As the traumatic brain injury (TBI) Pathway of Care manager within the Military Health System (MHS), the Defense and Veterans Brain Injury Center (DVBIC) promotes state-of-the-science care from point-of-injury to reintegration for service members, veterans, and their families to prevent and mitigate consequences of mild to severe TBI. DVBIC operates within the Defense Health Agency (DHA) under its Research and Development Directorate.

At the national provider training in September 2018, 285 providers learned about the latest DVBIC tools (DVBIC photo by Carlson H. Gray)
Letter from the Division Chief, TBI CoE

Dear Colleagues and Collaborators:

As DVBiC celebrates its 26th anniversary, I am proud of all that our organization has accomplished to provide state-of-the-science care for our service members and veterans.

Having long been a consumer of DVBiC products as a clinician, I am excited about the opportunity to contribute as a leader in the continued advancement of this respected organization. We have a tremendous opportunity to improve on our past successes and explore areas where DVBiC will achieve its greatest impact. Coincidentally, I bring with me 26 years of experience as a family medicine/sports medicine physician, and arrive just in time for updates in clinical tools to address acute concussion. I embrace the challenge of sharing these tools for advancing acute TBI care as well as supporting all of our lines of effort. I am especially encouraged by the work to address families and caregivers of those who sustained a TBI because it complements our work with service members and veterans.

Over the past year, it has been a pleasure to watch all sections of DVBiC (Clinical Affairs, Education, Mission Support, and Research) collaborate and result in continued advances. Specifically, DVBiC has updated the Military Acute Concussion Evaluation (MACE) to a state-of-the-science multimodal assessment in the MACE 2, and its companion Concussion Management Tool (CMT) has developed corresponding education initiatives. During the National Provider Training in September, we successfully provided hands-on experiences on updated clinical practices and tools in the evaluation and management of mild TBI, and (arguably more importantly) we provided sessions to explain the utility and clinical indications for the additions to the tools and rehabilitation. This is not to be overshadowed by the Cognitive Rehabilitation Clinical Recommendations Expert Working Group efforts in updating this product.

A renewed focus on acute care makes sense not only from a clinical perspective — but also from the standpoint of military readiness. With earlier diagnosis and directed treatment, we can expect earlier recovery and safer return to full unlimited activity. This, in turn, is expected to decrease the requirement for treatment of those with chronic symptoms.

We are still committed to continuing DVBiC’s longstanding leadership in all areas of clinical-TBI research and collaboration with our numerous partners in the Department of Defense, Veterans Health Administration, and civilian facilities. Whether focused on advancing research, supporting critical care, or educating providers, service members, and veterans, the central goal must be to return the brain injury survivor to the highest level of function. As Hippocrates said long ago, “No head injury is too severe to despair of, nor too trivial to ignore.”

Finally, looking back on 2018, we should not only feel proud that we are fulfilling our mission of serving the needs of service members, veterans, and their families, but also look ahead optimistically to all that we will accomplish on their behalf in the year ahead.

Sincerely,

Navy Capt. (Dr.) Scott W. Pyne

Leadership

Division Chief

U.S. Navy Capt.
Scott W. Pyne

As division chief, CAPT Pyne oversees all key activities of DVBiC. Also, he manages the Military Health System TBI Pathway of Care. He holds a Bachelor of Science from Muhlenberg College in Allentown, Pennsylvania, and a doctorate of medicine from Temple University School of Medicine in Philadelphia. He completed his family medicine internship and residency at the Naval Hospital Jacksonville, Florida, and a fellowship in primary care sports medicine in San Diego.

In July 1999, CAPT Pyne was assigned to the Naval Health Clinic Quantico, Virginia, and from June 2003 until July 2009, he was assigned to Naval Health Clinic Annapolis, Maryland. In July of 2009, he deployed to the Expeditionary Medical Facility Kuwait. Following a three-year interlude in the office of the Medical Inspector General for the Bureau of Medicine and Surgery, he returned to the Naval Health Clinic Annapolis in August 2012. There, he served as the Naval Academy admissions medical officer, concussion clinic coordinator, physician for varsity football and rugby teams, and as a clinical staff physician.

CAPT Pyne is board-certified in family medicine (with a Certificate of Added Qualification in Primary Care Sports Medicine), an assistant professor of family medicine at the Uniformed Services University of the Health Sciences, Bethesda, Maryland, and a member of the American Academy of Family Physicians, the American College of Sports Medicine and the American Medical Society of Sports Medicine. He has authored several scientific publications and given numerous regional, national and international presentations. Military decorations include Meritorious Service Medal (3), Navy Commendation Medal, Navy Achievement Medal (2), and numerous campaign and service medals.

