

USAARL Report No. 2017-15

Proceedings of the Military Operational Medicine Research Program Return to Duty (RTD) Toolkit Expert Panel Workshop, 16–17 February 2017

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Aircrew Health and Performance Division

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14. ABSTRACT A workshop, titled “Return to Duty (RTD) Toolkit Expert Panel Workshop,” was held at Fort Detrick, MD, on 16–17 February 2017. Sponsored by the U.S. Army Medical Research and Materiel Command’s (USAMRMC’s) Military Operational Medicine Research Program (MOMRP), the workshop objectives were: 1) to agree on operational tasks/assessments to be included in or excluded from the RTD Toolkit Manual, 2) to identify any additional tasks and clinical assessments for inclusion in the RTD Toolkit Manual, and 3) to agree on a method to categorize operational tasks/assessments in the toolkit. This report contains the workshop presentations, comment highlights, and an overall summary of the workshop outcomes.					
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Introduction

This report is a record of the proceedings of the third (and final) in a series of workshops, held on 16–17 February 2017, in which experts (clinicians, occupational and physical therapists, psychologists, and researchers) were assembled to provide guidance toward the goals of the U.S. Army Medical Research and Materiel Command's (USAMRMC's) Military Operational Medicine Research Program (MOMRP) Task Area P1, "Return-to-Duty Standards and Strategies After Neurosensory Injury." Previous workshops were held in September 2012 and September 2015. (Estrada, Crowley, and Stokes, 2013, and Thomson et al., 2016, respectively)

This research task area is focused on injury effects on human neurosensory function, including those resulting from blast, blunt, and ballistic threats. The aim of Task Area P1 is to provide validated standards and strategies enabling accurate, safe, and rapid decisions regarding the return of Soldiers to military occupations after neurosensory injury. To this end, Task Area P1's capstone effort is to publish a Toolkit (reference manual) of best practices and validated return-to-duty (RTD) assessments (batteries and discrete assessment tools) for far-forward and clinical use in determining readiness to return to duty following neurosensory injury. The primary objective of the toolkit is to provide clinicians and decision makers with resources to supplement those currently available. Specifically, these additional resources will provide information regarding military functional performance.

Workshop Objectives

The primary objectives of the workshop were: 1) to agree on operational tasks/assessments to be included in or excluded from the RTD Toolkit Manual, 2) to identify any additional tasks and clinical assessments for inclusion in the RTD Toolkit Manual, and 3) to agree on a method to categorize operational tasks/assessments in the toolkit.

In accordance with the workshop goals, the following were solicited from the experts:

- a. agreement on operational tasks/assessments to be included in or excluded from the RTD Toolkit Manual;
- b. identification and agreement of any additional tasks and clinical assessments for inclusion in the RTD Toolkit Manual;
- c. agreement on categorization of operational tasks/assessments into domains;
- d. agreement on level of detail in a Condensed (version) RTD Toolkit;
- e. agreement on tasks/assessments to be included in a Pamphlet (version) RTD Toolkit;
- f. agreement on level of detail in the Pamphlet (version) RTD Toolkit; and
- g. a request for information on proposed additional tasks/assessments for inclusion in the RTD Toolkit Manual.

Workshop Sessions – Day 1, 16 February 2017

0900 – 0945 Welcome and Introductions – Maj Ed Edens (PhD), USAARL Aircrew Health and Performance Division Chief



Return-to-Duty Toolkit Expert Panel Workshop

MAJ Ed Edens, Ph.D.

Art Estrada, Ph.D.

Amanda Kelley, Ph.D.

US Army Aeromedical Research Laboratory

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Announcements

- Meeting is being recorded and a report of the workshop presentations will be published (USAARL Tech Report)
 - Please indicate if you would like to make an off-the-record comment
- Time keeper – MAJ Edens
- Questions – please state your name clearly and loudly

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Agenda

AGENDA
Return to Duty (RTD) Toolkit Expert Panel Workshop
Building 1123 Classroom #6, Fort Detrick, MD

Day 1: Thursday (17 FEB 2017)

0900 – 0930 Registration

0930 – 0945 Welcome and introductions – MAJ Edens (PIC, USAARL, Science Program and Performance Division Chief)

0945 – 1000 Workshop Goals – Dr. Amanda Kelly

1000 – 1040 Task Area Overview – Dr. Arthur Dennis (PIC, USAARL, Science Program Administrator)

1040 – 1100 Break

1100 – 1130 Pathways to Resonance based practice in 3D – Mr. Katherine Helms (PIC, Deputy Director of 3D-BC)

1130 – 1200 Discussion of the neural pathways for those with persistent post-traumatic symptoms risk scale discussion – Mr. Katherine Helms (PIC, Deputy Director of 3D-BC)

1200 – 1230 Lunch Break

1300 – 1330 (1) Overview of RTD Toolkit products – Dr. Arthur Dennis (PIC, USAARL, Science Program Administrator)

1330 – 1400 (2) Review of all scientific evidence for neural tasks – Dr. Amanda Kelly, Assistant Psychologist at USAARL

1400 – 1430 (3) Review of scientific evidence for ADAPT tasks – Dr. Amanda Kelly, Assistant Psychologist at USAARL

AGENDA
Return to Duty (RTD) Toolkit Expert Panel Workshop
Building 1123 Classroom #6, Fort Detrick, MD

Day 2: Friday (17 FEB 2017)

0900 – 0930 Review of Day One and Goals – Dr. Arthur Dennis (PIC, USAARL, Science Program Administrator)

0930 – 1040 Development of auxiliary classes for Duty Standards – Dr. Douglas Shugart, Behavioral Chief, Science

1040 – 1100 Discussion of toolkit details – including possible discussion of any additional tools not presented for possible inclusion into the RTD Toolkit, keeping in mind that goal of the Toolkit is to determine fitness for military duty, beyond clinical diagnosis.

1100 – 1140 Break

1140 – 1200 Overview and the Way Forward: Discussion on modifications to format and presentation to provide a user-friendly RTD Toolkit – one that provides military decision makers with a high degree of confidence in answering the question:

(Dr. Phil Sander (James, 2016, 2016): perform his/her job effectively despite having experienced a neurosensory injury?)

1200 – 1230 Closing Remarks – Dr. Dennis and Dr. Shugart

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Comment highlights and discussion summary:

Maj Edens welcomed the attendees to the workshop. He thanked everyone for their attendance and continued support of the MOMRP Task Area addressing RTD following neurosensory injury.



Workshop Goals

- **Ultimate goal** of TA P1 is to produce a toolkit useable by clinicians and RTD decision makers for making fitness for military duty decisions
- Agreement on operational tasks/assessments to be included in or excluded from the RTD Toolkit Manual
- Identification and agreement of any **additional** tasks and clinical assessments for inclusion in the RTD Toolkit Manual
- Agreement on categorization of operational tasks/assessments into domains
- Agreement on level of detail in the Condensed RTD Toolkit
- Agreement on tasks/assessments to be included in a RTD Toolkit Pamphlet
- Agreement on level of detail in the RTD Toolkit Pamphlet
- Distribution of packets for information on proposed additional tasks/assessments for inclusion in the RTD Toolkit Manual

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Workshop Purpose and Objectives

- How to accomplish
 - Review all eligible Toolkit tasks
 - Discuss scientific evidence supporting each task
 - Present any updated results since last workshop
 - Present clinical assessments currently in use
 - Discuss any that should be included or excluded
 - Discuss any additional assessments for inclusion
 - Discuss current practices
 - Discuss the three Toolkit products

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Comment highlights and discussion summary:

Dr Kelley presented to the group an overview of the goals for the workshop focusing on the main objectives as well as discussing goals for follow-up materials with the group. During discussion, it was clarified that the goal of the toolkit is to provide supplementary tasks for

medical providers to use at their discretion.

1000 – 1040 Task Area Overview – Dr. Arthur Estrada, USAARL Science Program Administrator



**MOMRP Task Area P1
Return-to-Duty Standards and
Strategies After Neurosensory Injury**

Task Area Overview

Arthur Estrada, Ph.D.
Task Area Manager

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TA P1 Description

Task Area P1 develops validated standards and strategies enabling accurate, safe, and rapid decisions regarding the return of Soldiers to military occupations after neurosensory injury.

It addresses the need for research aimed at providing evidence-based criteria for standards to determine the level of operational competence and performance of a Warfighter after injury. The need for RTD assessment criteria includes the spectrum of injury and disease experienced by U.S. Soldiers, Airmen, Sailors and Marines. This research task area is focused on injury effects on human neurosensory function, including those resulting from blast, blunt, and ballistic threats.

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TA P1 Research Gaps

REQUIREMENT (Proponent)	Objectives and Products (Material or Knowledge)		
	Near-Term (FY17-19)	Mid-Term (FY20-24)	Far-Term (FY25-31)
Force Health Status (FHS) – MCM/ICD. Real-time Joint surveillance system to monitor health and readiness of the force; identify health trends and provide interventions to maintain and improve the health and readiness of the force. Capability Gap: No evidence-based assessment and intervention tools.	P1- Publish and distribute a RTD Toolkit to TTA partners and other stakeholders for use and reference by clinicians and RTD decision-makers.	NA	NA
ICD for Human Dimension Associated Gap #125- Insufficient ability to develop, validate and implement measures to assess/evaluate a soldier's cognitive, physical, and social readiness for combat based on such factors as MOS, position in Army lifestyle (advanced operators) and health status (permanent profile, Wounded Warrior).	P1- Publish and distribute a RTD Toolkit to TTA partners and other stakeholders for use and reference by clinicians and RTD decision-makers.	NA	NA

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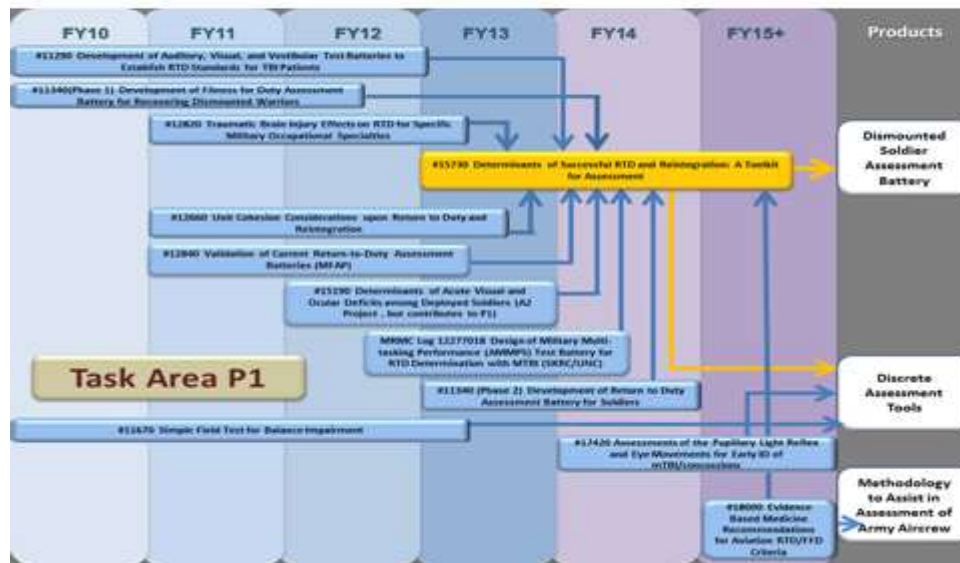
TA P(1) Funding History

FY	\$K
2010	2251
2011	2455
2012	1644
2013	2013
2014	1134
2015	1134
2016	235
2017	229
2018	234
2019	TA Ends

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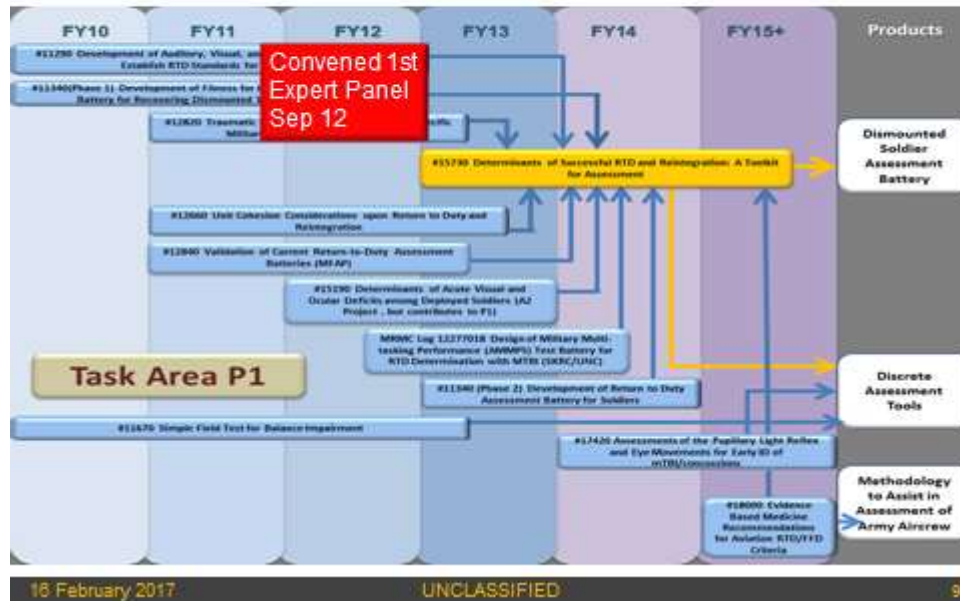
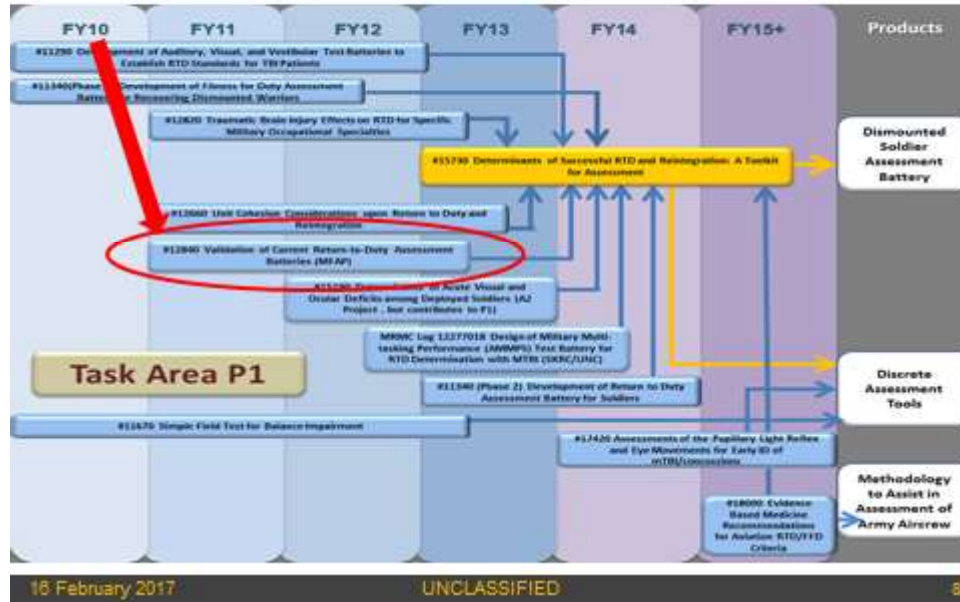
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Task Area P1

