Problem solving and decision making skills;
- Vision: scanning, tracking, acuity, gaze stabilization;
- Auditory processing;
- Reaction time under normal and stressful conditions;
- Speed and accuracy component (task efficiency, reaction time) to assess capacity and performance;
- Ability to perform a list of tasks / instructions in order and prioritize (essential to RTD);
- Dual task/multi-task performance;
- Cognitive flexibility.

Motor/endurance vulnerabilities that the AMMP should challenge:

- Coordination;
- Balance/vestibular dysfunction;
- Dynamic gait;
- General strength and fitness;
- Stamina/fatigue.

Social-interpersonal vulnerabilities that may be observed during AMMP performance post mTBI:

- Irritability and frustration tolerance;
- Poor eye contact;
- Alterations in personality;
- Inability to work within a team;
- Poor communication skills;
- Anxiety;
- Behavioral and emotional reaction to noxious stimuli.

Finding 4: Key factors must be considered if the AMMP is to be successfully adopted by the military to inform RTD status (Tables 2.8, 2.9.A, 2.9.B, 2.9.C, 2.12, 2.13, 2.14, 2.16).

Test development

- The research team was advised to consider and clearly specify the intent of the AMMP (e.g., indication of combat readiness versus suitability for RTD versus performance on par with those deemed duty-ready).
- Seeking input during the development and validation phases from key stakeholders was considered important to successful adoption of the instrument.
- Strong psychometric properties including reliability and validity must be demonstrated.

Test composition

- A linkage between test tasks and soldiering tasks was viewed by many interviewees as important to adoption. Interviewees suggested a variety of tasks including operating and or assembling/dissembling weapons; complex walking tasks; carrying tasks; doning/doffing rucksack, MOPP gear, gas mask; dealing with mock casualties.

- The AMMP should incorporate a dual-task paradigm. This includes performance of tasks in the presence of auditory/visual distracters and/or associated with stressful environmental factors such as smoke, simulated explosions.
- The AMMP should incorporate task performance under physical exertion.

Administration

- Instrumentation was recommended as means of optimizing accuracy and ease of administration/scoring.
- Length of administration time is seen as a critical factor in adoption of the AMMP. Suggestions for maximum administration time ranged from 30 minutes to 2 hours, with a briefer screen recommended for use in theater.
- Adoption will also be optimized if the AMMP can be administered in a relatively small amount of space (within a busy clinic) and in a variety of settings and environments.
- Ease of use, set-up, and storage was deemed important to adoption.
- A good training manual will be needed.

Reporting of test results

- Results should be documented in the medical record.
- Some stakeholders recommended that test results be reported as Go / Go with limitations / No Go with recommendations.
- Normative and/or cut-off scores were viewed as important to AMMP scoring, reporting, and interpretation.
- Stakeholders suggested that results will likely be used in conjunction with other formal and informal patient assessments (i.e., the AMMP will not be a stand-alone assessment).

Finding 5: In future phases of test development, researchers were advised to utilize existing expertise, facilities, and already validated tests and tasks (Tables 2.17, 2.18, 2.19).

Discussion

This Appendix of the Final Report describes Aim 1 of the funded project to develop the preliminary test protocol for the AMMP. Specifically, the Stakeholder Inquiry Report summarizes the methods and findings associated with 33 telephone interviews with AMMP stakeholders - information used to inform AMMP test task development and plans for further evaluation of reliability and validity of the AMMP.

Interviewees provided a broad range of information on the types of metrics currently used for return-to-duty decision-making with an overall impression that the current system lacks consistency across the persons and sites that were sampled. Even as there was widespread endorsement for the development of an additional metric to inform RTD decision-making, many interviewees suggested the continued use of current assessments and methods in addition to the AMMP metric. Additionally, a broad range of suggestions were made as to the types of impairments and vulnerabilities that should be considered in return-to-duty decision-making and that should be tested by the AMMP. Some of the more consistently mentioned body structure/body functions included the balance and

vestibular systems, cognitive components such as memory and judgment; and attention/concentration.

Interviewees indicated that efficiency in time, space, and storage was of high priority for ultimate adoption of the AMMP. The amount of time and space suggested did vary among interviewees (Table 2.16), with a premise that strong psychometric properties were equally or more important in influencing adoption of the AMMP test protocol (Table 2.12).

Soldiering tasks were identified as having the strongest face validity and were identified for critical consideration in test construction, although some interviewees emphasized the importance of the types of mTBI vulnerabilities to be tested over the specific task set. Dual-tasking, multi-tasking and the challenge of visual and audio distracters were identified as necessary to simulate the soldiering environment (Tables 2.9.A-C). Interviewees provided an extensive list of specific soldiering tasks to consider (Tables 2.9.A-B) as well as types of task characteristics that should be included in the AMMP (Table 2.9.C).

A number of additional considerations and suggestions were mentioned by various interviewees including obtaining a baseline measurement for Service members similar to the protocol for the Automated Neuropsychological Assessment Metrics (ANAM) program. Some interviewees recommended building in a challenge to physical fitness and collecting data on other issues affecting soldiers including balance/vestibular function, vision and hearing impairments as well as physical symptoms of pain, poor sleep and headache.

Finally, to facilitate adoption of the AMMP, interviewees encouraged continued provision of education and information to key stakeholder groups throughout the AMMP development process. A number of stakeholders provided names of other possible consultants and sites for possible validation testing.

Limitations

There are several limitations to methods used to solicit, analyze, and ultimately employ stakeholder input to develop the AMMP test protocol. By using a semi-structured interview, researchers may have failed to ask important questions or obtain critical input in areas that were omitted from the question set. Additionally, prospective interviewees were either known to research team members or recommended by colleagues, which may have inadvertently limited the diversity of opinion or resulted in the omission of perspectives of experts outside of this more familiar circle of stakeholders.

There were also limitations in methods use to analyze and interpret interview data. Formal qualitative analytic methods were not employed in favor of quantitative summaries of categories of interviewee comments. The stakeholder groups could be assumed to have diverse priorities for a new assessment such as the AMMP, with clinicians potentially valuing ease of test administration and researchers emphasizing the importance of test psychometrics. Given that there were unequal numbers of interviewees in each of the stakeholder categories, interpreting the significance or importance of specific stakeholder comments by virtue of their frequency may not, in fact, provide a true picture of what are the most important considerations in developing the AMMP. Use of the Transcript Analysis Template may also have contributed to either bias or misinterpretation of results. For example, dimensions and items included in the template were not mutually exclusive. Interview responses could be assigned to different items by different reviewers. In addition, some interviewee

responses were not always totally relevant to a given question but were still extracted and registered on the template for the designated item. This further may have resulted in items appearing on more than one result table.

Finally, the findings of the Stakeholder Inquiry are limited by the fact that interviewees' comments may simply have reflected personal opinions that were not informed by research or an accurate understanding of military rehabilitation practice environments. Therefore, members of the research team who analyzed the transcripts were required to evaluate the legitimacy or veracity of interviewee recommendations and suggestions offered.

Conclusion

The AMMP represents a new concept in mTBI assessment based on research regarding assessment of dual task performance after concussion and observational assessment strategies that emphasize performance of real life complex tasks. The development of the AMMP is not solely an important scholarly undertaking but a process aimed at producing a clinically useful tool to contribute to critical decisions about RTD after mTBI. Using stakeholder input, as was the focus of Aim 1 of the broader project, in conjunction with literature review and consultation with experts will increase the likelihood of developing an assessment protocol that meets that highest scientific standards and is readily adopted by clinicians and RTD decision-makers.

Appendix A-1: Interviewees

Only interviewees who agreed to have their name included in documents are listed.

Name	Position/location
COL Robinette Amaker, PhD, OTR/L, CHT, FAOTA	Occupational therapy Consultant Chief, Occupational therapy section, Army Medical Specialists Corp Fort Sam Houston, San Antonio, Texas
Carolyn M. Baum, PhD, OTR, FAOTA	Professor Washington University in St Louis School of Medicine
MAJ Robyn Bolgla, MSPT, CTRS	PT clinician Department of Veterans Affairs, Sunrise, Florida
COL Myrna Callison, PhD, OTR/L	Ergonomics Program Manager US Army Public Health Command. Aberdeen, MD
Robert Catena, PhD	Professor Torrance, California
Rose Collins, PhD	Neuropsychologist Veterans Administration Medical Center, Minneapolis
LTC Andrea Crunkhorn, PT	Chief, Physical therapy section, Army Medical Specialists Corp
Judith Deutsch, PT, PhD	Associate Professor University of Medicine and Dentistry of New Jersey School of HRP
Kim R. Gottshall, PhD, PT, ATC	Director – Vestibular Assessment & Rehabilitation Naval Medical Center, San Diego, California
LTC Sandra Harrison-Weaver, OT	Chief, Integrated Occupational Therapy Service Walter Reed Army Medical Center Washington, DC
Kathy Helmick	Senior Director for the Traumatic Brain Injury Clinical Standards of Care Directorate Defense Centers for Psychological Health and Traumatic Brain Injury
Greg Johnson, MD	Physician Tripler Army Medical Center Hawaii
Melissa Jones, OTR/L, PhD	OT clinician Landstuhl, Germany
CPT Karen Lambert,	Walter Reed Army Medical Center
Jeffrey Lewis, MD, PhD	Neurologist San Antonio Military Medical Center San Antonio, Texas
LTC Lynne Lowe, PT, DPT, OCS	Proponency for Rehabilitation & Reintegration Falls Church, Virginia
COL Joseph McKeon, MC, MD, MPH	Researcher Airworthiness Certification and Evaluation Branch U.S. Army Aeromedical Research Laboratory, Fort Rucker, Alabama
CPT Tamara Moreland,	PT clinician

	Blanchfield Army Community Hospital Warrior Resiliency and Recovery Center Ft. Campbell, KY
Jenny Owens, OTD, OTR	OT clinician Blanchfield Army Community Hospital Warrior Resiliency and Recovery Center Ft. Campbell, KY
Michelle Peterson, PT, DPT, NCS	PT clinician Minneapolis VA Medical Center, Minneapolis, Minnesota
Sonya Sconiers, DHA, MSPT, OTR/L	Proponency for Rehabilitation & Reintegration Falls Church, Virginia
Anne Shumway-Cook, PT, PhD	Professor (retired) University of Oregon
COL Barbara Springer, PT, PhD OCS, SCS	Director Proponency for Rehabilitation & Reintegration Falls Church, Virginia
LTC Matthew St Laurent	Assistant Chief Occupational Therapy Walter Reed Army Medical Center Washington, D.C
Kelly Thompson,	Line commander
Jake Turner	Line commander
Dr. David Twillie	Medical Director Blanchfield Army Community Hospital Warrior Resiliency and Recovery Center Ft. Campbell, KY
Robert Wellmont, PT, PhD, NCS	Associate Professor Widener University Chester, PA
COL Paul Whittaker, MD	Physician Fort Lewis, Washington
Tim Wolf, OTD, MSCI, OTR/L	Associate Professor Washington University St. Louis, MO
Anonymous (4)	

Appendix A-2: Structured Interview

AMMP Interview Script

- Hello, _____. This is _____ from the research team funded to develop the Combat Readiness Check[1]. Thanks in advance for scheduling this time to talk with me today.
- Before I ask you a few questions, let me give you some background on our project. As you know, to be safe and effective in combat and protect others, Soldiers must perform tasks that require motor behaviors, quick reactions, and the ability to simultaneously, continuously, and rapidly process information. Blast-related concussion potentially compromises Soldiers' ability to multi-task, a capacity that is essential to safety and mission-success. At present, there are few, if any, standardized procedures that quantify capacity for multi-tasking immediately after concussion in-theater or as a Soldier progresses toward return to duty in rehabilitation. To address this problem, we received funding to develop an assessment protocol (tentatively called the Combat Readiness Check). The CRC protocol will attempt to simulate some of the multi-tasking demands of the battlefield by requiring the Soldier to perform common military tasks under dual-task conditions. We believe that the CRC has the potential to improve return-to-duty decision-making and rehabilitation planning by providing a metric of Soldier status and progress over time, while avoiding the issues with over memorization inherent in current assessment protocols. The objective of Phase I of the project is to use expert military and civilian expertise to develop a testable combat readiness assessment protocol in order to ensure that evaluation tasks and methods of administration meet the needs of end users and ultimate decision makers, such as yourself. Phase II of the project will involve validating the protocol and collecting normative data on healthy troops and those with concussion.

- Do you have any questions about our project that I can try to answer before we begin?

- [INTERVIEW QUESTIONS BASED ON STAKEHOLDER GROUP]

[1] Note that the name adopted for the test is the Assessment of Military Multitasking Performance but the original verbiage used in the interview script is used in Appendix B to illustrate the actual interview content.

Stakeholder group	Goal of interview/kind of input we seek	Proposed questions
Dual task experts	Advice about potential tasks Critical considerations (to avoid, to keep in mind)	• We aim to develop a CRC protocol that has face validity to both soldiers and decision-makers by using common soldier tasks such as using visual signaling techniques, identifying topographic symbols on a military map, reacting to indirect fire. Procedures for common soldier tasks such as the ones mentioned are specified in detail in the Soldier's Manual of Common Tasks including how to set up an evaluation and "Go/No Go" ratings for each component. - Based on your experience and/or reading, can you give us some examples of complex dual-task combinations that have been tested for reliability and validity? - In your experience, what kinds of complex cognitive and motor tasks would be realistic options for measurement in a dual-task scenario? - Are there any principles we should keep in mind in selecting motor tasks? Are there any principles we should keep in mind in selecting cognitive tasks? - What are the limits of complexity that are possible for measurement? - What are the typical types of cost that are measured beyond time and number of errors? • Are there any pearls of wisdom or pitfalls to avoid that you might have about the types of tasks appropriate for dual task assessment with military overtones?

Stakeholder group	Goal of interview/kind of input we seek	Proposed questions
Functional – observational assessment test developers	Advice about operationalizing, establishing reliability/validity specific to safety assessments based on observation and ordinal levels of measurement	We would like to learn from your experiences regarding developing a reliable and valid functional assessment. What processes did you use to identify essential components/requirements of the tasks included in your functional assessment? [For example, for the EFPT, by what process did you choose these tasks as representative of executive functioning versus others?] Beyond speed and accuracy, we are interested in rating qualitative aspects of task performance. What observable qualitative aspects of task performance have you found to be a) relevant to safety and b) reliably rated by others and over time? *Follow-up: Were there any task performance aspects that you wish that you'd recorded/tracked but didn't?* To what extent did you weigh the trade off in various aspects of performance (ie accuracy over speed) and if so, how did you determine what was more important than something else? As you think back to the development of your functional assessment, what can you recommend to us about operationalizing observations and using ordinal levels of measurement to evaluate safety/functional performance?
Military leadership	Aim to keep them on-board with development and future implementation Understand where the CRC fits relative to broader policies,	To what extent will the concept of dual task or multi-task performance have face validity for those who will need to shepherd, advance, support its ultimate implementation? What can we do in the development process to optimize the likelihood that that the AMMP will provide helpful information and be adopted/incorporated into routine procedures once

Stakeholder group	Goal of interview/kind of input we seek	Proposed questions
	procedures, priorities	developed, validated? What other initiatives related to mTBI/return-to-duty decision making are underway that we need to know about to inform the protocol development? Who are the critical military stakeholders that the team should seek input from/keep informed as the CRC is developed? Is there anything else you think we should keep in mind when developing this assessment protocol? To what extent are you interested in following our progress? How do we keep you apprised of the project going forward?
Military researchers involved in return-to-duty issues	Critical benchmarks deemed critical to determining readiness to return to duty Information about any other efforts underway	Are you involved in or aware of any other efforts (including research efforts) to study issues related to return to duty following traumatic brain injury? (If so, please ask him/her to describe emphasizing the key issues) Are you involved in any working groups to study or re-evaluate return to duty standards? (if so, please ask him/her to describe the purpose/task of the group and key issues) What are the biggest issues involved with return-to-duty for military members who have had a traumatic brain injury – especially **concussion/mild traumatic brain injury**?

Stakeholder group	Goal of interview/kind of input we seek	Proposed questions
Therapists	What is currently used Critical specifications for test administration	What is your role in return-to duty decision making? How much input do you have in the ultimate decision? How are your OT/PT information and/or recommendations currently being used in return-to-duty decision-making? What tools (formal/informal) or observations do you use now that are critical to your reporting or recommendations regarding return to duty? Why? What do they tell you? Do you currently evaluate patients' ability to multi-task or perform more than one thing at the same time? If so, what kinds of tasks do you ask patients to perform? Are there critical or benchmark tasks that inform your return to duty recommendations? - If yes, what is the nature of these tasks? ADL/IADL? Duty? What tools are <u>available that you do not use</u> to determine return to duty? Why? For service members who are physically able, what are the common impairments that prevent them from returning to duty? What cognitive abilities do you think are critical for return to duty? How do you currently assess cognition?

Stakeholder group	Goal of interview/kind of input we seek	Proposed questions
		What types of social skills are critical for return to duty? How do you currently assess social skills? What types of distracters typically interfere with patients' performance? What administration requirements must the CRC meet in order to work in your clinical environment? - What is the maximum amount of time you have available to administer it? - How much space do you have available? What type of report/ display would be most helpful in a tool that assesses function: o Score with cut off per normal? o Score with association to specific duties?
Medical Board	How results will be used	Beyond the global recommendations of MDs/therapists etc., what data/information/assessment results from therapists are

Stakeholder group	Goal of interview/kind of input we seek	Proposed questions
	Critical specifications for how test results are reported, summarized, interpreted	

Stakeholder group	Goal of interview/kind of input we seek	Proposed questions
Line commanders	What happens now in-theater or in units for RTD? What functional/soldiering tasks are the key to successful return to duty?	What problems do soldiers with mild traumatic brain injury have as they go about their work? What do you look for to tell whether or not they are ready to go back to full duty? How do you know if they don't seem ready to go back to full duty? How do you use the information given to you from your medical officers to determine whether or not your soldier is ready to return to duty? What information would help you decide if they were ready? Do you want more information from the medical providers or simply a GO, NO GO? In your experience, what do you see as the indicators that a soldier is ready to return to duty after concussion? How can you tell that he/she is ready? Similarly, how do you know that the soldier is NOT ready? Can you give me a couple of examples *(probe for context of events)*? What are indicators/how can you tell? Can you give me an example of a time when you would override the medical officer's recommendation? Either case of returning someone to duty when the Solider is on a profile or not returning the Soldier to duty when he/she has been cleared by the medical officer.

[WRAP UP QUESTIONS ASKED OF ALL STAKEHOLDER GROUPS]

- What are the critical success factors or critical requirements for the CRC (the make-it or break-it elements) that are of particular priority to _____ (military leadership, medical board, therapists in military settings, researchers, line commanders)?

- As we attempt to optimize various aspects of the CRC protocol, we need to know what aspects of the assessment are of greatest priority to future users. Appreciating that all of these elements are important, I would like you to put the following 5 CRC requirements in rank order based on what you see as most important. By rank order, state which requirement is most important (#1), next most important (#2), etc. I will read these 5 requirements and they are also listed in the email we sent to confirm the date/time of this interview, if you want to review them.

  The CRC must be:

  ___ **repeatable (**It is not able to be memorized; be stable across raters and time)

  ___ **comprised of common soldier tasks** as opposed to a more generic task like walking (It has face validity to soldiers and decision-makers)

  ___ **interpreted based on norms**

  ___ **valid** (It is strongly related to theory and able to separate those how have mild traumatic brain injury from those who do not)

  ___ **meets logistical requirements** (It takes a short time to administer, costs little and involves few materials and little space)

- Is there someone else who you think we should make sure to talk with about this project?

- Thank you very much for taking the time to share your ideas with me today. If other suggestions come to mind after this phone call which you think would be important to this effort, please pass them along via a phone call or by email. [PROVIDE CONTACT INFORMATION.]