Assistant Division Chief

Katherine M. Lee, M.S., CRNP, ANP-BC, CNRN

Ms. Lee brings considerable clinical, educational, and research experience in the field of neuroscience to include more than 150 regional, national and international presentations and more than 15 peer-reviewed publications. She has served in a variety of leadership, advisory and operational roles, including deputy director for the Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury, deputy director for the Clinical and Educational Affairs Office for DVBiC, manager of the Office of Clinical Standards at DVBiC, neurological surgery nurse practitioner at Hodes Neurosurgery in Louisville, Kentucky, nurse practitioner and clinical care coordinator at the University of Louisville Hospital, and clinical research coordinator in the Division of Neurosurgery at the Medical College of Virginia Hospitals.

Ms. Lee holds both a bachelor’s and master’s degree in nursing from Virginia Commonwealth University, as well as a Bachelor of Science degree in family and child development from Virginia Tech University. She has earned the following certifications: Adult Nurse Practitioner (ANP) through the American Nurses Credentialing Center and Neuroscience Registered Nurse (CNRN) through the American Board of Neuroscience Nursing.
Branches

DVBIC accomplishes its mission through four branches: Research, Clinical Affairs, Education and TBI Mission Support. Each section relies on DVBIC’s extensive network to coordinate with the individual services to advance care, conduct clinically meaningful research within the Department of Defense and Veteran Affairs (VA), and improve caregiver, patient and clinician awareness.

Research

Mission: To provide evidence-based knowledge by conducting and supporting hypothesis-driven, clinically-focused research that improves treatment and outcomes for service members, veterans and beneficiaries affected by a TBI.

Saafan Malik, M.D.
Chief, Research Branch

Dr. Malik, a neurosurgeon and researcher with over fifteen years of experience in the field of TBI, has been the Chief of Research Branch since 2014. He directs and oversees research at DVBIC headquarters and across network sites, and serves on numerous government scientific steering committees. Prior to DVBIC, he served as the Senior Research Investigator in the Department of Neurosurgery, University of Pennsylvania-Pennman School of Medicine and then at the Texas Tech University Health Sciences Center. He has authored several peer-reviewed publications and book chapters and given national and international presentations. His grants and awards include the National Institutes of Health (NIH) - National Neurotrauma Society. His medical degree is from the University of Pennsylvania-Perelman School of Medicine and researcher with over fifteen years of experience in the field of TBI, has been the Chief of Research Branch since 2014. 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Clinical Affairs

Mission: To provide state-of-the-science TBI knowledge by developing clinical recommendations, analyzing outcomes, providing subject-matter expertise on TBI-related matters, and assisting service members and veterans in accessing TBI clinical care, supportive services and information throughout the TBI Pathway of Care.

Katharine Stout, P.T., DPT, NCS, MBA
Chief, Clinical Affairs Branch

Dr. Stout is a board-certified neurological specialist by the American Board of Physical Therapy Specialties. For more than a decade, she has worked in TBI and military medicine in a variety of roles including direct clinical care, research portfolio management and program management within telehealth. In addition to her work with the military, she has taught as an adjunct faculty member at the University of Maryland School of Medicine and served as a board member for the Maryland Board of Physical Therapy Examiners. She has authored several publications and a book chapter. She received her doctorate in physical therapy from Northeastern University and her master’s degree in business administration with a concentration in healthcare administration from the University of Scranton.

Education

Mission: To provide evidence-based knowledge about TBI through implementation of educational programs, activities, and resources along the continuum of care for health care providers; conduct outreach and education to service members, veterans, caregivers, family members and providers; and produce state-of-the-science education and training resources.

Scott Livingston, Ph.D., P.T., ATC
Chief, Education Branch

Dr. Livingston served as chief of the Education Branch at DVBIC until August of 2018. Previously, he was the program manager for the Warrior Adaptive Reconditioning Program of Wounded Warrior Battalion East — one of two components of the U.S. Marine Corps’ Wounded Warrior Regiment. He also served as a Medical Service Corps officer (physical therapist) in the U.S. Navy. He has held academic positions at the University of Kentucky, the George Washington University and Gannon University, worked in a variety of clinical settings in physical therapy and athletic training, and has published numerous peer-reviewed articles. He received his doctorate in kinesiology from the University of Virginia and is board certified as a sports clinical specialist (SCS) by the American Board of Physical Therapist Specialties and a certified athletic trainer (ATC) by the National Athletic Trainers’ Association Board of Certification.

