January 17, 2008

This report details the Task Force's findings and recommendations from January through May 2007. It does not include the actions taken since May 2007 to correct the identified gaps or implement these recommendations. For information about actions already completed and underway, please see the following information paper.

BG Donald Bradshaw
Chairman
Traumatic Brain Injury Task Force

Information Paper

DASG-HSZ
17 January 2008

SUBJECT: Traumatic Brain Injury (TBI) Task Force Report Recommendation Summary

1. Purpose: To provide information of the progress of TBI Task Force recommendations.

2. Definition.

a. Implemented - Work with Inter-Agency (DoD/DVA) and Civilian groups on the definition and further the taxonomy of TBI.

b. In Progress - Develop a single academically rigorous, operationally sound definition for the case ascertainment of TBI (especially mild TBI) to facilitate accurate screening, evaluation, diagnosis, treatment, and education.

3. Screening.

a. Implemented - Implement in theater TBI screening and documentation for all soldiers exposed to Blast.

b. Implemented - Add TBI specific screening questions to the PHA, PDHA and the PDHRA to assess for TBI.

c. In Progress - Develop an Army wide post-deployment TBI screening tool and implement/conduct post-deployment TBI screening at every de-mobilization site for all Soldiers.

d. In Progress - Develop an appropriate tool and conduct TBI screening for all patients who are evacuated from theater who are appropriate for screening.

e. In Progress - Develop and implement TBI screening policy at all echelons of care. The policy will encompass all mechanisms of TBI occurring both within and outside the theater of operations.

f. In Progress - Conduct screening with a consistent team trained to perform this function.

4. Baseline Neuropsychological Evaluation.

a. In Progress - Implement a baseline (pre-deployment), post deployment and post-injury/exposure neuropsychological evaluation using the Automated Neuropsychological Assessment Metrics (ANAM).

b. In Progress - Utilize ANAM for neuropsychological testing per Acute In Theater Care Clinical Practice Guidelines (CPG).

5. Outreach Program.

a. In Progress - Propose outreach programs through the Deputy Chief of staff for Personnel (DCSPER) for soldiers separated from the Army since 2003 to facilitate identification of mild TBI and to initiate treatment if needed - possibly similar to Gulf War Registry.

6. Traumatic Brain Injury Center of Excellence.

a. Implemented - Develop a proposal on the appropriate functions of a “TBI Center of Excellence (COE)” for MEDCOM to submit to HA.

b. Implemented - Propose the DVBIC as the core of a the new COE for DoD and DVA.

c. Implemented - Optimize the positioning of clinical, educational and research activities.

d. In Progress - Utilize the Defense and Veterans Brain Injury (DVBIC) model of a joint/interagency network for TBI.

e. In Progress - Evaluate the impact of expansion of DVBIC sites to all MTFS.

f. In Progress - Establish and utilize a proponency office to address TBI health integration and rehabilitation that serves as the main proponent for all TBI inquiries, issues, policy development and implementation for OTSG/MEDCOM and executes recommendations of the TBI Task Force through a process that includes timelines, tracking and interagency coordination of actions.

6. Treatment.

a. In Progress - Develop a system-wide policy to institute identified best practices across the continuum of care for patients with all degrees of TBI. This system-wide effort should include development and implementation of in-theater concurrent screening protocol; acute in-theater management of mild TBI CPG; standardized early symptomatic treatment after identification; identification of a POC for TBI issues and deployment of a Neurologist with every CSH.

b. In Progress - Establish deployment/redeployment TBI programs including: primary care, social work, case management, and behavioral health programs based upon the Fort Carson model at each installation. Population needs may reveal the need for an enhanced or reduced version of the Fort Carson model. In

some cases a regionally based MEDCOM TBI Surge teams may meet the needs of sites with few and infrequent re-deployments.

c. In Progress - Develop and implement a policy to establish critical positions for TBI care at every MTF based upon added mission and available resources. At a minimum there will be two critical positions that will be essential: A TBI POC (the go-to person for “all issues related to TBI” at that facility) and a TBI specific care coordinator or clinical case manager.

d. In Progress - The DVA facilities should be the first option of care for inpatient and outpatient rehabilitation for Soldiers requiring care beyond the capability of the MTF. Exceptions to use of the DVA should be reviewed by the MTF Deputy Commander for Clinical Services (DCCS) with second level review by the nearest regional MTF DCCS to facilitate consistent, fair and equitable decision making across the AMEDD.

e. In Planning - Coordinate with DVA (VHA/VBA) to establish a utilization review of benefits.

7. Case Management.

a. In Progress - Implement a population based model for CM support which is reflective of best practices across the DoD and DVA. Establish a standardized definition of military CM for the Army and start CM processes as early as possible from the point of injury across the continuum of care.

b. In Progress - Establish a standardized documentation template for TBI CM Army-wide according to the level of care. Provide accessible documentation systems needed to enhance communication in each care venue with a smooth transition to the next site or level of care.

8. Research.

a. Implemented - Centralize evaluation of the scientific merit, clinical utility, and priority of new treatment strategies, devices or interventions (basic, clinical, applied research efforts). Clinical research will be synchronized with basic science and technology. All TBI research will be coordinated, integrated and vetted through USAMRMC.

b. In Progress - Conduct centralized, standardized reporting to determine the actual incidence and prevalence of TBI, with focus on mild TBI. The current disparate methods of identifying TBI at the point of occurrence or at other times in the care process suggest that any effort to gather this data without standardization will yield very questionable and easily challenged findings.

c. In Planning - Develop a mechanism for collecting the frequency, severity, care and outcomes of TBI to provide adequate, reliable data for analysis to assist in care and decision-making.

d. In Planning - Coordinate, synchronize, and conduct multi-center clinical research on TBI under a centralized authority.

9. Family Issues.

a. In Progress - Provide psychosocial supports for Soldier, family members and staff, to include: support groups (GWOT and TBI sensitive); individual and family counseling utilizing models of care adapted to the needs of family members of a brain injured individual.

b. In Progress - Recommend placement of military liaisons at the VA Polytrauma Network Sites.

c. Refer to another Agency - Review benefits packages provided by TRICARE, DVA and Medical Assistance (MA) (e.g. non-governmental organizations, advocacy groups, and volunteers) to determine optimal uniform package.

d. Refer to another Agency - Establish new uniform benefit sets that include both the entitlements and healthcare benefits to serve those with minimal needs as well as those with lifelong needs. Examples of areas that need to be addressed include: therapies required to meet the individualized treatment plan; housing, including supported living, home modifications, and long term care; healthcare, to include in-home and outpatient care as needed based on individual care plan; medical equipment; temporary transitional living; support for daily living to include independent living services, homemaking services, meals on wheels, and behavioral treatment plans; community participation, to include educational support services, vocational rehabilitation, structured day programs, sports and leisure activities, and social activities.

e. Refer to another Agency - Provide resources for family members who have chosen to leave their jobs to care for a service member. Consider provision of health insurance for family members who provide full-time care to an injured service member/veteran.

f. Refer to another Agency - Recommend placement of USAR chaplains at each of the four DVA Polytrauma Rehabilitation Centers for additional psychosocial support services.

10. Education.

a. In Progress - Develop and disseminate standardized education products that provides a practical overview of TBI to Soldiers, family members and unit commanders to increase their TBI proficiency and improve the positive, accurate identification of symptoms. This product will include general TBI information, other pre-deployment issues which may include living wills and powers of attorney, and a standardized explanation of all levels of care. Provide ongoing periodic refresher sessions to improve the retention of information.

b. In Progress - Educate and train providers on TBI specific screening tools, proper evaluation, appropriate treatment, documentation requirements (mechanism of injury/nature of injury, Glasgow Coma Scale (GCS), level of consciousness (LOC), Post Traumatic Amnesia (PTA)), models for grief and loss counseling and care giver support. Provide continuing medical education credit.

c. In Progress - Provide TBI education to medical providers at MEPS stations, everyone involved in the Physical Disability Evaluation System, and coders.

d. In Progress - Provide consistent, in-depth education throughout the continuum of care for family members, Soldiers and care professionals, to include the following: clinical condition (TBI); benefits and entitlements; and simplified understanding of the DoD PDES.

e. In Planning - Encourage and reinforce unit leaders to capture data about potential concussive events as a part of mission recovery and after action review. Correlate this information with Soldier, medic, combat lifesaver and buddy reporting. Identify Soldiers in need of observation as they may have had a TBI and require a short periodic “stand down” for full recovery.

11. Marketing.

a. In Progress - Continually market TBI successes via command groups, Public Affairs Offices and as many media outlets as possible. Potential topics include DVA Polytrauma System of Care liaisons; DVA care educational videos; DVBIC consultation and educational offerings, outstanding examples of MTF care, personal accounts from Soldiers and their Families, and the positive care experiences received by noncombatants.

b. In Progress - Produce commercials briefly outlining the processes, improvement initiatives and preponderance of positive outcomes to provide a more balanced account.

c. In Progress - Keep Soldiers and their Families informed by actively marketing the methodology, status and outcomes of studies conducted within and external to DoD/DVA.

12. Documentation.

a. Implemented - Adapt the Military Acute Concussion Evaluation (MACE) overprint as an approved DA Form to document mild TBI closest to the point of injury.

b. In Progress - Develop and use an Electronic Medical Record (EMR) that follows a Soldier from the point-of-injury to the Veterans' Affairs Healthcare System. When multiple electronic systems are in use, ensure data interface between systems.

c. In Progress - Standardize documentation for TBI to include capture of all data elements necessary for accurate classification of the injury, standard use of AHLTA templates, and uniform documentation of caregiver assistance (for TSGLI).

d. In Progress - Establish and formalize the procedure for all Army MTFs to report TBI data (utilizing a standardized definition and identification methodology) to DVBIC. Joint coordination required for Soldiers in non-Army MTFs.

13. Physical Disability Evaluation System.

a. In Progress - Participate in a review of the PDES by the DA and DoD being conducted by specific process action teams. Monitor process improvement recommendations in the following categories: automation, counseling/training, medical evaluation board/physical evaluation board process, and transition. Evaluate and update AR 40-501, Standards of Medical Fitness to include specific guidance on TBI.

Report to The Surgeon General
Traumatic Brain Injury
Task Force

May 15, 2007

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CHAPTER 1. INTRODUCTION

SECTION 1–1. CHARTER AND METHODOLOGY

On 16 January 2007, Lieutenant General (LTG) Kevin Kiley, The Surgeon General (TSG), chartered a Traumatic Brain Injury (TBI) Task Force (TF) for the Department of Army (DA) to seek a clearer picture of the processes and research involved with the prevention, identification, assessment, treatment, rehabilitation, Family support, and transition to civilian life of Service members with TBI. The Surgeon General appointed the Commander of the Southeast Regional Medical Command (SERMC), Brigadier General (BG) Donald Bradshaw, as the Chair of the TF and appointed other U.S. Army Medical Command (USAMEDCOM) members to the TF. BG Bradshaw invited the Department of Veterans Affairs (DVA), the U.S. Navy (USN), U.S. Marine Corps (USMC), and the U.S. Air Force (USAF) to nominate subject matter experts to the TF. The TF was authorized to operate for 5 months from the commencement of the TF charter.

The clinical, administrative, and research processes of the charter included but were not limited to identifying existing policies, procedures, and resources; possible gaps though which Soldiers and Family members may slip; which gaps can be closed by USAMEDCOM vice Department of Defense (DOD) or interagency action or higher level policy and resources; best practices in the treatment and management of TBI; research efforts in the prevention, diagnosis, treatment, and management of TBI; and required resources to care for Service members with TBI.

Since TBI is manifested throughout the continuum of care, TF members visited multiple sites and interviewed Soldiers, Family members, caregivers, and clinical providers. The TF team members met with subject matter experts and care teams at several DVA medical centers (MEDCENs), civilian rehabilitation centers, and military treatment facilities (MTFs). The TF members also spoke with nonmedical military leaders from all levels in both Active and Reserve Components. Soldiers, Sailors, Marines, and Airmen were interviewed separately and in a "town hall" format to provide comment at each site visit. The command structure up to Brigade-level commanders and other interested people, including advocacy groups and Family members, were interviewed during site visits. Current policy and literature was also reviewed throughout the duration of the TF charter.

Use of trademarked names does not imply endorsement by the U.S. Army but is intended only to assist in the identification of a specific product.

SECTION 1–2. SCOPE AND FINDINGS

The TF reviewed the continuum of care while focusing on best practices and gaps in the care of military Service members with TBI. After analysis of the best practices and gaps, the recommendations of the TF were divided into 13 areas. Some near-term recommendations are available for immediate implementation while others will require additional staff work prior to implementation. There are also recommendations that require assignment to other agencies within DA and others that require a higher level of authority (such as, Health Affairs (HA), Office of the Secretary of Defense, and DVA) to implement. A very brief summary of the best practices and gaps precedes the recommendations below. Appendix A contains a list of references and forms cited within this report as well as a related bibliography.

a. Best Practices.

Many best practices were identified but were not policy driven and were inconsistent within the regional medical command (RMC) and between RMCs. Various education efforts have occurred at all levels, and some have been very successful with the intended audience. High quality and correct educational products have consistently come from the Defense and Veterans Brain Injury Center (DVBIC). The Military Acute Concussion Evaluation (MACE) has been utilized in theater since 2005 but has not been consistently applied and only recently was entered into the Armed Forces Health Longitudinal Technology Application (AHLTA). In-theater operational guidelines for the diagnosis and treatment of mild TBI were developed through DVBIC in December 2006. The Fort Carson Soldier Readiness Processing (SRP) site, in coordination with Evans Army Community Hospital (EACH), began with initial education from DVBIC and has provided a model of post-deployment TBI evaluation and treatment. Compassionate and comprehensive SRP support with continuous quality improvements has led to measurably improved post-deployment TBI outcomes at Fort Carson.

Processes at Walter Reed Army Medical Center (WRAMC), also a DVBIC site, have provided the model for inpatient TBI management. Appropriate acute inpatient TBI rehabilitation during medical stabilization utilizes the full scope of services including physical therapy (PT), occupational therapy (OT), and speech and language pathology (SLP) early in the rehabilitation process and provides functional cognitive rehabilitation across all disciplines. Furthermore, WRAMC utilizes resources at National Naval Medical Center (NNMC) to provide neurointensive care and endovascular management for those Soldiers with severe and penetrating TBI and also utilizes resources at the DVA Medical Center in Washington, DC, to provide additional rehabilitation for outpatient Soldiers with TBI.

b. Gaps.

The TF found that major gaps were created by a lack of coordination and policy-driven approaches. For example, TBI identification and documentation is not standardized due to the absence of USAMEDCOM, Army, or HA policy. This leads to inaccuracies of incidence data, treatment, and documentation especially for mild TBI. Likewise, professional educational tools for Soldiers, units, leaders, Families, providers and communities lack standardization and effective dissemination. There are no medical provider core competencies defined for TBI proficiency. The Physical Disability Evaluation System (PDES) contains no specific standards in Army Regulation (AR) 40-501, chapter 3, for TBI, and there is little TBI-specific Medical Evaluation Board (MEB) guidance on the Human Resources Command/Physical Disability Agency (HRC/PDA) Web site (*see https://www.hrc.army.mil/site/Active/TAGD/Pda/pdapage.htm)* (reference 1). Moreover, the current MEB guidance on the use of neuropsychological testing is nonspecific and nonprescriptive, and the complexity of dysfunction after TBI is not easily captured in the Veterans Administration Schedule for Rating Disabilities (VASRD) (reference 2).

The Army TBI TF also revealed inefficient communication among levels of care and among systems (such as, records, databases, handoffs) which places an undue burden on Family members to play the role of record keeper, communicator, advocate, and case manager. Additionally, the TF found significant financial burdens imposed throughout the pathway of care for Soldiers, spouses, parents, and Families, as well as the lack of necessary documentation to make care determinations (that is, Living Wills and Powers of Attorney). The benefit and resource gaps existing in the transition to and from DOD/DVA/Community placed an additional burden on Soldiers' Families. Clearly, resources are not evenly distributed across the country, and there is incomplete knowledge of all available services for Soldiers with TBI.

Gaps were identified in procedures for TBI screening through all levels of casualty care. There are inconsistencies in specialty staffing, to include the lack of a neurologist with expertise in TBI at Level III (Combat Support Hospital (CSH)). There is no standardized AHLTA template for documenting the results of screening and inconsistent use of standardized codes, especially for those with nonsymptomatic TBI and mild TBI. There is no policy for post-deployment screening, and there is a lack of resources to institute such screening. Additionally, Soldiers who separated from the Army between 2003 and 2007 may not have received standardized TBI screening since the post-deployment health assessment (PDHA) and post-deployment health reassessment (PDHRA) did not include specific TBI screening questions.

Few MTFs provide multidisciplinary, proactive evaluation and treatment of patients with mild TBI at Level V (continental United States (CONUS) MTFs), and the risk of fragmented services

is high especially in outpatient care. There is a wide variance in practice patterns throughout the U.S. Army Medical Department (USAMEDD). Inconsistent availability of multi-modality monitoring in a neurointensive care setting and the nonavailability of endovascular intervention has constrained the USAMEDD to rely on a single MEDCEN for the evaluation and treatment of severe TBI. Acute inpatient TBI rehabilitation during medical stabilization is not always available at all sites using the full scope of standard rehabilitation services (PT, OT, and SLP) early in the rehabilitation process.

Other gaps were revealed in the area of marketing and public affairs. There is no clear strategy for the accurate "messaging" of TBI initiatives, ongoing efforts, and accomplishments. For the USAMEDD, there is currently no policy that directs or implements case management (CM) services; consequently, the term "case management" is frequently misused, often describing the process of simply coordinating, monitoring, or limiting the volume of services. This lack of clarity minimizes the complex role of CM, dilutes its meaning, and undermines the true value of what CM can deliver. For Soldiers with TBI, effective and comprehensive CM is essential because the TBI often interferes with the Soldier's self-management skills. Additionally, there are no consistent warm "hand-off" polices (that is, policies that describe the transfer of responsibility for a patient from one caregiver to another) which are critical to the coordination of care among teams within the USAMEDD across the Military Health System (MHS), through the DVA, and into the community.

SECTION 1–3. RECOMMENDATIONS

a. Definition.

Develop a single academically rigorous, operationally sound definition for the case ascertainment of TBI (especially mild TBI) to facilitate accurate screening, evaluation, diagnosis, treatment, and education.

Work with interagency (DOD/DVA) and civilian groups on the definition of TBI and further the taxonomy of TBI.

b. Screening.

Implement in-theater TBI screening and documentation for all Soldiers exposed to blast.

Add TBI-specific screening questions to the Periodic Health Assessment (PHA), PDHA and the PDHRA to assess for TBI.

Develop an Army-wide post-deployment TBI screening tool, and implement/conduct post-deployment TBI screening at every demobilization site for all Soldiers.

Develop an appropriate tool, and conduct TBI screening for all patients evacuated from theater who are appropriate for screening.

Develop and implement TBI screening policy at all levels of care. The policy will encompass all mechanisms of TBI occurring both within and outside the theater of operations.

Conduct screening with a consistent team trained to perform this function.

c. Baseline Neuropsychological Evaluation.

Implement a baseline (pre-deployment), post-deployment, and post-injury/exposure neuropsychological evaluation using the Automated Neuropsychological Assessment Metrics (ANAM®). (ANAM® is a registered trademark of Elsevier B.V., New York, New York.)

Utilize ANAM for neuropsychological testing per acute in-theater care clinical practice guidelines (CPGs).

d. Outreach Program.

Propose outreach programs through the Deputy Chief of Staff for Personnel for Soldiers separated from the Army since 2003 to facilitate identification of mild TBI and to initiate treatment if needed—possibly a program similar to the Gulf War Registry.

e. Traumatic Brain Injury Center of Excellence.

Develop a proposal on the appropriate functions of a "TBI Center of Excellence" (COE) for USAMEDCOM to submit to HA.

Utilize the DVBIC model of a joint/interagency network for TBI.

Propose the DVBIC as the core of a new COE for DOD and DVA.

Evaluate the impact of the expansion of DVBIC sites to all MTFs.

Optimize the positioning of clinical, educational, and research activities.

Establish and utilize a proponency office to address TBI health integration and rehabilitation. This office will serve as the main proponent for all TBI inquiries, issues, policy development, and implementation for the Office of the Surgeon General (OTSG)/USAMEDCOM and will

execute recommendations of the TBI TF through a process that includes timelines, tracking, and interagency coordination of actions.

f. Treatment.

Develop a system-wide policy to institute identified best practices across the continuum of care for patients with all degrees of TBI. This system-wide effort should include development and implementation of in-theater concurrent screening protocol; acute in-theater management of mild TBI CPGs; standardized early symptomatic treatment after identification; identification of a point of contact (POC) for TBI issues; and deployment of a neurologist with every CSH.

Establish deployment/redeployment TBI programs at each installation including: primary care, social work, CM, and behavioral health programs based upon the Fort Carson model. Population needs may reveal the need for an enhanced or reduced version of the Fort Carson model. In some cases, regionally based USAMEDCOM TBI surge teams may meet the needs of sites with few and infrequent redeployments.

Develop and implement a policy to establish critical positions for TBI care at every MTF based upon added mission and available resources. At a minimum, there will be two critical positions that will be essential: a TBI POC (the go-to person for "all issues related to TBI" at that facility) and a TBI specific-care coordinator or clinical case manager.

Establish the DVA facilities as the first option of care for inpatient and outpatient rehabilitation for Soldiers requiring care beyond the capability of the MTF. Exceptions to use of the DVA should be reviewed by the MTF Deputy Commander for Clinical Services (DCCS) with second-level review by the nearest regional MTF DCCS to facilitate consistent, fair, and equitable decision making across the USAMEDD.

Coordinate with DVA (Veterans Health Administration/Veterans Benefits Administration (VHA/VBA)) to establish a utilization review of benefits.

g. Case Management.

Implement a population-based model for CM support which is reflective of best practices across the DOD and DVA. Establish a standardized definition using DOD's definition of military CM for the Army, and start CM processes as early as possible from the point of injury across the continuum of care.

Establish a standardized documentation template for TBI CM Army wide according to the level of care. Provide accessible documentation systems needed to enhance communication in each care venue with a smooth transition to the next site or level of care.

h. Research.

Centralize evaluation of the scientific merit, clinical utility, and priority of new treatment strategies, devices, or interventions (such as, basic, clinical, and applied research efforts). Clinical research will be synchronized with basic science and technology. All TBI research will be coordinated, integrated, and vetted through U.S. Army Medical Research and Materiel Command (USAMRMC).

Conduct centralized, standardized reporting to determine the actual incidence and prevalence of TBI, with focus on mild TBI. The current disparate methods of identifying TBI at the point of occurrence or at other times in the care process suggest that any effort to gather this data without standardization will yield very questionable and easily challenged findings.

Develop a mechanism for collecting the frequency, severity, care, and outcomes of TBI to provide adequate, reliable data for analysis to assist in care and decision making.

Coordinate, synchronize, and conduct multicenter clinical research on TBI under a centralized authority.

i. Family Issues.

Review benefits packages provided by TRICARE, DVA, and medical assistance (MA) (such as, nongovernmental organizations, advocacy groups, and volunteers) to determine an optimal uniform package.

Establish new uniform benefit sets that include both the entitlements and healthcare benefits to serve those with minimal needs as well as those with lifelong needs. Examples of areas that need to be addressed include: therapies required to meet the individualized treatment plan; housing to include supported living, home modifications, and long-term care; health care to include in-home and outpatient care as needed based on an individual care plan; medical equipment; temporary transitional living; support for daily living to include independent living services, homemaking services, meals on wheels, and behavioral treatment plans; community participation to include educational support services, vocational rehabilitation, structured day programs, sports and leisure activities, and social activities.

Provide resources for Family members who have chosen to leave their jobs to care for a Service member. Consider provision of health insurance for Family members who provide full-time care to an injured Service member/veteran.

Provide psychosocial support for Soldier, Family members, and staff to include support groups (such as, Global War on Terrorism (GWOT) and TBI-sensitive) and individual and

Family counseling utilizing models of care adapted to the needs of Family members of a brain-injured individual.

Recommend placement of U.S. Army Reserve (USAR) chaplains at each of the four DVA Polytrauma Rehabilitation Centers (PRCs) for additional psychosocial support services.

Recommend placement of military liaisons at the Veterans Administration (VA) polytrauma network sites (PNSs).

j. Education.

Develop and disseminate standardized education products that provide a practical overview of TBI to Soldiers, Family members, and unit commanders to increase their TBI proficiency and improve the positive, accurate identification of symptoms. This product will include general TBI information, other pre-deployment issues which may include Living Wills and Powers of Attorney, and a standardized explanation of all levels of care. Provide ongoing, periodic refresher sessions to improve the retention of information.

Educate and train providers on TBI-specific screening tools, proper evaluation, appropriate treatment, documentation requirements (such as, mechanism/nature of injury Glasgow Coma Scale (GCS), level of consciousness, posttraumatic amnesia (PTA) models for grief and loss counseling, and caregiver support). Provide continuing medical education credit.

Provide TBI education to medical providers at Military Entrance Processing Stations (MEPS), everyone involved in the PDES, and coders.

Provide consistent, in-depth education throughout the continuum of care for Family members, Soldiers, and care professionals to include the following: clinical condition (TBI), benefits and entitlements, and simplified understanding of the DOD PDES.

Encourage and reinforce unit leaders to capture data about potential concussive events as a part of mission recovery and after-action review. Correlate this information with Soldier, medic, combat lifesaver, and buddy reporting. Identify Soldiers in need of observation as they may have had a TBI and require a short, periodic "stand down" for full recovery.

k. Marketing.

Continually market TBI successes via command groups, public affairs offices, and as many media outlets as possible. Potential topics include DVA Polytrauma System of Care liaisons, DVA care educational videos, DVBIC consultation and educational offerings, outstanding examples of MTF care, personal accounts from Soldiers and their Families, and the positive care experiences received by noncombatants such as journalists Bob Woodruff and Kimberly Dozier.

Produce commercials briefly outlining the processes, improvement initiatives, and preponderance of positive outcomes to provide a more balanced account.

Keep Soldiers and their Families informed by actively marketing the methodology, status, and outcomes of studies conducted within and external to DOD/DVA.

l. Documentation.

Develop and use an electronic medical record (EMR) that follows a Soldier from the point of injury to the Veterans Affairs Healthcare System. When multiple electronic records are in use, ensure interoperability among systems.

Standardize documentation for TBI to include capture of all data elements necessary for accurate classification of the injury, standard use of AHLTA templates, and uniform documentation of caregiver assistance (for Traumatic Servicemembers Group Life Insurance (TSGLI)).

Adapt the MACE overprint as an approved DA form to document mild TBI closest to the point of injury.