Appendix A-3:

Interview Transcript Analysis Template

Interviewee category/subject code:
Analyzed by:

Input on assessing readiness for return to duty after mTBI

Soldier characteristics, capacities, and performance abilities that decision-makers consider in forming return-to-duty decisions	mTBI –relevant body-structures/functions that the AMMP should challenge	Indicators that soldiers with mTBI are **not ready** to return to duty	Assessment methods that the interviewee now uses to assess return to duty after mTBI

Input on test construction: tasks, environment, person factors

Recommendations about the overall construction of the AMMP	Recommendations about **task composition** of the AMMP	Recommendations about **environmental factors** associated with the AMMP	Recommendations about qualifying **person factors** associated with the AMMP

Input on test construction: test development, measurement/metrics, instrumentation

Recommendations related to **psychometrics, measurement** aspects of the AMMP	Recommendations regarding **how results/findings of AMMP are reported**	Recommendations regarding **instrumentation of AMMP**	Other

Input on test dissemination and adoption

Recommendations or critical requirements related to **logistics of the AMMP (**materials, space requirements etc.)	Who are the key stakeholders that are central to widespread dissemination and adoption and how should we keep them engaged?	What can we do during the development/validation phase to optimize that the AMMP is adopted?	Other

Input regarding Phase II (Validation)

Finding soldiers and/or sites to participate in validation testing	Possible tasks/tests to use to validate AMMP	Possible partners for Phase II	Other

Miscellaneous

Are there other working groups examining return to duty issues?	Lessons learned elsewhere – what to steer clear of and/or what has worked well	Other	Other

Your synthesis of interviewee input regarding:

Assessing readiness for return to duty after mTBI –

Test construction: tasks, environment, person factors-

Test construction: test development, measurement/metrics, instrumentation –

Test dissemination and adoption –

Phase II (Validation) –

Anything else -

APPENDIX A-4: Data tables

Assessment of readiness for RTD after mTBI

Soldier characteristics, capacities, and performance abilities that decision-makers consider in forming return-to-duty decisions

Table 2.4 describes the themes for characteristics, capacities, and performance abilities that decision makers use in forming return to duty decisions. Multi-tasking, self-assessment and social skills had the highest counts. Interviewees contributing to these results were: Total(23): DTE(1), LC(3), MEB/PEB(3), MM(2), MML(4), NPSY(1), OTPT(8), RTDE(1).

Table 2.4 Characteristics, capacities and performance abilities considered

code	Count
Multi-tasking / dual task	4
Self assessment for readiness to return to duty	4
Social skills (maintain eye contact included)	4
Attention span	3
Executive function with emotional stability	3
Hand function (related to work duties and operation of a weapon)	2
Move ahead and visually track	2
Neuropsychological evaluation: transfer to real life is not clear	2
Physical fitness	2
Physical symptoms	2
Profile	2
Reaction time(muscle memory)	2
Soldier tasks	2
Task efficiency	2
Vision	2
Visual scanning	2

code	Count
Able to learn	1
Accomplish a list of tasks in order	1
Alteration in personality	1
Auditory processing	1
Background/history	1
Balance	1
Box 5 A-F on DD 3349	1
Chronicity of symptom/condition	1
Decision making	1
Decision making skills	1
Degree of combat stress	1
Don mask in 9 seconds	1
Driving: visual scanning while moving	1
Follow directions	1
Forgetting things?	1
Go/NO GO recommendation of PA	1
Headaches	1
Hearing	1
Higher level coordination	1
Irritability	1
Military Acute Concussion Assessment (MACE) scores	1
Map reading	1
Operate a weapon	1
Organizing	1
Performance on the Army Physical Fitness Test	1
Persistent cognitive	1

code	Count
Problem solving	1
PT assessment of weakness, muscle spasms	1
Post-Traumatic Stress Disorder (PTSD)	1
Put on Mission Oriented Protective Posture (MOPP) gear in 8 minutes	1
Running ability	1
SLP cognitive	1
Strategic planning	1
Symptom free	1
Use of assistive technology devices	1
Verbally express	1
Wear a rucksack	1

Relevant body structures/functions that the AMMP should challenge

Table 2.5 describes the themes for relevant body-structures/functions the AMMP should challenge. Balance/Vestibular function, cognitive components and attention/concentration had the highest counts. Two items suggest combining cognitive with motor and affective functioning. Interviewees contributing to these results were: Total(24): DTE(3), FAE(2), LC(1), MEBPEB(2), MM(2), MML(4), NPSY(1), OTPT(8), RTDE(1).

Table 2.5 Relevant body-structures/functions that the AMMP should challenge

Code	Count
Balance / Vestibular dysfunction	7
Cognitive components: i.e. memory, sequences, judgment, safety	7
Attention/concentration also with auditory distracters	7
Memory including procedural	4
Ability to multi-task / dual task	3
Affective and cognitive combined	3
Physical fitness	3

Code	Count
Sustain visual fixation	3
Ability to shift priorities and attention	2
Auditory processing difficulties	2
Executive function	2
Follow instructions(hear/understand/enact without repeating)	2
Motor and cognitive combined	2
Musculoskeletal	2
Problem solving, also under stress	2
Speed of processing information (i.e. scanning environment-judgment-process)	2
Stamina / fatigue (run, jump)	2
Symptom magnification	2
Ability to lift/carry	1
Alterations in personality	1
Behavioral issues	1
Challenge frontal lobe functions	1
Complete a list of tasks	1
For leaders: Take charge and give directions	1
Frustration/temperament level: i.e. take an order and not get upset	1
Headache	1
Mobility	1
Neuropsychological performance plus cognitive skills	1
Pain	1
Duty specific limitations	1
Range of motion	1
Reaction time	1

Code	Count
Response inhibition	1
Social skills	1
Soldier skills (evade the enemy)	1
Vision	1
Visual distraction	1
Visual scanning	1

Indicators that SM is not ready for RTD

Table 2.6 describes the themes for indicators of not ready for return to duty. Headaches had the highest count. Interviewees contributing to these results were: Total(19):FAE(1), LC(3), MEBPEB(3), MM(1), MML(3), NPSY(1), OTPT(7).

Table 2.6 Indicators that SM is not ready for return to duty

Code	Count
Headaches	7
Cognitive issues / Decreased cognitive flexibility	5
Inability to concentrate	5
Pain	5
Balance problems	4
Psychological Issues/Mental Inflexibility/Emotional Dysregulation	4
Cannot do soldiering skills	3
Memory problems	3
Visual impairment	3
Alteration in personality	2
Anxiety/Stress	2
Inability to manage anger and frustration	2
PTSD	2

Code	Count
Right brain deficits: impulsivity, poor judgment	2
Unable to follow instructions	2
Altered social skills	1
Auditory divided or alternating	1
Behavioral problems	1
Cannot do functional tasks	1
Can't maintain eye contact	1
Gaze instability (interferes with weapons use and running)	1
Hearing impairment	1
Inability to solve problems	1
Motivational issues	1
Musculoskeletal issues	1
No good method-all over the map	1
Not medically cleared	1
Physical symptoms	1
Poor sleep	1
Reactive to noise	1
Soldier reports unconscious when injured	1
Still working on strength and functional goals in OT/PT	1

Assessment methods currently in use

Table 2.7 describes the themes for assessment methods in use. Interviewees contributing to these results were: Total(29), DTE(2), FAE(1), LC(3), MEBPEB(3), MM(2), MML(7), NPSY(1), OTPT(9), RTDE(1).

Table 2.7 Assessments methods currently in use

Physical Assessments
Ambulation status
APFT(fitness test)
Balance Error Scoring System (BESS)
Balance Master (Computerized Dynamic Posturography)
Balance/coordination
Degree of combat stress,
Dizziness Handicap Inventory
Dynamic Gait Index
Dynamic visual acuity
Dynamic visual acuity and gaze stabilization
Dynavision: may add cognitive task
Endurance testing
Head Thrust test
Hearing screen
High Level Mobility Assessment Tool (HiMAT) PT examines balance and vestibular functioning before and after the patient performs vigorous combat simulations including tandem stance, sharpened Romberg, head thrust (head impulse test). She is looking for pre-post changes in functioning.
Jepson Hand Function test
Military Acute Concussion Assessment (MACE) <=25 NO GO until further assessment
Manual muscle testing
Medical clearance
Ocular motor reflexes
Neurocom
Physical Fitness Test
Posturography including the Sensory Organization Test (SOT), Motor Control Test, and Adaptation Test. If norms met and still complains add head shaking SOT (Neurocom)

Range of motion Rotational chair to examine vestibular ocular reflexes, gain phase, symmetry of reflexes Sleep quality Treadmill-20 minutes
Neuropsychological Testing
Automated Neuropsychological Assessment Measure (ANAM)   Neuropsycholgical interviews and 4-hour blocks of testing. Neuropsychological tests may be used to inform return to duty decisions including MMPI, TOMM (Test of Memory Malingering), Green Word Memory Test. Intelligence testing, WAIS, California Verbal Learning Test, Conners' Continuous Performance Test, Wisconsin Card Sort.
Functional Testing
Bouncing on large gym ball--> trampoline (moving head different planes) -simulates drop to the ground on one knee. Catches vestibular issues. Driving test actual/simulated (can require multi-tasking) Executive Function Performance test EST 2000 Engagement Skills Trainer(compare to baseline pre-injury) FATS (Firearms Training Simulator) to see how patient performs combat readiness skills Force projection system with training tasks timed(Humvee rollover simulator) Functional testing(get to appointments on time, take care of themselves) Geo-tracking using GPS IADL Knot tying-time, attention, frustration tolerance Land navigation tasks Map reading Obstacle courses Simulating combat situations "pretending that there's a guy on the rooftop but you have to carry your gear and full battle rattle and walk forward, side to side. So look right, look left and see if you can go through

the cone”. Trail making test Using an IPOD calendar Video incorporating judgmental shooting scenarios
Multi-Step / Dual Task
Multi-step performance/time Informally examine dual task such as balance while naming states Dual task(bouncing ball and answering questions)
Self Assessment and Other General Assessment
Ask if ready Past knowledge about soldier: lies, skills Check with non-commissioned officers: notice anything? Ask: Do you play video games at same level as pre-injury? Ask: Can you multi-task?
Other/Combinations
CAGE questionnaire(Alcohol use screen) Internet based test Supervisor notice-red/amber-green RBANS Veterans Administration worksheet for TBI MEB decides: combination of diagnosis, functional capabilities, neuropsychological testing: disability rating Ft. Campbell 5 week RTD program(10 events scored by OT, PT and mental health person, scoring is on 5 point scale) Combination testing; does a combination of vestibular screenings (Head Thrust Test, Head Shake Nystagmus Test, observes for spontaneous nystagmus); and balance testing (eyes closed – Romberg/sharpened Romberg and a Fukuda Step Test).

OT/PT/Case Manager
Two essential elements include a measure of symptom validity (Test of Memory Malingering, Green Word Memory Test, Victoria Symptom Validity Test) and mental health (MMPI) Case Manager assessment Canadian Occupational Performance Measure (COPM) OT/PT assessment Real life activities by OT/SLP: can be poor for combat readiness
Psychosocial Testing
Community re-integration skill (outing) Psychosocial skills assessed through observation on trips (bowling, etc.)
Cognitive Testing
Allen Cognitive Levels Test Cognistat Cognitive assessments may include – Weschsler Memory Scale; California Verbal Learning Test; Brief Visual Memory Test; PASAT; Wisconsin Card Sorting Cognitive tasks that Don McClellan (SLP, Mpls VA) has created a manual for – gradually increase complexity Example: Set up a cognitive dual task scenario – hold a # in mind, add a digit when they hear one stimulus, subtract when they hear another stimulus (PASAT) Rancho scale
Considerations
Allen Cognitive Test is not validated for TBI Need cognitive testing in addition to physical testing(I.e. give orders such as right face, right flank) Neuropsychological interviews and 4-hour blocks of testing x 2 better than OT/ST findings No formal assessments are currently done No tests for complex functions Only have tests for static abnormalities Self assessment concerns: May not be truthful, often too soon-provide some rest away from duty prior to

returning

Test construction: Tasks, environment, person factors

Overall construct

Table 2.8 describes the themes and aggregate counts for overall construct of the AMMP. The two themes with the highest counts for overall construct were: 1) common soldier tasks and 2) measure single task and then look at dual task interference.

Interviewees contributing to these results were: Total(27): DTE(4), FAE(2), LC(1), MEBPEB(3), MM(2), MML(6), NPSY(1), OTPT(7), RTDE(1).

Table 2.8 Overall construct

Theme	Count
Common soldier tasks	8
Measure single task(i.e. reaction time) first then look at dual task interference	6
Fast to administer	4
Incorporate cognitive element in physical tasks	3
Game: advantage of soldier not knowing what is being tested	2
How sensitive/specific must the test be?	2
Observational or cues allowed?	2
Repeatable	2
Tasks must have opportunity for error	2
Within and between task trade-offs	2
Cannot be memorized	1
Compare soldiers who had to be separated from Army to those who did not for concussion-identify abnormalities that are shared and not shared. Select a variety of multi-tasks that fit into identified categories of abnormalities.	1
Complex tasks	1
Evidence based	1
Format in simple binder	1
Gradually increase task complexity	1

Indicator of test fidelity (soldier not faking)	1
Instructions repeated: Allowed? Penalty if repeated?	1
Key is figuring out how to score and interpret the scores	1
Measure speed/accuracy	1
Model using Multiple Errands Test: patient is given instructions/rules and then they perform task-record performance parameters	1
Neurobehavioral tests do not relate well to real world performance	1
Outcomes of test(normal/abnormal) must correlate with success/failure in the environment based on stressors, teamwork, personnel	1
Precede task with exertion testing (i.e. sit-ups, treadmill)	1
Specific instructions (pictures, video)	1
Standardized script	1
Use ANAM for baseline	1
Use HARD primary and secondary tasks to discern subtle differences	1
Weapons simulator	1
Would recommend targeting the MOS most likely to have exposure to TBI – 11 Bravo (infantry) and choose tasks that are generalizable to all SMs	1

Task composition

Tables 2.9 A-C describe the themes and aggregate counts for task composition. Interviewees contributing to these results were: Total(25): DTE(4), FAE(1), MEBPEB(2), MM(2), MML(6), NPSY(1), OTPT(8), RTDE(1).

General task types are described in Table 2.9A. Common soldier tasks received the highest count.

Table 2.9A General task types

Theme	Count
Common soldier tasks	6
Multiple tasks with complex situations: initiate, organize and execute	4
Alertness: hear/understand/enact w/o repeating	2
Dynamic visual acuity tasks	2

Reaction time tasks with dual task condition	2
Tasks that require decision making	2
Attention /concentration task-not self report	1
Common requirements tasks	1
Consistent cognitive task that has face validity	1
Handling changes in plan and/or stimuli	1
Mobility tests	1
Multiple tasks incorporating levels of the Multiple Errands test – incorporating different cognitive demands, including prospective memory	1
Obstacle crossing tasks, walking, balance control	1
Operational decision making tasks using visual inputs	1
Physical fitness tasks with cognitive overlay	1
Serial subtraction tasks	1
Spatial orientation tasks	1
Task switching and maintain performance	1
Task to follow commands	1
Tasks from standardized physical fitness tests augmented with cognitive task	1
Tasks that require a specific sequence	1
Visual tracking task	1

Specific tasks are described in Table 2.9.B. Operating weapons and measuring accuracy and speed and complex walking tasks received the highest count.

Table 2.9.B Specific tasks

Theme	Count
Complex walking tasks, i.e. obstacles, signs with an R or L and an arrow>> <<, symbols not congruent, using a cell phone, walking a line	5
Operate weapons and measure accuracy and speed	5
Time to don MOPP and NBC gear	4

Theme	Count
Using a compass while orienteering and while on uneven surfaces	4
Map reading	3
Applying a tourniquet, managing an open chest wound	2
Assemble / disassemble a weapon	2
Pass the Army Performance Fitness Test (APFT)	2
Put a rucksack on and off	2
Running / pushups /sit-ups / single limb standing	2
Time to don a gas mask	2
Automated Neuro Psychological Measure (ANAM) tasks for dual task conditions	1
Attention Network Task	1
Carry a load	1
Dig trenches	1
Dual task using backward digit spans, months of year backwards or spelling backwards	1
For 'real life task' be in gear	1
Memory tasks for details, i.e. escape routes, different roads, maneuvers	1
Monitoring unclear images	1
Negotiating stairs	1
Physical profile items 5A-F	1
Reaction time/accuracy: Consider auditory Stroop for accuracy/reaction time	1
Safety checklist requiring order, i.e. read an instrument panel	1
Sensory conflict, use of infrared goggles at night, to identify visual conditions (friendly fire), (to continue vs. stop firing)	1
Transport a mock casualty	1
Treadmill with a secondary task, i.e. carry bag of popcorn/water, ripping tape off a roll	1

Theme	Count
Wii tasks	1

Table 2.9.C describes things to consider when selecting tasks. No item was repeated so aggregate counts are not applicable.

Table 2.9.C Task considerations

Theme
Ability to shift priorities / attention
Auditory Stroop may be too simple a task for persons with a concussion based on published study
Evaluate frustration level when given an order
Functional assessment more important than neuropsychological assessment
Interview officers and soldiers for recommendations for valid multi-tasking scenarios
Measure galvanic skin response
Measure heart rate/stress during tasks
Simple to complex tasks
Tasks should have a stressor component
Tolerance for ambiguity

Environmental factors

Table 2.10 describes the themes and aggregate counts for environmental factors. The theme with the highest count was visual and acoustic distracters, also identified for task components. The second theme, closer to real duty (combat) the better, was also identified for task components. Interviewees contributing to these results were: Total(17): DTE(3), FAE(2), MEBPEB(1), MM(1), MML(3), OTPT(6), RTDE(1).

Table 2.10 Environmental factors

Theme	Count
Visual and acoustic distracters	6
Closer to real duty(combat) the better	3

Theme	Count
Consider space requirements for administering AMMP	3
Environmental distractions/stressors important	2
Mobility task, increase complexity of environment	2
Adrenalin situation: smoke, changing in light condition, simulated explosion	1
Auditory distracters: noise from radio or TV; hammering; a machine that makes a lot of noise; phone ringing; people talking	1
Close quarters, i.e. striker's horizon seat cramped, multiple buttons and monitors and limited field of vision	1
Consider logistics of administering AMMP	1
Does not recommend simulating land navigation in a gym, would not be as challenging.	1
Environment can add to face validity	1
Gradually increase task complexity	1
In full gear	1
Inability to respond to threat	1
Interaction of instruction set and task demand	1
Obstacle avoidance	1
Relevance to function with increase in inclination angle	1
Selection of position to do a task safely	1
Simulate 'adrenalin' situation	1
Situational awareness with obscure information while driving/foot patrol	1
Space for physical capacity testing	1
Tasks that require a specific sequence to complete	1
Test can be replicated in different settings/environments	1
Use of gaming	1

Person factors

Table 2.11 describes the themes for person factors, meaning personal characteristics or attributes the impact RTD. No item was repeated so aggregate counts are not applicable. Interviewees contributing to these results were: Total(18): DTE(4), FAE(3), MEBPEB(1), MM(1), MML(3), NPSY(1), OTPT(4), RTDE(1).

Table 2.11 Person factors

Theme
Affective/behavioral vs.TBI based
Anxiety about their safety when returning to duty can impede progress
Army Warrior Tasks not practiced regularly by all soldiers
Can work in teams
Consider affective component such as a simulation that is combat like with a speed and accuracy component
Dealing with emotional dysregulation
Energy drink provided while on patrol-caffeine factor
Error rates more difficult to measure than reaction time
Evaluation of a task will be different depending on goal of assessment: if to go home then accuracy and safety is more important than speed or reaction time
Headaches
How comparable are autonomic responses to fear, anger and anxiety?
Include mental health measures
Language requirements
Many different skill sets for combat readiness
Marital concerns
Medications in use at time of test
Meta-cognition
Non-irritability
Operational decision making: Ensuring own survival
Operational decision making: Protect others
Operational decision making: Rapidity(friend/foe, fire/hold)

Theme
Personal interests
Postural problems become apparent only when forced into complex situations
Pre-morbid issues are related to cognition, attention and executive function
Quality of sleep
Takes order without needing it to be repeated
Tolerance for ambiguity
Tolerance for boredom
Understanding orders and respond correctly and quickly
Variability of persons with TBI is a challenge-quantifiable measure needed such as reaction time
Vestibular component

Test construction: test development, measurement/metrics, instrumentation

Psychometrics

Table 2.12 describes the themes and aggregate counts for psychometrics. Themes were categorized by: Psychometrics, Scoring and Components. The two themes with the highest counts for psychometrics were: 1) Validity and 2) Reliability. Interviewees contributing to these results were: Total(22): DTE(2), FAE(3), MEBPEB(3), MM(1), MML(5), NPSY(1), OTPT(6), RTDE(1)

Table 2.12 Psychometrics

Theme	Count
Psychometrics	
Validity	17
Reliability	8
Norms on healthy population	6
Sensitivity/Specificity	5
Face validity	4
Consistent administration-training manual	3
Correlation between sideline tests with gold standards	1

Theme	Count
Discriminant validity	1
Inter-rater reliability	1
Meets logistical requirements	1
Not necessary to discriminate mTBI from non-mTBI	1
Rasch analysis	1
Repeatability difficult because learns from first administration	1
Screening vs. predicted Return to Duty	1
Valid across Military Occupational Specialty(MOS)	1
Scoring	
Measure pre-deployment for comparison	3
Task scoring: Lose points depending on level of cues(none, gesture, verbal, instruction)	3
Response to cues/amount of cuing	2
Dual task norms: % decline	1
Error rates/Accuracy difficult to measure	1
Once task begins, examiner does not interact/ provide feedback	1
Pre-post with cutoff for entry	1
Reaction time	1
Response to rules during task instructions	1
Components	
Common tasks/relevant to Military Occupational Specialty (MOS)	3
For executive function: strategies used	1
Memory/concentration	1
Single task then dual task	1
Task prioritization	1

Reporting

Table 2.13 describes themes and aggregate counts for reporting the results of the AMMP. The two themes with the highest counts for reporting were: 1) recommendation for Go (refined as with or without limitations) or No Go, and 2) norms. Interviewees contributing to these results were: Total(20): FAE(3), LC(2), MEBPEB(3), MM(1), MML(3), OTPT(8).