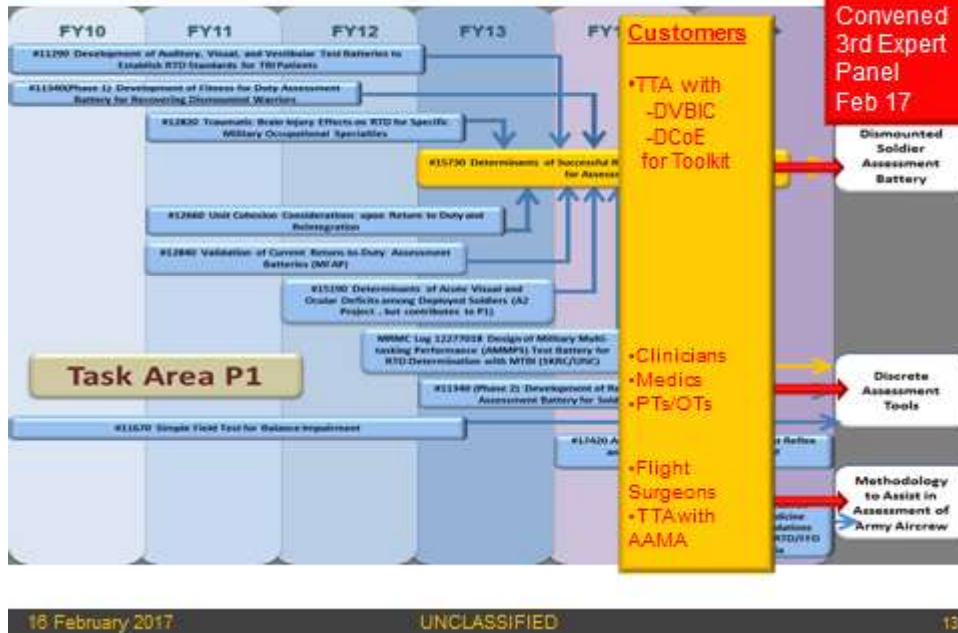
Convened 1st Expert Panel Sep 12

USAARL Report No. 2013-15
 Proceedings of the Military Operational Medicine Research Program Return-to-Duty Research Working Group Meeting, 19-20 September 2012
 By Arthur Estrada, John Crowley, Elizabeth Stokes
 United States Army Aeromedical Research Laboratory
 Warfighter Health Division
 May 2013
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Task Area P1

Convened 2nd Expert Panel Sep 15

Projects include: #11280 Development of Auditory, Visual, and Vestibular Test Batteries to Establish RTD Standards for TB Patients; #11340 (Phase II) Development of Fitness for Duty Assessment Battery for Reassigning Discharged Warriors; #12600 Traumatic Brain Injury Effects on RTD for Specific Military Occupational Specialties; #12660 Validity Considerations upon Return to Duty and Reintegration; #12840 Validation of Current Return-to-Duty Assessment Batteries (M2AF); #13120 Determinants of Acute Visual and Ocular Deficits among Deployed Soldiers (A2 Project - but contributes to P1); MRRWC Log 1327018 Design of Military Model: Tracking Performance (M2AF) Test Battery for RTD Determination with MTR (SRR/JMC); #11340 (Phase II) Development of Return to Duty Assessment Battery for Soldiers; #17420 Assessments of the Pupillary Light Reflex and Eye Movements for Early ID of RTD/Unconsciousness; #18000 Evidence Based Medicine Recommendations for Audition RTD/TFD Criteria.





TA P1 Highlighted Deliverables and Transitions

Capability Transitioning	Knowledge or Material Product (K/M)	Transitions To	Agreement (TTA/ITA, etc.) Completed (Yes/No/N/A)	Transition Target Date
Transitioned report by Britt, T. & Long, C. (2016). Waivers for Mental Disorders in the Aviation Components of the Armed Services: Recommendations for Improving Evidence-Based Decisions and Aviator Return to Duty. USAARL Report No. 2016-11.	K	1. US Army Aeromedical Activity, Fort Rucker, AL	1. TTA - Yes	FY18
Publish a Toolkit (reference document) of best practices and validated RTD assessments (batteries and discrete assessment tools) for far-forward and clinical use in determining fitness for duty following neurosensory injury	K	1. Defense and Veterans Brain Injury Center (DVBIC) 2. Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury (DCoE)	1. TTA - Yes 2. TTA - Yes	FY17
Publish feedback report following the collection and analysis of feedback and validation data from Toolkit users.	K	1. Defense and Veterans Brain Injury Center (DVBIC) 2. Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury (DCoE)	1. TTA - Yes 2. TTA - Yes	FY18

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TA P1 FY18 Project

Task Area Title: Return-to-Duty Standards and Strategies After Neurosensory Injury					
Funding: 6.3 Total = \$234K					\$234K
Proposal Title (Number)	Rank	PI	Lab	Milestone	Funding
Determinants of successful return-to-duty and reintegration: A toolkit for assessment (19300)	1	Dr. Amanda Kelley	USAARL	1. After 6 months, data collection and analysis for the RTD Toolkit validation will be complete and the research team will re-deploy the revised RTD Toolkit to end-users with implemented improvements. 2. Publish toolkit, present findings, and meet obligations of TTA.	\$234K (6.3)

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Recent Project (19300) Accomplishments

Part 1: Military Functional Assessment Program (MFAP) Longitudinal Study

- Closed study enrollment in May 2016 with 51 participants
- Completed 6-month follow-up data collection in November 2016 with 20 participants (31 lost to attrition or non-response to follow-up attempts)
- Analyzed 6-month follow-up data which show that performance ratings on four of the MFAP tasks are predictive of overall self-reported performance levels and self-satisfaction. The relationship is positive such that higher MFAP performance ratings correspond to higher levels of performance and self-satisfaction.
- Analyzed baseline data which shows that six MFAP tasks correlate highly to performance requiring judgment and decision making, as well as the ability to work under stress. The findings support prior research on the construct validity of the nine MFAP tasks.

Part 2: Deliver RTD Toolkit

- Maintained TTAs with Defense and Veterans Brain Injury Center (DVBIC) and Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury (DCoE)
- Published the proceedings of the 2nd RTD Expert Panel Workshop held on 1-2 Sep 2015: Thomson, C.A., Basso, J.E., McCulley, N.L., and King, M.R. (2016). *Proceedings of the Military Operational Medicine Research Program Return-to-Duty Toolkit Working Group Symposium, 1-2 September 2015. USAARL Report No. 2016-21*
- Holding 3rd (Final) RTD Expert Panel Workshop on 16-17 February 2017

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TA P1 Recent Accomplishments

- Peer Reviewed Publications
 - Lawson, B.D., Kass, S.J., Dhillon, K.K., Milam, L.S., Cho, T.H., & Rupert, A.H. (2016). Military Occupations Most Affected by Head/Sensory Injuries and the Potential Job Impact of Those Injuries. *Military Medicine*, 181, 887-894.
- Presentations
 - Ballard, A.D., Capó-Aponte, J.E., Walsh, D.V., & Dumayas, J.Y. (Oct. 2015). *Validation of Objective Visual System Biomarkers for Early Identification of Warfighters with Acute mTBI/concussion: Preliminary Results*. Presentation at the American Academy of Optometry, New Orleans, LA.
 - Thomson, C., Estrada, A., & Showers, M. (April, 2016). *Evaluation of the Military Functional Assessment Program (MFAP): A prospective, longitudinal study of the predictive validity of the MFAP for return-to-duty*. Oral presentation at Aerospace Medicine Association's annual meeting, Atlantic City, NJ.
- Knowledge Products – Recommendations delivered to USAAMA:
 - Britt, T. & Long, C. (2016). *Waivers for Mental Disorders in the Aviation Components of the Armed Services: Recommendations for Improving Evidence-Based Decisions and Aviator Return to Duty*. U.S. Army Aeromedical Research Laboratory, USAARL Report No. 2016-11.

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Full List of TA P1 Publications/Presentations From October 2010 to September 2016

- Ballard, A.D., Capó-Aponte, J.E., Walsh, D.V., & Dumayas, J.Y. (2015). *Validation of Objective Visual System Biomarkers for Early Identification of Warfighters with Acute mTBI/concussion: Preliminary Results*. Presentation at the American Academy of Optometry, New Orleans, LA.
- Pavelites, J. (2016). *Traumatic Brain Injury: Recommendations for Updating the Army Aeromedical Letters*. U.S. Army Aeromedical Research Laboratory. USAARL Technical Memorandum No. 2016-15.
- Jackson, S., Lieberman, H., Young, A. (2016). *Herbals and Dietary Supplements: An Aeromedical Policy Review*. U.S. Army Aeromedical Research Laboratory. USAARL Technical Memorandum No. 2016-16.
- Lawson, B. et al. (2016). *Mild Traumatic Brain Injury and Dynamic Simulated Shooting Performance*. USAARL Technical Report No. 2016-18.
- Thomson, C., Estrada, A., & Showers, M. (April, 2016). *Evaluation of the Military Functional Assessment Program (MFAP): A prospective, longitudinal study of the predictive validity of the MFAP for return-to-duty*. Oral presentation at Aerospace Medicine Association's annual meeting, Atlantic City, NJ.
- Lawson, B.D., Kass, S.J., Dhillon, K.K., Milam, L.S., Cho, T.H., & Rupert, A.H. (2016). *Military Occupations Most Affected by Head/Sensory Injuries and the Potential Job Impact of Those Injuries*. *Military Medicine*, 181, 887-894.
- Thomson, C., Basso, J., McCulley, N., & King, M. (2016). *Proceedings of the Military Operational Medicine Research Program Return-to-Duty Toolkit Working Group Symposium, 1-2 September 2015*. USAARL Technical Report 2016-21.

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Full List of TA P1 Publications/Presentations From October 2010 to September 2016 (cont.)

- Britt, T. & Long, C. (2016). *Waivers for Mental Disorders in the Aviation Components of the Armed Services: Recommendations for Improving Evidence-Based Decisions and Aviator Return to Duty*. U.S. Army Aeromedical Research Laboratory. USAARL Report No. 2016-11.
- Kelley, A.M. & Lawson, B. (in prep). *Development and Preliminary Evaluation of a Dynamic Marksmanship Battery for use with Soldiers following head injury: Sensitivity to vestibular disturbances relevant to return-to-duty*. *Journal of Head Trauma Rehabilitation*.
- Walsh, D.V., Capó-Aponte, J.E., Cole, W.R., Ballard, A.D., Dumayas, J.Y., Beltran, T.A. (2015). *Assessments of the pupillary light reflex (PLR) and eye movements for diagnosis of acute mTBI/concussion in Warfighters*. Poster presented at the American Association of Military Surgeons of the United States meeting, San Antonio, TX.
- Ballard, A.D., Beltran, T.A., Capó-Aponte, J.E., Cole, W.R., Dumayas, J.Y., Walsh, D.V. (2015). *Validation of Objective Visual System Biomarkers for Early Identification of Warfighters with Acute mTBI/concussion*. Presentation at the Womack Army Medical Center Research Symposium, Fort Bragg, NC.
- Ballard, A.D., Capó-Aponte, J.E., Walsh, D.V., Dumayas, J.Y. (2015). *Validation of Objective Visual System Biomarkers for Early Identification of Warfighters with Acute mTBI/concussion: Preliminary Result*. Presentation at the American Academy of Optometry, New Orleans, LA.

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Full List of TA P1 Publications/Presentations From October 2010 to September 2016 (cont.)

- Walsh, D.V., Capó-Aponte, J.E., Ballard, A.D., Beltran, T.A., Cole, W.R., Dumayas, J.Y. (2015). *Assessments of the Pupillary Light Reflex (PLR) and Eye Movements for Early Identification of Warfighters with mTBI/Concussions*. Presentation at Return to Duty Working Group Symposium, Fort Detrick, MD.
- Kelley, A., Ranes, B., Estrada, A., & Grandizio, C. (2014). *Evaluation of the Military Functional Assessment Program: Preliminary Assessment of the Construct Validity using an Archived Database of Clinical Data*. Presentation at the 32nd Annual Neurotrauma Symposium, San Francisco, CA.
- Britt, T., Ranes, B., Kelley, A., Grandizio, C., & Gaydos, S. (2014). *Soldier Beliefs About the Readiness of Military Personnel with Mild Traumatic Brain Injury*. USAARL Report No. 2014-20.
- Ranes, B., Lawson, B., King, M., & Dailey, J. (2014). *Effects of Rifle Handling, Target Acquisition, and Trigger Control on Simulated Shooting Performance*. USAARL Report No. 2014-19.
- Grandizio, C., Lawson, B., King, M., Cruz, P., Kelley, A., Erickson, B., Livingston, L., Cho, T., Laskowski, B., & Chiaramonte, J. (2014). *Development of a Fitness-for-Duty Assessment Battery for Recovering Dismounted Warriors*. USAARL Report No. 2014-18.
- Kelley, A.M., Ranes, B.M., Estrada, A., Webb, C.M., Milam, L., & Chiaramonte, J. (2013). *Evaluation of the military functional assessment program: Preliminary assessment of the construct validity using an archived database of clinical data*. USAARL Report No. 2013-19.
- Estrada, A., Crowley, J., & Stokes, E. (2013). *Proceedings of the Military Operational Research Program Return-to-Duty Research Workshop Group Meeting, 19-20 September 2012*. USAARL Report 2013-15.

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Full List of TA P1 Publications/Presentations From October 2010 to September 2016 (cont.)