Establish and formalize the procedure for all Army MTFs to report TBI data (utilizing a standardized definition and identification methodology) to DVBIC. Joint coordination is required for Soldiers in non-Army MTFs.

m. Physical Disability and Evaluation System.

Encourage DA and DOD participation in a review of the PDES being conducted by specific process action teams. Monitor process improvement recommendations in the following categories: automation, counseling/training, MEB/physical evaluation board (PEB) process, and transition. Evaluate and update AR 40–501 to include specific guidance on TBI.

SECTION 1–4. NEXT STEPS

The identification, evaluation, treatment, and management of the spectrum of TBIs are part of the process of continuous improvement, laboratory research, clinical application, and investigations. It is not possible to capture all of the issues, information, and potential courses of action related to TBI in one document. This report captures the current state of USAMEDD activities related to the most pressing TBI issues and presents recommendations to address these most pressing issues. The report is intended to serve as a basis for action, further discussion, and continuous improvement of the care provided to injured Service members and their Families.

CHAPTER 2. TASK FORCE

SECTION 2–1. BACKGROUND

LTG Kevin Kiley, TSG, established the TBI TF charter for the DA to clarify a clear picture of the processes and research involved with the prevention, identification, assessment, treatment, rehabilitation, Family support, and transition to civilian life of Service members with TBI. A copy of the signed *Army Traumatic Brain Injury (TBI) Task Force Charter* is attached as Appendix B.

The Surgeon General appointed BG Donald M. Bradshaw, Commander, SERMC, as the Chair of the TF and appointed other USAMEDCOM members to the TF. BG Bradshaw invited the DVA, USN, USMC, and USAF to nominate members to the TF; all four invitees appointed medically competent experts to the team.

The mission of the TF, as outlined in the signed charter, was to analyze and make recommendations for improving clinical, administrative, and research processes involved with the care of Service members who suffer from TBI. The clinical, administrative, and research processes included but were not limited to identifying—

a. Existing policies, procedures, and resources.

b. Possible gaps through which Soldiers and Family members may slip.

c. Which gaps can be closed by USAMEDCOM or by DOD or those gaps that require interagency action, policy, and resources.

d. Best practices in the treatment and management of TBI.

e. Research efforts in the prevention, diagnosis, treatment, and management of TBI.

f. Required resources to care for Service members with TBI.

It should be noted here that the term TBI for this TF included concussion and intracranial injury resulting from either external forces or acceleration and deceleration.

SECTION 2–2. TEAM MEMBERS

Chairperson: BG Donald Bradshaw, MC, USA

Chief of Staff: COL (b)(6) MS, USA

Senior Medical Officer: COL (b)(6) MC, USA

Neurologist: COL (b)(6) MC, USA

Nurse Case Manager: COL (b)(6) AN, USA

Office of Army Transformation: COL (b)(6) AN, USA

Rehabilitation Specialist: LTC (b)(6) SP, USA

Patient Administrator: MAJ (b)(6) MS, USA

Research and Statistics: LTC (b)(6) MS, USA

Physician with Deployment Experience: MAJ (b)(6) MC, USA

Senior Medical Noncommissioned Officer (NCO): SGM (b)(6) USA

Neuropsychologist DVBIC: Dr. (b)(6) PsyD

Medical Writer: (b)(6) Telemedicine and Advanced Technology Research Center

Under Secretary for Health, DVA representative: Dr (b)(6) MD

Navy Surgeon General representatives: CAPT (b)(6) and CDR (b)(6)

Air Force Surgeon General representatives: Dr. (b)(6) and LtCol (b)(6)

Army Wounded Warrior Program: LTC (b)(6) AN, USAR

TRICARE, Office of the Chief Medical Officer: (b)(6)

SECTION 2–3. REQUIREMENTS

The TF was authorized for 5 months from the date of the signed charter beginning 16 January 2007 and terminates 60 days after the date of the report's submission. The Chair was directed to serve as the single POC for official TBI TF communication. This included other informal communications as well. The TF Chair was authorized assistance and resources coordinated through the OTSG/USAMEDCOM's staff. The TF was directed to submit a written report

containing an assessment of, and recommendations for, improving the care provided to Service members suffering from TBI. The report is to include—

a. The methodology used.

b. Analysis and assessment of the process and research involved with the prevention, identification, assessment, treatment, rehabilitation, Family support, and transition to civilian life of Service members with TBI.

c. Recommendations for improvement.

d. Such other matters relating to the activities of the TF that are considered appropriate.

SECTION 2–4. METHODOLOGY

The TF utilized a multifaceted review process that included site visits; interviews with Soldiers, Family members, caregivers, and subject matter experts; and literature and policy review. The TF established a Web portal for reports and pertinent documents collected throughout the research process; these reports and documents were available virtually to all team members. This approach, as well as constant interaction among the team, was instrumental in the TF grasping the extent and broad scope of the tasking.

In looking at the holistic issue of TBI and Soldier care and prevention, it was also determined that utilizing a linear study of the process left many unanswered questions making it impossible to perceive the whole process at the different levels of care. For this reason, the TF expanded the known levels of care and further subdivided the issues into seven special emphasis work groups. Each of the special emphasis work groups had, as the lead, an appointed TF team member who possessed the needed subject matter expertise for the issue.

The TF divided the continuum of care into the accepted levels of care commonly discussed in military doctrine: Level I through Level V. The TF further defined the continuum of care beyond the MHS by designating Levels "VI," "VII," and "VIII" as placeholders for inpatient rehabilitation, outpatient health care in network, and lifetime support. An explanation of the levels of care is listed below—

a. Level I—Buddy Aid to Battalion Aid Station

b. Level II—Forward Support Medical Company/Forward Surgical Team

c. Level III—CSH

d. Level IV—outside continental United States (OCONUS) MTFs

e. Level V—CONUS MTFs

f. "Level VI"—Inpatient Rehabilitation (non-MTF)

g. "Level VII"—Outpatient Rehabilitation (non-MTF)

h. "Level VIII"—Lifetime Care

Based on the gap analysis, the TF's seven spcial emphasis work groups developed preliminary recommendations. The groups were—

a. Documentation

b. Medical Boards

c. Education

d. Marketing

e. Systems/Pathways/Best Practices

f. Case Management

g. Research

These seven special emphasis work groups were stratified across a continuum of care assessing the status, gaps, best practices, and recommendations. It was readily apparent that information was accruing in a non-linear fashion; the ability to capture and logically categorize data and information proved difficult. Appendix C provides a global diagram of the activities related to TBI across all levels of care extending from Level I through Level "VIII".

SECTION 2–5. SITE VISITS

Since TBI is manifested throughout the continuum of care and the management of TBI varies across sites, it was decided that TF members would go to the field and interview patients, Family members, caregivers, and staff. Visits were not limited to military sites. The TF team members met with subject matter experts at several DVA MEDCENs, both PRCs and PNSs, civilian rehabilitation centers, and MTFs. The team members also spoke with nonmedical military

leaders from all levels of command structure up to and including Brigade-level commanders and leaders.

At each site the TF staff specifically, but not exclusively, sought out gaps in the delivery of care or services, best practices in all aspects of the programs reviewed, current research and documented findings with outcomes, and knowledge levels of programs. Other matters that came to the staff's attention were reviewed for relevance to the TF charter and were included if applicable. If an issue was determined to be not applicable, it was referred to an appropriate agency. The site visits included—

a. Washington, District of Columbia.

(1) WRAMC

(2) Community Based Health Care Organization (CBHCO), North Atlantic Region Headquarters

(3) DVBIC Headquarters

(4) District of Columbia Veterans Administration Medical Center (VAMC)

(5) National Rehabilitation Hospital

b. Colorado.

(1) EACH, Fort Carson

(2) SRP site, Fort Carson

(3) Denver VAMC PNS

(4) Craig Rehabilitation Hospital

c. Minnesota/Illinois.

(1) Rock Island CBHCO

(2) Minneapolis VAMC PRC

(3) Minneapolis VAMC PNS

(4) Courage Center

d. West Coast.

(1) Madigan Army Medical Center, Fort Lewis, Washington

(2) Solider Wellness Assessment Pilot Program, Fort Lewis, Washington

(3) Naval Hospital, Camp Pendleton, California

(4) Camp Pendleton/DVBIC Concussion Clinic

(5) American Lake VAMC, Tacoma, Washington

e. Germany.

(1) Landstuhl Regional Medical Center (LRMC)

(2) Deployed Warrior Medical Management Center (DWMMC)

f. Puerto Rico.

(1) CBHCO

(2) Caribbean VAMC

(3) Centro Medico Hospital System

g. Southeast United States.

(1) Ireland Army Community Hospital (ACH), Fort Knox, Kentucky

(2) Blanchfield ACH, Fort Campbell, Kentucky

(3) Fort Knox Solider Support Center

(4) U.S. Southern Command Clinic

(5) Orlando CBHCO

(6) Tampa VAMC PRC

(7) U.S. Special Operations Command Care Coalition

CHAPTER 3. BACKGROUND

Traumatic brain injury is an extremely broad and diverse condition involving all levels of health care and is associated with both short- and long-term consequences. Expertise and

understanding of the full spectrum of TBIs have greatly expanded in the past two decades but remain rudimentary when compared to other areas of medicine. Many fundamental advances were made during the end of the 20th century, but few evidenced-based guidelines are currently available for the acute, subacute, and chronic care of people with TBI. As a consequence of greater recognition and awareness, in addition to greatly improved emergency care of trauma victims, the incidence and prevalence of TBI has increased and is now more fully appreciated. The impact of and need for a comprehensive care network with multiple specialties and flexible services at all levels for people with TBI is readily apparent.

There are 1.4 million people who sustain a TBI each year in the United States. Of that total, 50,000 die; 235,000 are hospitalized; and 1.1 million are evaluated, treated, and released from emergency departments (reference 3). If mild TBI or concussion is taken into account, the largest proportion of patients is not seen in an emergency department. Estimates indicate that at least 5.3 million Americans (about 2 percent of the population) have current long-term or lifelong disabilities as a result of TBI (reference 4). Military duties in peacetime are associated with an increased incidence of TBI (reference 5). Though the DOD and DVA have had a Memorandum of Agreement for the treatment of TBI in place since 1986, prior to 1991, those who suffered a TBI in the military received appropriate care locally with little national military, VA, or civilian coordination (reference 6). During the GWOT, marked improvements in medical care and body armor coupled with the use of improvised explosive devices (IEDs) has led to an increased awareness and incidence of TBI. The TBIs have been called one of the signature wounds of the current conflicts.

In response to a need for coordinated TBI care for veterans of Operation Desert Shield/Storm, Congress approved funding for the Defense and Veterans Head Injury Program (DVHIP) in 1991 (reference 6). This DOD and DVA collaboration began with three military sites at Army, Navy, and Air Force MEDCENs and four DVA centers. This unique, joint DOD/DVA TBI network was created with a tri-fold mission—

a. Ensure optimal clinical care.

b. Conduct clinical research.

c. Provide education for patients and providers.

The DVHIP established the necessary coordinated teams for TBI patient evaluation and care, as well as the development of a comprehensive TBI database from those patient evaluations. With support from DVHIP, an article published in 1996 revealed that military men had 1.5 times the rate of TBI as their civilian counterparts and that military women had a rate of TBI that was two

times greater than their civilian counterparts during peacetime (reference 5). The DVHIP also published a TBI rehabilitation landmark article in the *Journal of the American Medical Association*, which revealed a favorable outcome with structured outpatient follow-up for those who have a TBI associated with less than 1 hour of loss of consciousness (LOC) (reference 7).

Early in the 21st century, the DVHIP changed its name to the DVBIC to reflect a new funding structure and to more correctly attribute the effects of the injury to brain dysfunction and damage. With the onset of the GWOT and Operation Enduring Freedom (OEF), it became clear that the number of brain injuries seen at the leading DOD DVBIC site, WRAMC, was increasing and that the cause of injury was greatly influenced by the tactics and weaponry. In general, there were two major types of TBI patients seen at WRAMC. There were those with a known TBI that was usually moderate or severe in degree, and there were those with other significant injuries with previously unrecognized mild to moderate TBI. In 2003, near the start of Operation Iraqi Freedom (OIF), DVBIC began screening all appropriate casualties evacuated to WRAMC for the presence of TBI. The WRAMC experience combined with an increasing use of IEDs by insurgents and documented in-theater reports led to the realization that many Soldiers were experiencing mild TBI (concussion) and were not identified as having a TBI. In July 2006, an All Army Activities (ALARACT) message describing the occurrence of concussion and its effects upon Soldiers on the battlefield was disseminated to unit leadership (reference 8).

Extensive clinical research in the DOD on TBI has been performed by or in collaboration with the DVBIC. That organization has presented and published most of the contemporary knowledge about TBI in the military during the past 5 years (see DVBIC Clinical Research Web site at: *http://www.dbvic.org/clinicalresearch.html*). Active study areas include investigations into the genetics of TBI, the development of biomarkers, and the use of telemedicine. Also undergoing study are the complications of TBI including auditory, visual, and pituitary dysfunction, sleep disturbances, and the presence of posttraumatic stress disorder (PTSD). Other studies are investigating various medication and other treatment modalities, in addition to several outcome studies. Currently, DVBIC is conducting 23 clinically relevant research studies in the area of TBI (see DVBIC Clinical Research Web site).

Some fragmented, locally driven, yet sporadic efforts to identify Soldiers with mild TBI began in 2003–2004. Through coordination and education by DVBIC personnel, larger scale efforts of mild TBI screening and identification both in-theater and upon redeployment began in 2004 and continues to this day (reference 9). The only consistent screening and identification that has been accomplished to date has been initiated with the assistance of the DVBIC. The TBI screening of over 35,000 redeploying Soldiers has revealed a 10-20 percent rate of a mild TBI

while deployed. Most are asymptomatic by the time of redeployment, but 20–40 percent may have residual symptoms of their mild TBI. Systemic, Army-wide screening for TBI upon redeployment is not currently practiced. Recommendations to the Assistant Secretary of Defense (HA) for post-deployment TBI screening were submitted by DVBIC early in 2006 (reference 10).

Screening of casualties requiring Level V care at WRAMC has found that 29 percent of those who are screened have a TBI. Approximately half of those have a mild TBI and the other half have a moderate, severe, or penetrating TBI. Of those patients at WRAMC who had a TBI, 78 percent were injured by a blast/explosion. Of those Soldiers treated at WRAMC for blast/explosion-induced injuries, 43 percent had a TBI (DVBIC unpublished data). The DVBIC utilized their preexisting network to further develop and maintain a national care coordination model for Soldiers with TBI. Regularly scheduled interval follow-up is established regardless of the Soldier's current condition and location. Appropriate rehabilitation services in the closest proximity to the Soldier are coordinated. More recent screening of all casualties at Level IV care has resulted in a 20 percent positive rate with 75 percent being symptomatic (reference 9).

Penetrating TBI and severe TBI are most often recognized in theater. In conjunction with the Brain Trauma Foundation, DVBIC developed *Guidelines for Field Management of Combat-Related Head Trauma* (moderate/severe) (reference 12). The availability of neurosurgical specialty care for these Soldiers has led to unprecedented survival rates due to the ability to provide decompressive craniotomies and close adherence to the American Association of Neurological Surgeons (AANS) guidelines for severe and penetrating TBI. Early evacuation to and care at a Level V MEDCEN with neurosurgical, neurovascular, and multi-modal monitoring has led to prevention of secondary brain damage and improved outcomes.

In summary, taking in the entire spectrum of TBI from mild to severe, it is unknown how many Soldiers have suffered a TBI during OEF/OIF. It is known that penetrating TBI is well captured and that most (but not all) casualties with moderate or severe TBI are likely counted. The true overall incidence of mild TBI or concussion in the military, in combat, and in civilian populations is unknown. Several individual sites have demonstrated that even upon redeployment, the proper identification and management of mild TBI is possible (DVBIC unpublished data).

The Armed Forces Epidemiological Board (AFEB) report of August 2006 stated that the "*DOD lacks a system-wide approach for proper identification, management, and surveillance for individuals who sustain a TBI, in particular mild TBI/concussion.*" The report went on to

recommend that there should be a "*focus on TBI prevention, assessment, and medical management in the combat theater*" and that the DOD should "*conduct post-deployment screening for TBI to ensure that those who remain impaired or are suffering persistent TBI-related health problems are identified for follow-up care.*" The AFEB report also recommended "*consensus panels to address the above recommendation(s).*" As a result, the DVBIC held a working group of civilian and military experts on the acute management of mild TBI in military operational settings in November 2006 with the CPGs and recommendations being released in December 2006 (reference 13). The guidelines are currently being taught to all medical providers entering the theater via Kuwait and are being utilized as the theater-wide tool for the identification and treatment of mild TBI (reference 14).

Several factors have led to the recognition of TBI as the signature injury of the current armed conflicts. First, during the last decade of the 20th century, TBI was increasingly recognized as a significant public and military health concern, while concussion (mild TBI), with or without a LOC, was also increasingly identified and managed. Second, the current weaponry (such as, IEDs and rocket-propelled grenades) results in a greater chance of TBI when compared to small arms or other ballistic weapons. Third, the use of body armor, the rapid availability of life-saving medical care, and the presence of state-of-the-art care all the way back to CONUS have led to unprecedented survival rates for patients with a variety of injuries including TBI. Therefore, a larger percentage of casualties than ever before will have some degree of TBI. Traumatic brain injury, from mild to severe, is currently the most common physical injury of OEF/OIF.

CHAPTER 4. TRAUMATIC BRAIN INJURY TASK FORCE WORKING DEFINITION

Traumatic Brain Injury, as used by this TF, is defined as a traumatically induced structural injury and/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—

a. Any period of loss of or a decreased level of consciousness.

b. Any loss of memory for events immediately before or after the injury.

c. Any alteration in mental state at the time of the injury (such as, confusion, disorientation, slowed thinking).

d. Neurological deficits (such as, weakness, balance disturbance, praxis, paresis/plegia, change in vision, other sensory alterations, aphasia) that may or may not be transient.

e. Intracranial lesion.

External forces include the head being struck by an object, the head striking an object, the brain undergoing an acceleration/deceleration movement without direct external trauma to the head, a foreign body penetrating the brain, forces generated from events such as a blast or explosion, or other force yet to be defined.

Traumatic brain injury is a general term and can refer to a number of different types of injuries to the brain. A TBI is sustained when any external force applied to the brain is significant enough to cause an alteration in consciousness or alter normal neurological functioning for a period of time. The nature of the external force that is exerted, the strength of the force, the area of the brain where it impacts, and individual physical and genetic variations are all factors that combine to yield highly individualized injuries. Operationally, the DVBIC uses the American Congress of Rehabilitation Medicine definition of TBI (reference 15), which is consistent with TBI definitions used by the World Health Organization (WHO) and the Centers for Disease Control and Prevention, with minor differences in severity classification.

In the current theaters of operation in Iraq and Afghanistan, the four most common mechanisms of brain injury are exposure to a blast, motor vehicle crash (MVC), fall, and gunshot wound to the head or neck. Different mechanisms of injury result in different types of injuries to the brain. Blunt force trauma, such as the impact from a fall or from a MVC, most often results in a coup or coup contra-coup type of injury. If such an impact happened with a great deal of velocity or with significant torsion, such as in an aviation accident or blast exposure, there may be a diffuse axonal injury—also referred to as a shear injury. Blunt trauma results in a closed head injury, which can be further classified on a continuum of severity. Any injury which involves the penetration of matter (whether a foreign object such as a fragment of munition or a sliver of bone) through the dura covering the brain is called a penetrating brain injury.

Due to the use of IEDs in OIF and OEF, closed-brain injuries have become a common battlefield injury. The IEDs are often placed along roadsides, and such blast exposures often result in MVCs, exposing a Service member to two possible mechanisms of injury in one combat incident.

When a penetrating brain injury occurs, it is not further classified by severity. When an identified, closed-head (non-penetrating) injury occurs, there is a severity rating assigned based

on three indices: GCS, LOC or alteration of consciousness, and/or length of PTA. The evaluation of these variables allows for a determination of severity of injury ranging from mild to moderate to severe. Mild TBI is characterized by an LOC of 0–30 minutes, a period of PTA that resolves within 24 hours, and/or a GCS score of 13–15. Moderate TBIs are indicated by LOC that lasts between >30 minutes–24 hours, PTA for more than 24 hours but less than 7 days, and/or a GCS score within the range of 9–12. A severe TBI is classified when there is an LOC longer than 24 hours, PTA greater than 7 days, and/or a GCS score of 3-8. When severity indicators are inconsistent, the most severe characterization is used for the rating (see Table 1).

Table 1. Traumatic Brain Injury Description

Severity	GCS	LOC	PTA
Mild	13–15	0–30 min*	0–24 hr*
Moderate	9–12	>30 min to 24 hrs	>24 hrs to 7 days
Severe	3–8	>24 hrs	>7 days

Note:
* This is the range of the UPPER limit. The lower limit is any alteration in mental status—confusion, dazed, etc.

When available, radiology findings from computed tomography (CT) or magnetic resonance imaging (MRI) of the brain may be important in severity ratings as well. If an injury has been classified as a mild TBI by the above factors and radiology findings are positive, the clinician should recognize it as a "complicated mild" with the prognosis of a moderate injury. Posttraumatic amnesia is a disturbance in memory for events that starts at the time of an injury and extends until the individual has full, clear, and continuous memory for events. At its mildest, this may represent a brief period of confusion. At its other extreme, it may represent a period in which individuals form no new memories, either because they are unconscious, or because the memory encoding in their brain has been disrupted by the physical trauma. Posttraumatic amnesia is neurally based and does not represent an emotionally based, psychogenic amnesia.

Typically, TBI is classified by the severity of the initial injury. While serial, in-depth evaluations of the patient's progress over time are a critical component of TBI care, the severity of an injury is not reclassified based on a patient's progress or rate of recovery. This can be confusing to patients, Families, and to command structures. They may observe what is classified as a mild injury present with persistent symptoms that are debilitating and significantly impact a Service member's ability to function, while another Service member may be diagnosed with a

severe injury and may eventually recover to a higher level of functioning than his/her counterpart who had an initial mild injury.

CHAPTER 5. SPECIAL EMPHASIS WORK GROUPS

SECTION 5–1. DOCUMENTATION

a. Current Status.

Medical documentation drives all subsequent administrative actions and is essential in the coordination of the clinical care. The war fighting theater utilizes many nonintegrated medical information systems. A check of multiple systems has to be performed by commanders, clinicians, and administrators to coordinate medical and administrative processes on injured or ill Soldiers. The programs include—

The Theater Medical Information Program–Joint (TMIP–J) is a family of systems designed to aid deployed medical personnel in all levels of care in theater, including complete clinical care documentation, medical supply and equipment tracking, patient movement visibility, and health surveillance. The TMIP–J software is integrated to address the program's four mission pillars: Electronic Health Record, Medical Command and Control, Medical Logistics and Patient Movement and Tracking. The TMIP–J ensures capture of all medical care data in theater and transfer of that data to the military member's longitudinal electronic health record.

The Joint Patient Tracking Application (JPTA) is a Web-based patient tracking and management tool that collects, manages, analyzes, and reports data arriving at MTFs from forward deployed locations. It was developed at LRMC to track and manage patients moved from the U.S. Central Command area of responsibility to LRMC. The JPTA combines clinical notes and patient tracking into one application.

The AHLTA enables worldwide healthcare provider access to data about beneficiaries' conditions, prescriptions, diagnostic tests, and additional information essential to providing quality care.

Essentris™ is an EMR system for inpatient documentation at several MTFs. This system enables providers to enter orders, document care, and monitor processes. (Essentris™ is a trademark of CliniComp International, Inc., San Diego, California.)

The Computerized Patient Record System (CPRS) is the DVA electronic health record. The CPRS is an integrated, comprehensive suite of clinical applications that work together to create a longitudinal view of the veteran's health record.

The Medical Communications for Combat Casualty Care (MC4) integrates, fields, and supports a medical information management system for Army tactical medical forces, enabling a comprehensive, lifelong EMR for all Service members and enhancing medical situational awareness for operational commanders.

b. Best Practices.

The MACE, a DVBIC-developed a screening tool, is being used in theater and is documented with MC4 and AHLTA templates. The MACE is also documented at Level IVin AHLTA.

c. Gaps.

Medical documentation is currently not standardized in a uniformed format making it impossible to reliably retrieve and manipulate. Documentation is a mixture of different electronic formats and paper forms. Individual facilities have developed locally generated forms in the absence of an Army-wide, USAMEDCOM, or HA policy directing the use of a specific form. Medical documentation is also difficult to reliably retrieve. It was reported in some cases to be misplaced, misrouted, or lost. The lack of a complete EMR necessitates the transfer of a patient with a paper-based medical record. In the confusion of patient transfer, the record is often misplaced.

Current automated repositories make it difficult for the Army to retrieve clinical information to convert into clinical, epidemiological, or statistical information in an automated format. There is not one information system which collects all patient data. Different information systems collect specific elements of the patient encounter (such as, evacuation, outpatient care, inpatient care, and epidemiological data).

Specifically, the DVA in its March 2007 study, *Task Force Report to the President: Returning Global War on Terror Heroes*, identified seven information technology initiatives which would address gaps identified in CPRS and would enhance the ability of DVA providers to care for veterans (reference 16). The following gaps were specific to TBI patients and are targeted for a September 2007 or September 2008 resolution—

(1) An Inability to Track Veterans' Demographic and Critical Patient History Collected in the OEF/OIF Theater of Operations. The recommendation was for DVA to create a version of JPTA using the Bidirectional Health Information Exchange (BHIE). The DVA will make a real-time query using BHIE framework to provide visibility to DVA providers, including case managers.

(2) An Inability to Electronically Track Veterans Who Have Experienced a TBI. The DVA is initiating a TBI database, to which both DOD and DVA will contribute information to monitor the quality of care, implement improvements in the system of care, and improve the ability to analyze trends in healthcare needs of TBI patients.

(3) An Inability to Smoothly Transfer Patient Information Between DVA and DOD When Active-Duty Soldiers Transfer to DVA Facilities. The DVA is planning to create an electronic patient hand-off system to allow clinicians in DVA and DOD to communicate patient care information at the time of transfer.

(4) An Inability of DVA Providers to View DOD Inpatient Health Records. The DOD is building a scanning interface with CPRS to enable the DVA providers to electronically view the scanned inpatient paper health records and imaging studies of Soldiers transferred to DVA facilities.

SECTION 5–2. COMMAND AND CONTROL—PHYSICAL DISABILITY EVALUATION SYSTEM

The PDES is undergoing a thorough and complete comprehensive review at DA and DOD levels. This report addresses only PDES issues specific to TBI.

a. Current Status.