Table 2.13 Reporting

Theme	Count
Items to Include	
Go /No Go, also a refined GO with limitations or without limitations	6
Norms reported	6
Cut-off scores	2
Normed scores	2
Observations of performance	2
Ordinal measures in which performance descriptors are operationalized	2
Acceptable scores	1
Affective and cognitive results reported	1
Associate with current profile	1
Cut-off score issues, handling of small differences from the cut-off	1
Personal baseline pre-deployment	1
Score associated with success for a specific duty	1
Time for timed tasks	1
What soldier can and can't do	1
Z-scores	1
Format	
Checklist	1
Integrate into MEDPROS	1
Scores within categories	1

Instrumentation

Table 2.14 describes themes for instrumentation related to the AMMP. No item was repeated so aggregate counts are not applicable. Interviewees contributing to these results were: Total(11): DTE(2), FAE(1), MEBPEB(2), MML(3), OTPT(2), RTDE(1).

Table 2.14 Instrumentation

Theme
Measure reaction time
Auditory Stroop test for accuracy and reaction time
Physical capacity testing(Treadmill)
Physical capacity testing (Push/Pull capacity testing (BTE Technologies^{TM})
Virtual Reality simulation to develop multi-tasking scenarios
Use SM tasks
Considerations
Avoid instrumentation if in theater
Center of Mass analysis may not make sense to someone in the field
General to cover large group but still applicable
Obstacle avoidance in dual task requires a lot of equipment that is not detectable visually
Rapid
Simple to do for any type provider
Validate clinical measure against lab based measure
Would tolerate cost of technology if proves to be a valid discriminator for return to duty

Test Dissemination / Adoption

Stakeholders

Table 2.15 describes the major categories of stakeholders and their aggregate counts. Interviewees contributing to these results were: Total (9): MEBPEB(1), MM(1), MML(4), OTPT(3). Interviewees suggested that 1) commanders and 2) persons responsible for making policy as the two major stakeholders whose endorsement was critical for test adoption.

Table 2.15 Stakeholders

Theme	Count
Commanders	5
Policy Persons (Medcom, Joint Staff)	3
Other experts	1
Therapists	2
Medical commanders	1
Soldiers	1
Families	1
Medical Board	1
Doctors	1

Adoption / Dissemination

Adoption and dissemination are merged in this analysis. Table 2.16 describes the themes and aggregate counts for adoption / dissemination. The three themes with the highest counts for adoption were: 1) easy setup requiring few materials that are easily stored in a closet, portable 2) short administration time of less than one hour (one interviewee indicated 15 minutes shown as a separate item) and 3) ability to administer in a small amount of space. Interviewees contributing to these results were: Total (21): DTE (2), FAE (1), MEBPEB (1), MML(7), OTPT(9), RTDE (1).

Table 2.16 Critical factors for adoption / dissemination of the AMMP

Theme	Count
Easy to set up, few materials, stored in a closet, portable	12
30 to 60 minutes	11
Ability to administer in a small amount of space	8
Validity of test	5
Ecologically valid elements, encompasses military norms / relevant tasks	4
2-3 hours over days is acceptable if it works	3
Clarity about the intended purpose, not diagnostic	2

Theme	Count
Easy to administer and score by a variety of disciplines / skills	2
Involve stakeholders / partners / policy makers in validation	2
Market to get buy-in of stakeholders	2
Able to document in the electronic medical record	1
Disseminate through Defense Veterans Brain Injury Center(DVBIC)/Defense Center of Excellence (DCOE)	1
Generic for all branches (Note-only Army now)	1
Less than 30 minutes	1
Low cost	1
No space requirement	1
Not stand-alone, nested within other tools	1
On-site training protocol available	1
Quick screen available	1
Require use by establishing metric of 90% use	1
Soon while urgent due to war situation	1
Stakeholders involved in development / OT-PT co-develop	1

Phase II Validation

Identification of test sites

Recommendations for identifying sites to test and validate the AMMP are described in Table 2.17. Interviewees contributing to these results were: Total (4): MML(3), OTPT(1).

Table 2.17 Identification of test sites

Sites
Bases with smaller hospitals
Involvement of OT doctoral students at San Antonio (new group begins in July)
Issue a tasking from MEDCOM up to FORSCOM

Large bases such as Fort Campbell, Fort Benning, Fort Bragg, Fort Hood
Recruitment
Identify deployed versus back in the United States Identify cycle: recuperation vs. training vs. readiness for return to duty Will need to have a civilian making contacts for recruitment so there isn't perceived coercion, for example, from a higher level officer

Tasks / Tests

An aggregate list of suggested tasks and tests is provided in Table 2.18. Some of the themes are repeats of themes from Table 2.9.B Specific tasks. Interviewees contributing to these results were: Total(12): DTE(1), MM(1), MML(3), NPSY(1), OTPT(5), RTDE(1).

Table 2.18 Task list

Common soldier tasks
Army Performance Fitness Test (APFT) Donning MOP gear EST 2000 Engagement Skills Trainer - laser rifle range. Shooting Steps that you take when your rifle jams Working a radio
Games / Simulations
1) Guitar Hero, 2) Belt – had to move torso to shine light on balls coming at you – hit number to add up to sum on screen. Distracter tasks: 1) state capitals, 2) simple math problems, 3) radio signal/conversation, 4) counting backwards by sevens Virtual reality at Center for the Intrepid VR combat simulations under development at Ft. Lewis
Other Validated Tests
Automated Neuro Psychological Measure (ANAM) DVBIC located in Tampa-postural sway

Dynavision – incorporating reaction time and visual scanning – could be done with dual-task conditions too Fort Campbell's Program Warrior Recovery and Resiliency Mobility Stroop test NeuroCom – they expect service members to get different raw scores based on their MOS (infantrymen have better balance than someone who sits behind a desk) Posturography – head shaking Sensory Organization Test (SOT) (conditions 2 [vision blocked, stable surface], 5 [vision blocked, unstable surface]) – sometimes the only way symptoms are picked up in higher functioning Service members
Signal technology – Brain Acoustic monitor – EEG responses to stimuli as an indicator of TBI
Other
3-person team assessment on various context-rich tasks Functional activities Something that incorporates dynamic movement/dual-task. Test on soldiers that do not have medical problems to establish normal

Possible partnering sites

Suggestions for possible partnering sites are described in Table 2.19. (Names of potential partnering individuals are not included in this report.) Few if any items were repeated so aggregate counts are not applicable. Interviewees contributing to these results were: Total(16): DTE(3), FAE(1), MEBPEB(1), MM(1), MML(5), NPSY(1), OTPT(4).

Table 2.19 Possible Partnering Sites

Sites - Units
Warrior Transition Units OT community in Army active and reserve may have more TBI experience Ft. Campbell could be a very important partner in the validation phase because of the highly contextually relevant tasks, the common interests, and their interest in a long term validation/follow-up on the outcomes of their own program. Ft. Lewis, National Center for Telehealth and Technology (Greg Gahm, PhD) Ft. Detrick: has groups of soldiers they bring in to test Ft. Carson

Ft. Rucker
San Antonio
Soldiers at military training facilities
VA OTs, neuropsychologists, speech therapists
Defense Centers of Excellence
Center for the Intrepid
Signal Technology
DCoE (MRMC staff)
DVBIC

Miscellaneous

Table 2.20 describes observations of interviewees regarding what works/ doesn't work. Interviewees contributing to these results were: Total(10): DTE(2), MEBPEB(1), MML(4), OTPT(2), RTDE(1).

Table 2.20 What Works/ Doesn't Work

Theme
Awareness of communication problems can indicate not ready for RTD
Baseline norm needed as a reference
Can be difficult to get patients for the study to test / validate the tool
Computer program for data reduction can help in scoring and evaluation
Current OT/PT assessments are too easy
Does not believe that people multi-task
Does not use Allen Cognitive Levels (ACL) leather lacing assessment
Does not use Allen Cognitive Levels because of ceiling problem
Farther away from basic training, the less facile at tasks not in your MOS – NEED PRACTICE PRIOR TO TESTING (hrs)
To be determined based on knowing what the final use of the AMMP will be
MACE may have a ceiling problem
Mark out lanes (OT,PT, Speech, Neuropsychology) but encourage all professionals to use the tool
Pros and cons of test administrators (OT/PT/PA vs. Medic/NCO)

Quality will result in embracing the test, higher ups will force use Soldiers are reluctant to participate during down time for money because they have to take a leave Soldiers max-out even when unimpaired

APPENDIX B

PROPOSED ASSESSMENT TASKS COMPRISING AMMP VERSION 1.0

PROPOSED ASSESSMENT TASKS COMPRISING AMMP VERSION 1.0

An iterative process was used to develop a set of dual tasks and multitasks comprising the AMMP. At the end of the one-year project, the AMMP consists of existing dual-task combinations (Ilinois Agility Test-Digit Span Dual Task and the Della-Salla Dual Task) and newly-developed dual task and multitask scenarios. The newly-developed task scenarios (indicated by * below) were developed based on existing measures of mTBI-related vulnerabilities and have features (e.g., instructions, supplies) that are aligned with military tasks and contexts.

Task type	Task description
Multitask scenarios*	Shipping Task requires establishing a work plan to efficiently pack of cartons by weight capacity
	Duty Roster task requires scheduling staff duty while monitoring a recording of a staff meeting and noting what is relevant to specific unit
	Run-Roll-Shoot task requires running, rolling, obstacle avoidance, and aiming at visual targets.
	Rucksack packing task requires packing a rucksack from a list of items with phone call interruption
	SALUTE task requires collecting visual and auditory information while under physical exertion
Dual-task scenarios*	Step Initiation-Stroop dual task
	Load Magazine/Listen dual task
Existing dual task assessment combinations	Illinois Agility Test[2]-Digit span dual task
	Della-Salla Dual Task [3](Pencil & Paper Task)

The newly-developed tasks comprising the AMMP are now described in the order listed on the above table. Each description involves a face sheet (summarizing the task), task instructions, materials packet including scoring sheet. These tasks will be further refined during the proposed follow-on phase of test development and validation.

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[2] Getchell B. Physical Fitness: A Way of Life, 2nd ed. New York: John Wiley and Sons, Inc., 1979.

[3] Baddeley, Della Salla, Gray, Papagno, & Spinnler. 1997 *Testing central executive functioning with a pencil-and-paper test*. In Rabbit. P. (Ed), Methodology of Frontal and executive function. Psychology Press. pp. 61-80.

MULTI-TASK SCENARIO: PACKING-SHIPPING

Purpose: This task provides an opportunity to observe and quantify how a SM with mTBI approaches an unstructured complex task when only task parameters and outcome are specified.

Description: The SM is challenged to develop a plan that minimizes his/her trips to 3 task-specific work areas as he/she pack items for shipping in appropriate boxes based on total weight of the items on 3 packing lists.

Primary task challenges: The primary mTBI-related cognitive demands include executive functions (foresight/planning/inhibition) and prospective memory (event and time-based. The primary motor demands include bending, lifting, carrying.

Operational definitions of scoring metrics:

Performance efficiency: # of transits between Work Areas once SM has left the Neutral Zone after task instructions/preplanning (transit from NZ to first work area is not counted)

Task completion: Total # of correct sub-task components performed minus total # items packed that were not on the list (errors of commission)

Amount of preplanning time: After receiving task instructions and answers to all task-related questions and being invited to spend time thinking about his/her approach to the task, the amount of time (minutes/second) that the SM spent in Neutral Zone before proceeding to the first Work Area (Packing Area, Box Storage Area, Shipping Area).

Rule breaks: total # of instances in which the SM breaks 2 rules during task performance and requires re-direction

Time:

Preparation: 30 minutes to assemble packing items; tape Task Areas

Set-up/take down: 5 minutes to position/take-down boxes, signs, laminated labels, to-be-packed items, scale, and office supplies (calculator, paper/clipboard, pencil)

Task instructions/administration: 10 – 20 minutes

Scoring: 5 minutes

Source: Multiple Errands Test-Simplified Version (Alderman et al., 2003)

Alderman, N., Burgess, P.W., Knight, C., & Henman, C. (2003). Ecological validity of a simplified version of the multiple errands test. Journal of the International Neuropsychological Society, 9, 31-44.

TASK SET UP AND ADMINISTRATION MATERIALS/SUPPLIES

Task set-up:

- Designate 3 areas of existing clinical space as task-specific areas (Packing Area, Box Storage Area, Shipping Area). The rest of the clinical space is designated as a Neutral Zone (NZ).
- Each area has at least a 6' x 6' area; mark off each task-specific area perimeter with 2" wide masking task.
- Post signs at a height ~ 5 feet from floor to identify task-specific area locations.
- Position task materials in task-specific areas as specified below.

Materials for test administration:

Packing area (PA)

- 8" x 11.5" sign on brightly colored paper with PACKING AREA in 72 pt font*
- Counter or table that is approximately 54" in length
- Packing lists* for LTC X, MAJ Y, SGT A
- A large box containing items to be packed (see packing lists) and 6 foils
- Scale situated on a table or counter
- Laminated premade packing labels* corresponding to the 3 packing lists
- Tablet/clipboard/pencil
- Calculator
- Cart

Box storage area (BSA)

- 8" x 11.5" sign on brightly colored paper with BOX STORAGE AREA in 72 pt font*
- 5 re-assembled cardboard boxes with bursting strength labels* affixed to the bottom of each box
- Sign with box bursting strength guidelines* - 8" x 11.5" brightly colored paper with text in 24 pt font

Shipping area (SA)

- 8" x 11.5" sign on brightly colored paper with SHIPPING AREA in 72 pt font*
- Counter or table that is approximately 40" in length
- Sign with pick-up times - 8" x 11.5" brightly colored paper with text in 24 pt font*
- Clearly marked spots for FedX, UPS, internal pickup*

Issued to SM: Task instructions handout *(which includes task rules and fill-in-the-blank section for information to collect during task performance)

Used by examiner for performance measurement:

- Clipboard/paper/pencil
- Stopwatch
- Score sheet*

* These materials are in the Shipping Task Materials Packet

SM TASK INSTRUCTIONS

Examiner instructions:

1. Brief soldier regarding task instructions in the Neutral Zone (NZ). Provide him/her with Task Instructions Handout.

2. Orient the soldier to the work station locations – Packing Area, Box Storage Area, Shipping Area; walk with SM to identify each area.

3. Ask SM to restate his/her understanding of the task instructions; clarify and answer all questions.

4. Tell the SM to take whatever time he/she needs in the Neutral Zone to get organized for the task.

5. Tell the SM that you will begin timing his/her performance when he/she enters the first work area (Packing, Box, Shipping).

6. Observe performance from NZ, tallying transits, rule breaks, and sub-task completions.

> Note: The SM is not allowed to break either of the 2 task rules. If he/she attempts to pack items in the Box or Shipping Area, redirect him/her to the Packing Area and note a rule break. If he/she initiates conversation, remind him/her of the rule and note a rule break.

7. Stop after 20 minutes, if task not completed.

Instructions provided to the SM:

[Task instructions]

Your job is to pack 3 boxes for shipping while making as few transits between work stations as possible.

All the materials and items you need to complete this job are within this work space. You can use all materials, supplies, or equipment located within the 3 work areas.

Please do the following:

- Pack for FedX pickup LTC X's supplies.
- Pack for UPS pickup MAJ Y's supplies.
- Pack for internal pickup SGT A's supplies.
- Select boxes for each packing list based on the total weight of objects to be shipped and the bursting strength standards of the available boxes.
- Report to me when LTC X's items are ready for pick up.
- Label all boxes for pickup by placing the packing labels underneath each box once positioned in pick-up location.

- Tell me the time 10 minutes after you start this task.
- Place all boxes in the correct shipping/pick-up locations.
- Report to me when you have completed this exercise.
- Obtain the following information:

    What is the maximum weight for Box Type 150?_____

    What is the shipping zip code for LTC X? _____

    What time is the next pick-up time for MAJ Y's package? _____

[Task rules]
You must follow these rules when you perform this task:

- Assemble materials/pack only in the PACKING AREA.
- Once you begin the task, you must not speak with anyone until it is completed.

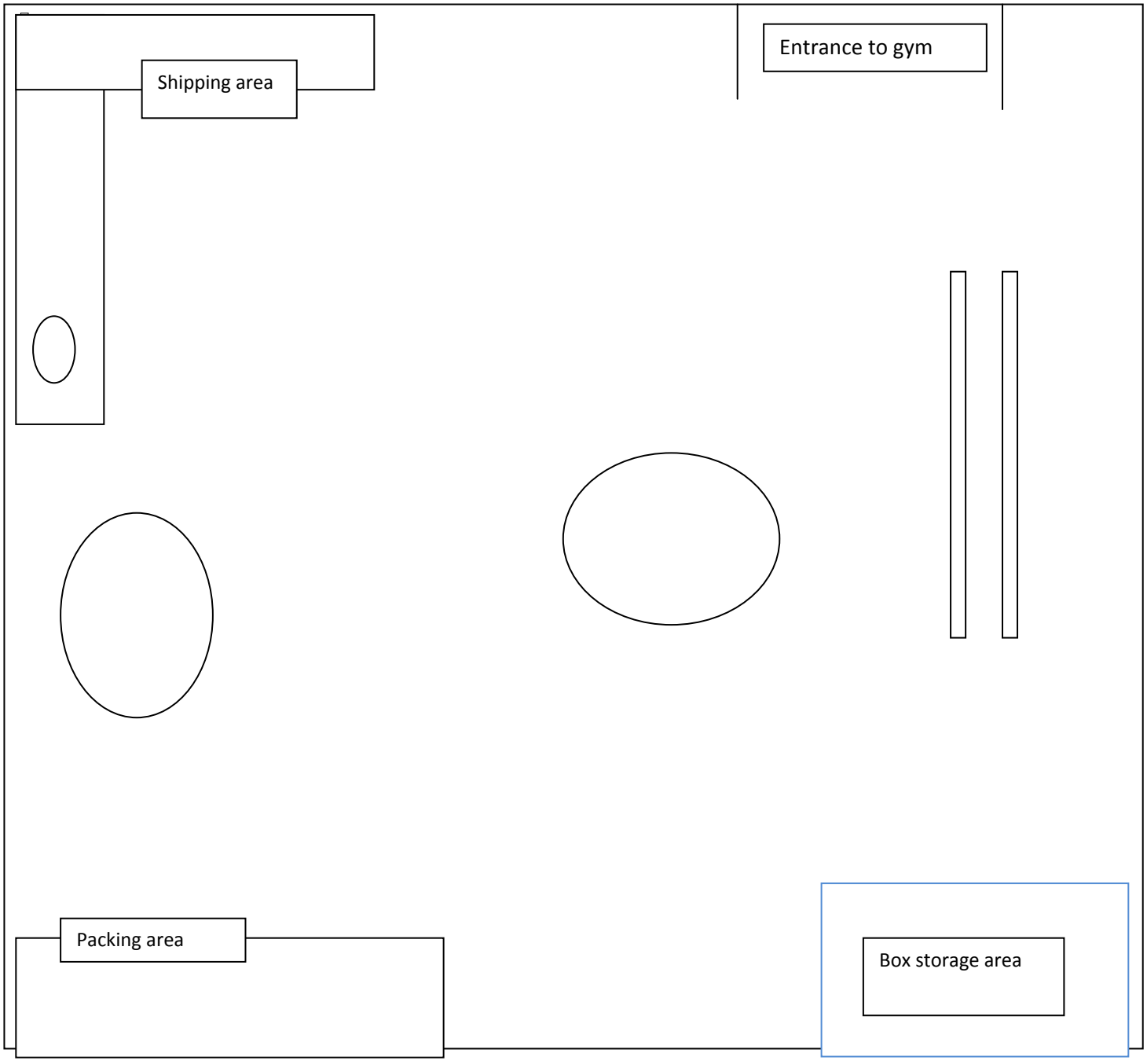
[Task verification]
Now, repeat back to me your understanding of what you are supposed to do (using your Handout as needed).
Remember, you can take whatever time you need to get organize your approach to this task here in the Neutral Zone. Once you enter one of the Task Areas, I will start timing your performance.

Do you have any further question before we begin?

Once the SM answers "NO" to this question, start the timer to begin timing length of pre-planning time. As soon as the SM moves from NZ to a Work Area, stop timer and record length of preplanning time.

Immediately restart timer to begin timing task performance.

Example of how the task scenario might be set up in a clinical space



SHIPPING TASK MATERIALS PACKET

- Shipping Task Instruction Handout
- Scoring sheet
- Packing lists
- Signs and shipping location designations
- Box strength labels
- Shipping labels

PACKING-SHIPPING TASK INSTRUCTIONS HANDOUT

Your job is to pack 3 boxes for shipping while following all task rules and while making as few transits between work stations as possible. This means that we want you to come up with a plan to complete this task as efficiently as possible.