TBI Mission Support

Mission: To provide operational and administrative support for DVBIC headquarters and its 22 network sites to advance DVBIC priorities and ensure that infrastructure, regulatory compliance and financial accountability — including personnel, budgeting, communications, strategic planning, and logistics — are consistent with DHA guidance and DVBIC mission and strategic direction.

U.S. Public Health Service Capt. James A. Blankenship
Chief, TBI Mission Support

CAPT Blankenship became the chief of TBI Mission Support in 2018. In 1986, he enlisted in the U.S. Navy and was commissioned as an Ensign in the U.S. Navy Reserve in 1996. In 1996, he transitioned from the U.S. Navy Reserve to the U.S. Public Health Service, and was assigned to the Bureau of Prisons. He received his Bachelor of Science in nursing from the College of West Virginia in 1965, and his Master of Science in nursing from the Uniformed Services University of Health Sciences in 2001. At the Bureau of Prisons, he performed duties as a registered nurse, family nurse practitioner, and a health services administrator. In 2008, he became an administrative officer at the Defense Center of Excellence, and joined DVBIC as site director for the Charlottesville Neuro- Rehabilitation Program of Care. In 2011, he was assigned to DVBIC as site director for the Charlottesville Neuro- Rehabilitation Program of Care. In 2011, he was assigned to the DVBIC HQ Process Improvement and Program Evaluation Office. In 2015, he transferred to the Immigration and Customs Enforcement Health Services Corps as the health services administrator and health authority for the Stewart Detention Center.
National Provider Training

In September, DVBIC hosted a training at Fort Belvoir on new concussion assessment tools for health care providers. The two-day event was attended by 285 health care providers serving at military and veteran hospitals and clinics across the U.S. Attendees heard from leading TBI experts and participated in hands-on training for new and improved tools that will enable them to best evaluate, diagnose, and manage TBI patients.

Attendees learned about new clinical practice guidelines on neurosurgery and severe head injury, neuro-optometric and ocular motor rehabilitation, and integrative medicine and creative arts therapies. They heard lectures on blast exposure risk reduction and management and emerging technologies for the acute assessment of TBI.

The most extensive part of the training focused on three new tools developed in 2018 by DVBIC and its collaborators in the Departments of Defense and Veterans Affairs.

MACE 2

The first tool, the Military Acute Concussion Evaluation (MACE), has been in use for a decade, and it was revised this year to reflect the current state-of-the-science. This year’s revised and improved MACE, known as MACE 2, features new material on Vestibular Ocular Motor Screening (VOMS), speech and balance testing, and red flags to help providers assess whether patients need further evaluation or urgent evacuation.

Additionally, unlike its predecessors, the MACE 2 is designed for use by all trained medical staff, not just corpsman or medics. As with the 2012 MACE, the MACE 2 remains a free concussion screening tool intended for use by military, veteran, and civilian medical personnel and is available for order in hard copy or digital download.

At the National Provider Training, participants earned continuing education credits for meeting learning objectives on the MACE 2.

MACE 2 Revision Update and Tutorial

Upon completion of this session at the National Provider Training, participants were able to

■ distinguish high level changes in the MACE 2 including specific updates and evidence to support: red flags, observable signs, history questions, and the addition of the Vestibular Ocular Motor Screening (VOMS).
■ Illustrate how MACE 2 updates information on symptom clusters and recovery trajectories, provides the information necessary to deliver targeted rehabilitation, and improves the current standard of care for TBI management.

MACE 2 Trauma Lane (Primary Care And Rehabilitation) Learning Objectives

Upon completion of this session at the National Provider Training, participants were able to

■ Demonstrate the MACE 2 using an Objective Structured Clinical Examinations (OSCE) approach.
■ Outline Tactical Combat Casualty Care (TCCC) guidelines applicable to TBI care.
■ Demonstrate how to administer each section of the MACE 2.
■ Accurately score and record MACE 2 findings.
■ Screen for vestibular and ocular motor deficits using the new VOMS portion of MACE 2 and understand how to assess for and interpret subjective and objective findings.

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National Provider Training

Concussion Management Tool
The second tool, the Concussion Management Tool (CMT), updates and revises an earlier DVBIC tool, the Concussion Management Algorithm. Among other changes, the CMT adds information on progressive return to activity and return to duty. Attendees at the training had the opportunity to provide feedback on a draft version of the CMT, which will be finalized and released in April 2019.

Upon completion of this session at the National Provider Training, participants were able to describe the high level changes in the CMT including specifics updates and evidence to support:
- how the CMT informs clinical practice and improves the current standard of care for TBI management.
- how the MACE 2 expanded assessment provides the information necessary to deliver targeted rehabilitation.