Army Regulation 40–501, paragraph 2-26, contains the standards for enlistment, appointment, and induction of an individual who has had a head injury (reference 1) (see Appendix D). The terminology and International Classification of Disease (ICD) 9 codes are outdated in their description of TBI.

Army Regulation 40–501, chapter 3 (reference 1), does not specifically mention TBI. The disqualifying TBI conditions have to be matched to one of the following paragraphs: 3–19, Head; 3–29, Mouth, esophagus, nose, pharynx, larynx, and trachea; 3–30, Neurological disorders; or 3–34, Dementia and other cognitive disorders due to a general medical condition.

Army Regulation 40–501, paragraph 3–19, addresses a loss of substance of the skull with or without prosthetic replacement when accompanied by moderate residual signs and symptoms of a neurological disorder as described in paragraph 3–30 and where the skull defect poses a threat to the Soldier or interferes with the wearing of protective headgear. Either of these conditions would cause referral to an MEB.

The causes for referral to an MEB include persistence of symptoms or associated personality change sufficient to interfere with the performance of duty or social adjustment. Most Soldiers with TBI are referred to an MEB to have their disability rated under AR 40–501, paragraph 3–30j, which states: *Any other neurologic conditions, regardless of etiology, when after adequate treatment there remains residual symptoms and impairments, such as persistent severe headaches, uncontrolled seizures, weakness, paralysis, or atrophy of important muscle groups, deformity, uncoordination, tremor, pain, or sensory disturbance, alteration of consciousness, speech, personality, or mental function of such a degree as to significantly interfere with performance of duty.*

Soldiers receiving an MEB for TBI typically require input from psychiatry due to AR 40–501, paragraph 3–34. The limits of cognitive dysfunction are then recorded under the psychiatric portion of the DA Form 3349, Physical Profile. This process often creates the perception that TBI is a psychiatric disorder.

The proper time to initiate an MEB for Soldiers with severe or catastrophic TBI is very difficult to discern. If an MEB is completed solely according to regulations, great difficulties arise in the perception of care, Soldier identity, and surrogate decision making.
The Army rates Soldiers with conditions that cause them to be physically unfit for military duty. Compensation is provided for a military career cut short. The rating is permanent upon final disposition. The terms "permanent" and "stable" are terms utilized as the basis for the decision to temporarily or permanently retire Soldiers.

The DVA rates all Service-connected impairments, combinations of impairments or Service-aggravated conditions, thus, compensating for loss of earnings capacity resulting from injuries that could impact civilian employability. The term of a DVA rating may change over time, depending upon the progress of the condition(s). The DVA compensation is a flat amount based upon the percentage of disability rating with a possible variance related to the number of dependents.

b. Best Practices. There are currently no existing best practices to report in the PDES.

c. Gaps.

Since there are no specific standards in AR 40-501, chapter 3, and there is no TBI-specific MEB guidance on the HRC/PDA Website, it is no surprise that MEB proceedings for TBI are problematic (see *https://www.hrc.army.mil/site/active/tagd/pda/pdapage.htm*). The MEB guidance on the use of neuropsychological testing is nonspecific and nonprescriptive. Neuropsychological testing is useful in assessing the extent of impairment from TBI. The examiner should comment on any ancillary testing and correlate the findings with the Soldier's current condition. The testing itself can be conducted either within the DOD or DVA system. The examiner should also provide a clinical correlation between the neuropsychological testing and the Soldier's current level of functioning. The examiner should confirm that the most recent testing accurately portrays the Soldier's current level of functioning. In most cases, if original testing was abnormal, improvement is expected. Therefore, testing should be dated no more than 4 months prior to the MEB. There is no descriptive matrix in the VASRD specific to the complexity of dysfunction after TBI. The DOD and VASRD utilize a combination of neurologic impairments and cognitive disorders, thereby, requiring an addendum from psychiatry.

SECTION 5–3. EDUCATION

a. Introduction.

The vast majority of evidence to date suggests that Soldiers, as well as their Families, unit leaders, providers, medical staff members, and combat lifesavers are unaware of—

(1) The affects or frequency of TBI and concussive events.

(2) The services available for Soldiers and Families coping with TBI.

(3) The alternatives for Soldiers with questionable opportunities for future service.

Although improving, this current deficit of knowledge is producing unknown, long-term negative consequences in the areas of mission accomplishment and Soldier health. Furthermore, insufficient educational efforts have hindered the accurate capture of epidemiological data for adequate retrospective, longitudinal, or cross-sectional study. Studies of this sort are necessary to support decision making in the provision of TBI care.

b. Current Status.

Until recently, there was no process for capturing TBI occurrences or identifying TBI that would produce a reasonable level of reliability between providers. The recent introduction of proposed TBI questions into post-deployment screenings provides a first step, but there is much concern in the field that these questions lack validation and reliability and may not provide the necessary data to provide clinical care.

While some Soldiers suffering from TBIs and their Families appear to be extremely happy with their care experience, others appear to have concerns about the lack of follow-up care and inadequate and disparate disability ratings when compared to other services. Additionally, Soldiers and Family members expressed concerns that their care and processing was not deliberate, coordinated, or planned. Further, Family members consistently expressed a need for counseling and assistance as they sought to participate in the care of their loved ones. These mixed outcomes and perceptions are the result of many factors, several of which are in the control of the Army and can potentially be improved.

c. Best Practices.

Published, peer-reviewed articles provide promising opportunities to take advantage of educational programs. Educational interventions have been shown to be effective in efforts to manage and reduce TBI symptoms (reference 17). Providing information booklets outlining TBI symptoms and suggesting coping strategies produced a marked reduction in reported symptoms overall and far lower levels of stress after a 3-month post-injury period.
The DVBIC, with 11 sites around the country, conducts clinical research and provides educational sessions for patients and providers. The DVBIC currently has 23 ongoing studies and conducts site visits and educational sessions upon request by DOD and DVA treatment facilities.

Several installations have developed local programs yielding favorable outcomes. The leadership at Fort Carson has taken an aggressive approach to educating assigned leaders with very positive results. Fort Bliss currently has a 90-day "Boots on the Ground" (BOG) training session for National Guard and Reserve medical providers, and the Combat Operational Stress Course (COSC) curriculum contains material aimed at improving the early identification and treatment of TBI.

d. Gaps.

A number of educational tools for Soldiers, units, leaders, Families, providers, and communities exist, but they lack standardization and effective dissemination. A potential result of this lack of standardization is that many Soldiers and their Families are often unable to identify mild TBI in their fellow Soldiers and loved ones. Additionally, no medical provider core competencies delineating TBI proficiency currently exist, so practice guidelines and proficiency in TBI identification and treatment lack clarity.

SECTION 5–4. MARKETING

a. Introduction.

There is a large amount of official and nongovernmental information about TBI prevention, treatment, rehabilitation, and family assistance available for Soldiers, their Families, units, and care teams. However, this sea of information is overwhelming or perceived as inaccessible by many Soldiers suffering from TBI as well as their Families. Additionally, many media outlets often misinterpret TBI data, and TBI successes are not widely publicized.

b. Current Status.

Some of the information reported in the popular press incorrectly interprets the incidence and prevalence of TBI, such as information suggesting that "two-thirds of all soldiers wounded in Iraq who don't immediately return to duty have traumatic brain injuries" (reference 18). This is based in part on incorrect interpretations of a sample (e.g., taking TBI rates in a severely wounded population, such as at Walter Reed, and extrapolating that to the whole military deployed population). Further, few if any reports or articles speak of the advancements and successes in the area of TBI, such as the unprecedented survival rates of injured Soldiers, as well as the comprehensive, personal care and rehabilitation services provided in the DVA Polytrauma System.

c. Best Practices.

The DVA Polytrauma System of Care liaisons, DVA care educational videos, DVBIC consultation and educational offerings, and the care provided at LRMC and several other locations all provide very positive examples of the high quality of care provided to wounded warriors with TBI. Additionally, personal accounts from Soldiers, their Families, and the positive care experiences received by noncombatants, such as journalists Bob Woodruff and

Kimberly Dozier, provide significant opportunities to ensure that a balanced story is presented. However, care must be taken when presenting personal cases as every TBI sufferer's situation, circumstances, and response to treatment are likely to be very different.

The Wounded Soldier and Family Hotline provides enormous promise in assisting Soldiers and their Families with navigating the complicated patchwork of official and nonofficial aid and assistance efforts that are currently available. This hotline should reduce the confusion produced by the ever-increasing number of organizations attempting to assist Soldiers suffering from TBI. (See *http://www.army.mil/-newsreleases/2007/03/18/2296-army-launches-wounded-soldier-and-family-hotline--1-800-984-8523/*.)

d. Gaps.

Marketing and efforts to inform the public about research aimed at identifying the effects of TBI appear to be nonexistent. There is a lack of case-controlled studies that compare U.S. OIF/OEF TBI Soldier health status to non-OIF/OEF Soldier health status. Anecdotal evidence suggests that some non-deployed Soldiers, probably due in part to their non-deployability, may have poorer health statuses than deployed Soldiers. Further, there are no studies of the potential impact on health status of multiple TBIs or concussive events among OIF/OEF Soldiers. The predictive value of current screening tools provides a rich opportunity for the early identification of Soldiers susceptible to TBI. However, mental health screenings have been found to provide very limited predictive value and previous comparisons of the health status of deployed and non-deployed Soldiers appear to show very minor differences. This opportunity to conduct additional research provides a chance to better inform Soldiers, their Families and the public, as well as help reinforce assurances that the Army is identifying, managing, and treating TBI.

SECTION 5–5. CASE MANAGEMENT

a. Introduction.

Treatment and rehabilitation of Soldiers with TBI involves multiple systems and agencies from the battalion-aid station to rehabilitative hospitals. Organizational silos, interagency policy differences, and service-specific preferences contribute to complexity.

Due to the potentially chronic nature of TBI and its clinical sequelae, the need for resources and treatment are constantly changing. The demands placed upon Family members and caregivers to

locate appropriate available resources and treatment may continue for the remainder of that individual's lifetime. A critical area of concern is how to address service gaps and make better use of existing agencies and services to meet the lifelong specialized needs of Soldiers with TBI. There has been a growing demand in the Direct Care System and in the DVA to have one person or nurse/social work team coordinate these services within the scope of the individual's entitlements, benefits, and individual funding resources. Similarly, the Managed Care Support Contractors often assign case managers to coordinate care service for catastrophic cases.

Clinical nurse and social work case managers possess the requisite knowledge needed to provide these services (reference 19). Their knowledge base must include an understanding of funding resources, treatment resources, social welfare benefits, vocational rehabilitation services, medicine, and most importantly, acceptance of disability and social issues (reference 19).

b. Current Status.

To date, there is no specific CM implementation policy in the USAMEDD. While MTFs have implemented local medical management programs, these nonstandardized CM programs reflect variances across facilities and levels of care. The case managers in the MTFs include nurses, social workers, and other non-healthcare professionals. There is no formal directive that indicates where CM should reside within the organizational structure for both inpatient and ambulatory care facilities.

Case management philosophies, practices, job descriptions, and ratios vary based upon perceived value, command, control, cost issues, and whether contract or government case managers provide services. Currently, CM services for Soldiers with TBI are initiated at LRMC. The hand-off of CM services varies across military MEDCENS and at the DVA, and there is limited evidence of an integrated CM approach.
The MHS does not have a single Tri-Service information technology system for CM. The MTFs rely on different systems and locally developed documentation templates. Some documentation takes place within computer data entry systems, such as trauma registries, the JPTA, AHLTA, Eccentris, and VistA. Some facilities, including LRMC, are still using paper for inpatient medical record documentation.

c. Best Practices.

The CM practices are more comprehensive, efficient, and effective when they incorporate the following:

(1) A Clear Definition of CM. According to the Case Management Society of America (CMSA), CM "*is a collaborative process that assesses, plans, implements, coordinates, monitors, and evaluates the options and services required to meet the client's health and human service needs*" (reference 19). The DOD TRICARE Management Activity (TMA) adapted CMSA's definition of CM for military CM. The TMA defines Military CM as a "*collaborative process under the population health continuum which assesses, plans, implements, coordinates, monitors, and evaluates options and services to meet an individual's health needs through communication and available resources to promote quality, cost-effective outcomes*" (reference 20).

(2) Defined Standards of CM Practice. The CMSA published the CMSA Standards of Practice, 1995, that define the primary functions of CM and include Standards of Care. Case managers must adhere to these standards in their daily clinical practice, and CM programs must also meet these national standards. (See *http://www.cmsa.org/Products/Bookstore*.)

(3) Training and Competencies. Case managers must have the necessary training and experience to understand the short- and long-term financial, psychological, physical, social, and vocational consequences of a TBI injury for a patient and Family. They must also be skilled in managing and solving these problems and should be proficient in a core of competency areas.

(4) A Defined Organizational Model. Evidence suggests that the best organizational model is to organize CM under a department and assign the individual members of the department throughout the inpatient and outpatient arenas.

(5) Early CM Intervention. Early CM intervention for both inpatient and outpatient clients generates the greatest potential for efficiency, improved clinical outcomes, and cost savings. The presence of early support and intervention from a case manager often sets the tone for how patients and Families respond to case managers throughout the different stages of treatment and rehabilitation. Facilities that centralized the management of TBI patients and incorporated an integrated disciplinary approach appeared more efficient and effective.

d. Gaps.

There is no policy that directs or implements CM services in the USAMEDD. Practices are inconsistent throughout the levels of care and are driven by local and/or program-specific policies. There is no standardized CM program across the continuum of care in the USAMEDD. There are no clearly defined standards, qualifications, or centralized training program for CM

that includes TBI-specific training across the USAMEDD. There is a lack of CM requirements in the Automated Staffing Assessment Model. Despite the value of early identification of cases and immediate implementation of CM, doctrine does not include CM at Level III.

No standard policy exists for CM staffing ratios that take into consideration all the complexities of the needs of Soldiers with TBI. The staffing ratio must take into account their individual needs, as well as the availability of resources at each level of care. In addition, there is a lack of information technology system support to meet documentation requirements. Also, access to physician consultation, benefits advisors, and educational resources are essential components to the success of CMs in their clinical management of Soldiers with TBI.

Active communication during hand-offs is not standardized. There are no consistent warm hand-off polices which are critical to the coordination of care between teams within the USAMEDD, across the MHS, through the VA, and into the community.

SECTION 5–6. FAMILY ISSUES.

a. Introduction.

Families and caregivers of combat-injured Soldiers are subject to multiple stressors and require significant supports as they traverse the continuum of care. Therefore, a major goal of the Army TBI TF was to identify issues that impact Soldiers, their Families, and their caregivers throughout the TBI continuum of care. To accomplish this goal we reviewed findings from—

(1) Two Army Wounded Warrior Symposiums held the summer and fall of 2006.

(2) Results of the DOD/DVA family Transition Initiative and the Seamless Transition Initiative.

(3) Results of a formal DVA, Institutional Review Board.

(4) Approved Rapid Assessment Process reviewing the PRCs.

(5) Site visits with Soldiers, their Families, and caregivers, throughout the Active Duty, National Guard, and Reserve Army components, DVA, and civilian medical rehabilitation care systems.

b. Current Status.

Common themes emerge regardless of severity of diagnosis. All Families require psychosocial support, education, information, resources, and logistical support. The specific nature of the support must be individualized to the caregiver's need. Families often go to heroic lengths to support their wounded Family member. They provide advocacy, supervision, direct care, and behavior management. Family members are intensely involved in the care process. They have a high expectation for care and outcomes, and they are frequently emotionally drained by the care-giving experience. They often undergo role reversals from spouse to caregiver or parent of a grown child to parent of a dependent child. They have had to make transitions across vast geographical expanses, from acute to rehabilitation settings, and from the major systems of DOD to DVA. Each of these transitions contributes to stress and the need for support. Outcomes and course of recovery vary dramatically and are not always predictable, contributing to stress and frustration for Family members and caregivers. Resource allocation also depends on level of recovery and can be impacted by lack of predictability. In addition to the above factors, the intensity of the interventions required, the support needed, and the resources expended vary greatly depending on whether a Soldier has experienced a mild, moderate, or severe TBI. Other areas of concern include difficulty accessing expert resources in rural areas of the country, the need for experienced case managers to assist with navigation through the continuum and systems of care, inadequate financial resources, sometimes loss of healthcare benefits, and gaps in resource availability depending on the responsible agency.

Currently, much is being done by both DOD and DVA to create enhancements that will traverse space, time, and systems of care and will give crucial support to those required to be away from home for long periods of time. Excellent education and information materials about TBI and Soldier benefits are being developed but are not yet consistently available across the entire continuum of care. Not all providers are fully versed in TBI, available benefits, and resources. Delivery of educational information is not always provided at a time the caregiver is ready to learn.

Many tools and strategies for providing emotional support for Soldiers, Families, and caregivers are also being utilized. This includes a variety of initiatives. Individual and Family counseling are available throughout DOD and DVA systems. The DVA is training professionals in a new model for counseling called "ambiguous loss" (reference 21). This is the kind of loss experienced when a person is still physically present in a Family system, but the type of person they were is lost (that is, the person they were before is gone). Families continue to grieve for the person that once was, thereby, creating a long-term, often lifelong grieving process. Both the

DOD and DVA have support groups for Families. The LRMC and WRAMC have support programs for their own staffs. The DVA implemented a model for proactive CM that provides substantial support to Families. Families are able to "meet" their rehabilitation teams by video teleconference prior to a Soldier's transfer to a PRC. In addition, case managers continue proactive routine monitoring for unmet or emerging needs after discharge.

Support services are also being resourced in the form of finances, equipment, and services. Logistic support for housing, meals, child care, and transportation are provided at Army and VHA facilities. Funds are available through VHA for housing and vehicle modifications, as well as in-home support services, community support services, and long-term care. The Army provides significant financial support during the recovery process through Nonmedical Attendant Orders. The DOD also provides a specialized insurance program (that is, TSGLI), Combat-Related Special Compensation, and Continue on Active Duty/Continue on Active Reserves (option to return to Active Duty or Active Reserve), in addition to a basic monthly compensation based on the impairment of Active-Duty performance. The DVA provides aid and attendance payments for individuals with severe impairments whose Families are providing these services. The DVA is also piloting a new program to provide independent living services to assist in keeping individuals with TBI in their homes and relieve the caregiver from some supervisory and caregiving activities. After discharge from the Army, the DVA also provides a monthly income based on how much the Soldier's injury will impact civilian employability.

Currently, there are continued service and financial difficulties for Soldiers and their Families with the potential for protracted recovery periods or lifetime care needs. Families moving from a military-payor source to a DVA-payor source will find a different package of benefits available in the two systems, requiring knowledge of both systems and the ability to determine the best potential package. TRICARE does not have an established TBI protocol and does not pay for outpatient TBI rehabilitation. There is a formal Memorandum of Agreement between DOD and DVA for the care of TBI (reference 22). There are gaps in service when the Active-Duty Service member is discharged from the DVA facility into his or her home community where the recommended service is not paid for by TRICARE. This may be short-term (a few weeks of cognitive therapy) to extensive support services to assist the Service member to live in community group home settings, to transitional community reentry services. The VBA is able to provide resources for vocational rehabilitation, educational programming, and community re-entry services to Service-connected veterans. These services are available once the Soldier is discharged.

The compensation of parents or spouses who have given up jobs and health benefits to care for the Service member is a current dilemma. The MA recipients in some states may receive a broad array of services and a flexible service package for TBI. This package often provides the resources, such as payment of a Family member as caregiver and coverage of caregiver health benefits essential to keep a severely injured individual in the community.

Families have suggested that the DOD should require each deploying Soldier to have a Power of Attorney and Living Will. Currently, these are voluntary documents. Families who now have Service members under constant care feel this is one of the issues that dramatically complicated their lives. They also feel these documents should be made universally available through a database that is transparent to all caregivers along the continuum of care.

Finally, for those parts of the DOD system required to develop a complete "picture" of a Soldier and his/her benefits and entitlements, it is painfully apparent that at the present time there are at least 16 different databases that need to be accessed in order to acquire the complete healthcare portrait of the Soldier. This creates multiple inefficiencies and frustrations for Soldiers and caregivers.

c. Best Practices.

The DVA system of proactive CM through the rehabilitation and post-acute phases of care is a best practice. The logistic support for Families (such as, Fisher House™, transportation support, housing grant programs), the DVA pilot for independent living services, and adoption of model psychosocial support that individually assesses and treats Family needs (such as, ambiguous loss) are all well received. (Fisher House™ is a trademark of the Fisher House™ Foundation, Inc., Rockville, Maryland.) Programs to adequately reimburse caregivers for loss of income and health benefits due to their caregiving role (such as, DOD Nonmedical Attendant Orders, DVA Aid and Attendance, and MA) remain essential. The use of specially trained personnel across the continuum of care to support care transitions and assist Soldiers and Families with acquisition of entitlements and benefits (such as, DOD liaisons at DVA Polytrauma Centers; DVA liaisons at DOD hospitals; service-specific support programs such as, the Marines for Life, Navy Safe Harbor, and Army Wounded Warrior) are very important to Families.

d. Gaps.

Inefficient communication between levels of care and systems (such as, records, databases, hand-offs) places undue burden on Family members to play the role of record keeper, communicator, advocate, and case manager.

Inconsistent educational practices and training for providers and Families results in important information not being communicated or communicated at a time when the Family is not prepared to listen or learn. Inconsistent levels of emotional support and understanding for Soldiers, Family members, and providers exists. Families provide "heroic support" to their loved ones and require continued emotional support to be effective. Not all providers are trained to be sensitive to these needs or have the skills to meet these needs. Not all resources available are sensitive to the military culture.

There is a lack of well-trained, consistent case managers and human resource personnel who know the system well and can help Families navigate the highly complex terrain. There is also case manager role confusion and duplication of effort at some points in the continuum of care.

There are financial burdens imposed throughout the pathway of care for Soldiers, spouses, parents, and Families. Families may also lack the necessary documentation (such as, Living Wills and Powers of Attorney) to make care determinations.

There are benefits and resource gaps in the transition to and from DOD/DVA/Community. Resources are not evenly distributed across the country, particularly in rural areas. Some services may be available, but there is a local lack of expertise regarding how to apply that service.

There is an inconsistent availability of resources to support community living and provide respite for caregivers (such as, assisted living, youth-oriented adult day care).

SECTION 5–7. RESEARCH

a. Introduction.

The TBI research, by virtue of the wide-ranging manifestations of the injury, is very broad in scope. Due to the increased risk of TBI for Soldiers as compared to the general population, the

military has particular interest in all aspects of the disorder. Military research into the prevention and diagnosis of TBI is critical. Also important is an examination of the aspects of TBI that relate to individual and unit readiness, as well as acute- and long-term treatment. Mild TBI, in the military as in the general population, is a common type of injury. Prompt identification and intervention for mild TBI in military operational settings is very important (see sections on Level I–III care). Accordingly, this is an area of particularly strong research interest. To examine this wide range of areas, both basic science research and human subjects' research must be conducted.

b. Current Status.

At present, Army TBI-related research is conducted and/or funded by the Army, as well as Congressionally Directed Medical Research Programs (CDMRP) (such as, Walter Reed Army Institute of Research (WRAIR)), USAMRMC, Telemedicine and Advanced Technology Research Center (TATRC), DOD agencies (such as, Defense Advanced Research Projects Agency), and other programs (such as, DVBIC). Other research is conducted in conjunction with the private sector (such as, universities), or other Federal agencies (such as, the National Institutes of Health, the DVA), sometimes utilizing DOD funds and/or subjects. Special attention has been focused on the consequences of blast (explosion), not only as it affects the brain but the body more generally. This blast research is coordinated by the Army as the Executive Agency for the DOD through USAMRMC.

While an examination of the ongoing and planned investigations is beyond the scope of this report, as is the relative scientific merit of any of the studies, the projects fall into a few general categories, with some overlap of these categories. This list is not exhaustive and is provided as general guidance.

(1) Research Concerned with the Prevention of Injury. This might include protective equipment, prophylactic medications, or other agents. Research on educational initiatives might also fall under this area.

(2) Research Concerned with the Nature of the Injury Itself. This area would involve research about better diagnosis (that is, biomarkers, predictive symptom clusters for outcomes of various types, genetic vulnerabilities and strengths); better prediction of outcomes and fitness for duty; improvements in understanding of blast-induced brain injury including potentially unique characteristics and outcomes; the value of blast "monitors" to measure cumulative exposure and whether repeated subclinical exposure is a risk factor for later difficulties; improved differential

diagnosis between mild TBI and PTSD symptom clusters; and investigation of how battlefield-induced brain injury may be different from other types of brain injury. This area also encompasses treatment strategies including the investigation of methods, devices, and drugs. Baseline cognitive testing, including its diagnostic or preductive value, comparisons of instruments for same and related matters, is also included under this broad category.

(3) Research about Persistent Consequences of a TBI, Both Over the Short Term and Across the Lifespan. This area includes such things as the assessment of medical, vocational, interpersonal, and psychosocial outcomes, as well as how various rehabilitation strategies affect those outcomes.

The DOD has directed the Army to be the Executive Agent for the Prevention, Mitigation, and Treatment of Blast. This research is conducted under USAMRMC. In addition to coordinating the various DOD agencies that are involved in these investigations, USAMRMC also has visibility of the research taking place through the CDMRP, TATRC, and DVBIC). In addition, the Office of Research Protection has clear visibility of all medical research being conducted and is tasked with ensuring that the research is scientifically relevant and that patient safety and care are optimized. As a further sign of the importance of scientific relevance, USAMRMC and TATRC have in place a procedure whereby research proposals are routinely sent to the American Institute for Biological Sciences to ensure that the scientific method is sound and that the outcome of the research is in alignment with the purpose of the funding.

CHAPTER 6. TRAUMATIC BRAIN INJURY ISSUES PRIOR TO DEPLOYMENT (PRE-DEPLOYMENT)

SECTION 6–1. CURRENT STATUS

a. Education. Although some local initiatives have been identified, currently there is no policy-driven, standardized education provided to Soldiers, Families, leaders, or providers prior to deployment. Informal sharing among leaders has been recognized at various sites as a means of sharing information.

b. Screening. A few sites have instituted pre-deployment TBI screening at their SRP sites. The process at Fort Carson is the most robust with TBI screening an integral part of the SRP and employs a screening tool developed with the assistance of the DVBIC.

c. Documentation. When TBI screening does occur, it may or may not be documented in the Soldier's medical record. Fort Carson is the only site known to document pre-deployment screening results in AHLTA.

d. Families. Families feel that the DOD needs to make it mandatory that each deploying Soldier has a Power of Attorney and Living Will. Currently, these are voluntary documents. Families who now have Service members under constant care feel this is one of the issues that dramatically complicates their lives. They also feel these documents should be made universally available through a database that is transparent to all caregivers along the continuum of care.