All the materials and items you need to complete this job are within this work space. You can use any materials, supplies, or equipment located within the Packing, Shipping, Box Storage areas to complete this task.

Please do the following:

- Pack for FedX pickup LTC X's supplies.
- Pack for UPS pickup MAJ Y's supplies.
- Pack for internal pickup SGT A's supplies.
- Select boxes for each packing list based on the total weight of objects to be shipped and the bursting strength requirements of the available boxes.
- Report to me when LTC X's items are ready for pick up.
- Label all boxes for pickup by placing the packing labels underneath each box once positioned in pick-up location.
- Tell me the time 10 minutes after you start this exercise.
- Place all boxes in the correct shipping/pick-up locations.
- Report to me when you have completed this exercise.
- Obtain the following information:

  What is the maximum weight for Box Type 150?_____

  What is the shipping zip code for LTC X? _____

  What time is the next pick-up time for MAJ Y's package? _____

You must follow these rules when you perform this task:

- Assemble materials/pack only in the PACKING AREA.
- Once you begin the task, you must not speak with anyone until it is completed.

SHIPPING TASK SCORE SHEET

EVIDENCE OF PRE-PLANNING

Operational definition: After receiving task instructions and answers to all task-related questions and being invited to spend time thinking about his/her approach to the task, the amount of time (minutes/second) that the SM spent in Neutral Zone before proceeding to the first Work Area (Packing Area, Box Storage Area, Shipping Area).

Amount of time devoted to pre-planning (in minutes/seconds):____

PERFORMANCE EFFICIENCY

Operational definition: # of transits between Work Areas once SM has left the Neutral Zone after task instructions/preplanning (transit from NZ to first work area is not counted)

Hash marks (1 for each transit):

Total # of transits between Work Areas:_____

RULE BREAKS

Operational definition: total # of instances in which the SM breaks 2 rules during task performance and requires re-direction

Rules	Hash-marks representing observed instances of rule-breaks	# of rule breaks
Pack boxes only in the Packing Area		
Once I have answered all of your questions about this task, you must not speak with anyone until it is completed.		
TOTAL		

TASK COMPLETION

Overall task completion:

___ SM completed the task (see subtask score below)

___ SM did not complete the task because the task was stopped due to time

___ SM chose not to complete the task

Specify reason:_____

Sub task completion:

Operational definition: Total # of correct sub-task components performed minus total # items packed that were not on the list (errors of commission)

Civilian Version

Sub-task	**Sub-task component**	**Correct performance**	**Observed performance**	
			YES	Error of commission
Pack box for LTC X	Box selection	Selected box with bursting test strength of 125		
	Items in box	1 – brick		
		1 – brick		
		1 -large bottle of grape juice		
		1- iron		
		1-19mm wrench		
		1-C clamp		
		Other:		
		Other:		
	Placement for shipping	Delivered to Shipping Area		
		Placed in area designated for FED EX Pick-up		
	Shipping label	Selected label to TBI program at Mpls VA Hospital		
		Placed label under packed box when positioned in Shipping Area		
Pack box for	Box selection	Selected box with bursting		

MAJ Y		test strength of 75		
	Items in box	1 box of sandpaper		
		1 box of sandpaper		
		1 – 50 pack of dowels		
		1 – plastic basket		
		1 – hammer		
		1 - box Oxydol		
		Other:		
		Other:		
	Placement for shipping	Delivered to Shipping Area		
		Placed in area designated for UPS Pick-up		
	Shipping label	Selected label to Warrior Recovery & Resiliency Center		
		Placed label under packed box when positioned in Shipping Area		
Pack box for SGT A	Box selection	Selected box with bursting test strength of 50		
	Items in box	1 – large coffee mug		
		1 – 4 pack of toilet paper		
		1 – box of tissues		
		1 – rolled up wire		
		1 – 17 mm wrench		
		Other:		
		Other:		
	Placement for shipping	Delivered to Shipping Area		
		Placed in area designated for		

		Internal Pick-up		
	Shipping label	Selected label to Internal destination		
		Placed label under packed box when positioned in Shipping Area		
Prospective memory tasks	Tell me the time 10 minutes after you start this exercise			
	Report to me when you have completed this exercise			
	Report to me when LTC X's items are ready for pick-up			
Obtain the following information:	Maximum weight for Box Type 150	25 lbs.		
	Shipping zip code for LTC X	55417		
	Next pick-up time for MAJ Y's package	[Filled in by examiner based on actual time of testing]		
SCORING		# of sub tasks completed	/38	
		# of errors of commission		
		TOTAL task completion score (# sub tasks completed minus # of errors of commission)		

QUALITATIVE OBSERVATIONS OF PERFORMANCE:

Operational definitions	Examiner observations
Instruction taking/retention: __ # of times task instructions needed to be repeated/clarified during initial presentation of task instructions __# of times task instructions needed to be repeated/clarified during task performance	
Scanning/vestibular/balance: __ Turns: Eyes turn, head held immobile	

__ Turns: Head & body turn as one unit logroll) __Turns: Slowed __Movement into/out of squat: Slowed __Verbal complaint of dizziness __Stabilizes by hand on table/counter surface	
Pain Behaviors[4]: ___Guarding ___ Arrhythmic breathing ___Bracing ___Negative Vocalizations ___Grimacing ___Fidgeting ___Stretching ___Rigidity ___ Rubbing (active/passive)	
Frustration: SM statements or behaviors suggestive of his/her annoyance, discouragement, dissatisfaction with the task or performance	
Other (specify):	

Self-appraisal of performance:

"How do you think you did on this activity?" [Record SM's response]

"What would you do differently if you were given this task again?" [Record SM's response]

[4] Primarily based upon McDaniel, Anderson, Bradley, Young, Turner, Agudelo, & Keefe (1986). Development of an observation method for assessing pain behavior in rheumatoid arthritis patients. *Pain, 24*, 165-184.

Examiner's list

Items to pack		Weight of items
LTC X's Packing List (Civilian Version)		
2 – bricks		7 lbs.
1 – C-clamp	2.75	
1- large bottle of Grape Juice	4	
1 – iron	2.75	
1- 19mm wrench	.25	
		16.75 lbs.
MAJ Y's Packing List		
2 – boxes of sandpaper	2	
1 – 50-pack of dowels	1.75	
1 – plastic basket	.5	
1- hammer		1.5
1 – box Oxydol	3.5	
		9.5 lbs.
SGT A's Packing List		
1- large coffee mug	1.5	
1- 4-pk of toilet paper	.75	
1- box of tissues	.75	
1- rolled up wire	1.25	
1 – 17 mm wrench	.25	
		4.5 lbs.

LTC X's Packing List (Civilian Version)

FOR FED-EX PICK-UP

Ship to the TBI Program in the Minneapolis Polytrauma Network Site

Minneapolis, MN

2 – bricks

1 – C-clamp

1- large bottle of Grape Juice

1 – iron

1- 19mm wrench

MAJ Y's Packing List (Civilian Version)

FOR UPS PICK-UP

Ship to the Warrior Resiliency and Recovery Center

Fort Campbell, KY

2 – boxes of sandpaper

1 – 50-pack of dowels

1 – plastic basket

1- hammer

1 – box Oxydol

SGT A's Packing List (Civilian Version)

FOR INTERNAL PICK-UP

1- large coffee mug

1- 4-pk of toilet paper

1- box of tissues

1- rolled up wire

1 – 17 mm wrench

Sign posted in Box Storage Area

BOX SELECTION BASED ON BURSTING STRENGTH GUIDELINES

1 – Select the most appropriate box for your to-be-shipped items based on the total weight of box contents.

2- Check the bursting strength designation on the bottom of the boxes.

3- For each packing list, select a box type based on the total weight of the contents to be shipped. Select the box that has a bursting strength designation that is closest to but less than the total weight of contents to be shipped.

Maximum weight of content	Box type based on minimum bursting strength test
5 lbs	50
10 lbs	75
15 lbs	100
20 lbs	125
25 lbs	150
30 lbs	200

Shipping location designations for Shipping Area

FED EX PICK UP

UPS PICK UP

INTERNAL PICK UP

Sign to be posted in the Shipping Area

SHIPPING PICK UP TIMES

FED EX

MORNING PICKUPS	0830
	1000
	1130
AFTERNOON PICKUPS	1300
	1530
	1700

UPS

MORNING PICKUPS	0900
	1100
AFTERNOON PICKUPS	1400
	1730

Shipping labels

SHIP TO:

TBI program in the Minneapolis Polytrauma Network Site (TBI-PNS) Veterans Administration Hospital
One Veterans Drive
Minneapolis, MN 55417-2300

SHIP TO:

Warrior Resiliency and Recovery Center (WRRC)
Blanchfield Army Community Hospital
650 Joel Dr.
Ft. Campbell, KY 42223

SHIP TO:

Shipping & Receiving

Internal zip #13940

Box bursting strength labels

MULTI-TASK SCENARIO: CREATING A DUTY ROSTER WHILE MONITORING RADIO COMMUNICATION

Purpose: This task provides an opportunity to observe and quantify the SM's ability simultaneously perform and alternate between familiar tabletop tasks.

Description: The SM is challenged to complete a staff duty roster for a one-month period while a) monitoring an audio-recording of a Command staff meeting and writing down any information related to B CO 123rd IN (the hypothetical unit) and b) calling the Battalion Staff Duty for updates two times during the task (with at least 3 minutes in between each call).

Primary task challenges: The primary mTBI-related cognitive demands include divided and alternating attention, auditory processing, prospective memory, and mental flexibility. The task also places demands on visual scanning; there are minimal demands on mobility skills.

Operational definitions of primary scoring metrics:

Performance efficiency: Total amount of time needed to complete the task

Task completion: Total # of correct sub-task components performed minus total errors of commission) and minus total # of rule breaks

Time:

Preparation: 15 minutes for a one- time assembly of materials and supplies

Set-up/take down: 3-5 minutes

Task instructions/administration: 10 – 30 minutes

Scoring: 5-7 minutes (to score completed duty roster based on rules and subtask specifications)

Source: Complex Task Performance Assessment (Wolf et al., 2008)

Wolf TJ, Morrison T, Leonard M. (2008). Initial development of a work-related assessment of dysexecutive syndrome: The Complex Task Performance Assessment. *Work*, *31*, 221-228

TASK SET UP AND ADMINISTRATION MATERIALS/SUPPLIES

Task set-up:

- Designate a rectangular table as the primary work space, with a chair positioned on one side of the table for the SM and a chair on the opposite side of the table for the examiner.
- Position a small table to the right of the examiner so that he/she has easy access to other testing materials.

Materials for test administration:

Positioned on rectangular table:

- Calendar*
- Telephone
- Audio recorder (with unit meeting discussion)
- Pencil with eraser
- Blank sheets of paper
- Watch or stopwatch

Issued to SM:

Sealed large envelope with the following materials-

- Rule sheet*
- Duty roster template*
- List of important numbers (including Command)*
- Notebook

Used by examiner for performance measurement:

- Task directions (to be read to Soldier)
- Scoring sheet*
- Pencil for recording information
- Clipboard
- Stopwatch

* These materials are in the Duty Roster Materials Packet

SM TASK INSTRUCTIONS

Examiner instructions:

1. Brief soldier regarding task instructions after he or she is seated at the table in the work space.

2. Ask SM to restate his/her understanding of the task instructions; clarify and answer all questions. (See below.)

3. After all questions regarding the task have been asked and answered, place the sealed packet directly in front of the SM, state, "Go", and start the stopwatch.

4. Once the SM empties contents of the packet onto the table, begin playing the staff meeting audio-recording.

5. When the SM calls in for the first check-in, he/she receives an instruction change:

> "I have just received a message from the Command. Baker is in the hospital and cannot be on Staff during the first week."

6. Observe performance including sub-task completions and qualitative aspects of performance.

7. When the SM states, "Stop" or discontinues task performance, stop the stopwatch and record the performance time.

8. If the SM has not completed the task after 30 minutes, stop task performance.

Instructions provided to the SM:

[Task instructions]

For this activity I will ask you to complete two table top activities. I would like you to complete them as accurately and quickly as you can. When you are finished with the tasks let me know by saying, "STOP." You will be provided with all the instruction and materials needed to complete the activity before you begin. Do you have any questions so far?

You are serving a 24 hour staff duty shift. During this shift there are a number of tasks you must accomplish during the first thirty minutes. In addition to the tasks outlined, you must call and check in with Battalion Staff Duty 2 times, with your calls at least 3 minutes apart.

Here are the tasks you are to perform:

1. Complete the staff duty roster for November using 1SG's guidance. He needs this ASAP.
2. While completing the roster monitor the recording of the Command staff meeting for anything pertaining to B CO 123rd IN. Write down any information they discuss about our unit. [The name of the unit is specified on the duty roster.]

The tasks should be completed as accurately and quickly as possible.

[Task verification]

Do you understand the instructions I provided? [Y/N]

[If Yes] Please repeat the instructions as you understand them.
[Check all that are stated and repeat all that have not been identified by SM.]

___ Call and check in with Battalion Staff Duty 2 times during your work, with call at least 3 minutes apart.

____ Complete the staff duty roster for November according to1SG's guidance

____ Take notes on information about B CO 123rd IN from a recording of a meeting

____ Let you know when I am finished

[If the SM does not repeat all of the key instructions repeat them before moving on.]

On the table you will find many of the materials you will need to complete these tasks. In addition, this envelope contains specific instructions regarding the duty roster and the worksheets your command wishes you to use for this task. When I say begin you can open the envelope and start the activity.

Before we begin do you have any questions?

Go ahead and begin. [Start timer.]

DUTY ROSTER TASK MATERIALS PACKET

- 1SG's Duty Roster Guidance
- Duty Roster Sheet
- Monthly calendar
- Scoring sheet
- List of important numbers
- Script for Command staff meeting (to be audiorecorded)

1SG'S DUTY ROSTER GUIDANCE

- Make sure that 1 person is scheduled for staff duty each day, 7 days per week, for all 30 days.
- Only E5 or higher can pull Staff Duty on Saturday and Sunday.
- E7s, 8s, and 9s do not pull Staff Duty.
- No one can be scheduled for more than 2 weekend shifts during the month.
- PSGs do not pull Staff Duty.
- Each person must have at least 3 days off in-between pulling Staff Duty.
- Each person must be scheduled for staff duty at least 4 times during the month.
- Jones is on leave the 3rd-15th
- Parker is on leave the 10th-19th
- Jefferies is on leave the 20th-30th
- Rickers cannot have Staff Duty on Tuesdays or Thursdays.

DUTY ROSTER SHEET

Duty Roster																															
Month Day																															
Grade	Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
E6	Baker																														
E3	Jones																														
E5	Jefferies																														
E3	Michette																														
E4	Parker																														
E5	Rickers																														
E7	Slate																														
E4	Slone																														
E8	Tranton																														
E7	Valone																														
E5	Warren																														

November

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

DUTY ROSTER

SCORING WORKSHEET

PERFORMANCE EFFICIENCY

Operational definition: Total time needed to complete the duty roster task

Total task completion time:_____

RULE BREAKS

Rule	Operational definition of rule break	Count
Only E5 or higher can pull Staff Duty on Saturday and Sunday.	# of times that Jones, Michette, Parker, and/or Stone were scheduled on Saturday or Sunday	
E7s, 8s, and 9s do not pull Staff Duty.	# of times that Slate, (E7), Valone (E7), and/or Tranton (E8) were scheduled for staff duty	
No one can be scheduled for more than 2 weekend shifts during the month.	# of times SMs were scheduled for more than 2 weekend shifts	
Each person must have at least 3 days off in-between pulling Staff Duty.	# of times SMs had less than 3 days off in-between their shifts	
	Total # of rule breaks	

TASK COMPLETION

Overall task completion:

___ SM completed the task (see subtask score below)

___ SM did not complete the task because the task was stopped due to time

___ SM chose not to complete the task

Specify reason:_____

Sub task completion:

Operational definition: Total # of correct sub-task components performed minus total # items packed that were not on the list (errors of commission)

Sub-task	Sub-task component	Correct performance	Observed performance		
			Yes		Error of commission
Duty roster development	1 person is scheduled for staff duty each day, 7 days per week for 30 days *1 point [+] if there is 1 and only 1 person scheduled on a given day*		1	16	
			2	17	
			3	18	
			4	19	
			5	20	
			6	21	
			7	22	
			8	23	
			9	24	
			10	25	
			11	26	
			12	27	
			13	28	
			14	29	
			15	30	
		[Sub-total for 30days]			
	Parker is on leave the 10th – 19th	Parker is not scheduled for 10-19th			
	Jefferies is on leave the 20th – 30th	Jefferies is not scheduled for 20th- 30th			
	Jones is on leave the 3rd – 15th	Jones is not scheduled for 3rd – 15th			
	Rickers cannot have staff duty on	Week 1: Rickers is not scheduled for T or Th			

	Tuesdays or Thursdays	Week 2: Rickers is not scheduled for T or Th		
		Week 3: Rickers is not scheduled for T or Th		
		Week 4: Rickers is not scheduled for T or Th		
	Each person must be scheduled at least 4 times during the month	Baker is scheduled at least 4 times		
		Jones is scheduled at least 4 times		
		Jefferies is scheduled at least 4 times		
		Michette is scheduled at least 4 times		
		Parker is scheduled at least 4 times		
		Rickers is scheduled at least 4 times		
		Stone is scheduled at least 4 times		
		Warren is scheduled at least 4 times		
	Instruction change 3 minutes into task	Baker is not scheduled for Staff Duty during first week.		
Meeting monitoring	Write down information about B CO 123rd IN	Content 1: (Specify)		
		Content 2: (Specify)		
		Content 3: (Specify)		
		Other: Irrelevant content		
		Other: Irrelevant content		
		Other: Irrelevant content		
Prospective	Call and check in	Call -in #1		

memory	the Battalion Staff Duty 2 times during task performance (with at least 3 minutes in-between calls)	Call - in # 2		
		Call-ins beyond the 2 required		
	When finished with the assignment, tell me you are Done.			
SCORING	# of sub tasks completed			
	# of errors of commission			
	SUB-TASK SCORE		(1)	(2)
	SUB-TOTAL Total 1 – Total 2			
	MINUS THE TOTAL # OF RULE BREAKS			
	TASK COMPLETION SCORE			

QUALITATIVE OBSERVATIONS OF PERFORMANCE:

Operational definitions	Examiner observations
Instruction taking/retention: __ # of times task instructions needed to be repeated/clarified during initial presentation of task instructions __# of times task instructions needed to be repeated/clarified during task performance	
Pain Behaviors[5]: ___Guarding ___ Arrhythmic breathing	

[5] Primarily based upon McDaniel, Anderson, Bradley, Young, Turner, Agudelo, & Keefe (1986). Development of an observation method for assessing pain behavior in rheumatoid arthritis patients. *Pain, 24*, 165-184.

___Bracing ___Negative Vocalizations ___Grimacing ___Fidgeting ___Stretching ___Rigidity ___ Rubbing (active/passive)	
Frustration: SM statements or behaviors suggestive of his/her annoyance, discouragement, dissatisfaction with the task or performance	
Other (specify):	

Self-appraisal of performance:
"How do you think you did on this activity?" [Record SM's response]

"What would you do differently if you were given this task again?" [Record SM's response]

LIST OF IMPORTANT PHONE NUMBERS

[TO BE DEVELOPED]

SCRIPT FOR COMMAND STAFF MEETING

[TO BE DEVELOPED AND AUDIORECORDED]

MULTI-TASK SCENARIO: RUN-ROLL-SHOOT

Purpose: This task provides an opportunity to observe and quantify the SM's agility, speed, ability to find visual targets while he/she is still and moving, and his/her ability to initiate and inhibit responses based on the nature of visual stimuli.

Description: Using a T-shaped formation, the SM is required to do a 3-5 second rush toward a center marker, roll to either the right or left based on visual instructions, find and call-out targets viewed in a simulated weapon (scope) and then repeat this sequence to ultimately return back to the start position. This constitutes 1 trial; the task in composed of 4 trials that involve 4 congruent/incongruent Stroop conditions (i.e., following instructions to roll to the left when an "R" appears on the screen).

Primary task challenges: The task challenges skills that are commonly affected by mild TBI and involve visual and vestibular function, two systems that interact for clear visual function in conditions where movement occurs. The task also requires decision making in response to visual information that requires inhibition of typical responses (Stroop effect).