Cognitive Rehabilitation for Service Members and Veterans Following Mild Traumatic Brain Injury Clinical Recommendations
The third major tool on which attendees received training — a set of clinical recommendations — synthesizes the latest evidence-based research findings and clinical guidance. The Cognitive Rehabilitation for Service Members and Veterans Following Mild Traumatic Brain Injury Clinical Recommendations were developed through research and collaboration by DVBIC experts and their partners both inside and outside the military community. The recommendations cover cognitive interventions aimed at improving cognitive deficits for service members and veterans, including returning to duty and to civilian work and community activities.

Upon completion of this session at the National Provider Training, participants were able to:
- discuss why cognitive rehabilitation is important for service members and veterans following mild to moderate TBI with persistent symptoms related to cognitive dysfunction.
- describe the scope of the Cognitive Rehabilitation Clinical Recommendations (CR), how the CR were developed, and the supporting evidence.
- apply tools that referring providers can use to determine whether a patient with mild-moderate TBI would be a good candidate for referral to a cognitive rehabilitation provider.
- identify how the Cognitive Rehabilitation Clinical Recommendations and the Clinical Resources and Links tool can be used to support the clinical practice of cognitive rehabilitation providers.
- locate and utilize the DVBIC Cognitive Rehabilitation web portal as a clinical support platform for referring providers and primary providers of cognitive rehabilitation.

Deborah L. Warden Lectureship
DVBIC presents the Deborah L. Warden Lectureship award annually to a distinguished TBI researcher to recognize outstanding contributions to the field. The award commemorates Deborah L. Warden, a neurologist who served as the DVBIC national director from 2001 to 2007. Warden’s research conceptualized and described wartime TBIs. Under her leadership, DVBIC contributed to the development of in-theater concussion clinics and guidance for in-theater TBI evaluation and care.

Michael McCrea, professor of neurosurgery and neurology at the Medical College of Wisconsin, received the 2018 award. DVBIC presented the award to McCrea during the National Provider Training, where he also gave a lecture focusing on knowledge translation.

Dr. McCrea is the author of the book Mild Traumatic Brain Injury and Postconcussion Syndrome: The New Evidence Base for Diagnosis and Treatment. He is a neuropsychology consultant for the Green Bay Packers and serves on the Head, Neck, and Spine Committee of the National Football League.
Awards

DVBiC received external recognition in 2018 for communications and education initiatives targeting service members, veterans, families, and caregivers.

Thoth 2018 Award of Excellence

In October, the Public Relations Society of America – National Capital Chapter awarded DVBiC the prestigious Thoth 2018 Award of Excellence in the Podcast/Webcast category for “The TBI Family,” a podcast for caregivers of service members and veterans with TBI. Launched in November 2016, the podcast offers information, resources, and tips for caregivers and shares caregiver stories.

The Thoth (pronounced “Tot”) Awards, named for the Egyptian god of communication, recognize outstanding strategic public relations programs and components developed and produced in the greater Washington, D.C. area. The Public Relations Society of America is the world’s largest organization for public relations professionals, with nearly 32,000 professional and student members. The National Capital Chapter, the largest and most active chapter, has more than 1,200 members.

Digital Health Awards

DVBiC received the Bronze Digital Health Award for A Head for the Future’s “Recovery” video. The Digital Health Awards recognize high-quality digital health resources for consumers and health professionals. The awards program is organized by the Health Information Resource Center and is an extension of the center’s 25-year-old National Health Information Awards, the largest program of its kind in the U.S.

AVA Digital Awards

The AVA Digital Awards is a highly regarded digital awards competition administered by the Association of Marketing and Communication Professionals. DVBiC’s A Head for the Future initiative received four AVA awards:

- Platinum for the overall A Head for the Future campaign
- Platinum for the overall A Head for the Future website
- Gold for the Bradley Lee TBI champion video
- Honorable Mention for the Recognize video

Media and Scientific Spotlight

Leatherneck Magazine

This two-part feature news story—entitled “Something’s Not Right: Marine Corps, DOD Confront Signature Wound of Modern-Day Combat” — highlighted the accomplishments of DVBiC and included interviews with leadership. The story appeared in the March and April editions of Leatherneck, a monthly magazine for the Marine Corps community that reached almost 70,000 monthly readers in 2018.

DVBiC researchers from Tampa VA studying TBI and sleep wrote a special issue in the Brain Injury Professional, a brain injury clinician’s magazine available in print and online with an electronic readership of about 60,000. This issue was published in 2018 and provided education about several sleep disorders (sleep apnea, insomnia, circadian rhythm disorders) common after TBI and their negative influence on recovery.