SECTION 6–2. BEST PRACTICES

Provider training in the use of the MACE and the Fort Bliss 90-day BOG training for Army National Guard and the USAR medical providers are examples of best practices for pre-deployment provider training. The officer and NCO leadership training at Fort Carson is a best practice that could be replicated across the Army to educate leaders about TBI.

SECTION 6–3. GAPS

Soldiers are unable to recognize signs and symptoms of mild TBI in themselves or their buddies and leaders lack awareness of TBI and its possible impact on mission readiness/performance. Providers have varying levels and often incomplete knowledge of TBI. No policies currently exist that require TBI education. The current Deployment Cycle Support Program does not have a specific TBI training program for Families. Further, a limited number of Soldiers have surrogate medical decision-making documents. In the event of a catastrophic TBI, decision making is complicated when these documents are not available.

SECTION 6–4. AUTOMATED COGNITIVE TESTING

Senate Bill 1065 introduced on 29 March 2007 states that the DOD should *establish a protocol for the assessment and documentation of the cognitive (including memory) functioning of each member of the Armed Forces before each such member is deployed in OEF or OIF, to facilitate the assessment of the cognitive (including memory) functioning of each such member upon returning from such deployment.* Further, it requires that the assessment *shall include the administration of computer-based neurocognitive assessments... before deploying to OEF or*

OIF; and upon return. It further states that *the Secretary (of Defense) shall ensure that the protocol ... provides appropriate mechanisms to permit the differential diagnosis of TBI and post traumatic stress disorder (PTSD).* (See U.S. Senate Bill 1065, Heroes at Home Act of 2007, *http://www.theorator.com/bills110/text/s1065.html*).

The provisions forwarded in this bill may or may not be valuable, or even possible. It is clear that the mental welfare of the Soldier is vital, not only for obvious health reasons but also for fighting effectiveness and military readiness. Freidl, et al states *the complexity, speed, and lethality of modern warfare means that even small mental lapses may have catastrophic consequences* (reference 23.) The authors suggest a number of specific reasons why a parsimonious set of neuropsychological tests would be valuable to the Army. These include assessment of subtle changes for post-deployment early detection of individual health and military performance impairments, and management of occupational and deployment health risks. Ironically, however, the very things that may cause impairment are typical operational stressors. These would include fatigue, sleep deprivation, anxiety, "information overload," and environmental exposures like heat, cold, altitude, etc. Combat exposure itself has contemporaneous cognitive consequences (see reference 23). These cognitive changes are likely transitory, but there is some evidence (reference 24) that deployment-related cognitive dysfunction may persist beyond the period of the deployment. The effects of these more environmental hazards, even if transient, would certainly have effects on cognitive test performance. In operational settings, performance on these tests when administered after an acute event (such as, blow to the head or blast exposure with resultant alteration of consciousness), even with the benefit of individual baselines to gauge change, could be expected to have a significant number of false-positive results. In other words, the meaning of a positive finding would be difficult to determine, as it might not reflect a sequelae of the acute event it is intended to measure. A Service member's incomplete effort or engagement may also affect the error rate and further degrade the diagnostic effectiveness of automated cognitive testing.

Are the available test instruments capable of providing accurate assessment and diagnosis for TBI? Some of the limitations of computer batteries are well discussed in the recent DVA TBI Cognitive Assessment Workgroup report—

Sport-concussion neuropsychologists have been trying to measure the cognitive effects of concussion (that is, mild TBI) for years and have developed various computerized assessment procedures to assist in this endeavor. A recent critical review examined both conventional neuropsychological and computerized tests (CogSport®, HeadMinder®, ImPACT™, and the ANAM used to assess the cognitive effects of concussion (references 25 and 26). (CogSport® is a registered trademark of The Pharos Sports Concussion, South Africa;

HeadMinder® is a registered trademark of HeadMinder, Inc., New York, New York; ImPACT™ is a trademark of ImPACT Applications, Inc., Pittsburgh, Pennsylvania.) Both clinical (pencil-and-paper) individually administered and computerized neuropsychological tests have been shown to be sensitive to cognitive impairment during the acute phase of mild TBI while patients are still reporting subjective cognitive symptoms and problems. Once subjective symptoms resolve (in the sport concussion literature usually within 1 to 2 weeks), clinical pencil-and-paper neuropsychological measures show a marginal 7 percent increase in classification accuracy (sports-concussed versus controls). However, no such increase in patient identification has yet been shown for any available computerized battery (reference 27). In fact, . . .*the literature to date . . . suggests that the effect of concussion on neuropsychological tests is minimal and relatively transient and may not even last as long as self-reported symptoms* (reference 28).

Several meta-analytic reviews of both the sports concussion literature and the general mild TBI literature find that cognitive impairment on neuropsychological tests is not found after somewhere between 7 days (reference 29) and 30 days following a mild TBI (reference 30).

As the effects of concussion extend beyond the cognitive (such as, mood changes, irritability, headache, and balance problems), an individual that manifests limited or no cognitive change may still have clinical difficulties that warrant attention. If identification relies solely on a computerized cognitive test instrument, false-negative findings would be expected to increase. A discussion of the differential diagnosis between PTSD and mild TBI is beyond the scope of this report. However, it should be stated that such a diagnostic decision is based on history, symptom presentation, and other factors. Available computerized neuropsychological test instruments (and for that matter, traditional pencil- and paper-cognitive tests) are not able to make that differentiation.

In conclusion, there are a number of important reasons why pre-deployment, cognitive testing would be useful. However, many of these reasons are not related to TBI. In-theater management of mild TBI would benefit from the additional information obtained through computerized neuropsychological test instruments, but they cannot be expected to provide complete diagnostic or dispositional clarity. In the post-deployment process, such testing, while potentially noting change, would not be specific about the etiology of that dysfunction. Though computerized cognitive testing may serve as a post-deployment screening instrument, any abnormal testing results would certainly require a more detailed clinical assessment and further testing.

CHAPTER 7: SOLDIERS DIAGNOSED WITH TRAUMATIC BRAIN INJURY

SECTION 7–1. PRIOR HISTORY

a. Current Status.

Recruits are evaluated at MEPS across the country prior to being accepted into military service. The AR 40-501, paragraph 2-26f (reference 1) provides guidance to the medical staff with regards to TBI. A clear understanding of the regulation and consistent application of the standard is necessary. Excerpts from AR 40-501 can be found in Appendix D.

b. Best Practice. Consistent adherence to AR 40-501.

c. Gaps. Possibility of inconsistent application of this standard due to a lack of provider knowledge/education related to TBI.

SECTION 7–2. CASUALTY CARE SYSTEM

a. Level I/II Screening.

(1) Current Status.

Screening of TBI at Level I/II relates in a practical manner to mild TBI. Moderate, severe, and penetrating TBI are typically identified at the time of injury, and medical care is rapidly initiated. Screening for moderate and severe TBI is not required at these levels. Conversely, mild TBI patients may not seek treatment on their own. They typically lack external injuries and may act relatively normally. Since a major tenet of Tactical Combat Casualty Care (TC3) involves fire superiority, a Service member who has experienced a mild TBI yet and is still combat effective will typically continue with the mission until it is completed. These patients often present themselves for care to the Battalion Aid Station at the end of the mission for evaluation. They may also choose not to seek care given the absence of obvious external injuries. It is not unusual for the Service member's chain-of-command to direct the patient to the treatment facility for evaluation.

In the current conflict, screening for mild TBI is taking place in two basic manners. First, a traditional approach involving a history and physical examination followed by documentation on

a paper medical record may be employed. Classic neurological evaluations may include assessment of the overall mental status, cranial nerve evaluation, assessment of motor strength, gross sensation, deep tendon reflexes, gait, and balance. Patients who have significant deficits in these areas will be referred to the next level of care for further evaluation. Patients who are deemed to be neurologically intact may be given a short period of rest, symptomatic treatment, and asked to follow up within a short (typically 24–72 hours) period of time. The record of their medical visit is placed in the Service member's record (DD Form 2766, Adult Preventive and Chronic Care Flowsheet) or electronic file, if available.

The second manner of medical screening involves using a standardized screening form and CPG. The CPG most often used for mild TBI was developed by the *DVBIC Working Group on the Acute Management of Mild Traumatic Brain Injury in Military Operational Settings* (reference 13). (See Appendix E for DVBIC Clinical Practice Guidelines.) In addition to the traditional history and physical examination as described above, the CPG provides a set of referral guidelines and a tool for standardized concussion evaluation or MACE (see Appendix F). The MACE provides a validated, reproducible exam that assigns a numerical value to the orientation, immediate memory, concentration, and delayed recall of the patient. It also provides data about the injury to include mechanism and associated symptoms. A full review of the MACE and the CPG are available at the DVBIC Web site *http://www.dvbic.org/*. The results of the MACE and the CPG may also be entered into the paper or EMR. The majority of Level I/II MTFs do not have full-time access to an EMR at this time, although a MACE template has been used successfully in MC4.

It should be noted that the vast majority of mild TBI patients are evaluated and cared for at Level I and Level II. Most Service members either have complete resolution of their symptoms or improve to the point where they can return to nonrestricted duty. It is relatively unusual for a Service member to be referred to a Level III facility in theater unless they have: (1) unresolved or worsening symptoms; (2) red flags (to include focal neurological deficits, seizures, pupil asymmetry, repeated vomiting, etc); or (3) the inability to return to their previous functional level.

(2) Best Practices.

Screening at Level I/II begins with education. All leaders and medical providers need to be fully educated on TBI to include the mechanism, signs, symptoms, and sequelae. Early recognition by fellow Soldiers and leaders will assist with referring Service members to MTFs. All Service

members exposed to a mechanism of injury that may cause TBI, and who have symptoms, which are temporally related to the trauma, should be screened and evaluated by medical professionals.

Once a Service member presents for medical evaluation, a best practice model includes the use of a standardized, reproducible screening tool. The DVBIC CPG, which includes the MACE, is the collaborative work of civilian experts in sports concussive events, military experts (to include Army, Navy, and Air Force medical assets) in combat-related TBI injuries and academicians with expertise in TBI. This model represents a best practice given the current body of knowledge.

(3) Gaps.

There are three major gaps in screening for mild TBI at Level I/II. First, there is not a theater-wide policy on what manner of screening should take place. While the DVBIC guidelines are recommended, they are inconsistently implemented. Second, current Level I/II providers are beginning to use the CPG. However, their knowledge of these tools remains variable. This is likely to change as recent educational packets, which include the CPG, have been distributed to units' medical assets prior to deployment. Third, there is variable command emphasis on TBI and the importance of seeking medical care. As first-line supervisors and other leaders become more educated, referral for mild TBI screening will certainly increase.

b. Level III Screening.

(1) Current Status.

In contrast to Level I/II, current Level III facilities see fewer identified mild TBI patients. Those that are seen at Level III are typically referred for neuroimaging and specialty evaluation (either neurosurgery or neurology). Patients with moderate and severe TBI are more commonly seen at Level III precisely because these facilities have the needed advanced imaging and specialty care. Screening for all forms of TBI may be initiated at this level, especially in patients who have concomitant traumatic injuries, as TBI may have not been diagnosed at lower levels of care.

Due to the increased recent awareness of TBI, the Level III facility at Balad provided significant educational materials and increased awareness of TBI in theater. Significant progress has been made in education of providers, dissemination of the DVBIC CPG, and management of TBI due to these efforts.

(2) Best Practices.

As with Level I/II, screening for TBI involves education at all levels to increase awareness. Widespread screening of asymptomatic Service members at this level is not indicated. Again, all Service members exposed to a mechanism of injury that may cause TBI, and who have symptoms which are temporally related to the trauma, should be screened and evaluated by medical professionals for possible TBI. Again, the DVBIC (reference 13) CPG for Level III represents the best practice model given the current body of knowledge.

(3) Gaps.

Similar to Level I/II, Level III areas that can be improved fall into three major categories. First, a consistent, theater policy on screening is required. Second, provider knowledge on TBI and screening for TBI is variable. Third, command education and emphasis on TBI is variable.

Additional areas for improvement include providing consistent specialty staffing to include a physician with expertise in TBI (typically a neurologist), otolaryngology, ophthalmology and psychiatry at Level III facilities to evaluate patients with persistent symptoms that are not responding to typical interventions.

Level III care is the earliest opportunity that any formal cognitive testing can reasonably be performed. Refer to the DVBIC guidelines on in-theater management and the discussion on automated cognitive testing in Section 6–4 of this report. In short, any cognitive metric, even if it can be compared to the individual's own baseline, is influenced by factors other than a potential TBI, to include pain, fatigue, or environmental distraction. Any test data would provide additional information on symptom manifestation that could be added to the decision-making algorithm.

c. Level I/II/III Evaluation and Treatment.

(1) Current Status.

Once a patient with TBI is identified, the primary objective for the Level I/II provider is to determine if evacuation to a Level III facility is required for neuroimaging and specialty evaluation. Patients with moderate and severe TBI are typically easily identified in the absence of other injuries. At Level I, these patients are treated according to Pre-Hospital Trauma Life Support (PHTLS) and TC3 standards of practice. There is currently variable use of the DVBIC CPG that directs symptomatic treatment, rest, and reevaluations in a short period of time. Of

particular importance is the recommendation that patients at Level I (and Level II) not be prescribed medications with sedating effects (in an effort to follow the mental status) or medications that may prolong bleeding until neuroimaging can confirm the absence of intracranial hemorrhages or contusions.

Patients at Level II are typically treated and evaluated by medical officers with acute care experience. Most Level II medical facilities have at least one emergency medicine-trained physician and the basic equipment that allows the patients to be treated according to standards of practice found in most CONUS emergency departments.

Patients at Level III have access not only to typical CONUS emergency department providers and equipment but also to neuroimaging (that is, computed tomography) and specialty evaluation (neurosurgery and neurology). While this is not always the case,(some Level III facilities may not have neurology or neurosurgery), most theaters of operation have strategically placed assets to cover for these contingencies. Patients at this level are usually treated according to AANS guidelines (see *http://www.aans.org/*).

There is currently variable use of the DVBIC CPG regarding the treatment of mild TBI at all levels. It should be emphasized that most mild TBI patients are treated at Level I and Level II and are rarely referred to Level III for evaluation. In addition, when patients with mild TBI are referred to Level III, they typically do not require admission. These patients are often evaluated as outpatients. Special recognition should be paid to the efforts of the Level III hospital in Balad, Iraq. The neurology provider in Balad has made particular efforts to create educational materials and assist with disseminating that material to other medical providers in theater.

It has been recognized that the treatment of TBI follows a model similar to combat stress treatment. The DVBIC Working Group recommended treating patients as close to their organic unit as possible. The mainstay of treatment is rest and symptomatic treatment of their symptoms. This can often be accomplished at a Level I or Level II area without evacuation to Level III or beyond. Once a patient is transferred to Level III or beyond, the administrative challenges of command and control become more problematic. Currently, there is variable use of liaison officers at Level III.

(2) Best Practices.

The current use of the DVBIC CPG to guide evaluation and treatment at all levels in the theater of operations is a best practice. The current efforts to follow established protocol from PHTLS,

TC3, and AANS should also be encouraged. The efforts to educate providers in the use of the CPG and MACE, spearheaded by Neurology at the Balad Level III facility, should be continued and expanded. Finally, the effort to treat Soldiers close to their organic units is recommended since most Soldiers improve with relatively simple interventions.

(3) Gaps.

There are four major issues to improve the current treatment of TBI at Levels I, II and III. First, there is variable implementation of the DVBIC CPG. These practice guidelines represent the current consensus on the best practice. Second, efforts should be made to improve the passage of medical information between levels (both anterograde and retrograde). The implementation of an EMR would be an ideal solution. However, the challenges of using electronic equipment in a field environment, with variable power sources, variable internet connectivity, and high mobility cannot be ignored. Third, there remains variable medical provider knowledge regarding TBI. Educational efforts should focus on the evaluation and treatment of TBI for medical providers and all aspects of the command element. Finally, there is variable availability of specialty physicians at Level III facilities.

d. Level IV.

In the current conflict, LRMC serves as the singular convergence point for Soldiers evacuated from the theater of operations. The hospital operates as a Tri-Service or joint organization.

(1) Screening.

(a) Current Status.

The majority of patients evacuated from the theater of operations arriving at LRMC are screened for TBI using the MACE. The person conducting this screening may be a nurse, chaplain, or social worker. The intent of this screening is to identify TBI as early as possible. Those not screened include: (1) patients with known TBI, usually those with moderate, severe, and penetrating TBI; (2) patients not appropriate for screening (due to co-morbidities, medications, sleep deprivation, etc.); (3) patients not at LRMC long enough to complete screening; and (4) patients with a primary psychiatric diagnosis.

Patients with negative TBI screening receive an educational handout about TBI, and no further TBI care is initiated. These patients can be returned to theater unless co-morbidities exist that preclude return to duty.

Patients with positive TBI screening and those with current, known TBI receive an evaluation by a provider with specific TBI training (such as, a Physical Medicine and Rehabilitation (PM&R) physician, or a neurologist). This provider first verifies the TBI diagnosis and determines if the patient is symptomatic or not. If the patient sustained a TBI and is not symptomatic, this is documented, the patient receives an educational handout about TBI, and no further TBI care is initiated. These patients can be returned to theater unless co-morbidities exist that preclude return to duty. If the patient sustained a TBI and is symptomatic, this provider initiates a plan of care related to the TBI and makes necessary referrals for specialty care. See current flowsheet (Appendix G).

(b) Best Practices.

Screening of all evacuated patients with an appropriate level IV TBI specific tool as applicable is a best practice.

(c) Gaps.

Patients with primary psychiatric diagnoses are not screened. This issue was being discussed at the time of the TF site visit. Screening of this population is necessary in an attempt to ensure attribution of symptoms to the correct diagnosis while realizing that more than one diagnosis may be present.

There is a lack of a standardized AHLTA template for documenting the results of screening. This contributes to inefficiency and redundancy in the system. If there is no evidence of screening being performed at level IV, screening must be conducted at Level V so as not to miss any patients with TBI.

There is inconsistent coding, especially for those with nonsymptomatic TBI and mild TBI. It is unclear what ICD-9 codes are being used for patients with mild TBI and how coding is different for mild TBI with and without symptoms. Correct coding is essential for epidemiologic study of this population.

There is a need for standardized and appropriate education tools. Patients who screen negative for TBI and those who screen positive without symptoms have different TBI education needs. The handouts used need to be appropriate for the intended audience.

The MACE may not be the best tool for screening at Level IV if the concussion or mild TBI occurred more than 3 days prior to evaluation. Some patients at this level may still be quite acute and if the MACE has not been previously administered, it may be the appropriate tool. However, some patients may have had this tool administered several times prior to arriving at Level IV and the magnitude of practice effect and other psychometric properties are unknown.

(2) Evaluation and Treatment.

(a) Current Status.

i. Moderate/Severe/Penetrating.

Patients with moderate, severe, and penetrating TBI are evaluated and treated according to emergency management and neurosurgical standards of care. They receive specialty evaluation and treatment as indicated by their condition. Services rendered include but are not limited to intensive care, neurosurgical care, intracranial pressure monitoring, and treatment, CT/MRI, PT and OT, speech and language therapy (SLT), audiology, and ophthalmology. Patients with this severity of injury are treated as inpatients, and their care is documented in a paper record. The typical length of stay at LRMC is 3 to 10 days, after which the patient is evacuated to a CONUS MEDCEN. The option of evacuating these patients directly to a DVA PRC or a civilian rehabilitation center was investigated by the TF. A chart depicting disposition options from Level IV for patients with moderate, severe, and penetrating TBI is available in Appendix H. The two facilities patients are most commonly evacuated to are WRAMC and NNMC.

ii. Mild.

Patients with mild TBI are identified by screening done at Level IV and at prior levels of care. When patients screen positive for TBI, they are evaluated by a provider with specific TBI training (such as, PM&R physician or neurologist). This provider first verifies the TBI diagnosis and determines if the patient is symptomatic or not. If the patient sustained a TBI and is not symptomatic, this is documented, the patient receives an educational handout about TBI, and no further TBI care is initiated. These patients can be returned to duty unless co-morbidities exist that preclude return to duty. If the patient sustained a TBI and is symptomatic, treatment is initiated to include medication and specialty referrals. The patient's plan of care incorporates the TBI-care needs and any co-morbidity care needed. Patients with symptomatic mild TBI may be treated as inpatients or outpatients depending on their symptoms and co-morbidities. Outpatient

care is documented in AHLTA, and inpatient care is documented in a paper chart. Several options are available for further evacuation of patients with mild TBI. Patients are evacuated to MEDCENs, medical department activities (MEDDACs), and occasionally are sent by commercial air to their home stations. A chart depicting disposition options from Level IV for patients with mild TBI is available in Appendix I. The four facilities patients are most commonly evacuated to include WRAMC, NNMC, Brook Army Medical Center and Womack Army Medical Center.

(b) Gaps.

The lack of an electronic inpatient medical record makes the system of care more cumbersome and less integrated. This often leads to inefficiency and unnecessary redundancy. Inconsistent documentation of the GCS and duration of LOC, as well as PTA in this patient population contributes to difficulty in making the diagnosis of TBI.

e. Level V—CONUS MTFs.

(1) Screening.

(a) Current Status.

A few facilities across the USAMEDD have instituted a TBI screening process for patients arriving from theater. The most robust program is occurring at WRAMC where a process is in place for screening both inpatients and outpatients with suspected TBI.

Inpatient: Since mid 2003, the medical evacuation manifest has been reviewed for patients with possible TBI. Patients with a traumatic mechanism of injury that places them at increased risk for TBI (such as, blast exposure, MVC, fall) and those with known head and neck injuries were interviewed by a DVBIC physician's assistant to determine if they had sustained a TBI. In addition, both neurology and PM&R were consulted for suspected cases of TBI. The cases identified through these methods were usually of mild severity, since the patients with moderate, severe, and penetrating TBIs were typically already identified. The combination of manifest review and direct consultation effectively captured most inpatients at WRAMC who had sustained a TBI. Patients who screen negative for a TBI receive educational information about TBI, and no further TBI care is initiated. These patients can be returned to duty unless co-morbidities exist that preclude return to duty. Patients who screen positive for TBI: (1) receive education, (2) have the injury circumstances and the nature of the injuries sustained documented, and (3) complete symptom questionnaires for both Acute Stress Disorder (ASD)/PTSD and

postconcussive symptoms. Also, a CT/MRI is ordered and basic cognitive testing is completed, with more comprehensive neuropsychological testing done as indicated. If the patient sustained a TBI and is not symptomatic, this is documented. The patient receives an educational handout about TBI, and no further TBI care is initiated. If the patient sustained a TBI and is symptomatic, neurology and/or PM&R remain on the case as a consulting service; a plan of care related to the TBI is established in consultation with the attending service. (See Evaluation and Treatment section below.)

Outpatient: A similar "mechanism of injury" approach was initiated at the same time as the inpatient screening for outpatients. However, there was not always good assurance that all individuals were identified and screened. To improve this, beginning in February 2007, a multidisciplinary TBI clinic was established at WRAMC to screen and manage outpatients with TBI. Any outpatients identified as possibly having sustained a TBI are evaluated in this clinic. Patients typically referred to this clinic for screening are those suspected of having sustained a mild TBI as those with moderate, severe, and penetrating TBI are typically already identified. A detailed interview and chart review is conducted by a provider with specific TBI training (PM&R or neurology resident) to determine if the patient sustained a TBI. Patients with negative TBI screening receive an educational handout about TBI, and no further TBI care is initiated. These patients can be returned to duty unless co-morbidities exist that preclude return to duty. For patients who screen positive but are asymptomatic, this is documented; the patient receives an educational handout about TBI, and no further TBI care is initiated. These patients can be returned to duty unless co-morbidities exist that preclude return to duty. If the patient sustained a TBI and is symptomatic, a plan of care related to the TBI is established, and referrals for further evaluation are made. (See Evaluation and Treatment section below.)

(b) Best Practices.

Screening of inpatients and outpatients as described above at WRAMC is a best practice.

(c) Gaps.

Screening for a mild TBI is not consistent throughout the USAMEDD. Most facilities have no specific program for screening for TBI and, therefore, are at risk for missing the often subtle condition of mild TBI. Lack of identification contributes to a delay in treatment.

(2) Evaluation and Treatment.

(a) Current Status.

i. Moderate/Severe/Penetrating.

Patients with moderate, severe, and penetrating TBIs are managed on a case-by-case basis based on their needs. The majority of these patients are cared for at either NNMC or WRAMC. The severity of their condition necessitates inpatient care, and their care is documented in an EMR. They are medically stabilized and receive acute care specialty services including but not limited to CT/MRI, administration of Repeatable Battery for the Assessment of Neuropsychological Status (RBANS), and europsychiatric/neuropsychological testing. Treatments include medication, PT and OT, SLT, audiology, ophthalmology, and behavioral health. Usually these Soldiers are referred to specialized DVA TBI inpatient rehabilitation centers. Refer to Appendix H for a review of disposition options for patients with moderate, severe, and penetrating TBI.

ii. Mild.

As stated in the screening section above, if the patient screens negative for TBI or screens positive for TBI but is asymptomatic, this is documented. The patient receives an educational handout about TBI, and no further TBI care is initiated. These patients can be returned to duty unless co-morbidities exist that preclude return to duty. Mild TBI can be found as a singular diagnosis, but in patients in the casualty care pathway, the mechanism that caused the mild TBI most often caused other injuries as well. Care for the other more visible injuries often overshadows the mild TBI, and if providers are not looking for mild TBI, it can be missed. Ideally, patients with mild TBI are identified by screening done at Level V and at prior levels of care. However, even when not identified as mild TBI by some specific screening program, symptomatic care is rendered when sought. The symptoms most commonly present are headache, irritability, sleep disturbance, balance deficit, and memory difficulty. Symptoms may be misattributed to other diagnoses such as ASD or PTSD. Most MTFs across the USAMEDD manage these patients using a typical primary care model. Patients are referred for specialty care based on their symptoms. They may be prescribed medications, referred for CT/MRI, receive the RBANS, receive additional or other neuropsychological testing, PT and OT, SLT, audiology, ophthalmology, and behavioral health. Clinical disposition options include outpatient care at the MTF and referral to local/regional/national DVA and civilian facilities ("Level VII"). Both inpatient and outpatient care is documented in an EMR.

(b) Best Practices.

i. Moderate/Severe/Penetrating.

The availability of multimodality monitoring in a neurointensive-care setting and the availability of endovascular intervention is a best practice.

Appropriate acute inpatient TBI rehabilitation during medical stabilization utilizing the full scope of standard rehabilitation services (that is, PT, OT, SLT) early in the rehabilitation process is a best practice. Providing cognitive rehabilitation in a functional manner across all disciplines is also a best practice.