Operational definitions of primary scoring metrics:
Performance efficiency: Total time to complete maneuver; Acceleration values for each segment of the trials

Task completion: Total subcomponents performed correctly (total subcomponents minus total errors - obstacles contacted, Stoop response, errors in identifying odd/even numbers)

Time:

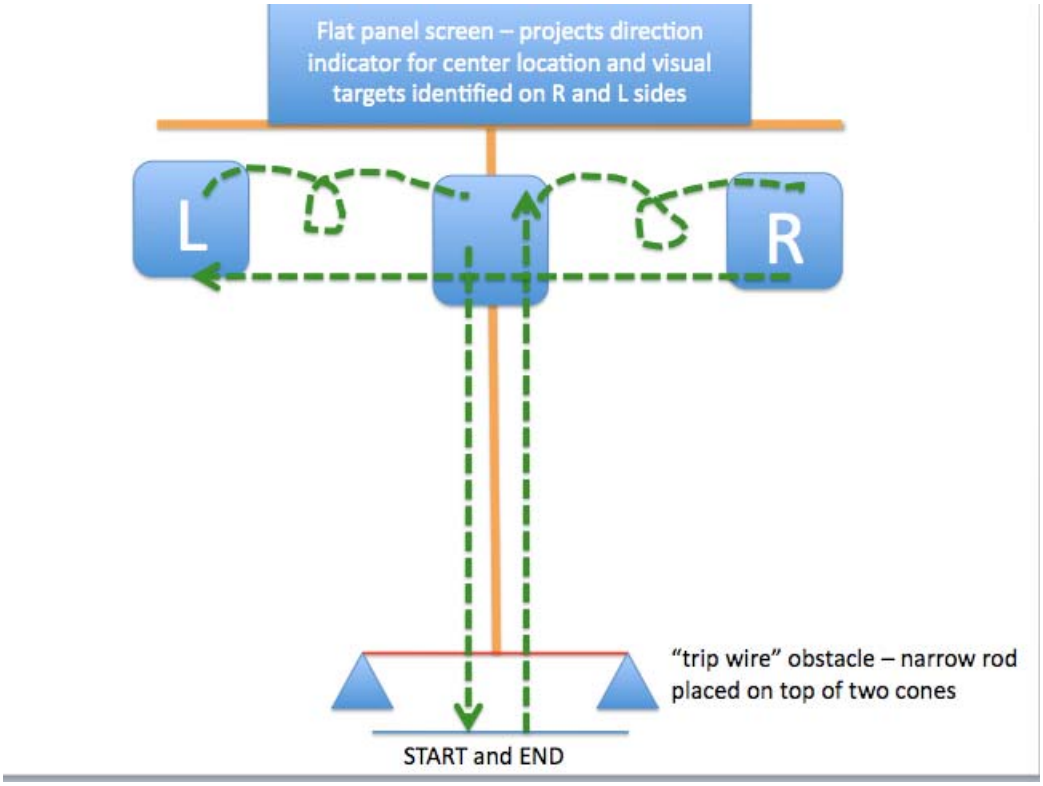
Set-up/take down: 5 minutes (presuming mobile or wall-mounted flat screen monitor)
Task instructions/administration: 5-10 minutes (including practice trial, applying accelerometer/sensor)
Scoring: 5 minutes

Source: This task is not modeled after an existing assessment protocol.

TASK SET UP AND ADMINISTRATION MATERIALS/SUPPLIES

Task set-up:

- Set up T-formation as depicted below.
- With masking tape, create X's at the Start/End line, at Center marker (10 feet from starting point), and at Right and Left locations (10 feet from Center marker).
- Position flat panel screen so that it is aligned with the Center marker - 3 feet outside of the T-formation and 5 feet from the floor (wall mounted or on a mobile stand).
- Create the "trip wire" by positioning 2 cones, 2 feet from the Starting point and 6 feet apart. Position a ½" diameter dowel (6 feet in length) so that it sits atop the cones.
- The computer is placed on a small table that is positioned outside of the T-formation.



Materials for test administration:

- Computer programmed to provide visual inputs (via PowerPoint) and to collect accelerometer data
- Flat panel monitor to project visual images during testing
- Remote control for examiner to change visual stimuli during testing
- Mock weapon with scope (to view visual stimuli)
- Obstacle ("trip wire"): 2 cones and ½" x 6 foot dowel
- Indicators on the floor in T position – indicating start, first landing position, and locations to right and left used during the maneuver
- Accelerometer/inertial sensor to measure head acceleration and peak velocity.

<u>In task-specific area:</u>

- Computer
- Flat panel monitor (on mobile stand or wall mounted)
- Remote control
- Obstacle

Issued to SM:

- Accelerometer/inertial sensor
- Mock weapon with scope

Used by examiner for performance measurement:

- Task directions (to be read to Soldier)
- Computer remote
- Scoring sheet
- Pencil for recording information
- Clipboard

SM TASK INSTRUCTIONS

Examiner instructions:

1. Brief soldier regarding task instructions.

2. Ask SM whether or not he/she understands the instructions; clarify and answer all questions. Have the SM verbal demonstrate comprehension of all tasks.

3. Position head accelerometer.

4. Ask SM to perform a practice run-through of the task. Answer any questions that result.

5. When all questions are resolved and the SM is ready, use the remote to advance computer so that the "Go" is seen on the flat screen panel.

Instructions provided to the SM:
[Task instructions]

- This test looks at your agility, speed and ability to find visual targets while you are still and moving. You should move as quickly as you can, but also make sure you are accurate with visual identification.
- See how the course is laid out in a T? You will begin at this end line facing the center of the T.
- When the computer indicates GO, move quickly stepping over this obstacle and perform a 3-5 second rush to land with your chest on the center marker.
- You will see a letter and arrow indicator in front of you. Roll in the direction the LETTER tells you to go. If you see an L, you will roll to the left arm of the T. If you see an R, you roll to the right arm of the T.
- After you roll, numbers will appear on the screen in the middle of the course. Look through the scope and say numbers out loud. Some times you'll look for odd numbers, other times even numbers – I'll let you know which for each time we try the task.
- When the screen goes blank, stand and quickly move to the opposite arm of the T onto your belly, and look for the numbers on the screen through your scope again. Call out the ones that you see as quickly as you can.
- When the screen goes blank, roll back to the center. Stand and move back to the starting point as quickly as you can.
- Remember to avoid the obstacle again on the way back. We will do this task a few times.

[Task verification]

- Do you understand the instructions I provided so far? [Y/N]

- Let's practice the steps once so you know how it will work. Then I'll give you instructions about your number target for the first trial.

[Have the SM perform a practice run of the task. Respond to questions/provide clarification as needed.]

[Just before task state the following:]

- So, remember, you're going to go forward to the center marker, look at the letter for which way to roll, find/call out targets, stand and move to the opposite arm of the "T", find/call out targets, roll back to the center of the T, then stand and move back to the start position. Do you have any questions? OK. Your targets for this trial are ____ (even or odd) numbers.

RUN-ROLL-SHOOT

SCORING WORKSHEET

PERFORMANCE EFFICIENCY

Operational definitions: a) time to complete maneuver; b) accelerations values for each segment of the trials

Trial #	Performance time
1	
2	
3	
4	
TOTAL TIME	

Trial #	Segment	Acceleration value
1	A	
	B	
	C	
	D	
2	A	
	B	
	C	
	D	
3	A	
	B	
	C	
	D	
4	A	
	B	

	C	
	D	

TASK COMPLETION

Overall task completion:

___ SM completed the task (see subtask score below)

___ SM did not complete the task because the task was stopped due to time

___ SM chose not to complete the task

Specify reason:_____

Sub task completion:

Operational definition: Total subcomponents performed correctly (total subcomponents minus total errors - obstacles contacted, Stoop response, errors in identifying odd/even numbers)

Sub-task	**Sub-task component**	**Correct performance**	**Observed performance**	
			Yes	**No (error)**
Trial 1	Starts task	Starts task in response to GO on screen		
	Obstacle avoidance	SM hurdles the obstacle without knocking off rod		
	Stroop response	Turns to direction of letter, not arrow		
	Visual target identification [congruent-incongruent stroop effect specified]	Verbalizes correct target 1 using scope		
		Verbalizes correct target 2 using scope		
		Verbalizes correct target 3 using scope		
		Verbalizes correct target 4 using scope		
	Moves to opposite end of T	When the screen goes blank, SM moves to opposite end of T		
	Visual target identification	Verbalizes correct target 1 using scope		
		Verbalizes correct target 2 using scope		

		Verbalizes correct target 3 using scope		
		Verbalizes correct target 4 using scope		
	Roll to center	When screen goes blank, SM rolls to center		
	Run to end	Stand and run toward end-line		
	Obstacle avoidance	SM hurdles the obstacle without knocking off rod		
Trial 2	Starts task	Starts task in response to GO on screen		
	Obstacle avoidance	SM hurdles the obstacle without knocking off rod		
	Stroop response	Turns to direction of letter, not arrow		
	Visual target identification [congruent-incongruent stroop effect specified]	Verbalizes correct target 1 using scope		
		Verbalizes correct target 2 using scope		
		Verbalizes correct target 3 using scope		
		Verbalizes correct target 4 using scope		
	Moves to opposite end of T	When the screen goes blank, SM moves to opposite end of T		
	Visual target identification	Verbalizes correct target 1 using scope		
		Verbalizes correct target 2 using scope		
		Verbalizes correct target 3 using scope		
		Verbalizes correct target 4 using scope		
	Roll to center	When screen goes blank, SM rolls to center		
	Run to end	Stand and run toward end-line		
	Obstacle avoidance	SM hurdles the obstacle without knocking off rod		
Trial 3	Starts task	Starts task in response to GO on screen		
	Obstacle avoidance	SM hurdles the obstacle without knocking off rod		

	Stroop response	Turns to direction of letter, not arrow		
	Visual target identification [congruent-incongruent stroop effect specified]	Verbalizes correct target 1 using scope		
		Verbalizes correct target 2 using scope		
		Verbalizes correct target 3 using scope		
		Verbalizes correct target 4 using scope		
	Moves to opposite end of T	When the screen goes blank, SM moves to opposite end of T		
	Visual target identification	Verbalizes correct target 1 using scope		
		Verbalizes correct target 2 using scope		
		Verbalizes correct target 3 using scope		
		Verbalizes correct target 4 using scope		
	Roll to center	When screen goes blank, SM rolls to center		
	Run to end	Stand and run toward end-line		
	Obstacle avoidance	SM hurdles the obstacle without knocking off rod		
Trial 4	Starts task	Starts task in response to GO on screen		
	Obstacle avoidance	SM hurdles the obstacle without knocking off rod		
	Stroop response	Turns to direction of letter, not arrow		
	Visual target identification [congruent-incongruent stroop effect specified]	Verbalizes correct target 1 using scope		
		Verbalizes correct target 2 using scope		
		Verbalizes correct target 3 using scope		
		Verbalizes correct target 4 using scope		
	Moves to opposite end of T	When the screen goes blank, SM moves to opposite end of T		

	Visual target identification	Verbalizes correct target 1 using scope		
		Verbalizes correct target 2 using scope		
		Verbalizes correct target 3 using scope		
		Verbalizes correct target 4 using scope		
	Roll to center	When screen goes blank, SM rolls to center		
	Run to end	Stand and run toward end-line		
	Obstacle avoidance	SM hurdles the obstacle without knocking off rod		
SCORING	# of sub tasks completed correctly			
	# of errors			
	TASK COMPLETION SCORE (correct subtasks)			

QUALITATIVE OBSERVATIONS OF PERFORMANCE:

Operational definitions	Examiner observations
Instruction taking/retention: __ # of times task instructions needed to be repeated/clarified during initial presentation of task instructions __# of times task instructions needed to be repeated/clarified during task performance	
Pain Behaviors[6]: ___Guarding ___ Arrhythmic breathing ___Bracing ___Negative Vocalizations ___Grimacing ___Fidgeting ___Stretching ___Rigidity ___ Rubbing (active/passive)	

[6] Primarily based upon McDaniel, Anderson, Bradley, Young, Turner, Agudelo, & Keefe (1986). Development of an observation method for assessing pain behavior in rheumatoid arthritis patients. *Pain, 24*, 165-184.

Frustration: SM statements or behaviors suggestive of his/her annoyance, discouragement, dissatisfaction with the task or performance	
SM complaints: Comments made by SM during task performance related to lack of visual acuity, symptoms of vertigo or dizziness, inability to accomplish fast position changes	
Other (specify):	

Self-appraisal of performance:
"How do you think you did on this activity?" [Record SM's response]

"What would you do differently if you were given this task again?" [Record SM's response]

MULTITASK SCENARIO: RUCKSACK PACKING-MESSAGE TAKING

Purpose: The task provides an opportunity to observe and quantify how a SM with mTBI alternates attention between two concurrent tasks (packing rucksack and answering telephone) and perseverance during a longer task.

Description: The SM is asked to use a list to pack a rucksack for a comrade, while responding to intermittent telephone messages. Items for packing are arrayed on and under two tables, with 2 items missing on each trial (varied across trials).

Primary task challenges: Cognitive demands are placed on alternating attention, response inhibition, and frustration control. The motor demands are standing with repeated bending, squatting, head turning, and reach-grasp-transport. Fine motor is limited to brief writing/printing.

Operational definition of scoring metrics:

Performance efficiency: The sum of the amount of time (to the nearest second) between putting message in message box and picking up the first item to pack after message taking (for all 4 messages).

Task completion: Total # of correct sub-task components performed minus total # items packed that were not on the list (errors of commission)

Rule breaks: total # of instances in which the SM breaks 4 rules during task performance and requires re-direction

Time:

Set up: 20 minutes to situate items in empty space
Task instructions/administration: 30 minutes
Scoring: 5 minutes
Take down: 10 minutes

Source: Naturalistic Action Test (Schwartz et al., 2002)

Schwartz, M. F., Segal, M., Veramonti, T., Ferraro, M., Buxbaum, L. J. (2002). The Naturalistic Action Test: A standardised assessment for everyday action impairment. *Neuropsychological Rehabilitation*, 12 (4), 311-339.

TASK SET UP AND ADMINISTRATION MATERIALS/SUPPLIES

Task set up:

- Set up 2 folding tables so that message table/counter is at least 5 feet from the end of packing tables.
- Create packing zone by taping a 3 x 5 ft rectangle between the between the packing tables. (The SM is to remain in the packing zone while packing the rucksack.)
- Position task materials in tables as specified below.
- Place a sheet over each table so that SM does not preview to-be-packed items.

Materials for test administration:

Phone message area:

Quantity	Item
1	Adapted telephone (fully automated, rings at each of 4 recorded messages). The automated phone rings at 1 minute after the SM starts the task and then for the final time (4/4) at 6 minutes into the task. The phone rings twice in-between. If the phone is not picked up by the 3rd ring, the ringing stops (and this is considered a missed message).
1	Electrical outlet (for adapted phone)
1	Message log (with page headings of date, time, person calling, mesg left for __) *
4	Sharpened pencils with erasers
1	Packet of 3x3" post-it notes
1	Message box
1	Small table

Rucksack packing area:

Quantity	Item
2	Pencils with eraser
1	Rucksack
2	Plastic templates for item layout
2	Folding tables (approximately 3ft x 6 ft)
2	Sheets (to cover materials until test starts)
1	Roll masking tape (to designate work area on floor)
1	Compass with case
6 boxes	M4 ammunition (labeled, sealed, weighted to represent ammunition)
4 boxes	M9 ammunition (labeled, sealed, weighted to represent ammunition)
1	Night Vision Goggles (NVG) or Global Positioning System (GPS)
5	Grenade pouches

5	MRE main courses
3	MRE side courses
3	MRE desserts
1	E-Tool & Case
1	First Aid Pouch
1	CamelBak
1	1 Quart Canteen
1	Waterproof bag
1	Brown Army Towel
1	Non-Govt. issue brown towel
1 pr	Goggles
1 pr	Non-military (personal) sunglasses
1 pr	Earplugs
1	Weapon cleaning kit with QTips and Pipe-cleaners
1	Handle section
4	Swab pads
1	Oil CLP-*top glued shut*
3	Rod sections
1	Bore brush
1	Chamber brush
1	Swab holder
1	“Toothbrush”
1	Metal rod similar to rod section without threading
1	Regular toothbrush
1	Helmet
1	Helmet cover
1 set	Helmet straps
1 set	Helmet pads
1	Night vision goggle mount
1 pr	Boots
3	t-shirts - White
3	t-shirts - Gray
5 pr	Socks
1	Wet Weather Gear Parka
1	Wet Weather Gear Trousers
1	Poncho liner
1 pr	Gloves - Black
1 pr	Gloves - Yellow work gloves
1	ACU Top - Black
1	ACU Bottom - Green
1	ACU Top - Green
1	ACU Bottom - Black
1	Cold Weather Jacket - Soft Shell Jacket R

1	Cold Weather Jacket - Soft Shell - trousers R Reg
1	Rank Insignia – Specialist
1	Rank Insignia PVT
1	Rank Insignia CPL
1	Rank Insignia SGT
1	Rank Insignia Staff SGT
1	Name tag: Jennings
1	Name tag: Fremming
1	Name tag: Jurinam
1	Name tag: Sullivan
6	Quarts Water
1	Can footpowder
1	tube tooth paste

Issued to SM: Packing list* on clipboard (pencils positioned near rucksack)

Used by examiner for performance measurement:

- Clipboard/pencils with erasers
- Stopwatch
- Scoring sheet*

* These materials are in the Rucksack-Message Task Materials Packet

SM TASK INSTRUCTIONS

Examiner instructions:

1. Prior to test administration/task instructions, both tables are covered with a sheet so that the SM does not preview the items to be packed.
2. Provide oral instructions to the SM as specified below.
3. Verify task comprehension as specified below.
4. Once all questions have been answered, state the following:
   Shut your eyes tightly.(Remove sheets covering tables) Begin when I say "Start". Work as fast as you can. Open your eyes. (Hand list to Service Member)…Start."
5. Stand where SM can be clearly observed. (Placement on the Set up Diagram is presumed optimal.)

Instructions provided to SM:

[Task instructions]

Your new commander has ordered that you pack a rucksack for Specialist Jennings stationed in FOB Bravo. At the same time, you must answer phone/radio messages. A ringing indicates when a message is waiting (demonstrate). You need to act in a calm efficient and speedy manner.

You must pack all of the items on this list, but only the items on this list. Pack the items in their order on the list. Items may be on or under the tables. Do not open items that are in sealed boxes or bags. (If there are unrelated items in the vicinity that are not part of the task, mark them with a black X.)

Items should be placed into the rucksack but not thrown into the rucksack.

Answer the messages as quickly as you can. Log the date and time that you received the message and the person calling. Write the message on a post-it. Write clearly enough for someone else to read it. Place the post-it in the Messages Box.

When you have completed the task say, "Done".

Tell me if an item or any part of an item is not present for packing, but your score will be reduced if you tell me that an item is missing when it is really here.

[Task rules]

You may **not** move the rucksack during the task.

You may only move an item when you are packing it.

While packing items, stay inside the taped area between the tables. Leave the taped area only to answer the ringing phone/radio.

Once you have started the task, do not seek help from another person.

Do not open items that are sealed in boxes or bags.