- Lawson, B.D., Rupert, A.H., & Cho, T.H. (2013). *Functional Screening for Vestibular and Balance Problems soon after Head Injury: Options in Development for the Field or Aid Station*. *Journal of Special Operations Medicine*, 13(1), 42-48.
- Webb, C., Lawson, B., King, M., Cruz, P., Kelley, A., & Erickson, B. (2012). *Development of a RTD Battery for Recovering Dismounted Warfighters: Phase 1*. Presentation at the Military Health System Research Symposium, Fort Lauderdale, FL.
- Lawson, B.D., Rupert, A.H., & Legan, S.M. (2012). *Vestibular and Balance Deficits Following Head Injury: Recommendations Concerning Evaluation and Rehabilitation in the Military Setting*. USAARL Report No. 2012-10.

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List of AMMP Grant Publications

- Radomski, M.V., et al., Development of a Measure to Inform Return-to-Duty Decision Making after Mild Traumatic Brain Injury. *Military Medicine*, 178(3):246-253, 2013.
- Scherer, M.R., et al., Returning Service Members to Duty Following Mild Traumatic Brain Injury: Exploring the Use of Dual-Task and Multitask Assessment Methods. *Physical Therapy Journal*, Sept 2013, 93(9):1-14.
- Smith, L.C., et al. (in press). Development and Preliminary Reliability of a Multitasking Assessment Following Concussion. *American Journal of Occupational Therapy*.
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List of AMMP Grant Publications

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- Smith, LB, Radomski, MV, Davidson LF, Finkelstein, M, Weightman, MM, Scherer, MR, McCulloch, K (2014). Development and preliminary reliability of a multitasking assessment following concussion. *American Journal of Occupational Therapy*, 68, 439-443.



TA P1 Final Objective:



TA P1 Final Objective:

Produce a Toolkit



Questions?

Arthur Estrada, Ph.D.
Manager, Task Area P1
334-255-6928
arthur.estrada.civ@mail.mil

Comment highlights and discussion summary:

Dr. Estrada provided an overview of the history of the task area and projects funded under this task area. He also reviewed the outcomes of the prior workshops. The project described on slide 13 was discussed further with respect to available data validating the device in an RTD setting. Dr Estrada clarified that validation data has not yet been established and that the device outcome is subjective in the sense that it is influenced by the patient's level of motivation to complete the task. LTC Kristy Casto stated that the device had shown sensitivity to balance dysfunction and Traumatic Brain Injury (TBI). However, the link between performance on the visual-vertical test, as well as other relevant tests including audiograms, and functional impairment has not yet been shown.

1130 – 1200 Discussion of the Normal Trajectory for those with Persistent Post Concussive Symptoms Vice Acute Concussion – Ms. Katherine Helmick (RN), Deputy Director of DVVIC

25 Years of Service



Defense and Veterans Brain Injury Center

The Defense and Veterans Brain Injury Center (DVVIC) promotes access to state of the science care for Service members, veterans, and their families to prevent and mitigate consequences of traumatic brain injury through management of the TBI pathway of care.

16 FEB 2017

RTD Toolkit Expert Panel Workshop: Acute and Chronic mTBI

Kathy Helmick, Deputy Director, DVVIC



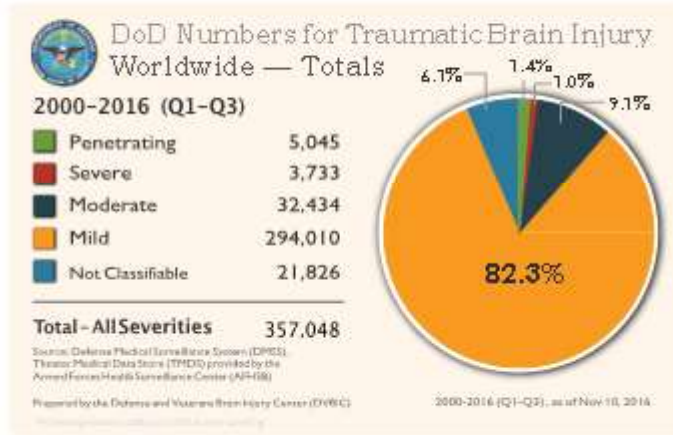
"Medically Ready Force...Ready Medical Force"

1

DVVIC Sites Strategically Located to Engage Providers and Patients (FY 15)



U.S. DoD Worldwide Numbers for TBI

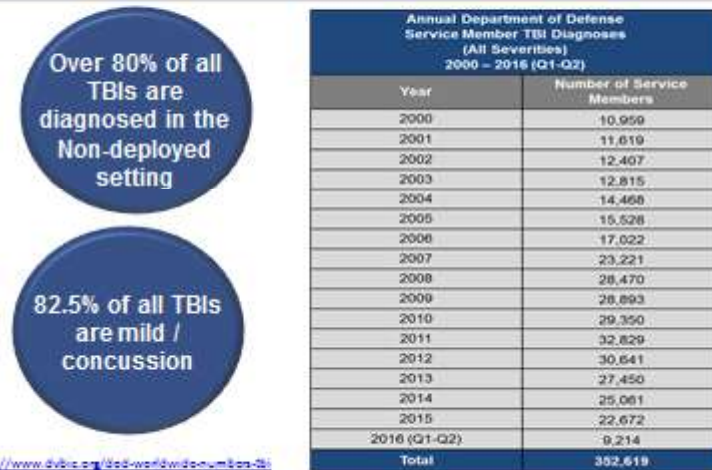


Source: <http://dvbic.doe.mil/dod-worldwide-numbers-tbi>

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All DoD TBI Incidence



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4

Top 10 MTF's : TBI Care Q3 CY 16 Snapshot



Military Treatment Facilities – Top 10 MTFs for Direct Care Medical Encounters by Service
(Active Component and Active-Duty Guard/Reserve), Q3 CY2016
Table 4 - Top 10 MTFs by operating service, ranked by combined total of patient admissions and outpatient medical encounters*

ARMY				AIR FORCE				NAVY			
Installation	Encounters No. (%)	Unique Patient	Avg No. encounters/Patient	Installation	Encounters No. (%)	Unique Patient	Avg No. encounters/Patient	Installation	Encounters No. (%)	Unique Patient	Avg No. encounters/Patient
FT BRAGG	4,339 (13.0%)	709	6	USAF AFB	3,529 (10.7%)	136	3	BETHESDA	1,893 (56.7%)	104	18
FT GOWAN	2,001 (5.9%)	255	8	WPAFB	1,441 (4.3%)	15	10	CAMP LEJUNE	849 (25.5%)	48	18
FT CARSON	1,898 (5.6%)	417	5	WPAFB	1,113 (3.3%)	17	6	SAN DIEGO	695 (21.3%)	183	4
FT CAMPBELL	1,852 (5.5%)	214	9	WPAFB	82 (0.2%)	50	2	PT BELLEVUE	334 (10.3%)	87	4
BETHESDA	1,312 (3.9%)	129	12	WPAFB	58 (0.2%)	23	3	CAMP PENDELTON	180 (5.5%)	25	7
FT HOOD	1,178 (3.5%)	222	5	WPAFB	58 (0.2%)	19	3	PORTSMOUTH	147 (4.5%)	44	3
FT BENNING	1,134 (3.4%)	111	10	WPAFB	37 (0.1%)	28	2	JACKSONVILLE	89 (2.7%)	16	5
FT BELT	905 (2.7%)	281	3	WPAFB	41 (0.1%)	15	3	FT BELLEVUE	41 (0.1%)	15	3
FT BELVOIR	843 (2.5%)	114	7	WPAFB	38 (0.1%)	18	2	ANTONIO LAF RAPT DIV	41 (0.1%)	8	5
FT JACKSON	616 (1.8%)	153	4	WPAFB	29 (0.1%)	17	2	FT SHAFTER	29 (0.1%)	17	2
Total at Top 10 Installations	16,110 (49.3%)			Total at Top 10 Installations	3,863 (11.3%)			Total at Top 10 Installations	3,863 (11.3%)		

Traumatic Brain Injury (TBI)

(Memorandum: TBI Updated Definition and Reporting, April 6, 2015)



DoD Definition:

A traumatically induced structural injury or physiological disruption of brain function as a result of an external force, that is indicated by new onset or worsening of at least one of the following clinical signs, immediately following the event:

- Any period of loss of or decrease of consciousness, observed or self-reported (LOC)
- Any loss of memory for events immediately before or after the injury (PTA)
- Any alteration in mental status (confusion, slowed thinking, disorientation) (AOC)

DoD definition parallels standard medical definition of Centers for Disease Control, World Health Organization, American Academy of Neurology, and American Congress of Rehabilitation Medicine

Neuroimaging following Mild Traumatic Brain Injury in the Non-Deployed Setting: Acute, Sub-Acute and Chronic



Table 4.0 Neuroimaging Recommendations following mTBI
No imaging is recommended if symptoms are improving

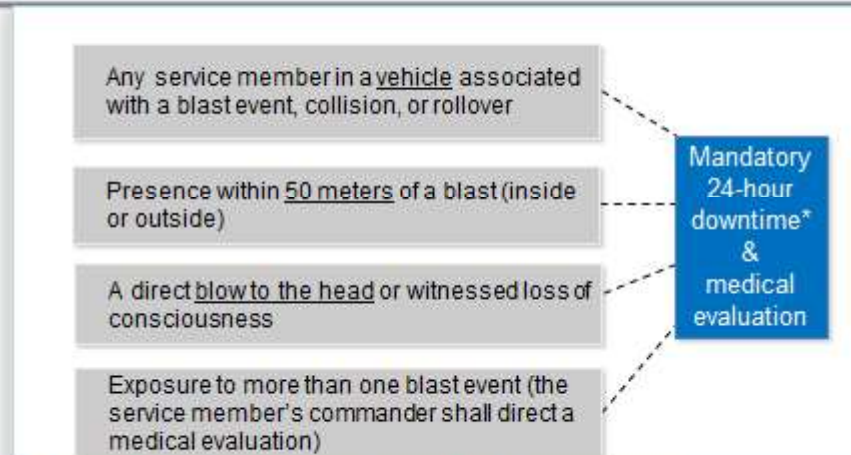
Modality	Clinical Indications in mTBI	Acute (Injury-7 days post injury) GOAL of imaging: identify structural injury or lesions (see Table 4.0 Page 4)	Sub-Acute (8-30 Days post injury) GOAL of imaging: evaluate symptoms within the acute setting. Identify need for referral.	Chronic (30 days or greater post injury) GOAL of imaging: evaluate structural lesions. Identify need for referral.
CT	Loss of consciousness or loss of orientation Glasgow Coma Scale (GCS) 14 or less Rapidly changing mental status Focal neurologic deficits Seizure activity Papilloedema Skull fracture	Modify of choice if no indication	Use only if MRI is contraindicated	Use only if MRI is contraindicated
MRI	Loss of consciousness or loss of orientation Glasgow Coma Scale (GCS) 14 or less Rapidly changing mental status Focal neurologic deficits Seizure activity Papilloedema Skull fracture	Modify of choice if no indication	Modify of choice	Modify of choice DI (head injury) individuals with chronic mTBI and persistent symptoms
PET	18F-DG PET	Technical Indication	If there are structural abnormalities identified on MRI or CT and organic metabolic dysfunction persists in the setting of the structural information (understanding of glucose utilization)	If there are structural abnormalities identified on MRI or CT and organic metabolic dysfunction persists in the setting of the structural information (understanding of glucose utilization)
SPECT	99mTc-DTPA SPECT	Technical Indication	If there are structural abnormalities identified on MRI or CT and organic metabolic dysfunction persists in the setting of the structural information (understanding of glucose utilization)	If there are structural abnormalities identified on MRI or CT and organic metabolic dysfunction persists in the setting of the structural information (understanding of glucose utilization)

Source: <http://dvic.dcoe.mil/dod-worldwide-numbers-tbi>

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Mandatory Event Screening & Reporting



* Commanders may delay or postpone 24-hour downtime based on mission requirements.

*Reference: Department of Defense Instructions (DoDI) 6490.11

8

Military Acute Concussion Evaluation (MACE)

Concussion Management Algorithms



Impact of mild TBI on Warfighter



DoD RTD Standards: Acute and Chronic



The Progressive Return to Activity clinical recommendations provide primary care managers and rehabilitation providers with guidance regarding how service members can incrementally return to pre-injury activity following an acute concussion. The two detail:

- Education interventions after diagnosis
- The parameters for physical and cognitive rest
- A standardized, staged approach for increasing physical and cognitive activities to optimize recovery
- Recommendations for progression, regression and referral

To download or order hard copies, visit dvbic.dcoe.mil/resources/progressive-return-to-activity

PRIMARY CARE MANAGER SUITE

This suite of tools provides an initial framework for gradually increasing service member activity after concussion.



REHABILITATION PROVIDER SUITE

This suite of tools is for more symptomatic service members referred by primary care managers to rehabilitation providers.



Each suite includes:
Clinical guidance
Clinical support tool
Provider educational slide deck
Patient education products

(DeFonzo and Veterans Brain Injury Center, 2014)

11

General Principles



- Six stages of progression from Stage 1- Rest to Stage 6-Return to pre-injury activity
- After an **education intervention** for all patients, those with few and mild symptoms are managed by a **Primary Care Manager** and follow a self-guided staged recovery
- Utilize the Neurobehavioral Symptom Inventory (NSI) for tracking symptoms
- List key activities for participation and activities to avoid at each stage
- Patients who are more symptomatic or who fail to progress are referred to **rehabilitation providers** for a more intensive, clinician-directed, daily-monitored recovery

Stages of Progressive Activity



Rehabilitation Stages	Description
Stage 1	Rest (minimum 24 hours)
Stage 2	Light Routine Activity
Stage 3	Light Occupation-oriented Activity
Stage 4	Moderate Activity
Stage 5	Intensive Activity
Stage 6	Unrestricted Activity

13

Return to Activity Educational Brochure



Stage 2: Light Routine Activity
All activities no longer than 30 minutes.
You may wear a uniform and boots.

- Walk and stretch
- May ride a stationary bike at a slow pace with low resistance
- Do light housework
- Use the computer
- Play simple games such as cards

DO NOT!!!

- Drink alcohol
- Drive
- Play video games
- Do resistance training or repetitive lifting
- Go to shops, post office or post office
- Go to crowded areas where you may be bumped into

Stage 4: Moderate Activity
You may wear PPE.
May perform these activities no longer than 90 minutes.