Patients with moderate or severe TBI and those with penetrating TBI with significant functional impairments are most appropriately referred to a TBI-specific rehabilitation center once they are medically stabilized.

ii. Mild.

The best practice identified for evaluation and treatment of mild TBI exists at WRAMC. The aggressive screening of inpatients and outpatients results in the identification of a significant number of patients with mild TBI. The volume has lead to expansion of services available at WRAMC and to connections with the local DVA to augment services. The neurology department and the PM&R service jointly staff weekly multidisciplinary inpatient TBI meetings and weekly outpatient TBI clinics to facilitate sharing of information across all disciplines. Information sharing and aggressive TBI CM contribute to a broad approach to TBI care. Specialty referrals are proactively placed for service-specific screening, such as balance testing, vestibular testing, cognitive-communication testing, and assessment of attentional or memory/learning problems instead of waiting until the patient has specific complaints. Cognitive rehabilitation is provided in a functional manner across all disciplines.

Clinical disposition options are discussed based on the totality of the patient's needs. Some co-morbidities necessitate staying at WRAMC for care (such as, amputation) in which case TBI care is provided in conjunction with other specialty care. Other patients may be referred to DVBIC sites at Virginia NeuroCare, Inc., (Charlottesville, Virginia) or Laurel Highlands Neuro-Rehabilitation Center (Johnstown, Pennsylvania) for structured residential day-treatment programs. Others may be best managed in their local community. Disposition options are discussed and decided on by the multidisciplinary team to best meet each patient's individual

needs. Both inpatient and outpatient care is documented in an EMR The TBI care at WRAMC has been positively influenced by the DVBIC presence and input.

(c) Gaps.

There are not enough MTFs providing multidisciplinary, proactive evaluation and treatment of patients with mild TBI at Level V. Currently, there is not a policy that exists to guide MTFs in the development or provision of programs to best manage patients with mild TBI. Lack of resources and variable command emphasis contributes to fragmented services. Lack of provider knowledge related to mild TBI can lead to under-identification and suboptimal treatment.

f. Level VI—Inpatient Rehabilitation (Non-MTF).

"Level VI" in the framework used by the TBI TF represents inpatient rehabilitation conducted at a non-MTF. This could be a DVA facility or a civilian rehabilitation facility. Inpatient rehabilitation provides specialized and intense rehabilitation to patients who are medically stable and able to participate in rehabilitation. A general guideline for patients to qualify for inpatient rehabilitation is if they require and can tolerate at least 3 hours per day of multidisciplinary rehabilitation. The VA PRCs, however, unlike private sector rehabilitation facilities, are positioned to be able to admit patients who may be in very early stages of recovery with continuing complex medical and surgical problems that do not allow participation in 3 hours of therapy per day. The PRCs care for these patients and provide rehabilitation at the level which they can tolerate until they are ready for the full course of rehabilitation therapies.

In the DVA system, four regionally dispersed PRCs were established to meet the needs of the current veteran and Active-Duty populations. These four PRCs were selected based upon greater than 20 years experience of providing rehabilitative care to their beneficiaries with complex rehabilitation needs, such as TBI, spinal cord injury (SCI), and amputation in addition to the availability of acute care and other specialty services deemed necessary. The four PRCs were also original DVBIC sites since 1991. There are other DVA facilities that have the capability to provide inpatient care and rehabilitation, although not classified as PRCs. The inpatient rehabilitation provided at other non-PRC facilities is also included in "Level VI." Inpatient rehabilitation provided at civilian rehabilitation facilities is also classified as "Level VI."

(1) Screening.

Screening at "Level VI" is not necessary as patients undergoing inpatient rehabilitation have been thoroughly evaluated prior to transfer to the rehabilitation facility.

(2) Evaluation and Treatment.

(a) Current Status.

i. Moderate/Severe/Penetrating.

Inpatient rehabilitation is the standard of care for most patients who sustain a moderate, severe, or penetrating TBI because the condition often results in significant impairments and functional limitations. Inpatient rehabilitation centers provide interdisciplinary care focused on facilitating achievement of the patient's highest possible functional level. The DVA PRCs visited by the TBI TF demonstrated the highest standards of practice provided in a culture of caring by adequately resourced, dedicated, experienced rehabilitation teams with a good understanding of the unique needs of Soldiers. The PRCs utilize the full scope of standard rehabilitation services (such as, PT, OT, SLT), incorporate recreational therapy and vocational rehabilitation early in the rehabilitation process, and provide cognitive rehabilitation in a functional manner across all disciplines. The civilian rehabilitation centers visited by the TBI TF also appeared to provide high-quality care but without the understanding of unique military issues and without a strong system of Soldier support.

ii. Mild.

Patients with solely a mild TBI are rarely symptomatic enough to require inpatient rehabilitation. However, patients with other injuries/conditions requiring inpatient rehabilitation may also have mild TBI. The patients with mild TBI undergoing inpatient rehabilitation for their co-morbidities receive TBI-specific services as needed.

(b) Best Practices.

The use of facilities that have experience with polytrauma, not just TBI, is essential since patients with all severities of TBI often have co-morbid injuries/conditions. The PRCs have a policy-driven, proactive approach to supporting patients and Families and a network of sites to facilitate smooth transition from inpatient to outpatient within the same system of care and in unison with the VBA. The use of military liaisons at the PRCs smoothes transitions and facilitates timely resolution of military-unique issues.

(c) Gaps.

Soldiers undergoing inpatient rehabilitation may be medically retired or still on Active Duty. The variance in duty status greatly complicates command and control and administrative-issue resolution.

The regional distribution of the PRCs and the lack of close proximity to military installations hamper the maintenance of military identification. Further, the four PRCs may not be in close proximity to the homes of patients/Families, thereby, necessitating uprooting of Families involved in this phase of rehabilitation.

Although it is untrue that the Federal system has no quality control over civilian facilities, there may still be a perception of less-than-optimal care in DVA facilities.

g. Level VII—Outpatient Rehabilitation (Non-MTF).

"Level VII" in the framework used by the TBI TF represents outpatient rehabilitation conducted at a non-MTF. This could be a DVA facility or a civilian facility. Outpatient rehabilitation may be a continuum after a period of inpatient rehabilitation. This is usually the case for patients with moderate, severe, or penetrating TBI; alternatively, outpatient rehabilitation may directly follow acute management and identification of TBI. This is usually the case with mild TBI and may be the case with some patients with moderate, severe, or penetrating TBI who have minimally impairing residual functional deficits. At this point in the continuum of care, it is the residual impairments, functional limitations, and potential for improvement that determines the need for care rather than the original diagnosis of mild, moderate, severe, or penetrating TBI. Outpatient rehabilitation provides a continuum of services as the patient works to achieve his/her highest possible functional level.

In the DVA system, 21 regionally dispersed PNSs and 75 Polytrauma Support Clinics (PTSCs) are available to provide outpatient rehabilitation to patients with TBI. There are other DVA facilities that have the capability to provide outpatient care and rehabilitation, although not classified as PNSs or PTSCs, and the outpatient rehabilitation provided there would be included in "Level VII." Outpatient rehabilitation provided at civilian facilities is also classified as "Level VII."

(1) Screening.

(a) Current Status.

Beginning in April 2007, DVA health clinics across the nation began screening all OIF/OEF veterans seeking care in their system. The DVA's EMR is linked to Service data and is automatically flagged if the patient seeking care is an OIF/OEF veteran. The provider is prompted to ask TBI screening questions, and results of the screening questions are documented. Positive screening results in a referral for further evaluation by a TBI-trained provider.

The four CBHCOs visited by the TBI TF are screening patients for mild TBI as they enter the CBHCO system. Screening forms were developed after consultation with the DVBIC and were distributed throughout the system.

(b) Best Practices.

Screening by the DVA and CBHCOs is a necessary best practice for the time being, until identification of mild TBI at prior levels of care is comprehensively executed. It is anticipated that future screening at this level will not be necessary.

(c) Gaps.

There are no gaps related to screening at "Level VII."

(2) Evaluation and Treatment.

(a) Current Status.

Patients may be receiving care from DVAs or community-based resources to augment care provided at an MTF or may be receiving all of their care in the community. The DVA provides a full spectrum of interdisciplinary rehabilitation, including transitional community reentry rehabilitation. The network of hospitals and clinics across the country facilitates transitions that aim to get patients and their Families closer to home. Patients and Families visited at DVA facilities unanimously reported excellent care and coordination of rehabilitation and administrative efforts. Reports of care provided in local civilian facilities ranged from excellent to poor and patients/Families noted minimal interdisciplinary communication, as well as a lack of understanding of military-specific issues.

(b) Best Practices.

The DVA's policy-driven, standardized approach of integrated interdisciplinary team rehabilitation with a nationwide network of hospitals appears to serve the TBI patient population best.

(c) Gaps.

The risk of fragmented services is high in outpatient rehabilitation, especially when multiple services are rendered. There is also a lack of a consistent and efficient referral process at this level of care.

The wide variance in practice patterns in local civilian facilities can contribute to perceived and real differences in quality and quantity of care, and the Federal system has no quality control over civilian facilities providing care to Soldiers.

h. Level VIII—Lifetime Care.

"Level VIII" in the framework used by the TBI TF represents the rest of the patient's life. As with "Level VII," in "Level VIII," it is the residual impairments, functional limitations, and potential for improvement that determine the care needs rather than the original diagnosis of mild, moderate, severe, or penetrating TBI. The patient has reentered their home community with varied needs for continued support. Patient needs are centered on the patient's daily activities.

(1) Screening.

Screening at "Level VIII" is not necessary as patients at this point in the continuum of care have been thoroughly evaluated and treated during the course of their care.

(2) Evaluation and Treatment.

(a) Current Status.

Patients with residual deficits after all levels of severity of TBI have needs that arise throughout their life that often require temporary increases in level and type of services. Examples of expected changes include development of new technologies and changes in stage of life or interests. Patients may also at times need crisis management. Consistent and readily accessible

CMs who provide periodic follow-up are able to mitigate the crises. Four categories of needs are listed below with examples:

i. Housing.

- Personal home or apartment
- Home modifications
- Assisted living
- Group home
- Total care in family home environment
- Institutional long-term care

ii. Health Care.

- Case management
- Outpatient care
- Treatment and follow-up care
- Home health care
  - Intermittent to 24-hour care
  - Visiting nurse
- Behavioral health services
- Medical equipment

iii. Support for Daily Living.

- Independent living services
- Homemaking services
- Meals on Wheels
- Respite care

iv. Community Participation.

- Educational services
  - Note taker, tutor, alternative testing, computer training, and modifications
- Vocational rehabilitation
  - Supported work, compensated work, competitive employment
- Structured day programs
- Sports and leisure activities
- Social activity

(b) Best Practices.

The DVA has the capability to provide a comprehensive package of services to support lifetime community care. However, DVA does not have legal authority to provide/pay for board and care services. Expansion into these areas is under investigation.

(c) Gaps.

There is possible inconsistent utilization of these services in communities across the nation due to lack of awareness of these benefits. The issue of DVA support for assisted living may need to be reconsidered for patients with TBI as this may be the most appropriate, best living arrangement for some patients post-TBI. Full utilization of these lifelong services may lead to a strain on DVA resources.

SECTION 7–3. REDEPLOYMENT/POST-DEPLOYMENT

a. Current Status.

Soldiers who sustain a moderate, severe, or penetrating TBI are almost always evacuated from the theater of operations. While there may be a rare case of a Soldier returning to duty after this type of injury, and subsequently redeploying with his/her unit, this is extremely uncommon. This section focuses of the screening, identification, and treatment of Soldiers with mild TBI who have completed their tour of duty in theater and re-deployed with their unit. Data from a few sites suggest that the incidence of mild TBI in the previous deployment ranges from 10–20 percent. While most of these Soldiers will have fully recovered, some of these Soldiers may remain symptomatic and may never seek care for their injury. Others may have sought care for other injuries and not been identified as having a mild TBI due to the sometimes subtle nature of their symptoms. Other Soldiers may have sought and received care for mild TBI and may have been able to return to duty.

In an attempt to identify deployment-related medical issues, Soldiers complete the PDHA, often both in theater and at demobilization. They are later assessed with the PDHRA 90–120 days post-deployment. The PDHA and PDHRA do not currently have any specific TBI-related questions. Analysis attempting to correlate the diagnosis of mild TBI with various questions currently on the PDHA/PDHRA has not been successful.

Some sites (such as, Fort Bragg, Fort Carson, Fort Irwin, Camp McCoy, and Camp Pendleton) have instituted TBI-specific post-deployment screening. With the assistance of DVBIC, forms have been developed to screen for mild TBI (see Appendix J), and stations have been set up at demobilization sites where Soldiers complete the form and then undergo a brief clinical interview to determine the presence or absence of mild TBI.

b. Best Practices.

At Fort Carson, the TBI screening is incorporated into the SRP. In groups of 20–30, Soldiers first receive a briefing about the TBI screening program and instruction on completing the screening form. Then they complete their sections of the form and undergo a brief clinical interview to determine the presence or absence of mild TBI. Providers who have been trained in the use of the screening form perform the interview. The screening form includes a diagnosis section in which one of the following four diagnoses is entered: (1) TBI with symptoms, (2) TBI without symptoms, (3) No TBI (positive injury event), and (4) No TBI (negative injury event) (Appendix J).

Soldiers who screen negative for TBI and those who screen positive for TBI without symptoms are provided an educational handout and no further TBI care is initiated. These patients proceed with the rest of the demobilization processing. The results of the screening are manually entered into AHLTA.

Soldiers who screen positive for TBI and have symptoms are immediately referred to one of two TBI providers located at the SRP. These providers, a family practice physician and a nurse practitioner, provide real-time evaluation and treatment. Initial treatment usually consists of reassurance in addition to written and verbal education. Medications are often prescribed to treat symptoms of headache, irritability, and sleep disturbance. Follow-up and continued care are provided by these same providers who both provide extensive walk-in appointment availability. Specialty care is also available on site from behavioral health providers, social workers, and CMs. Referrals for additional specialty care is made as needed and may include, but are not limited to, neurology, neuropsychology for cognitive testing, physical, occupational, and cognitive therapies. All care is documented in AHLTA using local templates.

This model of post-deployment screening is a collaboration between garrison and MEDDAC assets. The program has support from all levels of command. The success of the TBI screening is attributable to strong leadership and a ruthlessly efficient system. Of note, the TBI providers

at the SRP also provide evaluation and management for personnel assigned to Fort Carson with TBI sustained in training and off duty.

c. Gaps.

Few sites are performing post-deployment screening. There is no policy for post-deployment screening, and there is a lack of resources to institute such screening. Some locations have also noted lack of ability to hire qualified providers.

SECTION 7–4. LACK OF FORMAL SCREENING 2003–2005

a. Current Status.

Prior to mid-2005, no formal screening for mild TBI was in place. While Soldiers who sustained a moderate, severe, or penetrating TBI were evacuated from the theater of operations and treated based on emergency medicine and neurosurgical care practice standards, Soldiers who sustained a mild TBI may have never been identified. Based on some post-deployment data from redeployed Soldiers, an incidence rate of 10–20 percent for mild TBI has been found. A higher incidence has been found in medically evacuated patients since this time. These findings raise the concern that from 2003 to 2005 and even today at locations where post-deployment TBI screening is not in place, Soldiers with mild TBI may not be identified and if not identified, then not documented or treated. Therefore, the identification of Soldiers with mild TBI who were previously undiagnosed and a robust "safety net" are part of a necessary practice until screening is in place within the casualty care system and upon redeployment.

Two programs are in place to attempt to identify those Soldiers who may have been missed. Beginning in April 2007, DVA health clinics across the nation began screening all OIF/OEF veterans seeking care in their system. The DVA's EMR is linked to Service data and is automatically flagged if the patient seeking care is an OIF/OEF veteran. The provider is prompted to ask TBI screening questions, and results of the screening questions are documented. Positive screening results in referral for further evaluation by a TBI-trained provider. The second initiative expected to be implemented in the very near future is the inclusion of TBI-specific screening questions on the PHAs. Positive answers to these questions will prompt referral for additional evaluation.

b. Gaps.

Soldiers who separated from the Army between 2003 and 2005 and those at many sites today receive no standardized TBI screening. Further, the PDHA and PDHRA do not include specific TBI screening questions and cannot be relied upon to identify Soldiers with TBI based on the current questions or the Soldiers' symptom profiles.

SECTION 7–5. NON-THEATER OF OPERATIONS

a. Current Status.

TBIs can occur outside of the theater of operations as a result of training accidents, falls, MVCs, and other mechanisms. Injury severity can range from mild to severe and penetrating. Treatment of these injuries follows a similar pathway of care as describe above in Levels V–"VIII." Injuries that occur outside of CONUS may even include care similar to that described at Level IV. Emergency care is often provided in local civilian facilities.

b. Gaps.

Care provided in local civilian facilities may not be redirected to the MHS. Civilian facilities may be unaware of the established pathways within the MHS and VA.

SECTION 7–6. RETENTION

a. Current Status.

Soldiers with residual impairments from TBI may be referred to a MEB. Army Regulation 40-501, chapter 3, does not include specific language about TBI. Selected sections of chapter 3 that are often used for medical board procedures are referenced in Appendix E.

b. Best Practices.

Use of a single staff member to write narrative summaries for MEBs for Soldiers with TBI greatly improves internal consistency.

c. Gaps.

Army Regulation 40-501, chapter 3, does not specifically mention TBI, and there is a lack of consistency in narrative summaries and application of the regulation relating to patients with TBI.

CHAPTER 8. RECOMMENDATIONS

A. DEFINITION.

Develop a single academically rigorous, operationally sound definition for the case ascertainment of TBI (especially mild TBI) to facilitate accurate screening, evaluation, diagnosis, treatment, and education.

Work with interagency (DOD/DVA) and civilian groups on the definition of TBI and further the taxonomy of TBI.

B. SCREENING.

Implement in-theater TBI screening and documentation for all Soldiers exposed to blast.

Add TBI-specific screening questions to the PHA, PDHA, and the PDHRA to assess for TBI.

Develop an Army-wide post-deployment TBI screening tool, and implement/conduct post-deployment TBI screening at every demobilization site for all Soldiers.

Develop an appropriate tool, and conduct TBI screening for all patients evacuated from theater who are appropriate for screening.

Develop and implement TBI screening policy at all levels of care. The policy will encompass all mechanisms of TBI occurring both within and outside the theater of operations.

Conduct screening with a consistent team trained to perform this function.

C. BASELINE NEUROPSYCHOLOGICAL EVALUATION.

Implement a baseline (pre-deployment), post-deployment, and post-injury/exposure neuropsychological evaluation using the ANAM.

Utilize ANAM for neuropsychological testing per acute in-theater care CPGs.

D. OUTREACH PROGRAM.

Propose outreach programs through the Deputy Chief of Staff for Personnel for Soldiers separated from the Army since 2003 to facilitate identification of mild TBI and to initiate treatment if needed—possibly a program similar to the Gulf War Registry.

E. TRAUMATIC BRAIN INJURY CENTER OF EXCELLENCE.

Develop a proposal on the appropriate functions of a "TBI COE" for USAMEDCOM to submit to HA.

Utilize the DVBIC model of a joint/interagency network for TBI.

Propose the DVBIC as the core of a new COE for DOD and DVA.

Evaluate the impact of the expansion of DVBIC sites to all MTFs.

Optimize the positioning of clinical, educational, and research activities.

Establish and utilize a proponency office to address TBI health integration and rehabilitation. This office will serve as the main proponent for all TBI inquiries, issues, policy development, and implementation for the OTSG/USAMEDCOM and will execute recommendations of the TBI TF through a process that includes timelines, tracking, and interagency coordination of actions.

F. TREATMENT.

Develop a system-wide policy to institute identified best practices across the continuum of care for patients with all degrees of TBI. This system-wide effort should include development and implementation of in-theater concurrent screening protocol; acute in-theater management of mild TBI CPGs; standardized early symptomatic treatment after identification; identification of a POC for TBI issues; and deployment of a neurologist with every CSH.

Establish deployment/redeployment TBI programs at each installation including: primary care, social work, CM, and behavioral health programs based upon the Fort Carson model. Population needs may reveal the need for an enhanced or reduced version of the Fort Carson model. In some cases, regionally based USAMEDCOM TBI surge teams may meet the needs of sites with few and infrequent redeployments.

Develop and implement a policy to establish critical positions for TBI care at every MTF based upon added mission and available resources. At a minimum, there will be two critical positions that will be essential: a TBI POC (the go-to person for "all issues related to TBI" at that facility) and a TBI specific-care coordinator or clinical case manager.

Establish the DVA facilities as the first option of care for inpatient and outpatient rehabilitation for Soldiers requiring care beyond the capability of the MTF. Exceptions to use of the DVA should be reviewed by the MTF Deputy Commander for Clinical Services (DCCS) with second-level review by the nearest regional MTF DCCS to facilitate consistent, fair, and equitable decision making across the USAMEDD.

Coordinate with DVA VHA/VBA to establish a utilization review of benefits.

G. Case Management.

Implement a population-based model for CM support which is reflective of best practices across the DOD and DVA. Establish a standardized definition using DOD's definition of military CM for the Army, and start CM processes as early as possible from the point of injury across the continuum of care.

Establish a standardized documentation template for TBI CM Army-wide according to the level of care. Provide accessible documentation systems needed to enhance communication in each care venue with a smooth transition to the next site or level of care.

H. Research.

Centralize evaluation of the scientific merit, clinical utility, and priority of new treatment strategies, devices, or interventions (such as, basic, clinical, and applied research efforts). Clinical research will be synchronized with basic science and technology. All TBI research will be coordinated, integrated, and vetted through USAMRMC.

Conduct centralized, standardized reporting to determine the actual incidence and prevalence of TBI, with focus on mild TBI. The current disparate methods of identifying TBI at the point of occurrence or at other times in the care process suggest that any effort to gather this data without standardization will yield very questionable and easily challenged findings.

Develop a mechanism for collecting the frequency, severity, care, and outcomes of TBI to provide adequate, reliable data for analysis to assist in care and decision making.

Coordinate, synchronize, and conduct multicenter clinical research on TBI under a centralized authority.

I. FAMILY ISSUES.

Review benefits packages provided by TRICARE, DVA, and MA (such as, nongovernmental organizations, advocacy groups, and volunteers) to determine an optimal uniform package.

Establish new uniform benefit sets that include both the entitlements and healthcare benefits to serve those with minimal needs as well as those with lifelong needs. Examples of areas that need to be addressed include: therapies required to meet the individualized treatment plan; housing to include supported living, home modifications, and long-term care; health care to include in-home and outpatient care as needed based on an individual care plan; medical equipment; temporary transitional living; support for daily living to include independent living services, homemaking services, meals on wheels, and behavioral treatment plans; community participation to include educational support services, vocational rehabilitation, structured day programs, sports and leisure activities, and social activities.

Provide resources for Family members who have chosen to leave their jobs to care for a Service member. Consider provision of health insurance for Family members who provide full-time care to an injured Service member/veteran.

Provide psychosocial support for Soldier, Family members, and staff to include support groups (GWOT and TBI sensitive); individual and Family counseling utilizing models of care adapted to the needs of Family members of a brain-injured individual.

Recommend placement of USAR chaplains at each of the four DVA PRCs for additional psychosocial support services.

Recommend placement of military liaisons at the VA PNSs.

J. EDUCATION.

Develop and disseminate standardized education products that provide a practical overview of TBI to Soldiers, Family members, and unit commanders to increase their TBI proficiency and improve the positive, accurate identification of symptoms. This product will include general TBI information, other pre-deployment issues which may include Living Wills and Powers of Attorney, and a standardized explanation of all levels of care. Provide ongoing, periodic refresher sessions to improve the retention of information.

Educate and train providers on TBI-specific screening tools, proper evaluation, appropriate treatment, documentation requirements, (such as, mechanism/nature of injury GCS, level of consciousness, PTA, models for grief and loss counseling, and caregiver support). Provide continuing medical education credit.

Provide TBI education to medical providers at MEPSs, everyone involved in the PDES, and coders.

Provide consistent, in-depth education throughout the continuum of care for Family members, Soldiers, and care professionals to include the following: clinical condition (TBI), benefits and entitlements, and simplified understanding of the DOD PDES.

Encourage and reinforce unit leaders to capture data about potential concussive events as a part of mission recovery and after-action review. Correlate this information with Soldier, medic, combat lifesaver, and buddy reporting. Identify Soldiers in need of observation as they may have had a TBI and require a short, periodic "stand down" for full recovery.

K. MARKETING.

Continually market TBI successes via command groups, public affairs offices, and as many media outlets as possible. Potential topics include DVA Polytrauma System of Care liaisons, DVA care educational videos, DVBIC consultation and educational offerings, outstanding examples of MTF care, personal accounts from Soldiers and their Families, and the positive care experiences received by noncombatants such as journalists (b)(6) and (b)(6).

Produce commercials briefly outlining the processes, improvement initiatives, and preponderance of positive outcomes to provide a more balanced account.

Keep Soldiers and their Families informed by actively marketing the methodology, status, and outcomes of studies conducted within and external to DOD/DVA.

L. DOCUMENTATION.

Develop and use an EMR that follows a Soldier from the point of injury to the Veterans Affairs Healthcare System. When multiple electronic records are in use, ensure interoperability among systems.

Standardize documentation for TBI to include capture of all data elements necessary for accurate classification of the injury, standard use of AHLTA templates, and uniform documentation of caregiver assistance for TSGLI.

Adapt the MACE overprint as an approved DA form to document mild TBI closest to the point of injury.

Establish and formalize the procedure for all Army MTFs to report TBI data (utilizing a standardized definition and identification methodology) to DVBIC. Joint coordination is required for Soldiers in non-Army MTFs.

M. PHYSICAL DISABILITY AND EVALUATION SYSTEM.

Encourage DA and DOD participation in a review of the PDES being conducted by specific process action teams. Monitor process improvement recommendations in the following categories: automation, counseling/training, MEB/PEB process, and transition. Evaluate and update AR 40–501 to include specific guidance on TBI.

APPENDIX A

REFERENCES

A–1. LITERATURE CITED

1. AR 40-501, Standards of Medical Fitness, 29 May 2007.

2, DOD Instruction 1332.39, Application of the Veterans Administration Schedule for Ratings Disabilities, November 14, 1996.

3. Langlois, J.A., Rutland-Brown, W., Thomas, K.E. 2006. Traumatic Brain Injury in the United States: Emergency Department Visits, Hospitalizations, and Deaths. Atlanta, Georgia: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control.