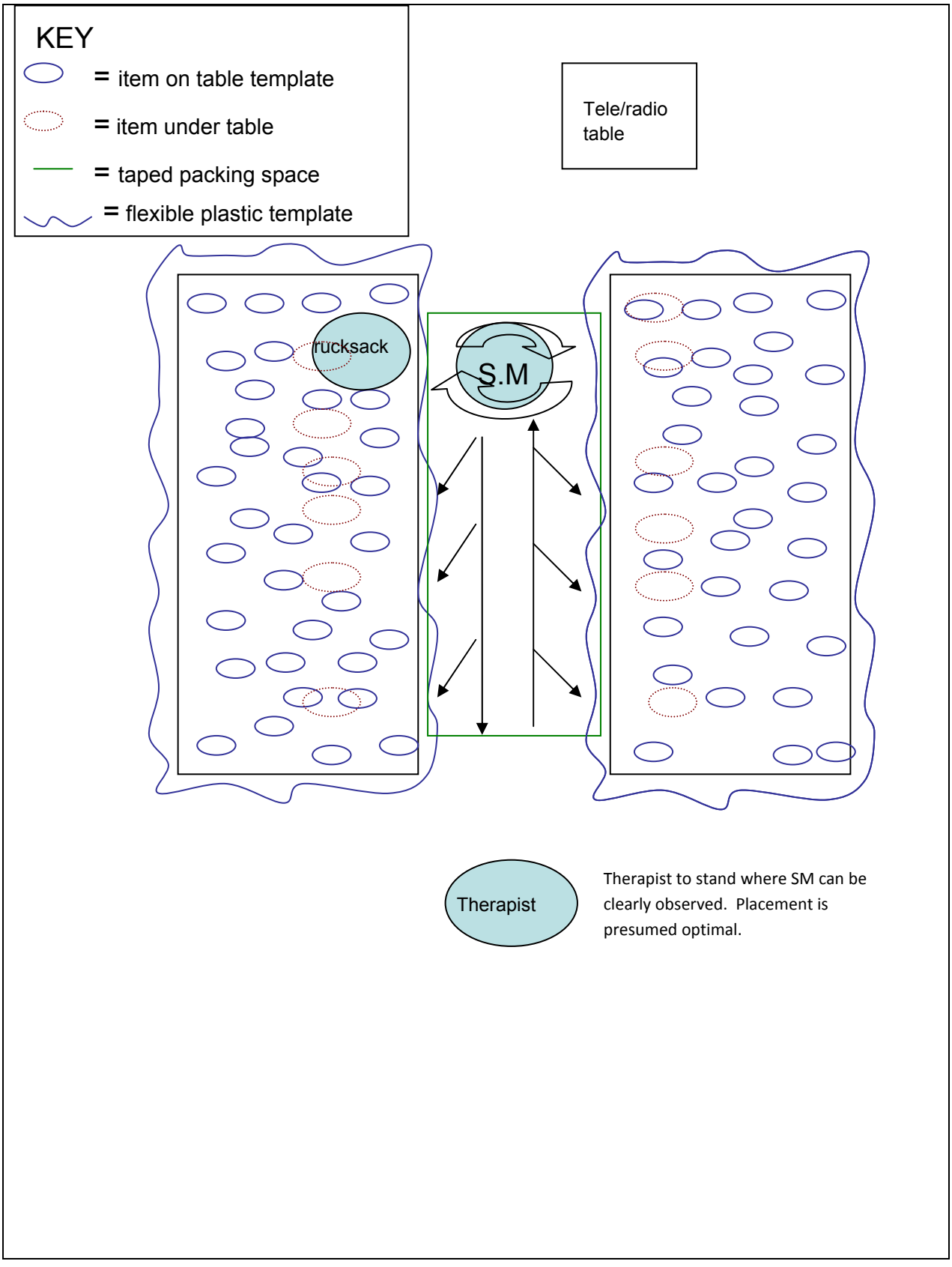
[Task verification]

Now I have to ask you some questions to be sure that you understand the task:

- Who are you packing for? *A: Specialist Jennings*
- Is speed important? *A: Yes*
- When should you pick up the phone message? *A: As soon as phone rings*
- Where are the items for packing? *A: On and under tables*
- What happens if you miss an item or pack a wrong item? *A: Penalized*
- What's the order for packing the items? *A: Pack according to the list.*
- What area do you work from when packing? *A: In rectangle*
- Should you open boxes or bagged items to see what's in them? *A: No*
- During packing, can you move the rucksack to a different place? *A: No*
- Can you move an item that you are <u>not</u> packing at that moment? *A: No.*
- What do you have to do if you determine that an item or part of an item is not available for packing? *A: Tell therapist*
- What should you do when a message comes in? A*: Log Date, time, person, write legible message on post-it, leave post-it in message box.*
- How do you let me know you have finished packing? *A: Say "Done"*

Service Member's understanding of expectations considered complete if correct on 9/10 of the questions, with erroneous item corrected with a prompt. If SM fails to meet this level, repeat instructions and repeat questions.

Example of task set-up within clinical space


KEY
= item on table template
= item under table
= taped packing space
= flexible plastic template
Tele/radio table
rucksack
S.M
Therapist
Therapist to stand where SM can be clearly observed. Placement is presumed optimal.

RUCKSACK-MESSAGE TAKING TASK MATERIALS PACKET

- Packing list (issued to SM)
- Message log
- Scoring sheet
- Message box label
- Script for contents of the 4 telephone messages

RUCKSACK PACKING LIST

Pack the following items while adhering to the task rules.

Compass with case
4 boxes ammunition for M4
Item to prepare for night operations
3 grenade pouches
5 MRE main courses
Item to prepare latrine
For personal emergency medical care
CamelBak (empty)
Waterproof bag
1 brown Army Towel
Eye protection
Hearing protection
1 complete weapon cleaning kit (requires 9 items)
Complete Helmet (M) (requires 5 items)
1 pr Boots
3 white t-shirts
5 pr socks
Complete set Wet Weather Gear (requires 2 items)
Poncho liner
1 pr of black gloves
1 ACU: Top (black)
1 ACU: Bottom (green)
Rank Insignia for the Soldier whose clothes you are packing
Name tag for this Soldier

2 Qt water for each day of a 3 day mission
Footpowder

MESSAGE LOG

Date	Time	Person calling	Message left for:	Message taken by:

RUCKSACK-MESSAGE TAKING SCORING WORKSHEET

PERFORMANCE EFFICIENCY

Operational definition: The sum of the amount of time (to the nearest second) between putting message in message box and picking up the first item to pack after message taking for all 4 messages.

Message #	**Amount of time (to the nearest second) between putting message in box and picking up first item to pack after message taking**
Message 1	
Message 2	
Message 3	
Message 4	
SCORE (sum of transition time for 4 messages)	

RULE BREAKS

Operational definition: total # of instances in which the SM breaks 5 rules during task performance

Rules	**Hash-marks representing observed instances of rule-breaks**	**# of rule breaks**
You may not move the rucksack during task performance.		

You may only move an item when you are packing it.		
Do not open items that are sealed in boxes or bags.		
Do not seek help from another person once you start the task.		
While packing items, stay inside the taped area between the tables. Leave the taped area only to answer the ringing phone/radio.		
	TOTAL	

TASK COMPLETION

Operational definition: Total # of correct sub-task components performed minus total # items packed that were not on the list (errors of commission)

Sub-task	**Sub-task component**	**Correct performance** ** sets of items have no order specified*	Observed performance	
			YES	Error of commission
Rucksack packing	Sequencing	Packed rucksack in the order specified on packing list		
	Item packing	Compass with case		
		Box of ammunition for M4 (1)		
		Box of ammunition for M4 (2)		
		Box of ammunition for M4 (3)		
		Box of ammunition for M4 (4)		
		Other: box of ammunition for M4 (5)		
		Other: box of ammunition for M9 (1)		
		Other: box of ammunition for M9 (2)		
		Other: box of ammunition for M9 (3)		

		Other: box of ammunition for M9 (4)		
		Item to prepare for night vision: Night vision goggles or GPS		
		Grenade pouch (1)		
		Grenade pouch (2)		
		Grenade pouch (3)		
		MRE main course (1)		
		MRE main course (2)		
		MRE main course (3)		
		MRE main course (4)		
		MRE main course (5)		
		Other: MRE side course (1)		
		Other: MRE side course (2)		
		Other: MRE side course (3)		
		Other: MRE dessert (1)		
		Other: MRE dessert (2)		
		Other: MRE dessert (3)		
		Item to prepare for latrine: US Army Entrenching Tool (folding shovel) & case		
		Item for personal emergency care: First Aid Pouch		
		CamelBak		
		Waterproof bag		
		Brown Army towel		
		Other: non-govt issue brown towel		
		Eye protection: goggles		
		Other: non-military (personal)		

		sunglasses		
		Hearing protection: earplugs		
		*Weapon cleaning kit (1):		
		Weapon cleaning kit (2):		
		Weapon cleaning kit (3):		
		Weapon cleaning kit (4):		
		Weapon cleaning kit (4):		
		Weapon cleaning kit (5):		
		Weapon cleaning kit (6):		
		Weapon cleaning kit (7):		
		Weapon cleaning kit (8):		
		Weapon cleaning kit (9):		
		*Complete helmet part (1): Helmet		
		Complete helmet part (2): cover		
		Complete helmet part (3): straps		
		Complete helmet part (4): pads		
		Complete helmet part (5): Night vision goggle mount		
		Pair of boots		
		White T-shirt (1)		
		White T-shirt (2)		
		White T-shirt (3)		
		Other: Gray T-shirt (1)		
		Other: Gray T-shirt (2)		
		Other: Gray T-shirt (3)		
		Pair of socks (1)		

		Pair of socks (2)		
		Pair of socks (3)		
		Pair of socks (4)		
		Pair of socks (5)		
		*Wet weather gear (1): Parka		
		Wet weather gear (2): Trousers		
		Poncho liner		
		Pair of black gloves		
		Other: Pair of yellow work gloves		
		1 ACU: Top short (black)		
		Other: 1 ACU Top short (green)		
		1 ACU: Bottom (green)		
		Other: 1 ACU Bottom (black)		
		Other: Cold weather jacket		
		Other: Cold weather trousers		
		Rank insignia for Jennings: Specialist		
		Other: rank insignia for PVT, CPL, SGT, or Staff SGT		
		Jennings name tag		
		Other: Fremming, Jurinam, or Sullivan name tag		
		Water – 1 quart		
		Water – 1 quart		
		Water – 1 quart		
		Water – 1 quart		
		Water – 1 quart		

		Water – 1 quart		
		Footpowder		
		Other: toothpaste		
Phone messages	Message # 1	Answered within 3 rings		
		Accurate and legible message		
		Accurate date/time/person		
		Put message in box		
	Message # 2	Answered within 3 rings		
		Accurate and legible message		
		Accurate date/time/person		
		Put message in box		
	Message # 3	Answered within 3 rings		
		Accurate and legible message		
		Accurate date/time/person		
		Put message in box		
	Message # 4	Answered within 3 rings		
		Accurate and legible message		
		Accurate date/time/person		
		Put message in box		
Prospective memory	Reports “Done” when task complete			
	Reports that an item is missing:			
SCORING		# of sub tasks completed	/79	
		# of errors of commission		
		TOTALS	(1)	(2)

	TASK SCORE: Total 1 – Total 2		

QUALITATIVE OBSERVATIONS OF PERFORMANCE:

Operational definitions	Examiner observations
Instruction taking/comprehension during initial task instruction: __ # of times task instructions needed to be repeated/clarified after initial task presentation	
Scanning/vestibular/balance: __ Turns: Eyes turn, head held immobile __ Turns: Head & body turn as one unit logroll) __Turns: Slowed __Movement into/out of squat: Slowed __Verbal complaint of dizziness __Stabilizes by hand on table	
Pain Behaviors[7]: ___Guarding ___ Arrhythmic breathing ___Bracing ___Negative Vocalizations ___Grimacing ___Fidgeting ___Stretching ___Rigidity ___ Rubbing (active/passive)	
Frustration: SM statements or behaviors suggestive of his/her annoyance, discouragement, dissatisfaction with the task or performance	

[7] Primarily based upon McDaniel, Anderson, Bradley, Young, Turner, Agudelo, & Keefe (1986). Development of an observation method for assessing pain behavior in rheumatoid arthritis patients. *Pain, 24*, 165-184.

Other (specify):	

Self-appraisal of performance:

"How do you think you did on this activity?" [Record SM's response]

"What would you do differently if you were given this task again?" [Record SM's response]

TELEPHONE MESSAGE SCRIPT

[To be developed]

MULTI-TASK SCENARIO: COLLECTING INFORMATION FOR A SALUTE REPORT UNDER PHYSICAL EXERTION

Purpose: This task provides an opportunity to observe and quantify the SM's ability to gathering information from a surveillance video and an audio-recording of radio communications during physical exertion.

Description: The SM is challenged to gather intel from video surveillance recordings and radio communication recordings (while he/she is doing continuous step-ups on an exercise step) in order to fill out a SALUTE report.

Primary task challenges: The primary mTBI-related neuro-behavioral demands include divided and alternating attention, visual attention and visual scanning, auditory and visual processing. The task also places demands on cardiovascular endurance.

Operational definitions of primary scoring metrics:

Performance efficiency: a) combined # of times SM watched video and listened to audio; b) total task completion time

Task completion: Total # of correct sub-task components performed minus total # of errors of commission (such as irrelevant or erroneous observations recorded)

Note: physical exertion is verified if the SM maintains >65% of maximum predicted heart rate during at least 80% of task performance.

Time:

Preparation: Positioning exercise step, video monitor
Set-up/take down: 3-5 minutes
Task instructions/administration: 20-30 minutes
Scoring: 5 minutes

Source: This task is not modeled after an existing assessment protocol.

TASK SET UP AND ADMINISTRATION MATERIALS/SUPPLIES

Task set-up:

- Position an exercise step in clinical space, clock within line of sight while stepping.
- Position a video monitor so that it is at eye-level when the SM steps up/down on the exercise step (video player is positioned nearby).
- Designate a small table on which to position audio device so that it is within 5 feet of the exercise step so that the SM can hear while stepping.

Materials for test administration:

In task-specific area:

- 5" high exercise step
- Heart rate monitor with visible wrist or upper arm display,
- Clinical step counter device
- Video monitor capable of playing either a digital video recording or a DVD
- Video recording of the surveillance recordings
- Audio playback device capable of playing either a digital audio file or a CD player
- Audio file with the radio communications
- Clock that is visible during stepping

Issued to SM:

- SALUTE report form*
- Instruction sheet*
- Clipboard
- Pencil/eraser
- Message pads*

Used by examiner for performance measurement:

- Task directions (to be read to Soldier)
- Scoring sheet*
- Pencil for recording information
- Clipboard
- Stopwatch

* These materials are in the SALUTE Task Materials Packet

SM TASK INSTRUCTIONS

Examiner instructions:

1. Brief soldier regarding task instructions, performing a quick walk-through of the task.

2. Provide SM with clipboard that includes task instruction sheet, SALUTE report form, pencil/eraser,

3. Ask SM whether or not he/she understands the instructions; clarify and answer all questions. Have the SM verbal demonstrate comprehension of all tasks.

4. Start the playing the video and audio recordings, instruct the SM to start stepping and start the stopwatch.

5. Stop the stopwatch after the SM fills out the SALUTE form and hands the form to you.

Instructions provided to the SM:

[Task instructions]

There were unconfirmed reports of an enemy patrol in the area right before our radio communications went down. Previously received radio communications provided intel about the patrol; however, the messages were incomplete. Your task is to review the video surveillance recordings and listen to the radio communications received immediately prior to loss of radio communications in order to complete this written SALUTE report for your commanding officer. The radio communications and the video surveillance of the area provide you with all of the information necessary to complete this entire report. Here is a description of the specific tasks I need you to do in order to complete this assessment.

Please do the following:

- We need you to continuously step up/down as frequently as you can while doing this assessment. You can speed up or slow your stepping as you need/want to in order to complete the assessment and write in a safe, efficient manner. However, we will be counting the number of steps you take, the total time it takes you to complete the task, and the total time that your heart rate is above 65% of your maximum predicted HR.
- To make sure that your heart rate is above 65% of your maximum predicted HR, I may ask you to step up and down faster.
- While on stepping up and down, watch the video surveillance recordings. The video will play on a loop so if you miss information you can wait until the next time it plays in order to record it. Not all of the information on the video is relevant. You are looking only for footage of the enemy patrol. Gather all the information you can to complete the SALUTE report. You can

record notes on your instruction sheet in the area provided and you can stop stepping to do this if you wish.

- While stepping up and down, an audio- recording of radio communications will be playing. The audio recording will play on a loop so if you miss information you can wait until the next time it plays in order to record it. All of radio communications are not relevant to this task. You are only listening for radio communications related to the enemy patrol in order to complete the SALUTE report.
- If you determine a radio communication message is relevant to your SALUTE report, you should stop stepping and record the message on the yellow sheet provided. Irrelevant messages can be disregarded.
- When you believe you have all the information necessary to complete all 6 items of the SALUTE report, stop stepping, fill out the form and give it to the examiner (event-based prospective memory task).
- Tell me the time 10 minutes after you start this exercise (time-based prospective memory task)
- You should complete this task as efficiently as possible and also be as thorough as possible in your SALUTE report.
- I will start my stopwatch once I start on the video/audio and stop the stopwatch when you hand me the completed SALUTE report.

[Task rules]
As you are performing the above tasks, you must adhere to the following rules:

- Once the assessment begins you cannot talk to the examiner or anyone else in the facility or use your cell phone.

- You cannot touch the monitor or audio recording device. If you miss information, you must wait for it to loop back around and play again.

- Once you state that you are finished, signal you are finished, or quit the test for any reason you will not be allowed to restart.

I have given you a copy of the instructions and task rules. You can use this sheet for taking notes on what you observe on the video surveillance recording.

[Task verification]
Do you understand the instructions I provided? [Y/N]
Have SM verbally tell examiner tasks to be completed.

SALUTE TASK MATERIALS PACKET

- SALUTE Report
- Instruction Sheet
- Scoring sheet
- Script for audio-recorded information
- Yellow sheet for audio information

Report Intelligence Information
SALUTE:

S—Size. Report the number of personnel, vehicles, aircraft, or size of an object. Make an estimate if necessary

A—Activity. Report detailed account of actions (direction of movement, troops digging in, artillery fire, type of attack, CBRN activity, and so forth).

L—Location. Report where you saw the activity. Include grid coordinates or reference from a known point including the distance and direction from the known point.

U—Unit. Report the enemy's unit. If the unit is unknown, report any distinctive features, such as uniforms, patches or colored tabs, headgear, vehicle identification markings, etc.

T—Time. Report the time and date the activity was observed, not the time you report it. Always report local or Zulu time.

E—Equipment. Report all equipment associated with the activity, such as weapons, vehicles, tools. If unable to identify the equipment, provide as much detail as you can so that higher headquarters can make an identification.

SALUTE Task Instruction Sheet

There were unconfirmed reports of an enemy patrol in the area right before our radio communications went down. Previously received radio communications provided intel about the patrol; however, the messages were incomplete. Your task is to review the video surveillance recordings and listen to the radio communications received immediately prior to loss of radio communications in order to complete the written SALUTE report for your commanding officer. Between the radio communications and the video surveillance of the area there will be all of the information necessary to complete this entire report.

- We need you to continuously step up/down as frequently as you can while doing this assessment. You can speed up or slow your stepping as you need/want to in order to complete the assessment and write in a safe, efficient manner. However, we will be counting the number of steps you take, the total time it takes you to complete the task, and the total time that your heart rate is above 65% of your maximum predicted HR.
- While on stepping up and down, watch the video surveillance recordings. The video will play on a loop so if you miss information you can wait until the next time it plays in order to record it. Not all of the information on the video is relevant. You are looking only for footage of the enemy patrol. Gather all the information you can to complete the SALUTE report. You can record notes on your instruction sheet in the area provided and you can stop stepping to do this if you wish.
- While stepping up and down, an audio- recording of radio communications will be playing. The audio recording will play on a loop so if you miss information you can wait until the next time it plays in order to record it. All of radio communications are not relevant to this task. You are only listening for radio communications related to the enemy patrol in order to complete the SALUTE report.
- If you determine a radio communication message is relevant to your SALUTE report, you should stop stepping and record the message on the message pads provided. Irrelevant messages can be disregarded.
- When you believe you have all the information necessary to complete all 6 items of the SALUTE report, stop stepping, fill out the form and give it to the examiner.
- Tell me the time 10 minutes after you start this exercise.
- You should complete this task as efficiently as possible and also be as thorough as possible in your SALUTE report

<u>Rules:</u>

1. Once the assessment begins you cannot talk to the examiner or anyone else in the facility or use your cell phone.
2. You cannot touch the monitor or audio recording device. If you miss information, you must wait for it to loop back around and play again.
3. Once you state that you are finished, signal you are finished, or quit the test for any reason you will not be allowed to restart.

FEEL FREE TO WRITE VIDEO SURVEILLANCE NOTES ON THE BACK OF THIS INSTRUCTION SHEET.

SALUTE TASK

SCORING WORKSHEET

PERFORMANCE EFFICIENCY

Operational definitions: a) combined # of times SM watched video and listened to audio; b) total task completion time (watching video/listening to audio, filling out SALUTE form, handing it to examiner)

Total # of audio and video loops required for task completion:_____

# of video loops watched:_____

# of audio loops listened to:_____

Total task completion time:_____

VERIFICATION OF PHYSICAL EXERTION DURING TASK PERFORMANCE

Operational definition of physical exertion: Maintaining at least 65% of maximum predicted heart rate during at least 80% of task performance

Total # of steps taken:_____

Total time (minutes) with HR > 65% of maximum predicted HR:_____

Physical exertion during testing: _____ Achieved _____Not achieved

RULE BREAKS

[Note: To preserve task integrity, SM is not allowed to break these rules. Examiner counts all episodes in which SM attempted to break rules and resultant redirection.]