- Take a brisk walk
- Do light resistance training
- Participate in non-contact sports
- Perform moderate job-related tasks
- Climb, crawl or jog

May perform these activities no longer than 45 minutes.

- Play video games, football, boxing and ping pong
- Play strategy games such as chess or Sudoku
- Shop for groceries
- Perform target practice
- Drive in a simulator

DO NOT!!!

- Drink alcohol
- Participate in combatives or contact sports
- Drive

Stage 3: Light Occupation-oriented Activity
May perform these activities no longer than 60 minutes.

- Lift and carry objects less than 20 pounds
- Take a brisk walk
- Ride in car and look around
- Use an electrical machine or tool similar
- Perform light military tasks such as cleaning equipment

May perform these activities no longer than 30 minutes.

- Shop for one item at the store
- Talk to someone at you work
- Gradually increase your exposure to light and noise
- Perform a maintenance check on a vehicle

DO NOT!!!

- Drink alcohol
- Drive
- Play video games
- Do resistance training or repetitive lifting
- Go to crowded places
- Participate in combatives or contact sports

Stage 5: Intensive Activity

- Resume normal routine and exercise
- Participate in normal military, training and social activities
- Use night vision goggles, take part in simulations, or be exposed to bright light

Start driving again

- Do heavy job-related tasks, such as rigging
- Communicate by signals during patrol duty or use radio communication

DO NOT!!!

- Drink alcohol
- Participate in combatives or contact sports
- Go outside the wire on a combat zone

WHAT IS A CONCUSSION?
A concussion is a head injury from a hit, blow or JOC to the head that:

- briefly makes you out (lose of consciousness), or
- may affect your ability to remember information before, during or after the event (post-traumatic amnesia), or
- makes you feel dazed, like you had your bell rung (alteration of consciousness).

A concussion is also known as mild traumatic brain injury (MTBI). This brochure will help you to recover as quickly and safely as possible. Each stage is designed to help you gradually return to your normal routine, while your brain heals. You may have to stay at one stage longer than another if your symptoms do not go away or return when you try to do more activities. Everyone is different. Do not rush your progress.

For more information visit dha.mil

Email: readers@hqa.mil

DHAPC is the 1st operational component of The Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury. January 2014

Return to Activity Educational Brochure



WHAT SHOULD I EXPECT?

- Most people fully recover from concussions
- Immediately or soon after the injury you may have the symptoms noted on the table on the following page
- Symptoms after a concussion can affect your performance, placing the safety of you or your unit at risk
- These temporary symptoms resolve faster when your brain gets rest, so it is important for you to take time to gradually recover
- Recovery is different for each person, but symptoms typically improve within hours, and resolve completely within days to weeks

Red Flags: When Should I Seek Help?

If you experience any of the following contact your primary care manager immediately:

- passing out or blackouts
- swelling or numbness of any part of the body
- one pupil larger or smaller than the other
- slurred speech or difficulty speaking
- changes in hearing, taste or smell
- difficulty recognizing people
- not knowing where you are
- upsetting headaches
- vomiting or fever
- seizures
- nausea
- something just isn't right

AVOID

- caffeine
- alcohol
- drugs
- sleeping pills or drugs
- anything that could harm you

DO NOT!!!

- drink or eat
- drink alcohol
- smoke
- drink
- hold your breath or "grind"
- return yourself to the point of making your heart race
- play video games

HOW DO I FEEL TODAY?

RATE ON A SCALE OF 0-4

	0	1	2	3	4
Feeling dizzy					
Loss of balance					
Poor coordination, (stuffy)					
Headaches					
Nausea					
Vision problems, blurring, trouble seeing					
Sensitivity to light					
Hearing difficulty					
Sensitivity to noise					
Numbness or tingling in parts of the body					
Change in taste and/or smell					
Loss of appetite or increased appetite					
Poor concentration, can't pay attention, easily distracted					
Forgetfulness, can't remember things					
Difficulty making decisions					
Slow thinking, difficulty getting organized, can't finish things					
Angry, lots of anger getting tired easily					
Difficulty falling or staying asleep					
Feeling anxious or tense					
Feeling depressed or sad					
Emotionally, easily annoyed					
Feeling nervous, nervous feeling					

WHAT SHOULD I DO?

After Mandatory 24 Hours of Recovery:

Stage 1: Rest

Rest in a very light activity for another 24 hours. Only do basic things the evening, using the bathroom, eating and sleeping.

- Keep your head above your heart when you put on your shoes, bring your feet to your level
- Get up when dressing and showering if needed
- Walk on level surfaces at an easy pace
- Limit head movements that cause symptoms
- Stay in a quiet environment with low lighting
- Periods of relaxation with rest breaks each hour
- Sleep as needed
- Dress comfortably

After this stage, see your primary care manager to discuss symptoms and determine next steps.

Practice good sleep habits (get 6-8 hours)
See healthy sleep fact sheet at dhsa.dhs.mil

If your heart starts to race, immediately STOP what you are doing and rest.

Persistent Post Concussion Symptoms



Physical	Cognitive	Behavioral/ Emotional	Vestibular/ Balance
<ul style="list-style-type: none"> Headache Nausea Fatigue Sleep Disturbance Visual Disturbance Neuroendocrine Disorders 	<ul style="list-style-type: none"> Attention Memory Problems Poor Concentration Delayed Processing Speed Impaired Judgment Decreased Executive Functioning 	<ul style="list-style-type: none"> Feeling Anxious Depressed Agitated Irritable Being Impulsive 	<ul style="list-style-type: none"> Dizziness Difficulty with Balance Hearing Difficulties Tinnitus

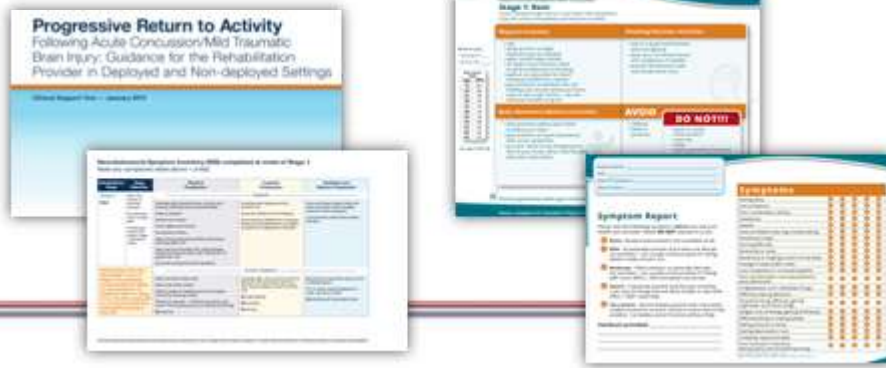
*Symptoms in red are the most common after concussion

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Rehabilitation Provider



Daily monitored approach
 For individuals who are not progressing as expected
 No progress in 7 days
 Per Primary Care Manager judgment



Rehabilitation Provider Clinical Support Tool



Neurobehavioral Symptom Inventory (NSI) completed at onset of Stage 1.
 Note any symptoms rated above 1 (mid).

Rehabilitation Stage	Stage Objective	Physical Progression	Cognitive Progression	Vestibular and Balance Progression
Stage 1	<p>Test and adjust to provide recovery</p> <p>10-15 min (10-15) (10-15)</p> <p>10-15 min (10-15) (10-15)</p> <p>10-15 min (10-15) (10-15)</p> <p>10-15 min (10-15) (10-15)</p>	<p>Screening light physical activity, primary rest</p> <p>Screening light cognitive activity, primary rest</p> <p>Screening light cognitive activity, primary rest</p> <p>Screening light cognitive activity, primary rest</p>	<p>Screening light cognitive activity, primary rest</p> <p>Screening light cognitive activity, primary rest</p> <p>Screening light cognitive activity, primary rest</p> <p>Screening light cognitive activity, primary rest</p>	<p>Screening light cognitive activity, primary rest</p> <p>Screening light cognitive activity, primary rest</p> <p>Screening light cognitive activity, primary rest</p> <p>Screening light cognitive activity, primary rest</p>
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Review details substantially and progressively, ensuring for any change that provides symptoms, modify characteristics of previous level of symptom description.

Patient Activity Guidance After Concussion
Stage 1: Rest
 If your symptoms get worse or you have new symptoms, stop the activity immediately and tell your provider.

<p>Write in pencil</p> <ul style="list-style-type: none"> • Reusing ink • A new ink <p>Map shows Age 40% 15 62 20 80 25 78 30 76 35 74 40 72 45 70 50 68 55 66 60 64 65 62</p> <p>200 Age - 100% = 100</p>	<p>Physical Activities</p> <ul style="list-style-type: none"> • rest • sleep 6-8 hrs. at night, daytime naps as needed • wear comfortable clothes • sit down if you feel your head to while showering or dressing • walk at an easy pace for short distances (backwards, head) • pay attention to whether you are holding your breath when you bend over or are under stress — do not hold your breath or grunt 	<p>Thinking/Decision Activities</p> <ul style="list-style-type: none"> • rest in a quiet environment with low lighting • wear your corrective lenses and sunglasses if needed • periods of television with rest breaks each hour
	<p>Body Movement/Balance Activities</p> <ul style="list-style-type: none"> • limit positions where your head is below your heart • pay attention to head movements that cause symptoms • put your shoes on by bringing your foot to your knee rather than bending with your head down 	<p>AVOID</p> <ul style="list-style-type: none"> • caffeine • tobacco products

Practice good sleep habits (get 6-8 hours). See Healthy Sleep fact sheet at tbiic.dcoe.mil.

Please complete the Symptom Report on the back of this form before you see your provider.

Multiple Concussion

- Multiple concussions are associated with greater number of cognitive, somatic/sensory, vestibular, and emotional symptoms.
- Multiple concussions is associated with a slower recovery of symptoms.
 - Military requires additional 7 days of rest for 2nd concussion within 12 months and additional rest plus referral to TBI specialist for 3rd concussion within 12 months
- Prior concussion may increase susceptibility to future TBI.
 - May require less force than previous
- Cumulative concussion is associated with a progressive decline of memory and cognition

Comment highlights and discussion summary:

Ms. Helmick’s presentation generated discussion with respect to the course of care patients’ engage in currently and how this effort mirrors the progressive return to activity approach. Discussion included identification of the challenges associated with self-reported symptoms and attempts to incorporate more objective measures (e.g., Automated Neuropsychological Assessment Metrics). Unfortunately, these objective measures are not being

used as widespread as originally intended. This discussion highlighted the particular gaps in the current approach and where this effort, in part, can address these including an enhanced level of objectivity and a “cookbook” approach that is easy to use for low-experienced medical providers.

1100 – 1130 Pathways to Disseminate Best Practices in DoD – Ms. Katherine Helmick (RN), DVBIC Deputy Director

25 Years of Service



Defense and Veterans Brain Injury Center

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16 FEB 2017

RTD Toolkit Expert Panel Workshop: Pathways to Disseminate Best Practices in DoD

Kathy Helmick, Deputy Director, DVBIC

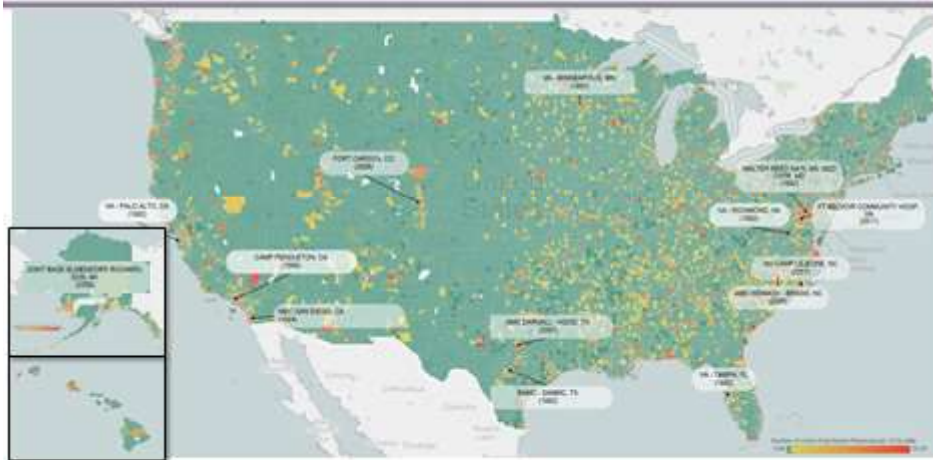


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Distribution of Active Duty Population

(09/2015 Defense and Military Data Center)

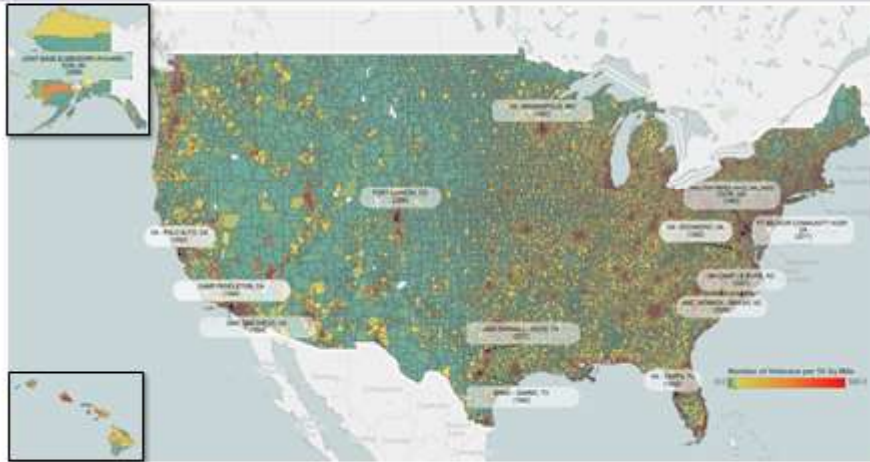


(Year) location becomes a DVBIC site

2

Distribution of Veteran Population

(09/2015 US Census, projected)

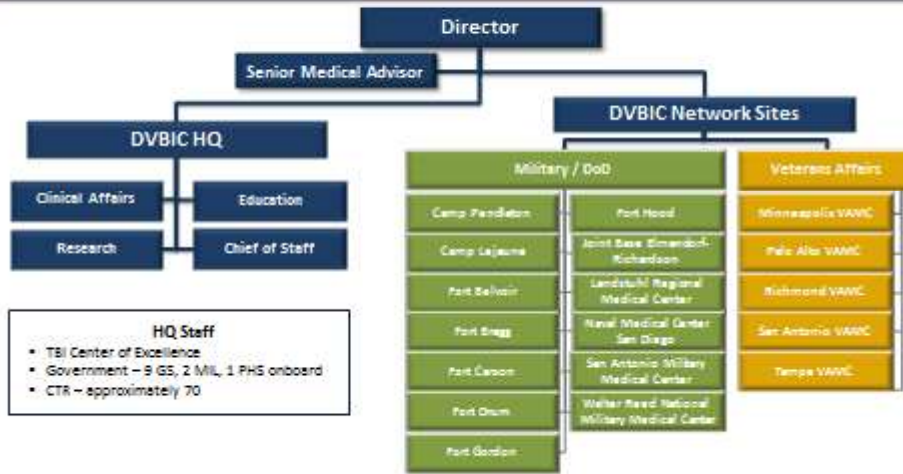


(Near) location became a DVBC site

DVBC Sites Strategically Located to Engage Providers and Patients (FY 15)



How Does DVbic Operate? People. Contracts. Locations.