4. Thurman, D.J., Alverson, C., Dunn, K.A., Guerrero, J., Sniezek, J.E. 1999. "Traumatic brain injury in the United States: A public health perspective." *J Head Trauma Rehabil* 14(6):602-615.

5. Ommaya, A.K., Ommaya, A.K., Dannenberg, A.L., Salazar, A.M. 1996. "Causation, incidence, and costs of traumatic brain injury in the U.S. military medical system." *J Trauma* 40(2): 211-217.

6. Memorandum, Deputy Assistant Secretary (Professional Affairs & Quality Assurance), dated: January 1992, subject: Traumatic Brain Injury Program.

7. Salazar, A.M., Warden, D.L., Schwab, K., Spector, J., Braverman, S., Walter, J., Cole, R., Rosner, M.M., Martin, E.M., Ecklund, J., Ellenbogen, R.G. 2000. "Cognitive rehabilitation for traumatic brain injury: A randomized trial. Defense and Veterans Head Injury Program (DVHIP) Study Group." *JAMA* 283(23):3075-3081.

8. ALARACT Message, Office of The Surgeon General, 272213Z Jul 06, subject: Concussion in Soldiers on the Battlefield.

9. Personal Communication between Dr. Louis French, WRAMC, and Dr. Karen Schwab, DVBIC Headquarters, 21 July 2007.

10. Defense and Veterans Brain Injury Center Position Paper, Identification and Treatment of Combat-Related Traumatic Brain Injury, 20 January 2006.

11. Personal Communication among COL Stephen Flaherty, LRMC, and COL Robert Lambutta and Dr. Louis French, Walter Reed Army Medical Center, LRMC TBI screening database, 27 February 2007.

12. Knuth, T., Letarte, P.B., Ling, G., Moores, L.E., Rhee, P., Tauber, D., Trask, A. 2005. Guidelines for Field Management of Combat-Related Head Trauma. New York, New York: Brain Trauma Foundation. Supported by Contract #102544 from the Henry M. Jackson Foundation for the Advancement of Military Medicine, Defense and Veterans Brain Injury Center Cooperative Agreement funded under the Uniformed Services University of the Health Sciences.

13. Defense and Veterans Brain Injury Center Working Group on the Acute Management of Mild Traumatic Brain Injury in Military Operational Settings, Clinical Practice Guideline and Recommendations, 22 December 2006.

14. E-mail from COL William Tozier, USAMEDCOM, to COL Elspeth Ritchie, OTSG, subject: Discussion Questions for Tuesday's Meeting on TBI, 19 February 2007.

15. Mild Traumatic Brain Injury Committee of the Head Injury Interdisciplinary Special Interest Group of the American Congress of Rehabilitation Medicine. 1993. "Definition of mild traumatic brain injury." *J Head Trauma Rehabil* 8(3): 86-87.

16. Task Force on Returning Global War on Terror Heroes. 2007. Task Force Report to the President: Returning Global War on Terror Heroes. Washington, DC: Department of Veterans Affairs.

17. Ponsford, J., Willmott, C., Rothwell, A., Cameron, P., Kelly, A.M., Nelms, R., Curran, C. 2002. "Impact of early intervention on outcome following mild head injury in adults." *J Neurol Neurosurg Psychiatry* 73(3):330-332.

18. Glasser, R. 2007, April 8. A shock wave of brain injuries. The Washington Post, p. B01.

19. Case Management Society of America. 2007. Professional Case Management®: The Leader in Evidence-Based Practice. Baltimore, Maryland: Lippincott Williams & Wilkins. (Professional Case Managment® is a registered trademark of Wolters Kluwer Health, Inc., Ambler, Pennsylvania.)

20. Department of Defense TRICARE Management Activity. 2006. Medical Management Guide. Washington, DC: Department of Defense.

21. Boss, P. 2006. Loss, Trauma, and Resilience: Therapeutic Work with Ambiguous Loss. New York: W.W. Norton.

22. Memorandum of Agreement between the Department of Veterans Affairs and the Department of Defense Regarding Referral of Active Duty Military Personnel Who Sustain Spinal Cord Injury, Traumatic Brain Injury, or Blindness to Veterans Affairs Medical Facilities for Health Care and Rehabilitative Services, 1 January 2007.

23. Friedl, K.E., Grate, S.J., Proctor, S.P., Ness, J.W., Lukey, B.J., Kane, R.L. 2007. "Army research needs for automated neuropsychological tests: monitoring soldier health and performance status." *Arch Clin Neuropsychol* 22 Suppl 1:S7-14.

24. Vasterling, J.J., Proctor, S.P., Amoroso, P., Kane, R., Heeren, T., White, R.F. 2006. "Neuropsychological outcomes of Army personnel following deployment to the Iraq war." *JAMA* 296(5):519-529.

25. Randolph, C., McCrea, M., Barr, W.B. 2005. "Is neuropsychological testing useful in the management of sport-related concussion?" *J Athl Train* 40(3):139-152.

26. McCrea, M., Barr, W.B., Guskiewicz, K., Randolph, C., Marshall, S.W., Cantu, R., Onate, J.A., Kelly, J.P. 2005. "Standard regression-based methods for measuring recovery after sport-related concussion." *J Int Neuropsychol Soc* 11(1):58-69.

27. Randolph, C., Barr, W.B., McCrea, M. 2006. Letter to the Editor. *J Athl Train* 41(2):138-140.

28. Belanger , H.G., Vanderploeg, R.D. 2005. "The neuropsychological impact of sports-related concussion: a meta-analysis." *J Int Neuropsychol Soc* 11(4):345-357.

29. Schretlen, D.J., Shapiro, A.M. 2003. "A quantitative review of the effects of traumatic brain injury on cognitive functioning." *Int Rev Psychiatry* 15(4):341-349.

30. Vanderploeg, R.D., Curtiss, G., Belanger, H.G. 2005. "Long-term neuropsychological outcomes following mild traumatic brain injury." *J Int Neuropsychol Soc* 11(3):228-236.

A–2. Forms

DA Form 3349
Physical Profile

DD Form 2766
Adult Preventive and Chronic Care Flowsheet

A–3. Bibliography

Alexander, M.P. 1995. "Mild traumatic brain injury: pathophysiology, natural history, and clinical management." *Neurology* 45(7):1253-1260.

Alfano, D.P. 2006. "Emotional and pain-related factors in neuropsychological assessment following mild traumatic brain injury." *Brain Cogn* 60(2):194-196.

Aliotta, S.L. 2000. "Focus on case management: linking outcomes and accountability." *Top Health Inf Manage* 20(3):11-16.

Anderson, S.D. 2004. "Mild traumatic brain injury and memory impairment." *Arch Phys Med Rehabil* 85(5):862; author reply 862.

Angell, B., Mahoney, C. 2007. "Reconceptualizing the case management relationship in intensive treatment: a study of staff perceptions and experiences." *Adm Policy Ment Health* 34(2):172-188.

Baker, R.J., Patel, D.R. 2000. "Sports related mild traumatic brain injury in adolescents." *Indian J Pediatr* 67(5):317-321.

Bazarian, J.J., McClung, J., Shah, M.N., Cheng, Y.T., Flesher, W., Kraus, J. 2005. "Mild traumatic brain injury in the United States, 1998-2000." *Brain Inj* 19(2):85-91.

Begaz, T., Kyriacou, D.N., Segal, J., & Bazarian, J.J. 2006. "Serum biochemical markers for post-concussion syndrome in patients with mild traumatic brain injury." *J Neurotrauma* 23(8), 1201-1210.

Belanger, H.G., Vanderploeg, R.D., Curtiss, G., Warden, D.L. 2007. "Recent neuroimaging techniques in mild traumatic brain injury." *J Neuropsychiatry Clin Neurosci* 19(1):5-20.

Birmingham, J. 2004. "Documentation: a guide for case managers." *Lippincotts Case Manag* 9(2):104-105.

Birmingham, J., Colon, R. 2005. "Case managers implement "action" plans." *Lippincotts Case Manag* 10(6):306-310.

Biros, M.H., Kukielka, D., Sutton, R.L., Rockswold, G.L., and Bergman, T.A. 1999. "The effects of acute and chronic alcohol ingestion on outcome following multiple episodes of mild traumatic brain injury in rats." *Acad Emerg Med* 6(11):1088-1097.

Boake, C., McCauley, S.R., Levin, H.S., Pedroza, C., Contant, C.F., Song, J.X., Brown, S.A., Goodman, H., Brundage, S.I., Diaz-Marchan, P.J. 2005. "Diagnostic criteria for postconcussional syndrome after mild to moderate traumatic brain injury." *J Neuropsychiatry Clin Neurosci* 17(3):350-356.

Borgaro, S.R., Prigatano, G.P., Kwasnica, C., Rexer, J.L. 2003. "Cognitive and affective sequelae in complicated and uncomplicated mild traumatic brain injury." *Brain Inj* 17(3):189-198.

Bryant, R.A., Harvey, A.G. 1999. "Postconcussive symptoms and posttraumatic stress disorder after mild traumatic brain injury." *J Nerv Ment Dis* 187(5):302-305.

Bryant, R.A., Moulds, M., Guthrie, R., Nixon, R.D. 2003. "Treating acute stress disorder following mild traumatic brain injury." *Am J Psychiatry* 160(3):585-587.

Busch, C. R., Alpern, H.P. 1998. "Depression after mild traumatic brain injury: a review of current research." *Neuropsychol Rev* 8(2):95-108.

Carroll, L.J., Cassidy, J.D., Peloso, P.M., Borg, J., von Holst, H., Holm, L., Paniak, C., Pépin, M., WHO Collaborating Centre Task Force on Mild Traumatic Brain Injury. 2004. "Prognosis for mild traumatic brain injury: results of the WHO Collaborating Centre Task Force on Mild Traumatic Brain Injury. *J Rehabil Med* (43 Suppl):84-105.

Carroll, L.J., Cassidy, J.D., Peloso, P.M., Garritty, C., Giles-Smith, L. 2004. "Systematic search and review procedures: results of the WHO Collaborating Centre Task Force on Mild Traumatic Brain Injury." *J Rehabil Med* (43 Suppl):11-14.

Cicerone, K.D., Smith, L.C., Ellmo, W., Mangel, H.R., Nelson, P., Chase, R.F., Kalmar, K. 1996. "Neuropsychological rehabilitation of mild traumatic brain injury." *Brain Inj* 10(4):277-286.

Comper, P., Bisschop, S.M., Carnide, N., Tricco, A. 2005. "A systematic review of treatments for mild traumatic brain injury." *Brain Inj* 19(11):863-880.

Conti, R.M. 1996. "Nurse case manager roles: implications for practice and education." *Nurs Adm Q* 21(1):67-80.

Creeley, C.E., Wozniak, D.F., Bayly, P.V., Olney, J.W., Lewis, L.M. 2004. "Multiple episodes of mild traumatic brain injury result in impaired cognitive performance in mice." *Acad Emerg Med* 11(8):809-819.

Dahl, E., von Wendt, L., & Emanuelson, I. 2006. "A prospective, population-based, follow-up study of mild traumatic brain injury in children." *Injury* 37(5):402-409.

De Kruijk, J.R., Leffers, P., Menheere, P.P., Meerhoff, S., Rutten, J., Twijnstra, A. 2002. "Prediction of post-traumatic complaints after mild traumatic brain injury: early symptoms and biochemical markers." *J Neurol Neurosurg Psychiatry* 73(6):727-732.

De Kruijk, J.R., Twijnstra, A., Meerhoff, S., Leffers, P. 2001. "Management of mild traumatic brain injury: lack of consensus in Europe." *Brain Inj* 15(2):117-123.

De Monte, V.E., Geffen, G.M., May, C.R., McFarland, K., Heath, P., Neralic, M. 2005. "The acute effects of mild traumatic brain injury on finger tapping with and without word repetition." *J Clin Exp Neuropsychol* 27(2):224-239.

Duff, M.C., Proctor, A., & Haley, K. 2002. "Mild traumatic brain injury (MTBI): assessment and treatment procedures used by speech-language pathologists (SLPs)." *Brain Inj* 16(9):773-787.

Ebert, J. 2001. "The promise of case management." *Public Health Nurs* 18(5):293-294.

Echemendia, R.J., Cantu, R.C. 2003. "Return to play following sports-related mild traumatic brain injury: the role for neuropsychology." *Appl Neuropsychol* 10(1):48-55.

Fann, J.R., Uomoto, J.M., Katon, W.J. 2001. "Cognitive improvement with treatment of depression following mild traumatic brain injury." *Psychosomatics* 42(1):48-54.

Feinstein, A., Rapoport, M. 2000. "Mild traumatic brain injury: the silent epidemic." *Can J Public Health* 91(5):325-326, 332.

Fricke, K. 2006. "Patient-centered case management in today's healthcare." *Lippincotts Case Manag* 11(2):112-114.

Fung, M., Willer, B., Moreland, D., Leddy, J.J. 2006. "A proposal for an evidenced-based emergency department discharge form for mild traumatic brain injury." *Brain Inj* 20(9):889-894.

Gebke, K.B. 2002. "Mild traumatic brain injury." *Curr Sports Med Rep* 1(1):23-27.

Gerstenbrand, F., Stepan, C.H. 2001. "Mild traumatic brain injury." *Brain Inj* 15(2):95-97.

Grindel, S.H. 2006. "The use, abuse, and future of neuropsychologic testing in mild traumatic brain injury." *Curr Sports Med Rep* 5(1):9-14.

Haag, A.B., Kalina, C.M., Tourigian, R., Wassel, M.L. 2004. "What is the role of the non-nurse case manager? *Aaohn J* 52(1):10-13.

Harvey, A.G., Bryant, R.A. 1998. "Acute stress disorder after mild traumatic brain injury." *J Nerv Ment Dis* 186(6):333-337.

Hayden, M.E. 1997. Mild traumatic brain injury. A primer for understanding its impact on employee return to work. *Aaohn J* 45(12):635-643; quiz 644-645.

Herbert, D.L. 2007. "Medical-legal issues of mild traumatic brain injury." *Curr Sports Med Rep* 6(1), 20-24.

Hogan, T.D. 2005. "The impact of staff case manager-case management supervisor relationship on job satisfaction and retention of RN case managers." *Lippincotts Case Manag* 10(5):246-253.

Hopkins, M., Ramsundar, N. 2006. "Which factors predict case management services and how do these services relate to client outcomes?" *Psychiatr Rehabil J* 29(3):219-222.

Hosack, K. 1999. "Suggestions for case managers who work with patients with severe traumatic brain injury." *Nurs Case Manag* 4(1):14-18.

Huber, D.L., Tahan, H.A. 2004. "Managing forces of change: commission for case manager certification looks to the future." *Lippincotts Case Manag* 9(2):57-60.

Hughes, D.G., Jackson, A., Mason, D.L., Berry, E., Hollis, S., Yates, D.W. 2004. "Abnormalities on magnetic resonance imaging seen acutely following mild traumatic brain injury: correlation with neuropsychological tests and delayed recovery." *Neuroradiology* 46(7):550-558.

Huh, J.W., Widing, A.G., Raghupathi, R. 2007. "Basic science; repetitive mild non-contusive brain trauma in immature rats exacerbates traumatic axonal injury and axonal calpain activation: a preliminary report." *J Neurotrauma* 24(1):15-27.

Inglese, M., Makani, S., Johnson, G., Cohen, B.A., Silver, J.A., Gonen, O., Grossman, R.I. 2005. "Diffuse axonal injury in mild traumatic brain injury: a diffusion tensor imaging study." *J Neurosurg* 103(2):298-303.

Issel, L.M., Anderson, R.A. 2001. "Intensity of case managers' participation in organizational decision making." *Res Nurs Health* 24(5):361-372.

Iverson, G.L., Lange, R.T., Franzen, M.D. 2005. "Effects of mild traumatic brain injury cannot be differentiated from substance abuse." *Brain Inj* 19(1):11-18.

Jagoda, A., Riggio, S. 2000. "Mild traumatic brain injury and the postconcussive syndrome." *Emerg Med Clin North Am* 18(2):355-363.

Jiang, J.Y., Yang, X.F. 2007. "Current status of cerebral protection with mild-to-moderate hypothermia after traumatic brain injury." *Curr Opin Crit Care* 13(2):153-155.

Kashluba, S., Casey, J.E., Paniak, C. 2006. "Evaluating the utility of ICD-10 diagnostic criteria for postconcussion syndrome following mild traumatic brain injury." *J Int Neuropsychol Soc* 12(1):111-118.

Kennedy, R.E., Livingston, L., Marwitz, J.H., Gueck, S., Kreutzer, J.S., Sander, A.M. 2006. "Complicated mild traumatic brain injury on the inpatient rehabilitation unit: a multicenter analysis." *J Head Trauma Rehabil* 21(3):260-271.

Knecht, T. 2003. [Mild traumatic brain injury and its psychiatric assessment]. *Schweiz Rundsch Med Prax* 92(38):1572-1577.

Kushner, D. 1998. "Mild traumatic brain injury: toward understanding manifestations and treatment." *Arch Intern Med* 158(15):1617-1624.

Levin, H.S., Brown, S.A., Song, J.X., McCauley, S.R., Boake, C., Contant, C.F., Goodman, H., Kotrla, K.J. 2001. "Depression and posttraumatic stress disorder at three months after mild to moderate traumatic brain injury." *J Clin Exp Neuropsychol* 23(6):754-769.

Levin, H.S., Goldstein, F.C., MacKenzie, E. J. 1997. Depression as a Secondary Condition Following Mild and Moderate Traumatic Brain Injury. *Semin Clin Neuropsychiatry* 2(3):207-215.

Levin, H.S., McCauley, S.R., Josic, C.P., Boake, C., Brown, S.A., Goodman, H.S., Merritt, S.G, Brundage, S.I. 2005. "Predicting depression following mild traumatic brain injury." *Arch Gen Psychiatry* 62(5):523-528.

Malec, J.F. 1997. "Mild traumatic brain injury." *Arch Phys Med Rehabil* 78(3):334-335.

McCullagh, S., Feinstein, A. 2003. "Outcome after mild traumatic brain injury: an examination of recruitment bias." *J Neurol Neurosurg Psychiatry* 74(1):39-43.

McHugh, T., Laforce, R., Gallagher, P., Quinn, S., Diggle, P., Buchanan, L. 2006. "Natural history of the long-term cognitive, affective, and physical sequelae of mild traumatic brain injury." *Brain Cogn* 60(2):209-211.

McIntire, A., Langan, J., Halterman, C., Drew, A., Osternig, L., Chou, L.S., van Donkelaar, P. 2006. "The influence of mild traumatic brain injury on the temporal distribution of attention." *Exp Brain Res* 174(2):361-366.

McKendry, M.J., Van Horn, J. 2004. "Today's hospital-based case manager: how one hospital integrated/adopted evidenced-based medicine using InterQual criteria." *Lippincotts Case Manag* 9(2):61-71.

Mendez, C.V., Hurley, R.A., Lassonde, M., Zhang, L., Taber, K.H. 2005. "Mild traumatic brain injury: neuroimaging of sports-related concussion." *J Neuropsychiatry Clin Neurosci* 17(3): 297-303.

Nolin, P. 2006. "Executive memory dysfunctions following mild traumatic brain injury." *J Head Trauma Rehabil* 21(1):68-75.

Owen, M. 2005. "Chronicling the past, charting the future of case management." *Lippincotts Case Manag* 10(6):272-273.

Owen, M. 2006. "An important perspective on the case manager's role." *Lippincotts Case Manag* 11(1):2-3.

Pellman, E.J., Viano, D.C., National Football League's Committee on Mild Traumatic Brain Injury. 2006. "Concussion in professional football: summary of the research conducted by the National Football League's Committee on Mild Traumatic Brain Injury." *Neurosurg Focus* 21(4):E12.

Peterson, D.I. 1996. "Mild traumatic brain injury." *Neurology* 46(5):1488-1490.

Plummer, J.K. 1995. "Ethical considerations in brain injury rehabilitation: applications to mild traumatic brain injury." *HEC Forum* 7(2-3):166-182.

Powell, S.K. 2006. "Footprints-what case managers leave behind." *Lippincotts Case Manag* 11(3):121.

Putukian, M. 2006. "Repeat mild traumatic brain injury: how to adjust return to play guidelines." *Curr Sports Med Rep* 5(1):15-22.

Raghupathi, R., Conti, A.C., Graham, D.I., Krajewski, S., Reed, J.C., Grady, M.S., Trojanowski, J.Q., McIntosh, T.K. 2002. "Mild traumatic brain injury induces apoptotic cell death in the cortex that is preceded by decreases in cellular Bcl-2 immunoreactivity." *Neuroscience* 110(4):605-616.

Rapoport, M.J., Kiss, A., Feinstein, A. 2006. "The impact of major depression on outcome following mild-to-moderate traumatic brain injury in older adults." *J Affect Disord* 92(2-3):273-276.

Rapoport, M.J., McCullagh, S., Streiner, D., Feinstein, A. 2003. "The clinical significance of major depression following mild traumatic brain injury." *Psychosomatics* 44(1):31-37.

Rosenthal, M. 1993. "Mild traumatic brain injury syndrome." *Ann Emerg Med* 22(6):1048-1051.

Sadowski-Cron, C., Schneider, J., Senn, P., Radanov, B.P., Ballinari, P., Zimmermann, H. 2006. "Patients with mild traumatic brain injury: immediate and long-term outcome compared to intra-cranial injuries on CT scan." *Brain Inj* 20(11):1131-1137.

Sagduyu, K. 2002. "Association of mild traumatic brain injury with bipolar disorder." *J Clin Psychiatry* 63(7):594.

Sbordone, R.J., Liter, J.C. 1995. "Mild traumatic brain injury does not produce post-traumatic stress disorder." *Brain Inj* 9(4):405-412.

Schmitt, N. 2005. "Role transition from caregiver to case manager, part 1." *Lippincotts Case Manag* 10(6):294-302.

Schmitt, N. 2006. "Role transition from caregiver to case manager, part II." *Lippincotts Case Manag* 11(1):37-46.

Sinson, G. 2001. "He was never quite 'himself' after that accident": exploring the long-term consequences of mild traumatic brain injury. *AJNR Am J Neuroradiol* 22(3):425-426.

Stålnacke, B.M., Björnstig, U., Karlsson, K., Sojka, P. 2005. "One-year follow-up of mild traumatic brain injury: post-concussion symptoms, disabilities and life satisfaction in relation to serum levels of S-100B and neurone-specific enolase in acute phase." *J Rehabil Med* 37(5):300-305.

Stanton, M.P., Swanson, M., Sherrod, R.A., Packa, D.R. 2005. "Case management evolution: from basic to advanced practice role." *Lippincotts Case Manag* 10(6):274-284; quiz 285-286.

Stapert, S., de Kruijk, J., Houx, P., Menheere, P., Twijnstra, A., Jolles, J. 2005. "S-100B concentration is not related to neurocognitive performance in the first month after mild traumatic brain injury." *Eur Neurol* 53(1):22-26.

Stulemeijer, M., van der Werf, S.P., Jacobs, B., Biert, J., van Vugt, A.B., Brauer, J.M., Vos, P.E. 2006. "Impact of additional extracranial injuries on outcome after mild traumatic brain injury." *J Neurotrauma* 23(10):1561-1569.

Swan, B.A., Conway-Phillips, R., Griffin, K.F. 2006. "Demonstrating the value of the RN in ambulatory care." *Nurs Econ* 24(6):315-322.

Tahan, H.A. 1999. "Clarifying case management: what is in a label?" *Nurs Case Manag* 4(6): 268-278.

Tahan, H.A. 2005. "Clarifying certification and its value for case managers." *Lippincotts Case Manag* 10(1):14-21.

Tahan, H.A. 2005. "Essentials of advocacy in case management." *Lippincotts Case Manag* 10(3):136-145; quiz 146-147.

Tahan, H.A. 2006. "CCMC's research uncovers latest trends in case management practice." *Lippincotts Case Manag* 11(2):65-66.

Tahan, H.A., Huber, D. L. 2006. "The CCMC's national study of case manager job descriptions: an understanding of the activities, role relationships, knowledges, skills, and abilities." *Lippincotts Case Manag* 11(3):127-144; quiz 145-146.

Tahan, H.A., Huber, D.L., Downey, W.T. 2006. "Case managers' roles and functions: Commission for Case Manager Certification's 2004 Research, Part I." *Lippincotts Case Manag* 11(1):4-22; quiz 23-24.

Tarzian, A.J., Silverman, H.J. 2002. "Care coordination and utilization review: clinical case managers' perceptions of dual role obligations." *J Clin Ethics* 13(3):216-229.

Tombaugh, T.N., Rees, L., Stormer, P., Harrison, A.G., Smith, A. 2007. "The effects of mild and severe traumatic brain injury on speed of information processing as measured by the computerized tests of information processing (CTIP)." *Arch Clin Neuropsychol* 22(1):25-36.

Tucker, F.M., Hanlon, R. E. 1998. "Effects of mild traumatic brain injury on narrative discourse production." *Brain Inj* 12(9):783-792.

Umile, E.M., Sandel, M.E., Alavi, A., Terry, C.M., Plotkin, R.C. 2002. "Dynamic imaging in mild traumatic brain injury: support for the theory of medial temporal vulnerability." *Arch Phys Med Rehabil* 83(11):1506-1513.

von Wild, K., Terwey, S. 2001. "Diagnostic confusion in mild traumatic brain injury (MTBI). Lessons from clinical practice and EFNS--inquiry. European Federation of Neurological Societies." *Brain Inj* 15(3):273-277.

WHO Collaborating Center Task Force on Mild Traumatic Brain Injury. 2004. "Appendix A: Bibliography of studies included in best evidence synthesis on mild traumatic brain injury." *J Rehabil Med* (43 Suppl):126-144.

Zhang, L., Yang, K.H., King, A.I. 2004. "A proposed injury threshold for mild traumatic brain injury." *J Biomech Eng* 126(2):226-236.

APPENDIX B

TRAUMATIC BRAIN INJURY TASK FORCE CHARTER

DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY MEDICAL COMMAND
2050 WORTH ROAD
FORT SAM HOUSTON, TX 78234-6000

REPLY TO
ATTENTION OF

MCHO-CL

16 JAN 2007

MEMORANDUM FOR Commander, Southeast Regional Medical Command

SUBJECT: Army Traumatic Brain Injury (TBI) Task Force Charter

1. Purpose: The Army seeks a clearer picture of the processes and research involved with the prevention, identification, assessment, treatment, rehabilitation, family support, and transition to civilian life, of service members with traumatic brain injury (TBI). The purpose of the TBI task force is to assess how the Army addresses these aspects of TBI care and make recommendations to The Army Surgeon General for improvement.

2. Proponent: The proponent for this charter is the Health Policy and Services Directorate, Office of The Surgeon General (OTSG).