Rule	Operational definition of rule break	Count
Once the assessment begins, you cannot talk to the examiner or anyone else or use your cell phone.	# of times that the SM initiates conversation with others during testing or attempts to use cell phone.	
You cannot touch the monitor or audio recording devices. If you miss information, you must wait for it to loop back around and	# of times that the SM touches monitor or audio player.	

play again.		
Once you state that you are finished, signal you are finished, or quit the test of any reason, you will not be allowed to restart.	# of times SM tried to restart task upon finishing	
	Total # of rule breaks	

TASK COMPLETION

Overall task completion:

___ SM completed the task (see subtask score below)

___ SM did not complete the task because the task was stopped due to time

___ SM chose not to complete the task

Specify reason:_____

Sub task completion:

Operational definition: Total # of correct sub-task components performed minus total # items packed that were not on the list (errors of commission)

Sub-task	**Sub-task component**	**Correct performance**	**Observed performance**	
			Yes	**Error of commission**
SALUTE report	S-Size	# of personnel: (Specify acceptable tolerances)		
		# of vehicles/aircraft: (Specify acceptable tolerances)		
		Size of an object: (Specify acceptable tolerances)		
		Included irrelevant information		
		Included irrelevant information		

		Included irrelevant information		
	A-Activity	Detailed account of action: (Specify acceptable tolerances)		
		Direction of movement: (Specify acceptable tolerances)		
		Included irrelevant information		
		Included irrelevant information		
	L-Location	Grid coordinates		
		Distance from a known point		
		Direction from a known point		
		Included irrelevant information		
		Included irrelevant information		
	U-Unit	Distinctive features of uniform, patches, headgear: (Specify acceptable tolerances)		
		Vehicle identification markings: (Specify acceptable tolerances)		
		Included irrelevant information		
		Included irrelevant information		
	T-Time	Time activity was observed		
		Date activity was observed		
	E- Equipment	Weapons associated with the activity: (Specify tolerances)		
		Vehicles associated with the activity: (Specify acceptable tolerances)		
		Tools associated with the activity: (Specify acceptable tolerances)		
		Included irrelevant information		
		Included irrelevant information		

		Included irrelevant information		
Audio recording	Write down messages related to SALUTE report	Audio # 1 accuracy : (Specify)		
		Audio #1 written on yellow sheet		
		Audio # 2 accuracy: (Specify)		
		Audio # 2 written on yellow sheet		
		Audio # 3 accuracy: (Specify)		
		Audio # 3 written on yellow sheet		
		Other: Irrelevant content		
		Other: Irrelevant content		
		Other: Irrelevant content		
Prospective memory tasks	Tell me the time 10 minutes after you start this exercise.			
	When you believe you have all the information to complete all 6 items of the SALUTE report, you must…	Stop stepping		
		Fill out the form		
		Give it to the examiner		
SCORING	# of sub tasks completed			
	# of errors of commission			
	SUB-TASK SCORE		(1)	(2)
	SUB-TOTAL Total 1 – Total 2			
	TASK COMPLETION SCORE			

QUALITATIVE OBSERVATIONS OF PERFORMANCE:

Operational definitions	Examiner observations

Instruction taking/retention: __ # of times task instructions needed to be repeated/clarified during initial presentation of task instructions __# of times task instructions needed to be repeated/clarified during task performance	
Pain Behaviors[8]: ___Guarding ___ Arrhythmic breathing ___Bracing ___Negative Vocalizations ___Grimacing ___Fidgeting ___Stretching ___Rigidity ___ Rubbing (active/passive)	
Frustration: SM statements or behaviors suggestive of his/her annoyance, discouragement, dissatisfaction with the task or performance	
Other (specify):	

Self-appraisal of performance:
"How do you think you did on this activity?" [Record SM's response]

"What would you do differently if you were given this task again?" [Record SM's response]

[8] Primarily based upon McDaniel, Anderson, Bradley, Young, Turner, Agudelo, & Keefe (1986). Development of an observation method for assessing pain behavior in rheumatoid arthritis patients. *Pain, 24*, 165-184.

SCRIPT FOR AUDIO-RECORDED INFORMATION

[TO BE DEVELOPED]

YELLOW SHEET

DUAL TASK SCENARIO: STEP INITIATION WITH STROOP

Purpose: The purpose of this task is to assess the cost of a cognitive task overlay (modified Stroop) on a relatively automated lower extremity task (step initiation to a vibratory stimulus).

Description: SM completes a step initiation task in a forward (3 repetitions) and backward direction (3 repetitions) for 6 repetitions with stepping signal of a sensory vibratory stimulation to the calf of the leg opposite the step leg. A total of 12 trials will be completed (six single task and six dual task trials) in a single task condition and a dual –task condition. The dual-task condition will involve performing a modified Stroop[9] test which will also be tested in a single task condition.

Primary task challenges: This task is intended to challenge postural control during such tasks as step initiation plays an important role in maintaining balance during normal activities. Postural control can be compromised with age (Melzer et.al., 2007) and after concussion (Fait, McFadyen, Swaine, & Cantin, 2009; Parker, Osternig, P, & Chou, 2006; Vallee, et al., 2006) and may be affected by cognitive or executive control deficits (McCulloch 2007).

Operational definitions of primary scoring metrics:

Dual task cost: Percent reduction in performance of one task when another task is performed simultaneously, represented by

(DTrt-STrt)/STrt x 100 (where rt = reaction time)

Time:

Set-up/take down: 2 minutes
Task instructions/administration: 5-7 minutes
Scoring: 5-10 minutes (to score and calculate dual task cost)

Source: Based on the work of Melzer, Shtilman, Rosenblatt and Oddsson (2007) involving step execution under single and dual task conditions.

Melzer, I., Shtilman, I., Rosenblatt, N., & Oddsson, L.I.E. (2007). Reliability of voluntary step execution behavior under single and dual task conditions. *Journal of NeuroEngineering and Rehabilitation, 4,* 16.

[9] The Stroop test involves asking subjects to name the ink color of a printed word when the name of the color (e.g., “blue” or “red”) is printed in a color not denoted by the word itself. For example, the word “blue” is printed in green ink and the subject is to correctly respond to the image by stating “green”, not reading the word “blue”. The Stroop effect has to do with the fact that most people demonstrate slowed reaction time when reporting the color of the ink and suppressing the automatic tendency to read the word.

TASK SET UP AND ADMINISTRATION MATERIALS/SUPPLIES

Task set-up:

- Set up assessment within a 6' x 8 ' area;
- Position Step Wiz so that there are clearances of at least 3 feet on all sides (i.e., it must not be positioned too close to walls or other objects);
- Position a laptop computer on a small table in the task area;
- Position a computer monitor so that it is ~ 9 feet away from the platform and at eye-level as SM stands on the Step Wiz platform.

Materials for test administration:

- Step Wiz (portable Kistler 9287 force platform)
- StepWix trigger device (vibratory stimulus to calf)
- Step Wiz software (installed on laptop)
- Stroop software (installed on laptop)
- Computer monitor on either an adjustable wall mounted bracket or adjustable stand

<u>Used by examiner for performance measurement:</u>

- Task directions (to be read to Soldier)
- Combined instruction and scoring sheet*
- How to calculate dual task cost sheet*
- Pencil for recording information
- Clipboard

* These materials are in the Step Initiation-Stroop Materials Packet

SM TASK INSTRUCTIONS

Examiner instructions:

1. Brief soldier regarding the test task while standing in the test area.

2. Apply the vibratory stimulus to the calf of the supporting leg.

3. Boot computer and the StepWiz software package.

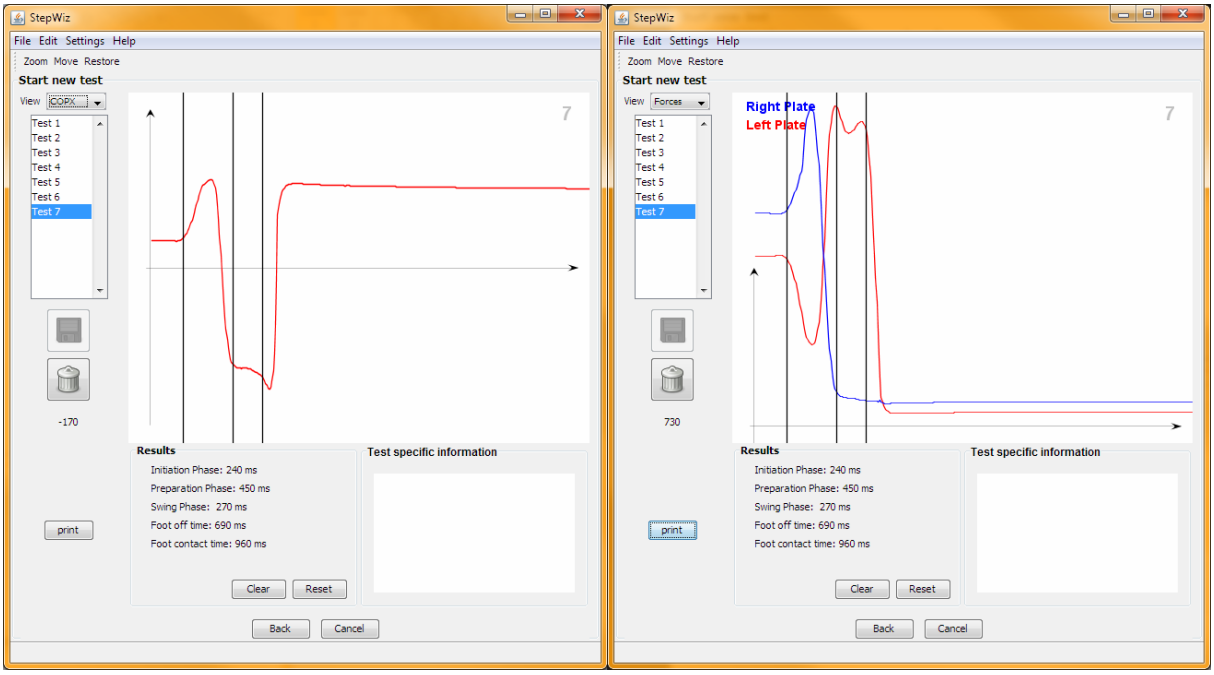
4. During the single task trials, the SM is asked to view an 'X' projected at eye level onto a monitor 3 meters (~ 9 feet) in front of the subject. Subjects are instructed to stand evenly on both feet and to step as quickly as possible forward or backward off the platform following a distinct vibratory stimulus to the lower calf of the stance leg.

5. During a step, the StepWiz software extracts three distinct performance/ time parameters: 1) reaction time, 2) foot-off time and 3) foot-contact time. These parameters are used to score performance.

Reaction time is the time from applied stimulus to when the SM starts pushing with the stepping leg to shift weight to the supporting leg in order to being able to initiate the step.

Foot-off time is measured from reaction time to when the leg is lifted off the plate, which is when no force is applied to the plate from the stepping leg.

Foot-contact time is measured from foot-off time until the SM touches down outside of the plate, which is when the total force applied to plate equals less than when test was initiated.



6. Click the “Start a new test” indicator which then elicits the vibratory stimulus along with the Stroop test that is shown on the monitor.

7. Conduct a practice run of the step initiation task so that the SM becomes familiar with the test situation and to ensure step clearance of the force platform.

8. Conduct the test using the 3 conditions: Single task condition - Step Initiation Forward or Backward with vibratory cue provided to lower calf of opposite leg; Single task condition - modified Stroop test while standing still; Dual task condition - step initiation forward or backward while performing modified Stroop test.

9. Calculate dual task cost score(s).

Instructions provided to the SM: See Combined Instruction and Scoring Worksheet*

STEP INITIATION-STROOP TASK MATERIALS PACKET

- Combined Instructions and Scoring Worksheet
- How to calculate dual task cost instructions/example

STEP INITIATION-STROOP TASK

COMBINED INSTRUCTIONS AND SCORING WORKSHEET

Single task step execution forward/backward: To determine average time it takes SM to step in response to vibratory stimulus

INSTRUCTIONS:

I want you to step (forward or backward) with your (right/left) leg when you feel a vibratory cue on your other leg. You will do this a total of 3 times – and each time I will tell you whether to step forward or backward the next time you feel the vibratory cue.

[Step direction is told to the subject before each trial.]

Do you have any questions?

[Answer all questions.]

Ready…GO.

[Click the start indicator.]

SCORING:

[The reaction time, foot-off time, foot-contact time are reported on the Step Wiz screen after each trial. Record the score in each domain after each trial.]

Forward	**Backward**
Trial 1:	
• reaction time_____	reaction time_____
• foot-off time_____	foot-off time_____
• foot-contact time____	foot-contact time____
Trial 2:	
• reaction time_____	reaction time_____
• foot-off time_____	foot-off time_____
• foot-contact time____	foot-contact time____
Trial 3:	
• reaction time_____	reaction time_____
• foot-off time_____	foot-off time_____
• foot-contact time____	foot-contact time____

Single task modified Stroop test: To determine the percentage of correct answers to the Stroop task.

INSTRUCTIONS:

While standing on the StepWiz force platform, I want you to view the monitor and call out the color of the word that is displayed on the screen.

You will see a 5 by 5 matrix with names of colors where the color of the ink is always different from the name of the color. For example, the word "red" is printed in yellow ink. There are 6 total words printed per screen.

The screens will be displayed for 5 seconds each. You are supposed to state aloud the color of each word printed.

You will see a total of 6 screens, 30 words altogether.

Do you have any questions?

[Answer all questions.]

Ready…GO.

[Click the start indicator.]

SCORING:

Total Names of colors correct_____ out of 30 possible.

Dual-Task Step initiation and Stroop: To determine average time it takes SM to step in response to vibratory stimulus while the SM simultaneously reports the colors of words printed on the screen.

INSTRUCTIONS:

This time you will step forward or backward (I will tell you before each trial) and at the same time, state the color of the words displayed on the screen.

SCORING:

[The reaction time, foot-off time, foot-contact time are reported on the Step Wiz screen after each trial. Record the score in each domain after each trial.]

Forward	Backward	Stroop Colors Correct (6 max)
Trial 1:		
• reaction time_____	reaction time_____	_____
• foot-off time_____	foot-off time_____	_____
• foot-contact time____	foot-contact time____	_____
Trial 2:		
• reaction time_____	reaction time_____	_____
• foot-off time_____	foot-off time_____	_____
• foot-contact time____	foot-contact time____	_____
Trial 3:		
• reaction time_____	reaction time_____	_____
• foot-off time_____	foot-off time_____	_____
• foot-contact time____	foot-contact time____	_____

DUAL TASK COST SCORING PROCEDURES:

DTC=DUAL TASK COST

RT=REACTION TIME

ST=SINGLE TASK

DT=DUAL TASK

[Procedures provided for reaction time (rt) only]

DTCrt =

Single task (from Condition 1 above):

Trial 1:___ Trial 2:___ Trial 3:____

Average (STrt):____ (Trial 1 + Trial 2 + Trial 3/3)

Dual-task (from Condition 3 above):

Trial 1:___ Trial 2: _____ Trial 3:_____

Average (DTrt):_____ (Trial 1 + Trial 2 + Trial 3/3)

Dual task cost = (DTrt-STrt)/STrt x 100

DTrt (_____) – STrt (_____) / STrt (_____) x 100 = _____

QUALITATIVE OBSERVATIONS OF PERFORMANCE:

Operational definitions	Examiner observations
Instruction taking/retention: __ # of times task instructions needed to be repeated/clarified during initial presentation of task instructions __# of times task instructions needed to be repeated/clarified during task performance	
Pain Behaviors[10]: ___Guarding ___ Arrhythmic breathing ___Bracing ___Negative Vocalizations ___Grimacing ___Fidgeting ___Stretching ___Rigidity ___ Rubbing (active/passive)	
Frustration: SM statements or behaviors suggestive of his/her annoyance, discouragement, dissatisfaction with the task or performance	
Other (specify):	

[10] Primarily based upon McDaniel, Anderson, Bradley, Young, Turner, Agudelo, & Keefe (1986). Development of an observation method for assessing pain behavior in rheumatoid arthritis patients. *Pain, 24*, 165-184.

Self-appraisal of performance:
"How do you think you did on this activity?" [Record SM's response]

"What would you do differently if you were given this task again?" [Record SM's response]

HOW TO CALCULATE THE DUAL TASK COST

EQUATION:

Dual Task Cost = (DTrt-STrt)/STrt x 100

EXAMPLE CALCULATION BASED ON REACTION TIME (rt)

Single task (from Condition 1 above):

Trial 1: 305ms Trial 2: 290ms Trial 3: 285 ms

Average (STrt): 293.3 msec (Trial 1 + Trial 2 + Trial 3/3)

Dual-task (from Condition 3 above):

Trial 1: 327 Trial 2: 315 Trial 3: 340

Average (STrt): 327.3 msec (Trial 1 + Trial 2 + Trial 3/3)

$$DTCrt = \frac{327.3msec - 293.3msec}{293.3} \times 100 ; \quad \textbf{DTCrt = 11.6\%}$$

DUAL TASK SCENARIO: LOADING A MAGAZINE

Purpose: The purpose of this task is to assess the cost of a cognitive task overlay on a relatively automated upper extremity manual task.

Description: SM completes a relatively automatic manual task choosing from a bin of mixed size rounds and loading M16 ammunition into magazines both in a single and a dual task condition. The dual-task condition requires monitoring radio communication and verbally announcing when radio chatter is relevant to Platoon 2.

Primary task challenges: This task is intended to challenge the following systems to varying degrees: attention allocation (divided attention), sustained attention, executive function, processing speed, manual dexterity, and hearing.

Operational definitions of primary scoring metrics:

Dual task cost: Percent reduction in performance of one task when another task is performed simultaneously, represented by
(DTrounds - STrounds)/STrounds x 100

Time:

Set-up/take down: 2 minutes
Task instructions/administration: 5-10 minutes
Scoring: 5-10 minutes (to score and calculate dual task cost)

Source: Based on the work of Cicerone (1996) assessing dual task measures in persons with mTBI

Cicerone, K. D. (1996). Attention deficits and dual task demands after mild traumatic brain injury. *Brain Injury, 10*(2), 79-89.

TASK SET UP AND ADMINISTRATION MATERIALS/SUPPLIES

Task set-up:

- Designate a rectangular table as the primary work space, with a chair positioned on one side of the table for the SM and a chair on the opposite side of the table for the examiner.
- Position magazines and plastic bin with M16 and M20 snap cap dummy rounds in front of the SM's chair.
- Position audio-player on the table such that SM can hear audio and control volume as needed.

Materials for test administration:

Positioned on rectangular table:

- 1-gallon plastic tub for holding snap cap dummy rounds
- 100 snap cap dummy rounds (M16)
- 100 snap cap dummy rounds (M20)
- 5 magazines for M16 caliber weapon
- Audio-player
- 2 versions of prerecorded ambient mock radio chatter*

Used by examiner for performance measurement:

- Task directions (to be read to Soldier)
- Combined instruction and scoring sheet*
- How to calculate dual task cost sheet*
- Pencil for recording information
- Clipboard
- Stopwatch

* These materials are in the Loading a Magazine Materials Packet

SM TASK INSTRUCTIONS

Examiner instructions:

1. Brief soldier regarding sub-task 1 after he or she is seated at the table in the work space. SM is instructed to load as many magazines as possible in 75 seconds. Examiner points out that a sorting task will be required in that ammunition is mixed up (of 2 sizes) in bin and to only place correct ammunition in the M16 magazine.

2. After assuring that the SM understands what he/she is supposed to do, simultaneously start the stopwatch, state “Go”, and the SM performs sub-task 1 (load magazine).

3. Tell SM to stop after 75 seconds has elapsed. Score sub-task 1 by counting the number of rounds correctly loaded in magazines in 75 seconds.

4. Brief soldier regarding sub-task 2. The SM is to listen to radio chatter and to state, “Platoon 2” whenever the chatter pertains to Platoon 2 (Wolf 2).

5. After assuring that the SM understands what he/she is supposed to do, state “Go”, start audio-player, and the SM performs sub-task 2 (listening for specific radio chatter).

6. Score sub-task 2 by counting the total number of correct oral responses of chatter pertinent to Platoon 2 as a percentage of total possible correct responses.

7. Put the second audio-recording in the audio-player.

8. Brief SM regarding performing sub-tasks 1 and 2 at the same time.

9. After assuring that the SM understands what he/she is supposed to do, simultaneously start the stopwatch, starts audio-player, and state “Go”, and the SM performs both sub-tasks 1 and 2.

10. Score by counting the number of rounds of ammunition loaded in 75 seconds and the percentage of correct responses regarding information on Platoon 2 from among the radio chatter.

11. Repeat steps 1-3 (SM performs magazine loading one final time).

12. Calculate dual task cost as described in the How to Calculate Dual Task Cost Instructions/Examples

Instructions provided to the SM: See Combined Instruction and Scoring Worksheet*

LOADING A MAGAZINE TASK MATERIALS PACKET

- Combined Instructions and Scoring Worksheet
- How to calculate dual task cost instructions/example
- Script for audio-recorded radio chatter # 1
- Script for audio-recorded radio chatter # 2

LOADING A MAGAZINE

COMBINED INSTRUCTIONS AND SCORING WORKSHEET

Single Task Magazine Loading: To determine the number of rounds of M16 ammunition loaded into magazines with ammunition chosen from a plastic bin with mixed M16 and M60 rounds.

INSTRUCTIONS:

I want you to load only the M16 rounds from this bin into these magazines as fast as you can for 75 seconds. Work quickly and with accuracy.

Do you have any questions?

[Answer all questions.]

Ready…GO.

[Tell SM to stop once 75 seconds has elapsed.]

SCORING:

Trial 1 (Steps 1-3 as described earlier):

Total full magazines loaded:_____

Total number of rounds correctly loaded:_____

Trial 2 (Step 11 as described earlier). This is filled after Step 2 and Step 3 are completed:

Total full magazines loaded:_____

Total number of rounds correctly loaded:_____

Average_____**(Rounds from Trial 1 + Rounds from Trial 2)/2**

Radio Chatter Responses Platoon 2: To determine the percentage of correct verbal reports of radio chatter relevant to Platoon 2 and its needs for an upcoming FTX from an audio-recording.