HQ Staff

- TBI Center of Excellence
- Government – 9 GS, 2 MIL, 1 PHS onboard
- CTR – approximately 70

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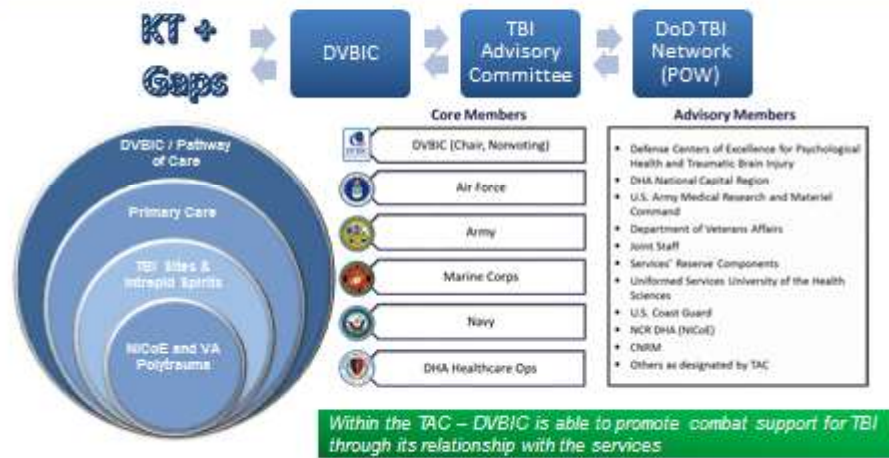
DVBIC Pillars of Effort



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6

TBI Pathway of Care



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DVBIC Strategic Initiatives



Further advance the level of care across the enterprise

- Knowledge translation for research findings
- Educate and train to accepted standards

Standardize care delivery

- Reduce geographic and service variations in care

Obtain standardized health outcomes data from across the MHS

- Allows for inter-site comparison to identify outliers in efficacy and identification and dissemination of best practices

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- Develop Clinical Recommendations State of the Science; Knowledge translation
- Perform TBI surveillance and health outcomes
 - Quarterly Reports to DoD
- Care coordination through Recovery Support Program

DVBIC is leading collaborations to advance evidence-based care	Date
Headache Symptom Management	Feb 2016
Management of Sleep Disturbances Following Concussion/Mild TBI	Jun 2014
Progressive Return to Activity Following Acute Concussion/Mild TBI: Guidance for the Primary Care Manager in Deployed and Non-deployed Settings	Jan 2014
Progressive Return to Activity Following Acute Concussion/Mild TBI: Guidance for the Rehabilitation Provider in Deployed and Non-deployed Settings	Jan 2014
Neuroimaging Following Mild TBI in the Non-Deployed Setting	Jul 2013
Assessment and Management of Visual Dysfunction Associated with Mild TBI (in collaboration with the Vision Center of Excellence)	Jan 2013
Assessment and Management of Dizziness Associated with Mild TBI	Sep 2012
Indications & Conditions for Neuroendocrine Dysfunction Associated with Mild TBI	Mar 2012
Indications & Conditions for In-theatre Post-Injury Neurocognitive Assessment Tool Testing	May 2011
Driving Following TBI	Jul 2009
Cognitive Rehabilitation	Apr 2009
	Jun 2006
Military Acute Concussion Evaluation (MACE) and Clinical Management Algorithms	Dec 2006 Sep 2012

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9

Education and Training

Provides evidence-based knowledge about TBI through educational programs, activities and resources

- Producing state-of-the-science joint education and training resources that contribute to the standard of care
- Educating and training clinical providers with end state of changing provider behavior

Regional Education Coordinators (RECs) network provide TBI outreach and training

- Increases awareness of TBI across the care continuum to maximize access to care
 - Reached an estimated 283,221 service members in FY 2015
- Fulfills service mandatory training requirements at some DVBIC sites



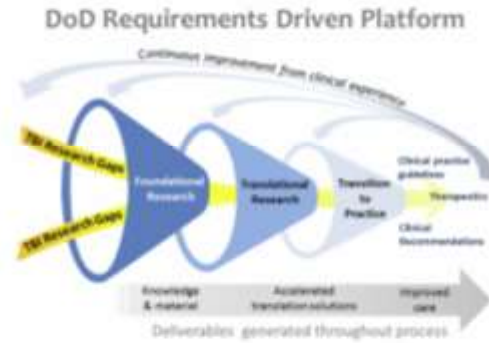
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10



"Medically Ready Force...Ready Medical Force"

11



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13

Dissemination and Outreach

- The aims of this phase are to increase stakeholder awareness of newly developed products through training, education, and outreach; scientific communication; and press.

- Communication channels identified during products development are leveraged to follow promotion and distribution plans for broad dissemination.



- The ultimate goal of KT is to implement newly translated knowledge, products and practices, and promote their continued adoption.
- Each implementation environment may differ based on its population, location, workflow, and operational constraints.
- This phase aims to identify barriers to the adoption of translated knowledge, practices and policies and supporting the integration of new information into novel implementation environments.



Comment highlights and discussion summary:

Discussion included suggestion of creating a common website where the tools can be available. While effectively using technology is a platform for some, others, particularly those outside of the country, may not have access to the necessary bandwidth. Therefore, mechanisms for dissemination need to include web-accessible platforms as well as formats that are appropriate in the combat environment. Another discussion point included the ability to use these tools in multiple locations (considering resources and availability) so as to minimize the possibility of the Soldier being removed from family and their unit, which impacts recovery.

1300 – 1330 Overview of RTD Toolkit Products – Dr. Arthur Estrada, USAARL Science Program Administrator



Overall Purpose of Toolkit

- Existing reference documents (e.g., OTSG mTBI Toolkit) for use by clinicians in RTD decision-making include:
 - Screening tools for detection of mTBI symptoms
 - Patient-oriented outcome instruments to qualify functional abilities
- Lack of assessment of military-specific functional performance
- This toolkit product will serve as a companion and supplement to existing reference documents by providing military-specific tasks and dual-task conditions

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RTD Toolkit Products

- Three products that will vary in the level of detail
 - RTD Toolkit Manual
 - Includes "annotated bibliography" style description of assessments/tools
 - Audience: Researchers and Clinicians
 - Condensed RTD Toolkit Manual
 - Includes one or two bullet points on assessments/tools
 - Audience: Clinicians, more in-depth, perhaps for unique cases
 - RTD Toolkit Pamphlet for clinicians/providers
 - Includes "best" assessments organized by purpose and domain
 - » Clinical assessment tools
 - » Military-specific tasks
- All products will include "5-star rating system" based on scientific evidence and SME opinion on utility

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Purpose of Products

- Purpose of the Toolkit is to aid RTD decisions
 - Purpose is NOT diagnosis of concussion
 - Purpose is NOT treatment following concussion
- All products will have brief intro describing:
 - Purpose of each version
 - Methods used to determine assessments included
 - Note that the complete manual will include a detailed section on how military-specific tasks were developed and evaluated



RTD Toolkit Products

- Organized by domain:
 - Vestibular
 - Neurocognitive
 - Mental Health
 - Vision/Oculomotor
 - Auditory
 - Military-specific
- Definitions of each domain and functional constructs will be included



RTD Toolkit Products

- Following slides are examples of format, content, and level of detail for each toolkit product
 - Requesting feedback on format
 - User-friendly?
 - Easy to understand?
 - Requesting feedback on content
 - What info would you want if you picked up this product?
 - Requesting feedback on level of detail/content provided for each product
 - How much detail to provide in each product?
- Example task is for reference only

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RTD Toolkit Product #1: Complete Manual

Task: Virtual Convoy Operations Trainer (VCOT)

Description: In this task, a Soldier completes three exercises in a virtual reality simulation convoy trainer. The exercises include serving as a 50cal gunner and communicating a SALUTE report, serving as a driver, including identification of RPGs and IEDs, and serving as vehicle command (VC) communicating with squad and radio communication to Tactical Operations Center (TOC).

Source: Military Functional Assessment Program (MFAP)

Equipment needed:

Access to Virtual Convoy Operations Trainer

Time to administer: 60-90 minutes per group of 3 participants

Administration instructions: See SOP [Appendix B]

Scoring instructions: Scoring based on performance with respect to leading and following drills

Scoring/interpretation: Scored on scale of 1 (independent) to 5 (dependent) [Appendix A]

Vestibular demands identified: Virtual reality goggles utilized for the task can create dizziness both from vestibular response but also secondary response to anxiety from realism.

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RTD Toolkit Product #1: Complete Manual, cont.

Summary of Experimental Results:

Reliability evidence: MFAP overall absolute average agreement ICC = 0.82

Construct validity evidence: Correlated with dizziness handicap inventory and dynamic visual acuity

Predictive validity evidence: Correlated with subjective perceived satisfaction and performance levels 6-months post-MFAP

Experimental evidence with military population: Yes

SME ratings:

- Usability/ease of administration – ★★★★★
- Results Valid for RTD determination – ★★★★★

Reference citations:

Kelley, A. M., Ranes, B. M., Estrada, A., & Grandizio, C. M. (2015). Evaluation of the Military Functional Assessment Program: Preliminary assessment of the construct validity using an archived database of clinical data. *Journal of Head Trauma Rehabilitation, 30*(4), E11-E20.

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RTD Toolkit Product #2: Condensed Manual

Task: Virtual Convoy Operations Trainer (VCOT)

Description: In this task, a Soldier completes three exercises in a virtual reality simulation convoy trainer. The exercises include serving as a 50cal gunner and communicating a SALUTE report, serving as a driver, including identification of RPGs and IEDs, and serving as vehicle command (VC) communicating with squad and radio communication to Tactical Operations Center (TOC).

Source: Military Functional Assessment Program (MFAP)

Equipment needed: Access to Virtual Convoy Operations Trainer

Time to administer: 60-90 minutes per group of 3 participants

Administration instructions: See SOP [Appendix B]

Scoring instructions: Scoring based on performance with respect to leading and following drills

Scoring/interpretation: Scored on scale of 1 (independent) to 5 (dependent) [Appendix A]

Vestibular demands identified: Virtual reality goggles utilized for the task can create dizziness both from vestibular response but also secondary response to anxiety from realism.

SME ratings:

- Usability/ease of administration – ★★★★★
- Results Valid for RTD determination – ★★★★★

Reference citations:

Kelley, A. M., Ranes, B. M., Estrada, A., & Grandizio, C. M. (2015). Evaluation of the Military Functional Assessment Program: Preliminary assessment of the construct validity using an archived database of clinical data. *Journal of Head Trauma Rehabilitation, 30*(4), E11-E20.

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RTD Toolkit Product #3: Pamphlet

Task: Virtual Convoy Operations Trainer (VCOT)

Equipment needed: Access to Virtual Convoy Operations Trainer

Time to administer: 60-90 minutes per group of 3 participants

Vestibular demands identified: Virtual reality goggles utilized for the task can create dizziness both from vestibular response but also secondary response to anxiety from realism.

Comment highlights and discussion summary:

In response to Dr. Estrada's presentation of the proposed format and content of toolkit products, discussion of the instruction for how a clinician should use this information for a complex patient occurred. Ideally, a mathematical algorithm weighting and combining outcomes on these measures would yield a binary yes/no with respect to RTD. However, the data to support such an effort does not currently exist. The discussion focused on the goal of providing the RTD decision maker with as much information as possible regarding whether it is reasonable to expect the patient to perform to standard. Future research isolating the predictive relationship between a simulated environment and a real-world environment as well military occupational specialty (MOS) specificity for the toolkit tasks were suggested.

1330 – 1400 Review of all scientific evidence for MFAP tasks – Dr. Amanda Kelley, USAARL Research Psychologist



Military Functional Assessment Program

- 10 military-relevant tasks are performed by Soldiers following head injury rehabilitation for ratings
- Four professionals rate task performance according to standards within their fields of specialization
 - Non-commissioned officer (NCO) rates military performance standards
 - Occupational therapist (OT) rates global function
 - Physical therapist (PT) rates physical strength, agility, and balance
 - Mental health counselor (MH) rates anxiety level and psychological level of independence
- All raters collaborate on a single overall level of independence score

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MFAP Tasks

Task: Warrior task battle drill

Description: This task is a collection of individual and independent subtasks including physical tasks, and Drill & Ceremony (D & C) procedures (e.g. donning gas mask within Army standard of 9 seconds, Mission-Oriented Protective Posture suit, casualty evacuation, leading/following commands).

Source: Military Functional Assessment Program (MFAP)

Equipment needed:

- Clipboards
- Mission-Oriented Protective Posture suit
- Gas mask

Time to administer:

Administration instructions: See SOP [Appendix B]

Scoring instructions: Scoring based on performance with respect to leading and following drills

Scoring/interpretation: Scored on scale of 1 (independent) to 5 (dependent) [Appendix A]

Summary of Experimental Results:

- **Reliability evidence:** MFAP overall absolute average agreement ICC = 0.82
- **Construct validity evidence:** Correlated with dizziness handicap inventory
- **Predictive validity evidence:** Correlated with subjective perceived performance level at 6 months post-MFAP completion
- **Experimental evidence with military population:** Yes

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MFAP Tasks

Task: HMMWV Egress Assistance Trainer

Description: This task includes a 30-minute class preparation on roll-over crashes and procedures followed by three egress exercises from a simulated HMMWV (high mobility multipurpose wheeled vehicle) rollover while wearing kit (Body armor and helmet). The SOLDIER serves a different role in each exercise (e.g., Vehicle Command (VC), driver, medic).