3. Charter:

a. Authority. As Commander, US Army Medical Command (MEDCOM), I hereby establish the Army TBI Task Force.

b. Mission. The TBI task force will analyze and make recommendations for improving the clinical, administrative, and research processes involved with caring for service members who suffer from TBI. Clinical, administrative, and research processes for analysis and recommendation include, but are not limited to identifying: (1) existing policies, procedures, and resources; (2) possible gaps through which Soldiers and family members may slip; (3) which gaps can be closed by MEDCOM vice DoD or interagency action, policy, and resources; (4) best practices in the treatment and management of TBI; (5) research efforts in the prevention, diagnosis, treatment, and management of TBI; and (6) required resources to care for service members with TBI. Note: TBI includes concussion, skull fracture, and intracranial injury resulting from an external impact or forces of acceleration/deceleration.

c. Administration.

(1) The TBI task force is authorized to operate for 5 months from the date on this charter.

(2) The task force chairperson shall serve as the single point of contact for official TBI task force communications. This does not restrict other informal communications.

(3) The task force chairperson may request assistance and resources through OTSG/MEDCOM, coordinated by the Health Policy and Services Directorate.

(4) No later than 120 days from the date on this charter, the TBI task force will conduct an in progress review (IPR) with the Chief of Staff, MEDCOM, to report on progress and to request an extension if necessary.

(5) The Commander, SERMC, is designated to serve as the task force chairperson.

(6) The task force shall terminate 60 days after the date on which the report of the task force is submitted.

d. Membership.

(1) The core membership will consist of the chairperson, a chief of staff, a researcher/statistician, an administrative assistant, a neurologist, a neuropsychologist, a rehabilitation specialist, a nurse case manager, a patient administrator, an emergency medicine physician, and a senior medical NCO (enclosed).

(2) I will extend an invitation to the Acting Under Secretary for Health, Department of Veterans Affairs, the Surgeons General of the Navy and Air Force, and the Director, Army Wounded Warrior Program (enclosed).

(3) The task force chairperson may request part-time support of additional subject matter experts as needed.

e. Functions and Processes.

(1) The TBI task force will provide periodic IPRs to TSG as determined by the task force chairperson or Chief of Staff.

(2) Changes to this charter require the approval of TSG.

(3) Not later than 19 January 2007, the task force shall submit its topics for analysis to TSG for approval.

(4) Not later than 17 May 2007, the task force shall submit its report containing an assessment of, and recommendations for improving, the care provided to service members suffering from TBI. The report shall include:

(a) Methodology used by the task force.

(b) Analysis and assessment of the processes and research involved with the prevention, identification, assessment, treatment, rehabilitation, family support, and transition to civilian life, of service members with traumatic brain injury (TBI).

(c) Recommendations for improvement.

(d) Such other matters relating to the activities of the task force that the task force considers appropriate.

Encl

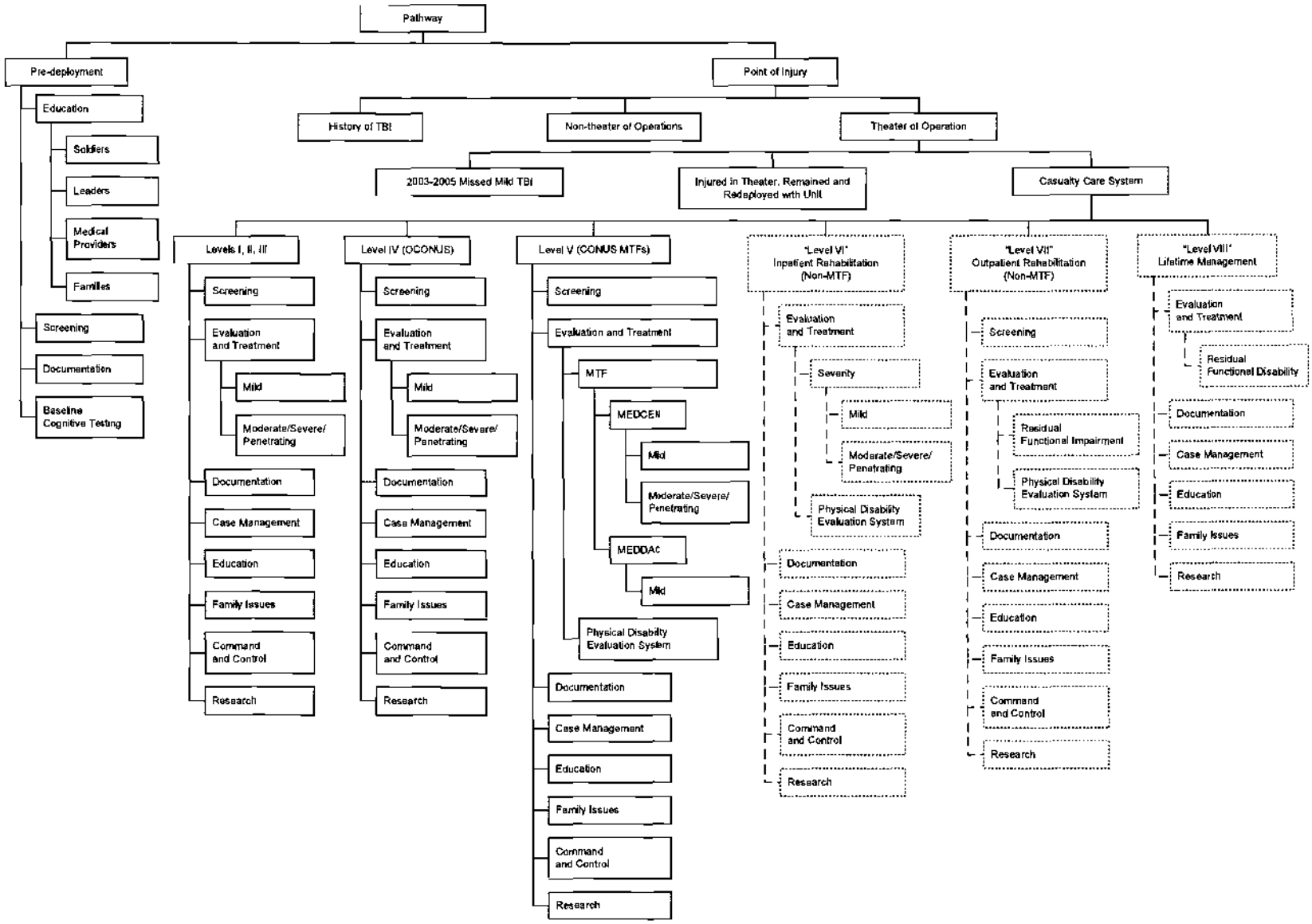
KEVIN C. KILEY
Lieutenant General, MC
Commanding

APPENDIX C

ACTIVITIES RELATED TO TRAUMATIC BRAIN INJURY ACROSS ALL LEVELS OF CARE

Global Diagram

Activities Related to Traumatic Brain Injury Across All Levels of Care



APPENDIX D

EXCERPTS FROM ARMY REGULATION 40-501

CHAPTER 2, PARAGRAPH 2–26F(1)–(4)

f. Head injury (854.0).

(1) History of head injury will be disqualifying if associated with any of the following:
(a) Post-traumatic seizure(s) occurring more than 30 minutes after injury.
(b) Persistent motor or sensory deficits.
(c) Impairment of intellectual function.
(d) Alteration of personality.
(e) Unconsciousness, amnesia, or disorientation of person, place, or time of 24-hours duration or longer post-injury.
(f) Multiple fractures involving skull or face (804).
(g) Cerebral laceration or contusion (851).
(h) History of epidural, subdural, subarachnoid, or intercerebral hematoma (852).
(i) Associated abscess (326) or meningitis (958.8).
(j) Cerebrospinal fluid rhinorrhea (349.81) or otorrhea (388.61) persisting more than 7 days.
(k) Focal neurologic signs.
(l) Radiographic evidence of retained foreign body or bony fragments secondary to the trauma and/or operative procedure in the brain.
(m) Leptomeningeal cysts or Arteriovenous Fistula.

(2) History of moderate head injury (854.03) is disqualifying. After 2 years post-injury, applicants may be qualified if neurological consultation shows no residual dysfunction or complications. Moderate head injuries are defined as unconsciousness, amnesia, or disorientation of person, place, or time alone or in combination, of more than 1 and less than 24-hours duration post-injury, or linear skull fracture.

(3) History of mild head injury (854.02) is disqualifying. After 1 month post-injury, applicants may be qualified if neurological evaluation shows no residual dysfunction or complications. Mild head injuries are defined as a period of unconsciousness, amnesia, or disorientation of person, place, or time, alone or in combination of 1 hour or less post-injury.

(4) History of persistent post-traumatic symptoms (310.2) that interfere with normal activities or

have duration of greater than 1 month is disqualifying. Such symptoms include, but are not limited to headache, vomiting, disorientation, spatial disequilibrium, impaired memory, poor mental concentration, shortened attention span, dizziness, or altered sleep patterns.

CHAPTER 3, PARAGRAPHS 3–9, 3–30, 3–31, 3–32, 3–33, AND 3–34.

3–19. Head

The causes for referral to an MEB are loss of substance of the skull with or without prosthetic replacement when accompanied by moderate residual signs and symptoms such as described in paragraph 3–30. (See also para 3–29.) A skull defect that poses a danger to the Soldier or interferes with the wearing of protective headgear is cause for referral to an MEB/PEB.

3–30. Neurological disorders

The causes for referral to an MEB are as follows:

a. Amyotrophic lateral sclerosis and all other forms of progressive neurogenic muscular atrophy.
b. All primary muscle disorders including facioscapulohumeral dystrophy, limb girdle atrophy, and myotonia dystrophy characterized by progressive weakness and atrophy.
c. Myasthenia gravis unless clinically restricted to the extraocular muscles.
d. Progressive degenerative disorders of the basal ganglia and cerebellum including Parkinson's disease, Huntington's chorea, hepatolenticular degeneration, and variants of Friedreich's ataxia.
e. Multiple sclerosis, optic neuritis, transverse myelitis, and similar demyelinating disorders.
f. Stroke, including both the effects of ischemia and hemorrhage, when residuals affect performance.
g. Migraine, tension, or cluster headaches, when manifested by frequent incapacitating attacks. All such Soldiers will be referred to a neurologist, who will ascertain the cause of the headaches. If the neurologist feels a trial of prophylactic medicine is warranted, a 3-month trial of therapy can be initiated. If the headaches are not adequately controlled at the end of the 3 months, the Soldier will undergo an MEB for referral to a PEB. If the neurologist feels the Soldier is unlikely to respond to therapy, the Soldier can be referred directly to MEB/PEB.
h. Narcolepsy, sleep apnea syndrome, or similar disorders. (See para 3–41.) The evaluation and treatment of these diagnoses by a neurologist or other sleep specialist should be routinely sufficient.
i. Seizure disorders and epilepsy. Seizures by themselves are not disqualifying unless they are manifestations of epilepsy. However, they may be considered along with other disabilities in

judging fitness. In general, epilepsy is disqualifying unless the Soldier can be maintained free of clinical seizures of all types by nontoxic doses of medications. The following guidance applies when determining whether a Soldier will be referred to an MEB/PEB.

(1) All active duty Soldiers with suspected epilepsy must be evaluated by a neurologist who will determine whether epilepsy exists and whether the Soldier should be given a trial of therapy on active duty or referred directly to an MEB for referral to a PEB. In making the determination, the neurologist may consider the underlying cause, EEG findings, type of seizure, duration of epilepsy, family history, Soldier's likelihood of compliance with therapeutic program, absence of substance abuse, or any other clinical factor influencing the probability of control or the Soldier's ability to perform duty during the trial of treatment.

(2) If a trial of duty on treatment is elected by the neurologist, the Soldier will be given a temporary P–3 profile with as few restrictions as possible.

(3) Once the Soldier has been seizure free for 1 year, the profile may be reduced to a P–2 profile with restrictions specifying no assignment to an area where medical treatment is not available.

(4) If seizures recur beyond 6 months after the initiation of treatment, the Soldier will be referred to an MEB.

(5) Should seizures recur during a later attempt to withdraw medications or during transient illness, referral to a PEB is at the discretion of the physician or MEB.

(6) If the Soldier has remained seizure free for 36 months, he or she may be removed from profile restrictions.

(7) Recurrent pseudoseizures are most commonly seen in the presence of epilepsy. As such, they are disqualifying under the same rules as epilepsy. While each case may be individualized, their evaluation by a neurologist should be routinely sufficient.

j. Any other neurologic conditions, regardless of etiology, when after adequate treatment there remains residual symptoms and impairments such as persistent severe headaches, uncontrolled seizures, weakness, paralysis, or atrophy of important muscle groups, deformity, uncoordination, tremor, pain, or sensory disturbance, alteration of consciousness, speech, personality, or mental function of such a degree as to significantly interfere with performance of duty.

Note. Diagnostic concepts and terms used in paragraphs 3–31 through 3–37 are in consonance with the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM–IV). The minimum psychiatric evaluation will include Axis I, II, and III.

3–31. Disorders with psychotic features

The causes for referral to an MEB are mental disorders not secondary to intoxication, infectious, toxic, or other organic causes, with gross impairment in reality testing, resulting in interference with duty or social adjustment.

3–32. Mood disorders

The causes for referral to an MEB are as follows:

a. Persistence or recurrence of symptoms sufficient to require extended or recurrent hospitalization; or
b. Persistence or recurrence of symptoms necessitating limitations of duty or duty in protected environment; or
c. Persistence or recurrence of symptoms resulting in interference with effective military performance.

3–33. Anxiety, somatoform, or dissociative disorders

The causes for referral to an MEB are as follows:

a. Persistence or recurrence of symptoms sufficient to require extended or recurrent hospitalization; or
b. Persistence or recurrence of symptoms necessitating limitations of duty or duty in protected environment; or
c. Persistence or recurrence of symptoms resulting in interference with effective military performance.

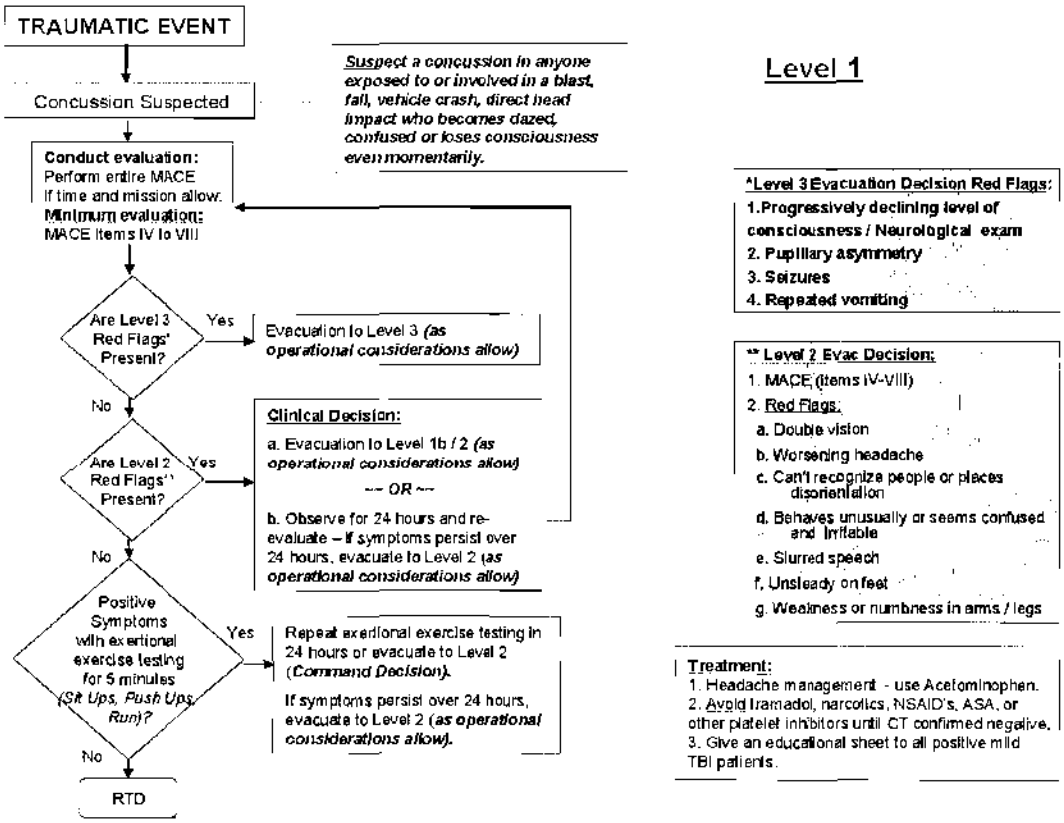
3–34. Dementia and other cognitive disorders due to general medical condition

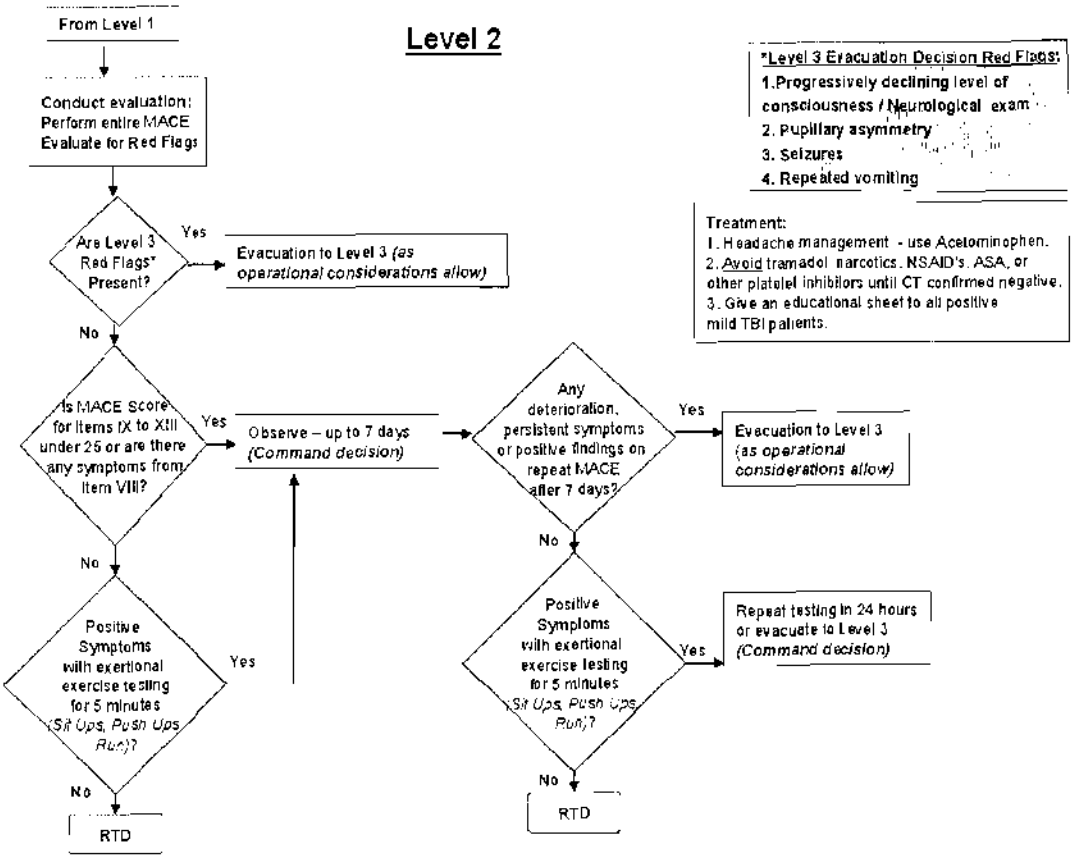
The causes for referral to an MEB include persistence of symptoms or associated personality change sufficient to interfere with the performance of duty or social adjustment.

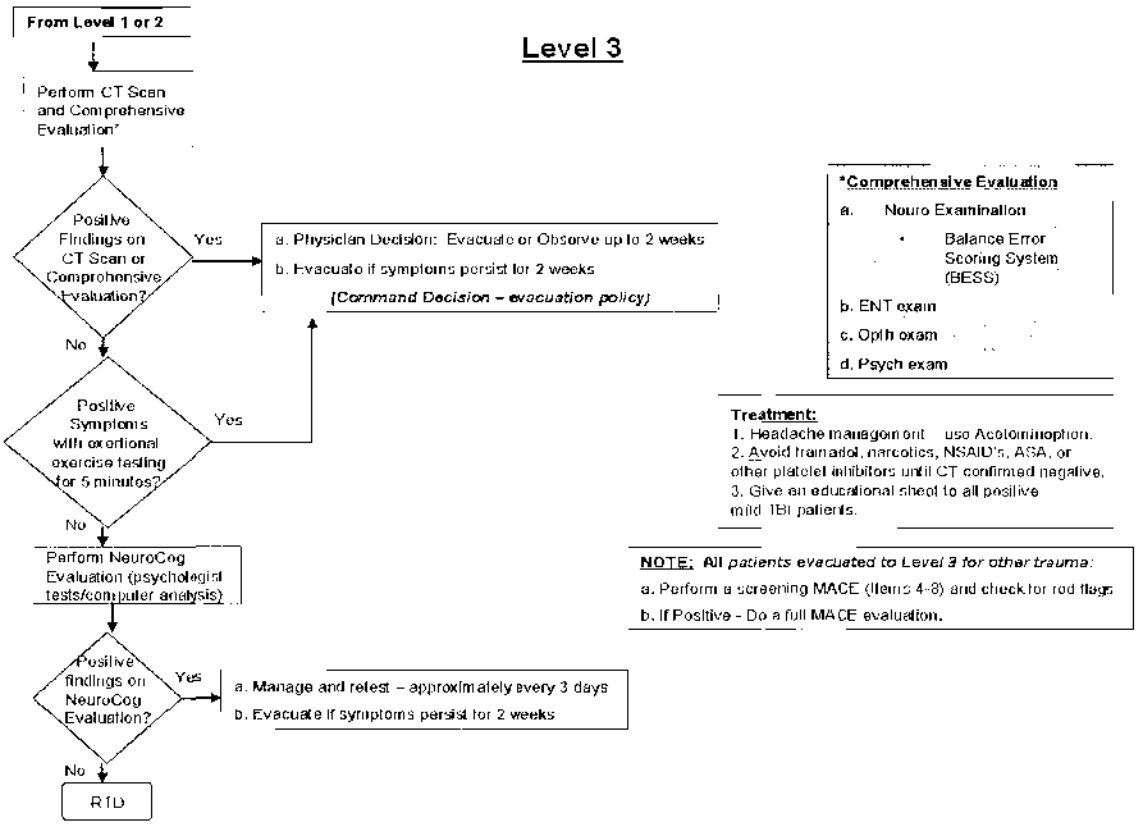
APPENDIX E

DEFENSE VETERANS BRAIN INJURY CENTER CLINICAL PRACTICE GUIDELINES

DVBIC Acute Mild TBI CPG
Appendix B. Level I Algorithm




Level 2
From Level 1
Conduct evaluation: Perform entire MACE Evaluate for Red Flags
Are Level 3 Red Flags* Present?
Yes
Evacuation to Level 3 (as operational considerations allow)
No
Is MACE Score for Items IX to XIII under 25 or are there any symptoms from Item VIII?
Yes
Observe – up to 7 days (Command decision)
No
Positive Symptoms with exertional exercise testing for 5 minutes (Sit Ups, Push Ups, Run)?
Yes
No
RTD
Any deterioration, persistent symptoms or positive findings on repeat MACE after 7 days?
Yes
Evacuation to Level 3 (as operational considerations allow)
No
Positive Symptoms with exertional exercise testing for 5 minutes (Sit Ups, Push Ups, Run)?
Yes
Repeat testing in 24 hours or evacuate to Level 3 (Command decision)
No
RTD
*Level 3 Evacuation Decision Red Flags:
1. Progressively declining level of consciousness / Neurological exam
2. Pupillary asymmetry
3. Seizures
4. Repeated vomiting
Treatment:
1. Headache management - use Acetominophen.
2. Avoid tramadol narcotics, NSAID's, ASA, or other platelet inhibitors until CT confirmed negative.
3. Give an educational sheet to all positive mild TBI patients.


From Level 1 or 2
Level 3
Perform CT Scan and Comprehensive Evaluation*
Positive Findings on CT Scan or Comprehensive Evaluation?
Yes
a. Physician Decision: Evacuate or Observe up to 2 weeks
b. Evacuate if symptoms persist for 2 weeks
(Command Decision – evacuation policy)
No
Positive Symptoms with exertional exercise testing for 5 minutes?
Yes
No
Perform NeuroCog Evaluation (psychologist tests/computer analysis)
Positive findings on NeuroCog Evaluation?
Yes
a. Manage and retest – approximately every 3 days
b. Evacuate if symptoms persist for 2 weeks
No
RTD
*Comprehensive Evaluation
a. Neuro Examination
• Balance Error Scoring System (BESS)
b. ENT exam
c. Opth exam
d. Psych exam
Treatment:
1. Headache management: use Acetaminophen.
2. Avoid tramadol, narcotics, NSAID's, ASA, or other platelet inhibitors until CT confirmed negative.
3. Give an educational sheet to all positive mild TBI patients.
NOTE: All patients evacuated to Level 3 for other trauma:
a. Perform a screening MACE (items 4-8) and check for red flags
b. If Positive - Do a full MACE evaluation.

APPENDIX F

MILITARY ACUTE CONCUSSION EVALUATION

Military Acute Concussion Evaluation (MACE)

Defense and Veterans Brain Injury Center

Patient Name: _____

SS#: _____-_____-_____ **Unit:** _____

Date of Injury: _____/_____/_____ **Time of Injury:** _____

Examiner: _____

Date of Evaluation: _____/_____/_____ **Time of Evaluation:** _____

History: (I – VIII)

I. **Description of Incident**
Ask:
a) What happened?
b) Tell me what you remember.
c) Were you dazed, confused, "saw stars"? ☐ Yes ☐ No
d) Did you hit your head? ☐ Yes ☐ No

II. **Cause of Injury** (Circle all that apply):
1) Explosion/Blast 4) Fragment
2) Blunt object 5) Fall
3) Motor Vehicle Crash 6) Gunshot wound
7) Other _____

III. **Was a helmet worn?** ☐ Yes ☐ No Type _____

IV. **Amnesia Before: Are there any events just BEFORE the injury that are not remembered? (Assess for continuous memory prior to injury)**
☐ Yes ☐ No If yes, how long _____

V. **Amnesia After: Are there any events just AFTER the injuries that are not remembered? (Assess time until continuous memory after the injury)**
☐ Yes ☐ No If yes, how long _____

VI. **Does the individual report loss of consciousness or "blacking out"?** ☐ Yes ☐ No If yes, how long _____

VII. **Did anyone observe a period of loss of consciousness or unresponsiveness?** ☐ Yes ☐ No If yes, how long _____

VIII. **Symptoms** (circle all that apply)
1) Headache 2) Dizziness
3) Memory Problems 4) Balance problems
5) Nausea/Vomiting 6) Difficulty Concentrating
7) Irritability 8) Visual Disturbances
9) Ringing in the ears 10) Other _____

08/2006 **DVBIC.org** **800-870-9244**
This form may be copied for clinical use.
Page 1 of 6

Examination: (IX – XIII)

Evaluate each domain. Total possible score is 30.