INSTRUCTIONS:

Now I am going to play a recording of radio chatter about the logistics of scheduling equipment and FTX for several platoons.

You are to say “Platoon 2” any time the information mentioned is relevant to Platoon 2 (called Wolf 2) and the scheduling and supplying for the upcoming FTX.

Listen carefully to the tape and state “Platoon 2” any time the information is pertinent to Platoon 2 and its scheduling/supply needs.

Do not respond to other chatter. You may adjust the volume of the radio as you need to using the volume control here (point to volume dial).

SCORING:

Total # of reports during task:_____

Total # of incorrect reports:_____

Total # of correct reports:_____

Dual-Task Magazine Loading: Determine the number of correctly loaded M16 rounds placed in magazines while SM simultaneously reports aloud when radio chatter is relevant to Platoon 2 (Wolf 2).

INSTRUCTIONS:

Now we are going to combine loading the M16 magazines with listening to and verbally reporting when radio chatter is relevant to Platoon 2. We are going to do this task once.

I am going to say "GO" and I will start the recording and you are to begin to load the ammunition into the magazines as quickly and as accurately as you can.

You are to state aloud "Platoon 2" any time the information mentioned is relevant to Platoon 2 (called Wolf 2) and the scheduling and supplying for the upcoming FTX.

You will be completing this task once. I will say "stop" when time is up.

SCORING:

Total full magazines loaded:_____

Total number of rounds correctly loaded:_____

Total # of reports during task:_____

Total # of incorrect reports:_____

Total # of correct reports:_____

DUAL TASK COST SCORE:

Dual task cost (DTC) = (DTrounds – STrounds)/STrounds x 100

Single task (from Step X) M16 rounds correctly loaded in 75 seconds:

Trial 1:___ Trial 2:____

Average (STrounds):_____ (Trial 1 + Trial 2/2)

Dual-task M16 rounds correctly loaded in 75 seconds while responding to audio chatter chatter

DTrounds:____

DTC:_____**%**

QUALITATIVE OBSERVATIONS OF PERFORMANCE:

Operational definitions	Examiner observations
Instruction taking/retention: __ # of times task instructions needed to be repeated/clarified during initial presentation of task instructions __# of times task instructions needed to be repeated/clarified during task performance	
Pain Behaviors[11]: ___Guarding ___ Arrhythmic breathing ___Bracing ___Negative Vocalizations ___Grimacing ___Fidgeting ___Stretching ___Rigidity ___ Rubbing (active/passive)	
Frustration: SM statements or behaviors suggestive of his/her annoyance, discouragement, dissatisfaction with the task or performance	
Other (specify):	

[11] Primarily based upon McDaniel, Anderson, Bradley, Young, Turner, Agudelo, & Keefe (1986). Development of an observation method for assessing pain behavior in rheumatoid arthritis patients. *Pain, 24*, 165-184.

Self-appraisal of performance:
"How do you think you did on this activity?" [Record SM's response]

"What would you do differently if you were given this task again?" [Record SM's response]

HOW TO CALCULATE THE DUAL TASK COST

EQUATION:

Dual task cost = (DTrounds – STrounds)/STrounds x 100

EXAMPLE EXAMPLE/CALCULATION # 1l

Single task (from Step X) M16 rounds correctly loaded in 75 seconds:

Trial 1: 28 Trial 2: 32

Average (STrounds): 30 (Trial 1 + Trial 2/2)

Dual-task (from Step 3) M16 rounds correctly loaded in 75 seconds:

Trial 1: 34

DTCrounds = 34 – 30 / 34 x 100

= 13.3%

DUAL TASK EXAMPLE/CALCULATION # 2

RADIO CHATTER REPORTING MISTAKES

The total of correct responses possible as 100% (Subject reports all instances of radio chatter related to the FTX for Platoon (Wolf) 2 and does not verbalize when any other information is mentioned on the radio tape. Determine the number of correct responses in the single task condition (Step 2 above). Then determine the number of correct responses in the dual task condition (Step 3 above). The differences between the single and dual task condition is the Dual-Task Cost in percentage change.

Example Calculations:

Possible correct mentions of Platoon 2 (Wolf 2) logistics needs for FTX in 75 seconds of tape = 7, 7 correct becomes **100%.**

Single task condition the Service member correctly states “Platoon 2” for 6 of the 7 instances for a single task percentage of **85.7%.**

Dual task condition the Service member correctly states “Platoon 2” for 4 of the 7 possible instances for a dual task percentage **57.1%.**

Dual Task Cost is 85.7%-57.1%=28.6%.

SCRIPT FOR AUDIO-RECORDING # 1

Wolf 7: Wolf 3 this is Wolf 7 over.

Wolf 3: Wolf 7 this is Wolf 3 go ahead over.

Wolf 7: Wolf 2 this is Wolf 7 over.

Wolf 2: Wolf 7 this is Wolf 2 go ahead over.

Wolf 7: Wolf 1 this is Wolf 7 over.

Wolf 1: Wolf 7 this is Wolf 1 go ahead over.

Wolf 7: Wolf 4 this is Wolf 7 over.

Wolf 4: Wolf 7 this is Wolf 4 go ahead over.

Wolf 7: Battalion has authorized the FTX for three weeks from now over.

Wolf 3: This is Wolf 3 Roger, over.

Wolf 2: This is Wolf 2 Roger, over.

Wolf 1: This is Wolf 1 Roger, over.

Wolf 4: This is Wolf 4 Roger, over.

Wolf 7: The FTX will last for five days and be conducted in Training Area 20. All platoons are responsible for consolidating and packing their own equipment, over.

Wolf 3: This is Wolf 3 Roger, over.

Wolf 2: This is Wolf 2 Roger, over.

Wolf 1: This is Wolf 1 Roger, over.

Wolf 4: This is Wolf 4 Roger, over.

Wolf 2: This is Wolf 2, what type of mission are we preparing for, over.

Wolf 7: Recon operations in a hostile area to include night operations based from an establish FOB in Training Area 20, over.

Wolf 2: Roger, over.

Wolf 1: This is Wolf 1. 1st Platoon will be short 5 men and three of our vehicles are down. Parts are order but they are not due in for three weeks and these vehicles are expected to remain deadlined, over.

Wolf 7: Attempt to coordinate with the BSB and see if there is a way to secure the parts sooner or borrow them from a different unit. I know 4-34th Battalion does not have any training exercises for the next 6 weeks. Try coordinating with them as a last option to borrow vehicles or parts over.

Wolf 1: What about 5-37th? I think they have extra vehicles and they just finished their most recent training exercise last week, over.

Wolf 7: Last I hear, 5-37th was planning a range for the same time frame and they will require most of their vehicles for that, over.

Wolf 1: Is it all right if I still check and see if they have any spares? They won't need all their vehicles for one range, over.

Wolf 7: Fine, just get working vehicles from somewhere, over.

Wolf 1: Roger, over.

Wolf 4: This is Wolf 4. 4th Platoon has a range already schedule that same week, over.

Wolf 7: Move the range over.

Wolf 4: Qualifications are all due by the end of the month at that was the only day the range had open. If I move the range then we are going to be late on qualifying several of our personnel, over.

Wolf 7: Move the range. I'll clear it with the Battalion CSM, over.

Wolf 2: This is Wolf 2. Will there be resupply or should we carry in enough for all five days, over.

Wolf 7: Resupply for water and food will be conducted on day three, over.

Wolf 3: This is Wolf 3 Roger, over.

Wolf 2: This is Wolf 2 Roger, over.

Wolf 1: This is Wolf 1 Roger, over.

Wolf 4: This is Wolf 4 Roger, over.

Wolf 7: Wolf 3 I need third platoon to coordinate for transportation to and from the FTX site over.

Wolf 3: Roger, send the details over.

Wolf 7: 4th Platoon needs to be picked up at the Battalion HQ at 0600. They will have 50 Soldiers with full battle rattle including rucks. In addition to that they will have ten cases of water, four boxes of MREs, and 5 boxes of additional supplies over.

Wolf 3: To verify 4th Platoon needs to be picked up at the Battalion HQ at 0600. They will have 50 Soldiers with full battle rattle including rucks. In addition to that they will have ten cases of water, four boxes of MREs, and 5 boxes of additional supplies over.

Wolf 7: Roger. 3rd Platoon needs to be picked up at 0630 at the Rock Gym. Make sure you have enough space to transport 63 Soldiers with full battle rattle and rucks plus 5 boxes of MREs, 6 boxes of additional supplies, 12 cases of water, 4 cases of ammo, and the mortar tubes.

Wolf 3: Can we push that to 0700 so we have enough time to get 4th platoon to the training area and come back for 3rd platoon, over.

Wolf 7: Fine, 4th platoon you got that, over.

Wolf 4: This is Wolf 4, roger, 0700 at the Rock Gym, over.

Wolf 7: 2nd Platoon needs to be picked up at 0800 at the barracks. They will need to transport 48 Soldiers with full gear and rucks, 4 boxes of MREs, 10 cases of water, 6 cases of ammo, and 4 foot lockers of additional gear to include extra batteries, enough for all the battalion night vision devices, over.

Wolf 2: This is Wolf 2, roger over.

Wolf 3: This is Wolf 3, roger over.

Wolf 7: 1st Platoon needs to be picked up at 0900 at the DFAC. Be ready to transport 52 Soldiers with equipment, 4 boxes of MREs, 3 cases of ammo, 5 foot lockers of additional equipment, and 11 cases of water, over.

Wolf 1: This is Wolf 1, roger over.

Wolf 3: This is Wolf 3, roger over.

Wolf 7: HHC needs to be picked up at HQ at 1000. They will need to transport 30 Soldiers with all their gear and rucks. They will also have 5 litters, 3 cases of medical supplies, 8 cases of electronic equipment, 5 cases of water, 3 boxes of MREs, and 8 foot lockers of additional equipment, over.

Wolf 3: This is Wolf 3, roger over.

SCRIPT FOR AUDIO-RECORDING # 2

[TO BE DEVELOPED AND AUDIORECORDED]

APPENDIX C:

STAKEHOLDER SUMMIT REPORT

CRC Summit
Thursday, August 19, 2010
National Intrepid Center of Excellence
Bethesda, MD

Invited Summit Participants: COL Robinette Amaker PhD, OTR/L, CHT, FAOTA; Joe Bleiberg PhD; MAJ Robyn Bolgla MSPT, CTRS; COL Myrna Callison PhD, OTR/L; Alison Cernich PhD; LCDR Tara Cozzarelli USPHS; Stephanie Hart-Hughes PT, MSMS, NCS; Kristin Heaton PhD; CPT Jennifer L Hundt PT; Val Kelly PhD, PT; Jenny Owens OTD, OTR/L; Elizabeth Sadler MS, OTR/L; Sonja M. Sconiers DHA, MSPT, OTR/L; LTC Matt St. Laurent, OTR/L, CHT; Timothy J. Wolf, OTD, MSCI, OTR/L

Research Team: Leslie Davidson PhD (Cand), MS, OTR/L; MAJ Sarah Goldman PhD, OTR/L, CHT; Karen McCulloch PhD, PT, NCS; Mary Radomski PhD, OTR/L, FAOTA; MAJ Tanja Roy DPT, PT; Erica Stern PhD, OTR/L, FAOTA; Maggie Weightman PT, PhD

Meeting Schedule of Events

8:30 – 8:40 am	Brief introduction of Summit Participants
8:40 – 9:40 am	Background and development
9:40 – 10:30 am	Introduction to tasks
10:30 – 10:40 am	BREAK
10:40 – 12:00 pm	Break outs by stakeholder group: Clinical practice; Test Development; Leadership
12:00 – 1:00 pm	Lunch roundtable discussions: Learning from the successes and pitfalls of other efforts
1:00 – 2:00 pm	Large group discussion
2:00 – 3:00 pm	Presentation on Phase II of the AMMP development process
3:00 – 4:00 pm	Large group discussion and wrap up

Note: At a pre-Summit planning meeting, the research team decided to change the name of "Combat Readiness Check (CRC)" to the "Assessment of Military Multitasking Performance (AMMP)". The research team was concerned that the term "CRC" was inaccurately/exclusively associated with combat and as such, may cause confusion. Further, stakeholders/advisers to the Phase I process indicated that the abbreviation, CRC, was used for other entities within the military. **Therefore in this report and in subsequent documentation, the CRC will henceforth be referred to as AMMP.**

Key themes/recommendations/observations identified by Research Team Members during small group/large group discussions

I. Impressions of general stakeholder endorsement of AMMP

- There was general endorsement from stakeholders regarding need for AMMP.
- A number of stakeholders emphasized the need for CRC/AMMP in theater.
- The AMMP team was advised to continue to refine/specify the purpose of the AMMP.

II. Input regarding tasks comprising AMMP

a. Comments on current AMMP tasks

- High level mobility task – Consider use of accelerometry (computer display, pressure sensitive mats, sensors attached to iPod, recorded data using 3d accelerometry – as per Stephanie Hart-Hughes)
    - Consider placement of this task in the "layering" approach given that SM will fail this test if they have vestibular issues and thus, it won't challenge cognitive and visual dimensions of function.
    - Consider further consultation with Faye Horak regarding instrumentation.
- Rucksack/Duty Roster/Packing Shipping
    - Many SM have very poor math skills; minimize math-related demands for all tasks.
    - Consider consultation with Justin Carter (rehabilitation engineer with National Rehab Hospital), who has used videography for psychometric evaluations of naturalistic tasks, such as kitchen evaluation.

b. Additional tasks/tests to consider including in AMMP:

- Clinical Test for Sensory Integration in Balance;
- Task requiring interaction with machinery/robotics;
- Weapon assembly/dis-assembly with built in malfunction/problem to be solved by SM.

c. Additional body functions/systems to challenge that are not in current AMMP menu of tasks

- Visual processing/monitoring
    - Consider incorporating a SALUTE task that would involve watching a video and identifying key issues (**S**ize, **A**ctivity, **L**ocation, **U**niform, **T**ime, **E**quipment)
    - Consider measuring visual tracking during scanning using head gear with instrumentation; examine visual attention issues during high stress multitasking scenarios.
    - Also, consider the fact that many SM have issues with re. photosensitivity, accommodation/convergence, gaze stability.
- Auditory processing
    - Consider challenging auditory differentiation tasks such as hearing details of a transmission in a busy auditory environment ("Shoot/Don't shoot")

III. Other performance factors to incorporate

- SM effort/motivation – Include a metric in pretest
- Exertion
  - Consider examining the impact of exertion on performance by "layering". For example, begin with a basic fitness test and if SM cannot pass that, the test is concluded. Or administer the first AMMP task and if the SM passes basic AMMP task, add exertional component(s).
  - Consider measuring impact of exertion on post-test recovery time (15 minutes, next day?)
  - Incorporate exertional testing that is specified in current mTBI CPG that is used in-theater.
- Fatigue
  - Consider using time of day as a stressor (taking into account circadian rhythms especially between 1 – 3 pm).
  - Consider inducing fatigue by the order of the test sequence.
  - Consider incorporating a brief task/test element that is performed at the beginning and end of the battery in order to examine the effects of fatigue.
  - Consider using a sleepiness scale to characterize tiredness.
- Pain
  - Measure baseline, during test, and posttest levels of pain (including headache pain) – using a visual analog scale.
  - Measure impact of pain on functional performance during preceding week (SF 36).
  - Utilize pain metric that is consistent with the PR&R's pain initiative lead by LTC Galloway.
- Emotional/behavioral issues and moderators of performance
  - Instruct SM to respond to examiner as if he/she is a commanding officer ("During this assessment, you are to conduct yourself as if I am your commanding/line officer"). Breaches in expected conduct can then be operationalized and tracked, including throwing things, swearing at test administrator.
  - Note frequency of anxiety via somatic behaviors such as sweating, putting down materials, moving objects without purpose, closing eyes to focus on instructions or listening.
  - Observe and operationalize eye contact during test instructions and at test conclusion using the following eye contact characteristics: Staring off, Well-maintained, Glancing, Adequately-maintained, Avoided, Not-maintained, Excessive (from Dr. Alison Cernich).
  - Measure depression and PTSD symptoms

IV. Test adoption/dissemination considerations

a. Test adoption issues

- Convenience
  - Time and ease of use is critical.
  - Minimize the number of items/materials required for test administration/set-up.
  - Consider portability (such as storing all supplies needed for AMMP in a rucksack).
- Training

    - Skill levels of therapists vary widely; AMMP must be inter-rater/intra-rater reliable and we must build in training vehicle
    - Provide face-to-face training initially (with proficiency established by return-demonstration)
    - Provide online review/refresher.
  - Documentation
    - Develop a documentation format so that the AMMP will provide a data point in seamless transition (including to the VA).
    - Develop a database in which therapists report use of AMMP; incorporate utilization into performance improvement initiative.
  - Name – AMMP might be confused with the AMPS (Assessment of Motor and Process Skills, an occupational performance test used in occupational therapy research)

b. Communicating/partnering during Phase II
  - Provide intermittent updates on AMMP development process to existing groups.
    - Quad-service telecom
    - Behavioral Health VTE (of which COL Amaker is a member)
    - Clinical Proponency Steering Committee (CPSC)
    - Functional Capacity Evaluation work group
  - Consider creating and distributing a quarterly newsletter (e-newsletter) on the project status.
  - Develop Command buy-in during the development process.

c. Long range dissemination planning
  - Incorporate long-range dissemination planning into Phase II proposal
  - Use resources from NIH Dissemination & Implementation to inform these aspects of the proposal.

V. Validation issues

a. Scoring/measurement
  - Specify scoring criteria including rule breaks, task failures, performance inefficiencies
  - Specify task-specific priorities specific to the speed/accuracy trade-off for each task. Add time/stress elements to elicit different task priorities.
  - Develop a scoring metric that is understandable/interpretable by SM such as a scale score of 1-100 so that decisions will be face valid.

b. Psychometric evaluation
  - Avoid overly-ambitious goals for Phase II.
  - Consider comparing performance on AMMP to measures of IQ (WAIS subtests, NART, Weschler Test of Adult Reading and/or baseline military entrance test scores such as AFQT, EFQT).
  - Consider MOS-related categories of AMMP performance related to the executive functioning requirements of MOS.
  - Consider floor/ceiling effects as well as variability among SM with mTBI and overlap with healthy controls when finalizing tasks.

c. Population
  - Identify the study population based on time since concussion (e.g., 1 day to 3 weeks, 4 – 8 weeks etc.) not setting (rehab vs in-theater).

- Use mTBI/PCS syndrome or Dysexecutive syndrome as part of inclusion criteria, not diagnosis of mTBI.
- Specify a military group, given that there are significant baseline differences between Special Forces and back area soldier.
- Consider inclusion of Reservists who are eligible for redeployment.
- Consider including civilian individuals with acute mTBI, such as athletes at UNC in field test.
- Explore partnering with Fort Bragg/Womack Army Medical Center

VI. Future issues and considerations

- Specify the re-test policy for those who do not "pass" the test; determine whether or not there will be alternate forms of the test.
- Determine how to get AMMP administration included in CPG.

Take-aways and follow-up actions based on Summit input

1) Articulate and specify an AMMP purpose statement that will be used in subsequent conversations and written materials .

2) Incorporate and operationalize the concept of "layering" in AMMP administration (that is, first administer "easy" task scenarios and if the SM demonstrates acceptable performance, proceed to more challenging tasks.) Note: this presumes the ability to empirically specify which tasks are easier than others, which may be dependent upon a given SM's constellation of impairments.

3) Obtain existing tools used by AMMP SMEs.
   a. Dr. Alison Cernich – Behavioral checklist
   b. Dr. Kristin Heaton – Intake form that includes demographics, medical history, education (learning disability or not, skipped grades etc.)

4) Develop additional tasks and/or test scenarios and measurement metrics.
   a. Work with Dr. Val Kelly to develop metrics and measurement plans for dual task elements and high level mobility task.
   b. Contract with Dr. Tim Wolf to propose an across-multitask measurement rubric.
   c. Develop an assessment task that challenges visual and auditory processing.
   d. Specify how exertional, fatigue, pain, and behavioral dimensions will be measured.

5) Proceed with proposal for Phase II of test development
   a. Further refine menu of assessment tasks using above input.
   b. Consult with psychometrician to help inform Phase II planning.
   c. Establish a Phase II proposal that examines/refines reliability of assessment tasks and examines preliminary construct validity by determining the extent to which SM deemed ready-for-duty score differently than those receiving rehabilitation for concussion/mTBI
   d. Develop a 3-year plan for up to with the goal of advancing the AMMP development as far as possible within the time/funding parameters.
   e. Consider a tentative plan to seek an amendment to the proposal in Year 2 (if the AMMP has demonstrated preliminary reliability/validity) in order to ask clinicians in-theater to use the AMMP and provide informal feedback.