Source: Military Functional Assessment Program (MFAP)

Equipment needed:

- Access to HMMWV Egress Assistance Trainer

Time to administer:

Administration instructions: See SOP [Appendix B]

Scoring instructions: Scoring based on performance with respect to leading and following drills

Scoring/interpretation: Scored on scale of 1 (independent) to 5 (dependent) [Appendix A]

Summary of Experimental Results:

- **Reliability evidence:** MFAP overall absolute average agreement ICC = 0.82
- **Construct validity evidence:** Correlated with dizziness handicap inventory and sensory organization test
- **Predictive validity evidence:** NA
- **Experimental evidence with military population:** Yes

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MFAP Tasks

Task: Land Navigation Prep

Description: This task is composed of classroom instruction using PowerPoint slides and hands-on application (e.g., plotting points on map).

Source: Military Functional Assessment Program (MFAP)

Equipment needed:

- PowerPoint class on land navigation to include familiarization with terrain features, legend, scale, how to plot a point, measure the distance between two points, shoot an azimuth using map and protractor, shoot a back azimuth, measure distance on a road, and identify key landmarks on a map using pre-plotted points listed within the PowerPoint presentation through hands-on practical exercises

Time to administer:

Administration instructions: See SOP [Appendix B]

Scoring instructions: Scoring based on performance with respect to leading and following drills

Scoring/interpretation: Scored on scale of 1 (independent) to 5 (dependent) [Appendix A]

Summary of Experimental Results:

- **Reliability evidence:** MFAP overall absolute average agreement ICC = 0.82
- **Construct validity evidence:** Correlated with sensory organization test
- **Predictive validity evidence:** NA
- **Experimental evidence with military population:** Yes

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MFAP Tasks

Task: Land Navigation

Description: In this task, Soldier must execute a land navigation task including three points.

Source: Military Functional Assessment Program (MFAP)

Equipment needed:

- Map
- Compass
- Protractor
- 3x5 notecard
- non-permanent marker

Time to administer:

Administration instructions: See SOP [Appendix B]

Scoring instructions: Scoring based on performance with respect to leading and following drills

Scoring/interpretation: Scored on scale of 1 (independent) to 5 (dependent) [Appendix A]

Summary of Experimental Results:

- **Reliability evidence:** MFAP overall absolute average agreement ICC = 0.82
- **Construct validity evidence:** Correlated with dynamic visual acuity ($r(33) = -0.39$, $p = 0.024$)
- **Predictive validity evidence:** NA
- **Experimental evidence with military population:** Yes

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MFAP Tasks

Task: Virtual Convoy Operations Trainer (VCOT)

Description: In this task, a Soldier completes three exercises in a virtual reality simulation convoy trainer. The exercises include serving as a 50cal gunner and communicating a SALUTE report, serving as a driver, including identification of RPGs and IEDs, and serving as vehicle command (VC) communicating with squad and radio communication to Tactical Operations Center (TOC).

Source: Military Functional Assessment Program (MFAP)

Equipment needed:

- Access to Virtual Convoy Operations Trainer

Time to administer:

Administration instructions: See SOP [Appendix B]

Scoring instructions: Scoring based on performance with respect to leading and following drills

Scoring/interpretation: Scored on scale of 1 (independent) to 5 (dependent) [Appendix A]

Summary of Experimental Results:

- **Reliability evidence:** MFAP overall absolute average agreement ICC = 0.82
- **Construct validity evidence:** Correlated with dizziness handicap inventory and dynamic visual acuity
- **Predictive validity evidence:** Correlated with subjective perceived satisfaction and performance levels 6-months post-MFAP
- **Experimental evidence with military population:** Yes



MFAP Tasks

Task: Engagement Skills Trainer 2000 – Weapons Qualification

Description: In this task, service member must zero weapon on the EST 2000 and complete 40-shot qualification task.

Source: Military Functional Assessment Program (MFAP)

Equipment needed:

- Access to Engagement Skills Trainer 2000

Time to administer:

Administration instructions: See SOP [Appendix B]

Scoring instructions: Scoring based on performance with respect to leading and following drills

Scoring/interpretation: Scored on scale of 1 (independent) to 5 (dependent) [Appendix A]

Summary of Experimental Results:

- **Reliability evidence:** MFAP overall absolute average agreement ICC = 0.82
- **Construct validity evidence:** Correlated with dizziness handicap inventory, dynamic visual acuity, and sensory
- **Predictive validity evidence:** NA
- **Experimental evidence with military population:** Yes



MFAP Tasks

Task: Engagement Skills Trainer 2000 – Shoot/No-Shoot Scenarios

Description: In this task, service member completes a set of collective, interactive videotaped scenarios with the marksmanship trainer that place Soldier in lifelike shooting scenarios requiring on-the-spot judgment.

Source: Military Functional Assessment Program (MFAP)

Equipment needed:

- Access to Engagement Skills Trainer 2000

Time to administer:

Administration instructions: See SOP [Appendix B]

Scoring instructions: Scoring based on performance with respect to leading and following drills

Scoring/interpretation: Scored on scale of 1 (independent) to 5 (dependent) [Appendix A]

Summary of Experimental Results:

- **Reliability evidence:** MFAP overall absolute average agreement ICC = 0.82
- **Construct validity evidence:** Correlated with dizziness handicap inventory
- **Predictive validity evidence:** NA
- **Experimental evidence with military population:** Yes



MFAP Tasks

Task: Medical Simulation Training Center – Mass Casualty Scenario

Description: This task is composed of three phases, each increasing in environmental stress (Crawl-Walk-Run). This real-time simulation task is completed individually in a medical training environment where service member must treat lifelike mannequins. These mannequins cannot move on their own in the first phase. In the second and third phases, the mannequins are powered electronically to perform "life-like" movements.

Source: Military Functional Assessment Program (MFAP)

Equipment needed:

Time to administer:

Administration instructions: See SOP [Appendix B]

Scoring instructions: Scoring based on performance with respect to leading and following drills

Scoring/interpretation: Scored on scale of 1 (independent) to 5 (dependent) [Appendix A]

Summary of Experimental Results:

- **Reliability evidence:** MFAP overall absolute average agreement ICC = 0.82
- **Construct validity evidence:** Correlated with dizziness handicap inventory and sensory organization test
- **Predictive validity evidence:** NA
- **Experimental evidence with military population:** Yes



MFAP Tasks

Task: Medical Simulation Training Center – Tactical Mission Scenario

Description: This task is a group activity where the squad completes a real-time simulation under field conditions involving ambush with paintballs (squad is capable of returning fire with paintball rounds). The squad must move casualties out of combat/IED lanes to a safe location and address injuries.

Source: Military Functional Assessment Program (MFAP)

Equipment needed:

- paintball guns
- paintballs
- safety glasses (for raters/providers too)
- aid bags
- IED simulator
- .50 cal simulator
- OPFOR

Time to administer:

Administration instructions: See SOP [Appendix B]

Scoring instructions: Scoring based on performance with respect to leading and following drills

Scoring/interpretation: Scored on scale of 1 (independent) to 5 (dependent) [Appendix A]

Summary of Experimental Results:

- **Reliability evidence:** MFAP overall absolute average agreement ICC = 0.82
- **Construct validity evidence:** Correlated with dizziness handicap inventory, dynamic visual acuity, and sensory organization test
- **Predictive validity evidence:** Correlated with subjective perceived satisfaction and performance levels 6-months post-MFAP
- **Experimental evidence with military population:** Yes



MFAP Tasks

Task: Tactical Combat Casualty Care

Description: This task consists of classroom instruction on basic life support primarily using PowerPoint slides and a quiz post-exercise.

Source: Military Functional Assessment Program (MFAP)

Equipment needed:

Time to administer:

Administration instructions:

Scoring instructions: Scoring based on performance with respect to leading and following drills

Scoring/interpretation: Scored on scale of 1 (independent) to 5 (dependent) [Appendix A]

Summary of Experimental Results:

- **Reliability evidence:** MFAP overall absolute average agreement ICC = 0.82
- **Construct validity evidence:** Correlated with scores on the Repeatable Battery for Neuropsychological Assessment
- **Predictive validity evidence:** Correlated with subjective perceived satisfaction level 6-months post-MFAP
- **Experimental evidence with military population:** Yes



MFAP Longitudinal Study

- Completed enrollment and 6-month follow-up data collection
- 12-month follow-up data collection will be complete in May 2017
 - Small number of respondents, data analysis will be descriptive only
- Limitations
 - Attrition rate was very high
 - Did not receive operational performance data in follow-ups despite strong efforts

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MFAP Longitudinal Study

- Correlational analyses with clinical assessments and MFAP data support previous findings regarding construct validity
- Significant correlations between self-report *performance* level at 6 months and...
 - Performance on tactical combat casualty care task
- Significant correlations between self-report *satisfaction* level at 6 months and...
 - Performance on land navigation
 - Weapons qualification
 - Tactical mission scenario performance (real-time simulation under field conditions involving ambush, paintball, treatment of a casualty)

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MFAP Rater Reliability Study

- Method: Vignettes describing performance of hypothetical Soldier on each MFAP task
 - Participants: 30 NCOs naïve to the MFAP and its administration
 - Used instructions written by current NCO conducting MFAP
 - Used MFAP rating system
- Results: Intra-class correlation coefficients assessing absolute agreement on average (rather than individual accuracy given that MFAP ratings are a team effort)
 - Very good resulting ICC of 0.82 for all tasks

Comment highlights and discussion summary:

Mark Showers described the Military Functional Assessment Program (MFAP) tasks as well as walked through the experience of the patient. Discussion included the need to examine clinical assessments used following concussion when specific symptoms have emerged. Ms. Helmick pointed out that headache and sleep are additional symptoms that need to be addressed in the toolkit products. At present, the tasks cover multiple domains but not necessarily reflect headache or sleep function. None of the tasks have been designed for that purpose. Dr. Estrada pointed out that the toolkit products are not designed to replace the RTD decision maker or medical provider but rather to provide additional information with respect to function and performance.



Assessment of Military Multitask Performance (AAMP)

- Battery of functional dual-tasks and multitasks that simulate the neurosensorimotor, cognitive, and exertional demands of Soldiers
- Development followed military stakeholder inquiry, expert consultation, lit review
- Inter rater reliability, convergent/discriminant validity, and known-groups validity examined
- Refined task battery to five best tasks



AAMP Tasks

Task: Charge of Quarter Duty

Description: The SM is challenged to develop and execute a work plan for completing an array of interleaving tasks (supply inventory, PVC foot stool assembly, providing information to superiors, prospective memory tasks) associated with his/her hypothetical assignment to Charge of Quarters Duty.

Source: Assessment of Military Multitasking Performance (AMMP)

Equipment needed:

- Blue painters tape
- Tape-measure
- Clipboard
- Administration manual and scoresheet
- Stopwatch
- Pencils

Time to administer: Approximately 30 minutes

Administration instructions: See Administration manual

Scoring instructions: See Administration manual

Scoring/interpretation: Scored on scale of 0 (does not do task) to 2 (100% accurate)

Summary of Experimental Results:

- **Reliability evidence:** ICCs range from 0.88-0.99
- **Construct validity evidence:** Correlated with Tower of Hanoi (planning), Neuropsychological Assessment Battery attention module, Comprehensive Trail Making Test (executive function)
- **Predictive validity evidence:** NA
- **Experimental evidence with military population:** Yes



AAMP Tasks

Task: Run-Roll-Aim

Description: The SM completes a high level mobility task with multiple maneuvers while carrying a simulated weapon. Maneuvers are cued by a computer screen with a handheld remote controlled slide advancer. The task requires a rapid start, avoiding a "trip wire" obstacle, performing a 3-5 second rush, combat rolling, searching for visual targets through simulated weapon scope, rapid lateral dodging and back pedaling.

Source: Assessment of Military Multitasking Performance (AMMP)

Equipment needed:

- Stopwatch
- Clipboard and Score sheet
- Simulated weapon
- Scope designed for bird/insect viewing mounted to weapon
- Adjustable headband and waistband to mount inertial sensors (strapped onto each)
- 2 NexGen inertial sensors* and wireless access point for data collection with computer laptop
- Power point presentation of targets and cues
- Remote to advance Powerpoint visual cues/targets during task
- 5'x10' floor mat for landing in after 3-5 second rush, visual scanning component, and combat rolls (mat should be secured as necessary to the floor so that it doesn't move easily)
- 2, 12" cones to set up "trip wire" obstacle (obstacle created by taut cord stretched between the two cones)
- Taped stripe down the middle of the floor mat to indicate landing zone after 3-5 second rush and taped X on right and left (3/4 feet from either side of the center) to mark approximate end point for combat rolls

Time to administer: Approximately 15 minutes

Administration instructions: See Administration manual

Scoring instructions: See Administration manual

Scoring/interpretation: Errors/accuracy, number of cues required, time to complete

Summary of Experimental Results:

- **Reliability evidence:** ICCs range from 0.87 – 0.99, Total errors ICC = 0.64
- **Construct validity evidence:** Correlated with Neuropsychological Assessment Battery attention module and Comprehensive Trail Making Test
- **Predictive validity evidence:** NA
- **Experimental evidence with military population:** Yes

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AAMP Tasks

Task: Illinois Agility Test – packing list

Description: The Illinois Agility Test requires running distances of 30' with rapid direction changes and navigation of obstacles in a serpentine pattern during the middle part of the obstacle course. A memory task is also completed. Then both the agility task and the memory task are performed at the same time. Accuracy of memory recall and time to complete the agility task are measured in single and dual-task conditions.

Equipment needed:

- Colored masking tape to mark start and end points of agility course
- Clipboard and Score sheet
- Stopwatch
- 6 cones
- Adjustable headband and waist band
- NexGen inertial sensors and wireless data collection port and laptop.