IX. Orientation: (1 point each)

Month:	0	1
Date:	0	1
Day of Week:	0	1
Year:	0	1
Time:	0	1

Orientation Total Score _____/5

X. Immediate Memory:
Read all 5 words and ask the patient to recall them in any order. Repeat two more times for a total of three trials. (1 point for each correct, total over 3 trials)

List	Trial 1		Trial 2		Trial 3	
Elbow	0	1	0	1	0	1
Apple	0	1	0	1	0	1
Carpet	0	1	0	1	0	1
Saddle	0	1	0	1	0	1
Bubble	0	1	0	1	0	1
Trial Score						

Immediate Memory Total Score _____/15

XI. Neurological Screening
As the clinical condition permits, check
Eyes: pupillary response and tracking
Verbal: speech fluency and word finding
Motor: pronator drift, gait/coordination
Record any abnormalities. **No points are given for this.**

Military Acute Concussion Evaluation (MACE)

Defense and Veterans Brain Injury Center

XII. Concentration

Reverse Digits: (go to next string length if correct on first trial. Stop if incorrect on both trials.) 1 pt. for each string length.

4-9-3	6-2-9	0	1
3-8-1-4	3-2-7-9	0	1
6-2-9-7-1	1-5-2-8-5	0	1
7-1-8-4-6-2	5-3-9-1-4-8	0	1

Months in reverse order: (1 pt. for entire sequence correct)
Dec-Nov-Oct-Sep-Aug-Jul-Jun-May-Apr-Mar-Feb-Jan
0 1

Concentration Total Score ____/5

XIII. Delayed Recall (1 pt. each)

Ask the patient to recall the 5 words from the earlier memory test (Do NOT reread the word list.)

Elbow	0	1
Apple	0	1
Carpet	0	1
Saddle	0	1
Bubble	0	1

Delayed Recall Total Score ____/5
TOTAL SCORE _____/30

Notes: _____

_____ _____ _____ _____

Diagnosis: (circle one or write in diagnoses)

No concussion
850.0 Concussion without Loss of Consciousness (LOC)
850.1 Concussion with Loss of Consciousness (LOC)

Other diagnoses _____

_____

Defense & Veterans Brain Injury Center
1-800-870-9244 or DSN: 662-6345

Instruction Sheet

Purpose and Use of the MACE

A concussion is a mild traumatic brain injury (TBI). The purpose of the MACE is to evaluate a person in whom a concussion is suspected. The MACE is used to confirm the diagnosis and assess the current clinical status.

Tool Development

The MACE has been extensively reviewed by leading civilian and military experts in the field of concussion assessment and management. While the MACE is not, yet, a validated tool, the examination section is derived from the *Standardized Assessment of Concussion* (SAC) (McCrea, M., Kelly, J. & Randolph, C. (2000). *Standardized Assessment of Concussion (SAC): Manual for Administration, Scoring, and Interpretation.* (2nd ed.) Waukesa,WI: Authors.) which is a validated, widely used tool in sports medicine. Abnormalities on the SAC correlate with formal comprehensive neuropsychological testing during the first 48 hours following a concussion.

Who to Evaluate

Any one who was dazed, confused, "saw stars" or lost consciousness, even momentarily, as a result of an explosion/blast, fall, motor vehicle crash, or other event involving abrupt head movement, a direct blow to the head, or other head injury is an appropriate person for evaluation using the MACE.

Evaluation of Concussion

History: (I – VIII)

I. Ask for a description of the incident that resulted in the injury: how the injury occurred, type of force. Ask questions A – D.

II. Indicate the cause of injury

III. Assess for helmet use. Military: Kevlar or ACH (Advanced Combat Helmet). Sports helmet, motorcycle helmet, etc.

IV – V Determine whether and length of time that the person wasn't registering continuous memory both **prior to** injury and **after** the injury. Approximate the amount of time in seconds, minutes or hours, whichever time increment is most appropriate. For example, if the assessment of the patient yields a possible time of 20 minutes, then 20 minutes should be documented in the "how long?" section.

VI – VII Determine whether and length of time of **self reported** loss of consciousness (LOC) or **witnessed/observed** LOC. Again, approximate the amount of time in second, minutes or hours, whichever time increment is most appropriate.

VIII Ask the person to report their experience of each specific symptom since injury.

Examination: (IX – XIII)

Standardized Assessment of Concussion (SAC):

Total possible score = 30
Orientation = 5
Immediate Memory = 15
Concentration = 5
Memory Recall= 5

IX Orientation: Assess patients awareness of the accurate time

Ask: WHAT MONTH IS THIS?
WHAT IS THE DATE OR DAY OF THE MONTH?
WHAT DAY OF THE WEEK IS IT?
WHAT YEAR IS IT?
WHAT TIME DO YOU THINK IT IS?

One point for each correct response for a total of 5 possible points. It should be noted that a correct response on time of day must be within 1 hour of the actual time.

X Immediate memory is assessed using a brief repeated list learning test. Read the patient the list of 5 words once and then ask them to repeat it back to you, as many as they can recall in any order. Repeat this procedure 2 more times for a total of 3 trials, even if the patient scores perfectly on the first trial.

Trial 1: I'M GOING TO TEST YOUR MEMORY, I WILL READ YOU A LIST OF WORDS AND WHEN I AM DONE, REPEAT BACK AS MANY WORDS AS YOU CAN REMEMBER, IN ANY ORDER.

Trial 2 &3: I AM GOING TO REPEAT THAT LIST AGAIN. AGAIN, REPEAT BACK AS MANY AS YOU CAN REMEMBER IN ANY ORDER, EVEN IF YOU SAID THEM BEFORE.

One point is given for each correct answer for a total of 15 possible points.

XI Neurological screening

Eyes; check pupil size and reactivity.
Verbal: notice speech fluency and word finding
Motor: pronator drift- ask patient to lift arms with palms up, ask patient to then close their eyes, assess for either arm to "drift" down. Assess gait and coordination if possible. Document any abnormalities.

No points are given for this section.

XII Concentration: Inform the patient:
I'M GOING TO READ YOU A STRING OF NUMBERS AND WHEN I AM FINISHED, REPEAT THEM BACK TO ME BACKWARDS, THAT IS, IN REVERSE ORDER OF HOW I READ THEM TO YOU. FOR EXAMPLE, IF I SAY 7-1-9, YOU WOULD SAY 9-1-7.
If the patient is correct on the first trial of each string length, proceed to the next string length. If incorrect, administer the 2nd trial of the same string length. Proceed to the next string length if correct on the second trial. Discontinue after failure on both trials of the same string length. Total of 4 different string lengths; **1** point for each string length for a total of 4 points.
NOW TELL ME THE MONTHS IN REVERSE ORDER, THAT IS, START WITH DECEMBER AND END IN JANUARY.
1 point if able to recite ALL months in reverse order.
0 points if not able to recite ALL of them in reverse order.
Total possible score for concentration portion: **5**.

XIII Delayed Recall
Assess the patient's ability to retain previously learned information by asking he/she to recall as many words as possible from the initial word list, without having the word list read again for this trial.
DO YOU REMEMBER THAT LIST OF WORDS I READ A FEW MINUTES EARLIER? I WANT YOU TO TELL ME AS MANY WORDS FROM THE LIST AS YOU CAN REMEMBER IN ANY ORDER.
One point for each word remembered for a total of 5 possible points.
Total score= Add up from the 4 assessed domains: immediate memory, orientation, concentration and memory recall.

Significance of Scoring

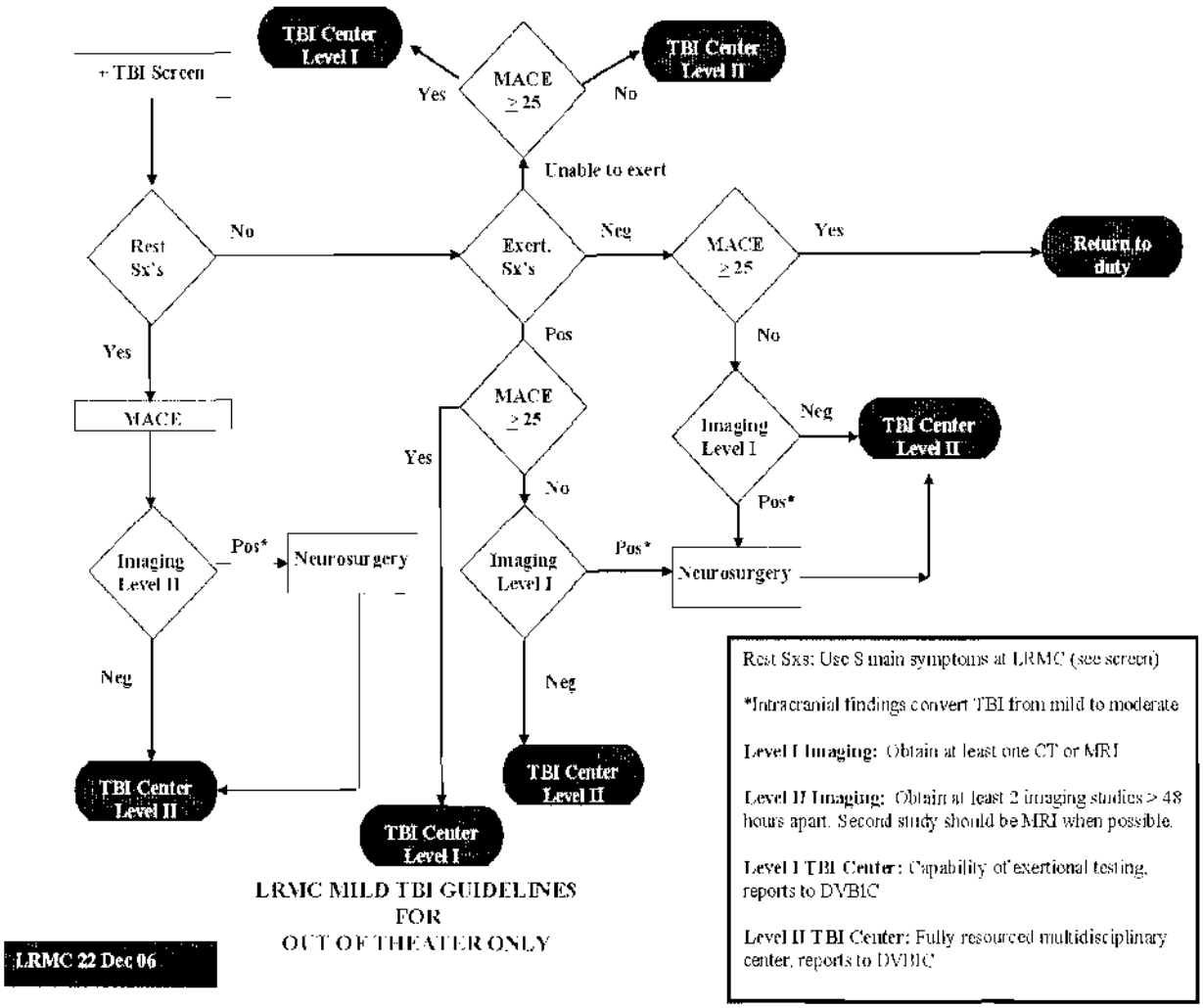
In studies of non-concussed patients, the mean total score was 28. Therefore, a score less than 30 does not imply that a concussion has occurred. Definitive normative data for a "cut-off" score are not available. However, scores below 25 may represent clinically relevant neurocognitive impairment and require further evaluation for the possibility of a more serious brain injury. The scoring system also takes on particular clinical significance during serial assessment where it can be used to document either a decline or an improvement in cognitive functioning.

Diagnosis

Circle the ICD-9 code that corresponds to the evaluation. If loss of consciousness was present, then circle 850.1. If no LOC, then document 850.0. If another diagnosis is made, write it in.

Appendix G

Landstuhl Regional Medical Command Mild Traumatic Brain Injury Guidelines



APPENDIX H

POSSIBLE DISPOSITIONS FOR PATIENTS WITH MODERATE/SEVERE/PENETRATING TRAUMATIC BRAIN INJURY

Option	Positives	Negatives
Course of Action (COA) 1—LRMC to MEDCEN to PRC	MEDCEN -acute care expertise available -subspecialty care/consult services readily available -capacity for acute medical care -capacity for family support available -initiate admin actions PRC -admit to rehab ward vs med/surg -acute interdisciplinary polytrauma rehab team available -balances access with expertise -subspecialty care/consult services readily available - family support available -enters into lifelong care system -intensive, proactive CM -military liaisons on site -collaboration with military on admin issues -DOD electronic records available -DOD/DVA MOA exists for TBI, SCI, Blind -maintains capacity at MTF for acute med/surg and ambulatory care -appropriate utilization of limited and specialized resources-off loads MTF	-Two transitions may increase Family stress -MEDCEN and PRC likely far from the homes of Soldiers/Families
COA 2—LRMC to a single MTF for full continuum of rehabilitation	-keep military identity -one transition	-distant from majority of homes of Soldiers/Families -delay of transition to veteran status and community reentry (GAP) -questions of capacity -duplication of DVA rehab mission -not currently in the inventory (2-yr min to stand up)
Option	**Positives**	**Negatives**
COA 3—LRMC to PRC	-acute care expertise available -subspecialty care/consult services readily available -one transition -TBI friendly environment -enters into lifelong care system early	-logistics of air travel/refuel -likely far from the homes of Soldiers -perception of Army abandonment -question of capacity for med/surg intensive-care unit
COA 4—LRMC to MEDCEN to Civilian Rehabilitation Center	MEDCEN -acute care expertise available -subspecialty care/consult services readily available -capacity for acute medical care -capacity for family support available -initiate admin actions Civilian Rehabilitation Center -potential for care closer to home -civilian facilities have extensive expertise in community acquired TBI	-lack of experience with combat trauma (GAP) -perception of military abandonment -lack of DOD/DVA connection (GAP) -lack of knowledge of DVA benefits limits long-range planning (GAP) -loss of cohort effect (GAP) -promotes episodic care rather than system of care (GAP) -cost -lack of TRICARE/DOD oversight of care plan/quality assurance/endpoint(GAP) -lack of command and control while at civilian center (GAP)

APPENDIX I

POSSIBLE DISPOSITIONS FOR PATIENTS WITHY MILD TRAUMATIC BRAIN INJURY

Option	Positives	Negatives
COA 1—LRMC to MEDCEN Caveat: Best Practice for patients with co-morbidities that require MEDCEN care	-capacity for management of co-morbidities in conjunction with mild TBI treatment	-question treatment capacity at MEDCEN -question Med Hold/Med Holdover capacity -housing capacity for Families of patients
COA 2—LRMC to MEDCEN to MEDDAC at duty station Caveat: Best Practice for patients whose co-morbidities have stabilized to the point that MEDCEN care no longer required	-appropriate utilization of limited and specialized resources-off loads MTF -patients/ get closer to home -contributes to balancing access with expertise	-two transitions
COA 3—LRMC to MEDDAC at duty station Caveat: Best practice for patients without co-morbidities requiring MEDCEN care	-one transition -closer to home	-logistics of travel (civilian, medevac) -logistics of interim lodging -requires intensive CM to set up -patient will require "handler" during transition process -medication management during transition -commercial air causes problems
COA 4—LRMC to MEDCEN/MEDDAC to CBHCO Caveat: Available only to COMPO 2/3 Soldiers who meet CBHCO care standards	-closer to home	two transitions -minimal face-to-face interaction with CBHCO staff

APPENDIX J

FORT CARSON SCREENING FORM

TBI QUESTIONNAIRE
SRC FT CARSON

NAME *(LAST, FIRST MI)*	GRADE	SSN

DATE *(DD-MM-YYYY)*	DEPLOYING UNIT	
DOB *(DD-MM-YYYY)*	UIC	MOS
MOB DATE *(DD-MM-YYYY)*	MOBILIZATION STATION	

OPERATION *(CIRCLE ONE)* OIF OEF OTHER *(LIST)*

COMPONENT *(CIRCLE ONE)* ACTIVE RESERVE NATIONAL GUARD

DEPLOYMENT LOCATION

IRAQ ○ AFGHANISTAN ○ EUROPE ○ ASIA ○ CONUS ○ OTHER *(LIST)* ○

HOME ADDRESS

HOME OR CELL PHONE

1. DID YOU HAVE INJURIES FROM ANY OF THE FOLLOWING EVENTS WHILE YOU WERE DEPLOYED?
(MARK ALL THAT APPLY. FOR EACH YES, NOTE THE NUMBER OF EACH EPISODE TO THE RIGHT.)

	YES	NO	NUMBER OF EVENTS 1	2	3	4	5 or more
A. FRAGMENT	○	○	○	○	○	○	○
B. BULLETS	○	○	○	○	○	○	○
C. VEHICULAR	○	○	○	○	○	○	○
D. BLAST (ANY)	○	○	○	○	○	○	○
E. FALL	○	○	○	○	○	○	○

F. DATE OF MOST SERIOUS INJURY *(DDMMYYYY)* _____

2. DID ANY OF THE INJURIES YOU RECEIVED WHILE DEPLOYED RESULT IN ANY OF THE FOLLOWING?

	YES	NO
A. BEING DAZED, CONFUSED, OR SEEING STARS	○	○
B. NOT REMEMBERING THE INJURY	○	○
C. LOSS OF CONSCIOUSNESS FOR LESS THAN 1 MINUTE	○	○
D. LOSS OF CONSCIOUSNESS FOR 1 TO 20 MINUTES	○	○
E. LOSS OF CONSCIOUSNESS FOR GREATER THAN 20 MINUTES	○	○
F. SYMPTOMS OF CONCUSSION	○	○
G. HEAD INJURY	○	○
H. NONE OF THE ABOVE	○	○

3. DO YOU HAVE OR HAVE YOU HAD ANY OF THE FOLLOWING SYMPTOMS FROM THE INJURIES NOTED IN #1? *(IF NO, LEAVE BLANK. IF YES, INDICATE BELOW WHEN YOU HAD THE SYMPTOMS. MARK ALL THAT APPLY.)*

	RIGHT AFTER INJURY	NOW	MARK THE CIRCLES BELOW FOR EACH SYMPTOM THAT WAS A PROBLEM BEFORE YOUR INJURY EVENT.	FOR EACH SYMPTOM THAT WAS A PROBLEM BEFORE YOUR INJURIES, MARK THE CIRCLES BELOW IF IT WORSENED AFTER YOUR INJURY EVENT.
A. HEADACHE	○	○	→ ○	→ ○
B. DIZZINESS	○	○	→ ○	→ ○
C. MEMORY PROBLEMS	○	○	→ ○	→ ○
D. BALANCE PROBLEMS	○	○	→ ○	→ ○
E. RINGING IN EARS	○	○	→ ○	→ ○
F. IRRITABILITY	○	○	→ ○	→ ○
G. SLEEP PROBLEMS	○	○	→ ○	→ ○
H. OTHER, SPECIFY	○	○	→ ○	→ ○

PLEASE CONTINUE ON REVERSE

IF YOU DID NOT REPORT ANY INJURIES IN PART 1, *STOP* AND DO NOT COMPLETE THE REST OF THE FORM.

4. PRIMARY INJURY EVENT HISTORY.

A. DESCRIBE _____

_____

_____

4 B. IF THE PRIMARY INJURY EVENT WAS AN IED, WHAT WAS THE GENERAL TYPE OF IED USED?

PACKAGE TYPE IED	○	VEHICLE BORNE IED	○	SUICIDE TYPE IED	○

C. WHAT WAS YOUR ESTIMATED DISTANCE FROM THE PRIMARY BLAST (IED AND NON IED BLAST)?

0 TO 1 METER	○	1 TO 5 METERS	○	5 TO 10 METERS	○
10 TO 20 METERS	○	20 TO 50 METERS	○	GREATER THAN 50 M	○

D. WHAT DIRECTION FROM YOU WAS THE BLAST?

		TO THE FRONT	○	TO THE RIGHT	○
		TO THE REAR	○	TO THE LEFT	○
THE BLAST ORIGINATED FROM UNDER ME OR MY VEHICLE			○	ABOVE	○

E. IF YOU WERE IN A VEHICLE DURING THE INJURY EVENT, WHAT WAS THE TYPE OF VEHICLE?

ARMORED HMMWV	○	OTHER NON ARMORED OR IMPROVISED ARMOR VEHICLE	○
LT ARMOR VEHICLE	○	HEAVILY ARMORED VEHICLE	○
OTHER	○	*(DESCRIBE)* _____	

F. IF YOU WERE IN A VEHICLE DURING THE PRIMARY INJURY EVENT, WHAT WAS YOUR POSITION?

DRIVER	○	GUNNER	○	TC	○
LOADER	○	SQUAD MEMBER	○	CREW	○
PASSENGER	○	OTHER	○		

G. TYPE OF HELMET WORN:

KEVLAR	○	CVC	○
OTHER	○	NA	○

H. DID THE HELMET STAY ON YOUR HEAD?

YES	○	NO	○

I. WAS THE HELMET DAMAGED?

YES	○	NO	○

J. DID YOUR HEAD GET HIT?

YES	○	NO	○

K. WERE YOU SEEN BY A MEDIC AFTER THE INJURY?

YES	○	NO	○

STOP - PROVIDER USE ONLY				
5. DIAGNOSIS	TBI W/ SYMPTOMS	○	NO TBI (POSITIVE INJURY EVENT)	○
	TBI W/O SYMPTOMS	○	NO TBI (NEGATIVE INJURY EVENT)	○

6. REFERRAL	PREVIOUS	INDICATED
A. NONE INDICATED	○	○
B. EDUCATION	○	○
C. PSYCH LEVEL 2	○	○
D. PSYCH LEVEL 3	○	○
E. PRIMARY CARE	○	○
F. NEURO	○	○
G. NEUROPSYCH	○	○
H. EENT	○	○
I. NEUROSURG	○	○
J. OTHER *(LIST)*	○	○

REVIEWER SIGNATURE ***DATE***

AUTHORITY FOR COLLECTION OF INFORMATION: Sections 133, 107-187, 3017, 5031, and 8012, Title 10 US Code and Exec Order 9397

ROUTINE USES: To plan, provide, and coordinate health care and identify medical records. To document post deployment health concerns, aid in preventive health, compile statistical data, and evaluate the scope and quality of care provided and required.

DISCLOSURE: Mandatory for all military personnel. Voluntary for all other personnel. If the requested information is not provided, comprehensive health care may Not be possible, but care will not be denied.

REV 11 MAR2007

GLOSSARY

AANS
American Association of Neurological Surgeons

ACH
Army Community Hospital

AFEB
Armed Forces Epidemiological Board

AHLTA
Armed Forces Health Longitudinal Technology Application

ALARACT
All Army Activities

ANAM
Automated Neuropsychological Assessment Metrics

AR
Army Regulation

ASD
Acute stress disorder

BG
Brigadier General

BHIE
Bidirectional Health Information Exchange

BOG
Boots on the Ground

CBHCO
Community Based Health Care Organization

CDMRP
Congressionally Directed Medical Research Programs

CM
case management

CMSA
Case Management Society of America

COA
course of action

COE
Center of Excellence

CONUS
continental United States

CPG
Clinical Practice Guidelines

CPRS
Computerized Patient Record System

CSH
Combat Support Hospital

CT
computed tomography

DA
Department of the Army

DCCS
Deputy Commander for Clinical Services

DOD
Department of Defense

DVA
Department of Veterans Affairs

DVBIC
Defense Veterans Brain Injury Center

DVHIP
Defense Veterans Health Injury Program

EACH
Evans Army Community Hospital

EMR
electronic medical record

GCS
Glasgow Coma Scale

GWOT
Global War on Terrorism

HA
Health Affairs

HRC
Human Resources Command

ICD
International Classification of Disease

IED
Improvised Explosive Device

JPTA
Joint Patient Tracking Application

LRMC
Landstuhl Regional Medical Center

LOC
Loss of consciousness

LTG
Lieutenant General

MA
medical assistance

MACE
Military Acute Concussion Evaluation

MC4
Medical Communications for Combat Casualty Care

MEB
Medical Evaluation Board

MEDCEN
medical center

MEDDAC
medical department activity

MEPS
Military Entrance Processing Station

MHS
Military Health System

MRI
magnetic resonance imaging

MTF
military treatment facility

MVC
motor vehicle crash

NCO
Noncommissioned Officer

NNMC
National Naval Medical Center

OEF
Operation Enduring Freedom

OIF
Operation Iraqi Freedom

OT
occupational therapy

OTSG
Office of the Surgeon General

PEB
physical evaluation board

PDA
Physical Disability Agency

PDES
Physical Disability Evaluation System

PDHA
Post-Deployment Health Assessment

PDHRA
Post-Deployment Health Reassessment

PHA
periodic health assessment

PHTLS
Pre-Hospital Trauma Life Support

PM&R
physical medicine and rehabilitation

PNS
polytrauma network sites

POC
point of contact

PRC
Polytrauma Rehabilitation Center

PT
physical therapy

PTA
posttraumatic amnesia

PTSC
polytrauma support clinics

PTSD
posttraumatic stress disorder

RBANS
Repeatable Battery for Assessment of Neuropsychological Status

RMC
regional medical command

SCI
spinal cord injury

SERMC
Southeast Regional Medical Command

SLP
speech and language pathology

SLT
speech and language therapy

SRP
Soldier Readiness Processing

TATRC
Telemedicine Advanced Technology Research Center

TBI
traumatic brain injury

TC3
Tactical Combat Casualty Care

TF
Task Force

TMA
TRICARE Management Activity

TMIP-J
Theater Medical Information Program-Joint

TSG
The Surgeon General

TSGLI
Traumatic Servicemembers' Group Life Insurance

USAF
U.S. Air Force

USAMEDCOM
U.S. Army Medical Command

USAMEDD
U.S. Army Medical Department

USAMRMC
U.S. Army Medical Research and Materiel Command

USAR
U.S. Army Reserve

USMC
U.S. Marine Corps

USN
U.S. Navy

VA
Veterans Administration

VAMC
Veterans Administration Medical Center

VASRD
Veterans Administration Schedule for Rating Disabilities

VBA
Veterans Benefits Administration

VHA
Veterans Health Administration

WHO
World Health Organization

WRAMC
Walter Reed Army Medical Center