Time to administer: Approximately 12 minutes

Administration instructions: See administration manual

Scoring instructions: See administration manual

Scoring/interpretation: Words Recalled Correctly, Word Errors, Agility Test Time, Agility Course Errors

Summary of Experimental Results:

- **Reliability evidence:** ICCs range from 0.86-0.99
- **Construct validity evidence:** Correlated with Wide Range Achievement Test (reading skills), Neuropsychological Assessment Battery attention module, Tower of Hanoi (planning)
- **Predictive validity evidence:** NA
- **Experimental evidence with military population:** Yes

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AAMP Tasks

Task: Instrumented Stand and Walk – Grid Coordinates

Description: The SM is challenged to perform the Instrumented Stand and Walk (ISAW) test (developed by APDM) which includes instrumented and timed assessment of quiet standing for 30 seconds, assessment of dynamic stability during walking for two 7 m (23 foot) lengths with a 180 degree turn at midpoint. The SM will next memorize an 8 digit alphanumeric grid coordinate provided within the context of a simulated patrol mission brief and report the exact sequence back to the examiner after 45 seconds. Finally, both the ISAW and the grid memorization tasks will be performed simultaneously. Accuracy of grid coordinate recall, postural sway area, gait path variability, and time to complete the ISAW (i.e. gait speed) will be measured in single and dual-task conditions.

Source: Assessment of Military Multitasking Performance (AMMP)

Equipment needed:

- Blue painter's tape to mark the initial standing position of subject's feet, the turn point at the end of the walkway and a box to stand in which is just past the start position for subject to stop in at the end of the walk (See administration manual)
- Clipboard with Score sheet that has Grid coordinate lists
- Pencil
- Stopwatch
- Opal or NexGen inertial sensor, MobilityLab (Opal) software, and wireless data collection port with computer, Opal hand held controller. www.apdm.com/mobility

Time to administer: Approximately 18 minutes

Administration instructions: See administration manual

Scoring instructions: See administration manual

Scoring/interpretation: Accuracy and time to complete

Summary of Experimental Results:

- **Reliability evidence:** ICCs range from 0.92-0.99
- **Construct validity evidence:** Correlated with Wide Range Achievement Test (reading skills and Neuropsychological Assessment Battery attention module)
- **Predictive validity evidence:** NA
- **Experimental evidence with military population:** Yes

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AAMP Tasks

Task: Load magazine – radio chatter

Description: SM completes a relatively automatic manual task choosing from a bin of mixed size dummy rounds (5.56 and 7.62 caliber) and loading 5.56 caliber training rounds into magazines as fast as possible 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 scenario instructions.

Source: Assessment of Military Multitasking Performance (AMMP)

Equipment needed:

- 1-gallon open bin or tub for holding snap cap 5.56 caliber (M16) and 7.62 caliber (foil) dummy rounds
- 2nd empty bin for emptying magazine(s) to allow for counting the number of rounds loaded
- 100 snap cap dummy rounds (M16)
- 50 snap cap dummy rounds (M20) as foils
- 5 magazines for M16 caliber weapon
- Computer or audio-player such as an I-pod or MP3 player
- Speakers to play radio chatter audio files at sufficient volume.
- 3 versions of prerecorded ambient mock radio chatter.
- Radio chatter Audio files
- Cue sheets-set of 3 laminated sheets for reminding subjects of "key words" they are responding to during each trial (Practice, single task dual task)

Time to administer: Approximately 22 minutes

Administration instructions: See administration manual

Scoring instructions: See administration manual

Scoring/interpretation: Time to complete, total correct, total distractors/errors

Summary of Experimental Results:

- **Reliability evidence:** ICCs range from 0.94-0.99
- **Construct validity evidence:** Correlated with Wide Range Achievement Test (reading skills, Neuropsychological Assessment Battery attention module, and Comprehensive Trail Making Test (executive function))
- **Predictive validity evidence:** NA
- **Experimental evidence with military population:** Yes

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Comment highlights and discussion summary (Note that discussion occurred the following morning with Dr. Maggie Weightman on the phone):

Dr. Maggie Weightman, a member of the research team that developed the Assessment of Military Multitask Performance (AAMP) battery presented by Dr. Kelley, clarified that the six full tasks were evaluated at Fort Bragg, NC, but only four tasks had data to support known-groups validity. Two of these tasks were dual-task and two were multi-task. She stated that the tasks able to discriminate between groups included both cognitive and physical components

while still emphasizing the need for further testing and refinement before these tasks would be ready for use in any diagnostic capacity. Further discussion included the need for establishing predictive validity and reliability.

1415 – 1445 Review of Scientific Evidence for Dynamic Marksmanship tasks – Dr. Amanda Kelley, USAARL Research Psychologist



Dynamic Marksmanship Tasks

- 4 dynamic shooting tests adapted from clinical balance tests, based on:
 - Reliability
 - Pilot findings from mTBI patients
 - Ability to detect temporary vestibular insult



Dynamic Marksmanship Tasks

- Task:** Traverser Beam and Shoot
Description: Walk on narrow beam parallel to screen, fire as many accurate shots as possible at target
Source: Dynamic Marksmanship Battery
Equipment needed: Balance platform, marksmanship trainer
Time to administer:
Administration instructions:
- **Participant instructions:**
Goal is to walk across the beam as quick as possible while accurately hitting all targets
 - **EST Scenario:**
3 lane configuration
4 targets from left to right
Targets appear at 2.5m
- Scoring instructions:** Scoring based on performance with respect to shot radius, reaction time, accuracy, root mean square error, and throughput (shots per second)
Scoring/interpretation: Higher scores indicate poorer performance
Summary of Experimental Results:
- **Reliability evidence:** Test-retest reliability ranges from $r = 0.33 - 0.58$ (accuracy, reaction time, rms)
 - **Construct validity evidence:** Sensitive to induced vestibular disturbance (accuracy, rms, and reaction time)
 - **Predictive validity evidence:** NA
 - **Experimental evidence with military population:** Yes





Dynamic Marksmanship Tasks

Task: Kneel and shoot

Description: Perform kneeling portion of marksmanship battery with a narrow stance (knee to heel)

Source: Dynamic Marksmanship Battery

Equipment needed: Balance platform, marksmanship trainer

Time to administer:

Administration instructions:

- **Participant instruments:**
Stay aimed at last target until next pops up
Kneel at location (90 inches from screen)
- **EST Scenario:**
3 lane configuration
1 target at a time, 10 targets total, targets appear at 75m;
Targets appear at extremes of lane width
Target up for 2 seconds, 2 seconds between targets

Scoring instructions: Scoring based on performance with respect to shot radius, reaction time, accuracy, root mean square error (rms), and throughput (shots per second)

Scoring/interpretation: Higher scores indicate poorer performance

Summary of Experimental Results:

- **Reliability evidence:** Test-retest reliability ranges from $r = 0.53 - 0.75$ (accuracy, reaction time, rms, shot radius)
- **Construct validity evidence:** Sensitive to induced vestibular disturbance (accuracy, reaction time, rms, shot radius)
- **Predictive validity evidence:** NA
- **Experimental evidence with military population:** Yes

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Dynamic Marksmanship Tasks

Task: Pickup and shoot

Description: Pick up weapon from floor, aim and shoot at target at top of screen as quickly as possible; place weapon back on ground and await instructions to pick up and shoot again

Source: Dynamic Marksmanship Battery

Equipment needed: Balance platform, marksmanship trainer

Time to administer:

Administration instructions:

- **Participant instruments:**
Pick up rifle with 2 hands;
Center behind projector;
Make sure participants has some pitch in waist;
Start facing perpendicular to screen;
Must keep eyes on rifle all the way down
- **EST Scenario:**
3 lane configuration
1 targets at top of screen, 2 shots
Note:
altitude: 7 and -3
targets appear at 40m

Scoring instructions: Scoring based on performance with respect to shot radius, reaction time, accuracy, root mean square error, and throughput (shots per second)

Scoring/interpretation: Higher scores indicate poorer performance

Summary of Experimental Results:

- **Reliability evidence:** Test-retest reliability ranges from $r = 0.28 - 0.47$ (accuracy, rms, shot radius)
- **Construct validity evidence:** Sensitive to induced vestibular disturbance (accuracy, rms, shot radius)
- **Predictive validity evidence:** NA
- **Experimental evidence with military population:** Yes

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Dynamic Marksmanship Tasks

Task: Walk and shoot

Description: Walk with 180° horizontal head/rifle turns on every 2 steps, fire at target whenever facing screen

Source: Dynamic Marksmanship Battery

Equipment needed: Balance platform, marksmanship trainer

Time to administer:

Administration instructions:

- Participant instructions:
2 steps, fire, 2 steps, walk, 2 steps, fire;
Start facing perpendicular to screen,
Start with left foot
- EST Scenario:
3 lane configuration
1 target, 2 shots total
Target appears at 15m

Scoring instructions: Scoring based on performance with respect to shot radius, reaction time, accuracy, root mean square error, and throughput (shots per second)

Scoring interpretation: Higher scores indicate poorer performance

Summary of Experimental Results:

- **Reliability evidence:** Test-retest reliability ranges from $r = 0.31$ (shot radius)
- **Construct validity evidence:** Sensitive to induced vestibular disturbance (shot radius)
- **Predictive validity evidence:** NA
- **Experimental evidence with military population:** Yes

Comment highlights and discussion summary:

No discussion at this point.

1505 – 1545 Presentation of Clinical Assessments and Discussion – Dr. Amanda Kelley, USAARL Research Psychologist; Dr. Arthur Estrada, USAARL Science Program Administrator



Clinical Assessments

- Clinical assessments currently used in the RTD setting will be included in the toolkit products
- Next, we present an initial list of assessments to be considered for inclusion by domain



Vestibular

- Sensory organization test
- Dynamic Visual Acuity
- Dizziness Handicap Inventory



Vision/Oculomotor

- Visual screening – reaction time and speed
- Function vision survey
- Visuospatial construction index
- King-Devick
- Pupillary Light Reflex



Auditory

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Note that Auditory slide was blank.



Neurocognitive

- Neuropsychological assessment battery
- Repeatable battery for the assessment of neuropsychological status (RBANS)
 - Immediate memory index
 - Language index
 - Attention index
 - Delayed memory index
 - Total scale

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Mental Health

- PTSD Checklist-Military Version
- Patient Health Questionnaire
- AUDIT (alcohol use disorder identification test)
- Quality of Life scale
- Beck depression inventory
- Beck anxiety inventory
- Trail Making Test

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Miscellaneous

- MACE (military acute concussion evaluation)
- Occupational performance measure (COPM)
- Epworth sleepiness scale

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Comment highlights and discussion summary:

Discussion during this presentation included active participation from the attendees with respect to revising the list of clinical assessments to be included in the toolkit products. Dr. Estrada suggested addition of the King-Devick and pupillary light reflex tests for vision assessment. Ms. Helmick proposed the addition of assessments for headache and sleep disturbances as these are common symptoms experienced by this patient population and influence performance. It should be noted that Ms. Helmick stated that headache is the number

one complaint that prevents someone from returning to duty. Dr Panker suggested inclusion of literature on assessments with respect to feasibility, training, treatment, space, speed, and accuracy while also highlighting that the unique quality of this product will be ecologically relevant tasks beyond what is currently available.

LTC Kim raised a question without respect to the audience of the toolkit and what we can offer for primary care providers (rather than rehabilitation providers). COL Fondy elaborated on this by stating that the resources required for many of the tasks make it unrealistic for use in a clinic setting. It was agreed that modification of the tasks for this purpose is possible but would require additional research to support the feasibility, validity, and reliability. The tasks most likely to be useful for this setting include those that are dual-task, both cognitive and physical.

An additional point of the discussion referenced future research. Dr. Estrada clarified that the toolkit product will provide enough detail for future researchers to continue refining and testing the tasks. It was suggested that the toolkit products could be considered a first version and future research would allow for updated versions to follow in the future. Ms Helmick also suggested future research evaluating the tasks at locations where rehabilitation services are not as readily available as they are at Fort Campbell, KY, where much of the current research has occurred.

Workshop Sessions – Day 2, 17 February 2017

Review of Day One and Goals – Dr. Amanda Kelley, USAARL Research Psychologist; Dr. Arthur Estrada, USAARL Science Program Administrator

Discussion Summary:

In response to the Day 1 discussion, a table presenting the 20 military functional tasks was generated for use during this day’s discussion (Appendix). In presenting this document to the group, Dr Kelley clarified that the main goal for the day is to discuss the tasks with respect to inclusion as well as inclusion of assessments for headache and sleep disturbances. The document presented summary information on each task with respect to feasibility, military relevance, scientific support for the reliability and validity of the tasks, and what they intend to measure. She clarified that the term “face-validity” is used in the table to represent tasks that may not have sufficient scientific support as of yet, but appear to be taxing a particular domain and are military relevant.

Development of Auditory Fitness for Duty Standards (presented by Dr. Douglas Brungart)

Slide deck not available.

Presentation and Discussion Summary:

Dr Brungart presented his current research efforts with respect to auditory fitness for duty. He presented a study in which participants were required to work as a team and experimentally manipulated the level of hearing ability through use of a helmet that functions similarly to a hearing aid but with the reverse effect. He noted that participants were blind to the manipulation and were not aware of the hearing deficit at the onset of the task. Participants were able to use any method to communicate including hand signals. He noted that the results are not yet published and are not releasable. Through discussion, he was able to provide insight as to auditory assessments currently available to be considered for toolkit inclusion.

Discussion of toolkit details:

This session was an open discussion on the format, content, and intended audience of the toolkit products. Dr Estrada opened the discussion by stating that the toolkit products are intended to supplement clinical decision making and not provide a “fail-safe” screening for RTD. The toolkit will provide the clinician or decision maker with additional information previously unavailable regarding military functional performance but will not replace the expertise required to evaluate each unique case as a whole. Dr Brungart and COL Fondy brought up two avenues for future research to pursue: 1) for the tasks that do not have an Army standard to use as criteria for performance need established normative data for a means of comparison; and 2) the tasks need to be refined and evaluated for use in clinics and by physician assistants (to minimize resources required for the tasks as well as provide standards to guide interpretation of performance). Ms Helmick shared a list of currently used clinical assessments focusing discussion on the Neurobehavioral Symptom Inventory. She stated that this inventory is the primary tool used in TBI clinics “for the clinician to work on symptom management and evaluate for sleep, headache, difficulty concentrating, etc.” There were no objections to the inclusion of this assessment. The group discussed inclusion of the following assessments:

1. Insomnia Severity Index (ISI): Symptoms of sleep disturbance (Morin, Belleville, Bélanger, & Ivers, 2011)
2. Headache Impact Test (HIT-6): Headache severity and negative impact on global functioning (Kosinski et al., 2003)
3. Detailed Assessment of Posttraumatic Stress (DAPS): Comprehensive assessment of PTSD symptoms (Briere & Staff, 2003)
4. Mild Brain Injury Atypical Symptom Scale (mBIAS): Symptom over-reporting/exaggeration based upon the acknowledgment of symptoms not associated with mild TBI (Cooper, Nelson, Armistead-Jehle, & Bowles, 2011)
5. Neurobehavioral Symptom Inventory (NSI): Symptoms associated with vestibular, somatosensory, cognitive, and affective difficulties (King et al., 2012)
6. Overall Anxiety Severity and Impairment Scale (OASIS): Symptoms of anxiety and impact on daily functioning (Norman, Hami Cissell, Means-Christensen, & Stein, 2006)
7. Patient Health Questionnaire – 9 (PHQ – 9): Symptoms of depression (Martin, Rief, Klaiberg, & Braehler, 2006)
8. Victoria Symptom Validity Test (VSVT): Effort on cognitive testing is evaluated through the VSVT (Slick, Hopp, Strauss, & Thompson, 1997)
9. MicroCog Assessment of Cognitive Functioning: A computerized assessment that evaluates the major functional domains including:
 - General cognitive functioning
 - General cognitive proficiency
 - Information processing speed

- Information processing accuracy
- Attention and mental control
- Reasoning and calculation
- Memory
- Spatial processing
- Reaction time

The group did not reject any of these assessments and agreed to pare down the list, if necessary, in a follow-up teleconference. The group also agreed to an additional “chapter” in the toolkit, which will address headache and sleep disturbances titled “Physiological.”

A large portion of this discussion centered on the definition of RTD and whether an intermediary step between “rehabilitation” and “deployable” should be considered. Specifically, Dr Panker posited a “return-to-training” step where a service member may not necessarily be ready to deploy but is making significant progress and is able to return to the training environment. While the toolkit products are not intended to redefine the RTD process, this discussion was of interest with respect to a way forward for the overall objective of improving RTD decision making.

Consensus and the Way Forward:

The group discussed the grouping of the available tasks and assessments to the following domains (each domain serving as a “chapter” in the toolkit): vestibular, vision/oculomotor, auditory, neurocognitive, physiological, and mental health. The group identified four assessments to be included in the vestibular chapter. These are the sensory organization test, dynamic visual acuity (Neurocom) test, dizziness handicap inventory, and a subset of questions from the neurobehavioral symptom inventory. This provides two objective and two subjective measures for this toolkit chapter. For the vision chapter, five tests (two subjective and three objective) were identified including the Nova Southwestern University College of Optometry oculomotor test, King Devick, vestibular oculomotor test, pupillary light reflex test, and visual spatial construction index. For the auditory chapter, four assessments (two subjective, two objective) were identified: Callsign Acquisition Test, modified rhyme test, hearing handicap inventory, and speech quality questionnaire.

At this point in the discussion, the group decided to move on to discussing the military-specific tasks in the interest of time. The group agreed to complete the assessments list for the remaining three chapters through follow-up e-mail correspondence.

The discussion began with a focus on the level of resources required for the tasks. The group agreed to include all of the tasks but to present them in the toolkit in such a way that they are ordered by level of difficulty to conduct/administer. Considering this, the group agreed that the Warrior Task Battle Drills and Tactical Combat Casualty Care tasks were the least resource intensive and still clearly military-specific. COL Fondy also suggested that the Tactical Combat Casualty Care task could be modified to induce stress and thus provide mental health information. Dr Brungart suggested an additional avenue for future research which is to develop an algorithm that pools across tasks.

Closing Remarks

The lists of assessments for inclusion were reviewed one final time and the group agreed to follow-up using email correspondence and teleconferences. Dr Panker suggested only producing two toolkit products: a full manual and a pamphlet. Drs Estrada and Kelley agreed. At this point, COL McGurk joined the group for the final discussion. He provided his vision for an occupational cognitive assessment test (similar to the currently used occupational physical assessment test) that can be used for RTD as well as a variety of other settings including initial evaluation at recruiting stations.

Workshop Summary

The workshop presentations and discussions highlighted the efforts conducted with the overall objective of developing tasks and instruments intended to aid RTD decision makers. The tasks presented attempt a novel undertaking: to link clinical outcomes with functional impairment in a military setting.

While a number of challenges with respect to RTD decision making still exist, many of which were discussed at length during this workshop, the toolkit product in development will serve as an additional information source for RTD decision makers. Most importantly, the tasks included that effectively link clinical outcomes to functional impairment are truly unique and will provide observable, previously unavailable information to medical providers and ultimately unit leadership.

In discussion of the components that lead to successful RTD, one particular point of interest that has not yet been addressed systematically is the motivation and self-perceptions of the individual. Throughout the workshop, the distinctions between subjective and objective tests, subjective meaning the test outcome being influenced by the degree to which the patient or service member is motivated to complete the task, were highlighted. All of the tasks discussed for inclusion in the toolkit are indeed subjective. We must wonder, however, how successful a Service member who is not motivated to perform well will be beyond their functional capabilities. One could argue that objective tests, while important in many contexts, are not essential in this setting given that RTD success will ultimately be a strong reflection of self-motivation. Similarly, self-perceptions are important to consider as well given that negative self-perceptions may be linked to depression or anxiety and are evident in one's performance. We must consider the level of motivation and confidence exhibited by these patients as well in order to promote their success.

Ultimately, the goal is to provide the best information possible to RTD decision makers. Often, the task of making such a determination falls on the medical provider. The RTD decision maker has to integrate multiple pieces of information to make their decision: the occupational hazards associated with the patient's duties with respect to re-injury, safety of the patient with respect to performance of duties, as well as the patient's ability to perform within their unit. Ideally, this decision is formed in consideration with three perspectives: the medical provider's observations (physical exam and consult), objective occupational testing (including tasks such as those to be included in the RTD toolkit), as well as unit-level observations. Incorporating these three pieces to the puzzle takes into account the health of the individual, the safety of the individual and his/her unit, and the unit's mission. At present, an exemplar of this approach is ongoing at the National Intrepid Center of Excellence (NICoE; Fort Campbell, KY). The

Military Functional Assessment Program (MFAP) incorporates multiple medical providers (occupational therapists, physical therapists, mental health providers) and an NCO in the decision making process. While the resources required for this program prohibit widespread application, there are a number of components that can be adapted for use in a variety of settings. In particular, there is an opportunity for future research to adapt the successful tasks included in the MFAP and modify them for use in a setting with limited resources. The same idea is true for the dynamic marksmanship tasks. Ultimately, these tasks could be adapted such that the marksmanship trainer is not necessary for administration and a smaller, portable device, such as a balance platform, could be incorporated. The opportunities for future research to advance these tasks and provide additional scientific support for their use are substantial and have the potential to improve RTD decisions.

Conclusions

The main finding of this workshop is that the work conducted thus far has not only provided additional tools for RTD decision makers but has also opened the door for future research to refine and fine-tune these tools. We have provided previously non-existent options to further educate the RTD decision maker, additional information to process when considering the complexity and individual uniqueness of each case. This has ultimately yielded the opportunity to minimize the possibility of error in these decisions, which translates to a safer and more effective force.

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Appendix A: Acronym List

Acronym	Term
AAMP	Assessment of Military Multitask Performance
AHPD	Aircrew Health and Performance Divison
AOC	Alteration of Consciousness
AUDIT	Alcohol Use Disorders Identification Test
BACH	Blanchfield Army Community Hospital
CT	Computed Tomography
DAPS	Detailed Assessment of Posttraumatic Stress
D & C	Drill & Ceremony
DCoE	Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury
DoD	Department of Defense
DVBIC	Defense and Veterans Brain Injury Center
EST	Engagement Skills Trainer
FFD	Fitness-For-Duty
FHS	Force Health Status
HIT-6	Headache Impact Test
HMMWV	High Mobility Multipurpose Wheeled Vehicle
ICC	Intra-Class Correlation Coefficient
IED	Improvised Explosive Device
ISAW	Instrumented Stand and Walk
ISI	Insomnia Severity Index
KT	Knowledge Translation
LOC	Loss of Consciousness

MACE	Military Acute Concussion Evaluation
mBIAS	Mild Brain Injury Atypical Symptom Scale
MEDCOM	U.S. Army Medical Command
MFAP	Military Functional Assessment Program
MH	Mental Health
MOMRP	Military Operational Medicine Research Program
MOS	Military Occupational Specialty
MRI	Magnetic Resonance Imaging
mTBI	Mild Traumatic Brain Injury
MTF	Military Treatment Facility
NCO	Non-Commissioned Officer
NICoE	National Intrepid Center of Excellence
NSI	Neurobehavioral Symptom Inventory
OASIS	Overall Anxiety Severity and Impairment Scale
OT	Occupational Therapist
OTSG	Office of the Surgeon General
PET	Positron Emission Tomography
PHQ-9	Patient Health Questionnaire
PT	Physical Therapist
PTA	Post-Traumatic Amnesia
RBANS	Repeatable Battery for the Assessment of Neuropsychological Status
RECs	Regional Education Coordinators

RPG	Rocket-Propelled Grenade
RTD	Return-To-Duty
SM	Service Member
SME	Subject Matter Expert
SOP	Standard Operating Procedure
SPECT	Single-Photon Emission Computerized Tomography
TA	Task Area
TBI	Traumatic Brain Injury
TOC	Tactical Operations Center
TTA	Technical Task Agreement
VAMC	Veterans Affairs Medical Center
VC	Vehicle Command
VCOT	Virtual Convoy Operator Trainer
VSVT	Victoria Symptom Validity Test
USAARL	United States Army Aeromedical Research Laboratory
USAMRMC	US Army Medical Research and Materiel Command
WRAIR	Walter Reed Army Institute of Research
WRNMMC	Walter Reed National Military Medical Center

Appendix B: Attendee List

Workshop Participants

COL Dennis McGurk	Research Area Director, MOMRP
Dr. Douglas Brungart	Chief Scientist, Walter Reed National Military Medical Center (WRNMMC)
LTC Kristen Casto	Staff Audiologist, Headquarters Department of the Army, Office of the Surgeon General (OTSG), Sensory Research Division
MAJ Edward Edens	Division Chief, Aircrew Health and Performance Division (AHPD), U.S. Army Medical Command (MEDCOM), U.S. Army Aeromedical Research Laboratory (USAARL)
Mr. Bradley Erickson	Research Program Coordinator, MEDCOM, USAARL
Dr. Art Estrada	Transition Assistance Program Manager, Science Program Administrator, MEDCOM, USAARL
COL Susan Fondy	Chief, Flight Physical Review and Disposition, MEDCOM HQ, Fort Rucker
Dr. Emma Gregory	Research Psychologist, Defense and Veterans Brain Injury Center (DVBIC)
Ms. Katherine Helmick	Deputy Director, DVBIC, U.S. Army Medical Research and Materiel Command (USAMRMC), Defense Centers of Excellence (DCoE)
LTC Michael Kim	Occupational Therapist, OTSG
Dr. Amanda Kelley	Research Psychologist, MEDCOM, USAARL
Ms. Melody King	Lead Research Technician, MEDCOM, USAARL
MAJ Chris Long	Research Psychologist, MEDCOM, USAARL
Dr. Donald Marion	Senior Clinical Consultant, USAMRMC, DCoE
Dr. Stephanie Panker	Traumatic Brain Injury (TBI) Program Director, OTSG
Mr. Mark E. Showers	TBI Occupational Therapist, MEDCOM, Blanchfield Army Community Hospital (BACH)
LTC James Truong	Research Optometrist, MEDCOM, USAARL
Dr. Josh Wilk	Task Area Manager, Walter Reed Army Institute of Research (WRAIR)
Dr. Maggie Weightman (participated via teleconference)	Sr. Scientific Advisor, Courage Kenny Research Center

MOMRP Support Staff

MAJ(P) James McKnight	Principle Advisor and Military Attaché, MOMRP
Dr. Richard Shoge	Medical Research Program Manager, MOMRP

Leidos Staff

Dr. Janet Hsu

Biomedical Scientist, Leidos

Appendix C: Summary table of Military-Specific Tasks

Task	Vestibular	Cognitive	Vision	Auditory	Mental Health	Feasibility	Military-relevant
<i>MFAP</i>							
Warrior Task Battle Drill	Correlated with DHI	Face validity				Low resources	Yes
HMMWV Egress	Correlated with DHI and SOT	Face validity				Access to HMMWV egress trainer	Yes
Land Navigation Preparation		Face validity	Face validity			Low resources	Yes
Land Navigation	Correlated with DVA	Face validity	Face validity			Low resources; time intensive	Yes
Virtual Convoy Operator Trainer	Correlated with DHI and DVA	Face validity	Face validity	Face validity		Access to VCOT	Yes
Weapons Qualification	Correlated with DHI, DVA, SOT		Face validity			Access to EST 2000	Yes
Shoot/No-Shoot	Correlated with DHI	Face validity	Face validity			Access to EST 2000	Yes
Mass Casualty Scenario	Correlated with DHI, SOT	Face validity	Face validity		Face validity	High resources	Yes
Tactical Mission Scenario	Correlated with DHI, SOT, DVA	Face validity	Face validity	Face validity	Face validity	High resources	Yes
Tactical Combat Casualty Care		Correlated with RBANS				Low resources	Yes
<i>AMMP</i>							
CQ Duty		Correlated with NAB, CTM, Tower of Hanoi	Face validity			Low resources, 30 min	Yes
Run-Roll-Aim	Face validity	Correlated with NAB, CMT				Moderate equipment	Yes
Illinois-Agility	Face	Correlated	Face			Low	Yes

Test-Packing List	validity	with NAB, reading skills, planning	validity			resources	
Instrumented Stand Walk-Grid Coordinates	Face validity	Correlated with reading skills, NAB	Face validity			Low resources	Yes
Load Magazine – Radio Chatter		Correlated with Reading skills, NAB, CTM	Face validity	Face validity		Low resources	Yes
Patrol-Exertion		Correlate to reading and planning skills	Face validity				Yes
<i>DYNAMIC MARKSMANSHIP</i>							
Traverse Beam And Shoot	Sensitive to vestibular insult		Face validity			EST-2000	Yes
Kneel And Shoot	Sensitive to vestibular insult		Face validity			EST-2000	Yes
Pick-Up And Shoot	Sensitive to vestibular insult		Face validity			EST-2000	Yes
Walk And Shoot	Sensitive to vestibular insult		Face validity			EST-2000	Yes



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