The A Head for the Future initiative also generated print and television placements, including stories on KKTV (CBS Colorado Springs), CBS Denver, and Good Morning San Diego and articles in The Coastal (Southern California) and U.S. Veterans Magazine.

Special Issue of the Journal of Head Trauma Rehabilitation

The March/April 2018 issue of the Journal of Head Trauma Rehabilitation was a commemorative issue celebrating the 25 years of contributions by DVBiC to this area of research. The issue featured an introductory article highlighting DVBiC’s accomplishments over the past 25 years in areas such as cognitive rehabilitation for TBI, the Study of Cognitive Rehabilitation Effectiveness (SCORE), 15-year studies, DVBiC’s role as the manager of the DoD TBI Pathway of Care program, and selected educational resources (e.g., in-theater tools, clinical recommendations, clinical practice guidelines, research reviews, webinars, and podcasts).

The issue also contained state-of-the-science empirical studies by current DVBiC researchers on issues such as symptom reporting in military service members with a history of multiple concussions, the effects of mTBI and PTSD symptoms on Automated Neuropsychological Assessment Metrics, Version 4 (a battery of seven cognitive tests), postconcussive symptom reporting after mild TBI in female service members, as well as other topics.
Warfighter Brain Health Call to Action

In October, then-Deputy Secretary of Defense Patrick M. Shanahan issued a memorandum advocating a "Comprehensive Strategy and Action Plan for Warfighter Brain Health" encompassing research, education, and clinical affairs; this memo reinforces DVBIC’s longstanding mission. In particular, it provides a call to action to invest in cutting-edge research that investigates the origins, progression, diagnosis, and treatment of TBI while pursuing research partnerships with other government agencies and the private sector.

Going forward, DVBIC plans to support research that fills gaps in the understanding and treatment of TBI. For health care providers, the research focuses on tools that will help the diagnosis and treatment of TBI (all severities). For patients, the research focuses on prevention, clinical effects of TBI (both acute and chronic), and resilience in service members who have sustained a TBI.

For health care providers, key features of this research will include:
- Identifying optimal assessment tools for the detection of blast-induced effects on the brain.
- Developing, assessing, and validating standard algorithms and tools, as well as innovative technologies (e.g., smartphones) to enable health care providers to assess, monitor, treat and triage service members with suspected TBI in both pre-hospitalized and post-TBI stages.

For patients, key features of this research will include:
- Identifying and characterizing the acute and chronic effects of blast exposure on brain health, as well as the effects of TBI on fitness for military duty.
- Developing and validating neuroprotection strategies to prevent TBI in at-risk service members.
- Identifying factors that affect individualized responses to pharmacologic and non-pharmacologic treatments in TBI patients.
- Characterizing aspects of resilience in service members who have sustained a TBI to include issues such as the effects of fatigue, sleep disturbance, psychological stress, cognitive performance, and nutrition.

Outcomes Data Collection

In October 2018, the Outcomes Quality Assessment Process Improvement (OQAPI) Project was completed. This was a one-year outcomes support contract. By collecting data from previously identified TBI clinics across the Military Health System, DVBIC staff collected information on the TBI data collection practices to inform future outcomes collection efforts. Data were collected at ten military hospitals and clinics. These data were analyzed to characterize TBI and its effects on service members.

In October 2018, the Outcomes Quality Assessment Process Improvement (OQAPI) Project was completed. This was a one-year outcomes support contract. By collecting data from previously identified TBI clinics across the Military Health System, DVBIC staff collected information on the TBI data collection practices to inform future outcomes collection efforts. Data were collected at ten military hospitals and clinics. These data were analyzed to characterize TBI and its effects on service members.

The report also addressed the many challenges to achieving uniformity in data collection, including sites collecting different data elements, patients evaluated at multiple clinics, and providers and patients not seeing the benefits of data collection.

Resources

Utilized by hundreds of thousands of service members, veterans, family members and health care providers each year, DVBIC resources fall into two major categories: clinical tools and patient education fact sheets. Many resources are available for download from the DVBIC website or can be ordered at no cost.

Print Products Distributed and Downloaded in 2018

<table>
<thead>
<tr>
<th>New Products</th>
<th>Print Products Distributed and Downloaded in 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completed and released the MACE 2</td>
<td>HEADS Card - Protect Your Strongest Weapon</td>
</tr>
<tr>
<td>Completed the Visual Guide to the MACE 2 Vestibular Ocular Motor Screening (VOMS)</td>
<td>8,937 8,547 8,376</td>
</tr>
<tr>
<td>Completed the web portal for the Cognitive Rehabilitation Clinical Recommendation</td>
<td>Signs and Symptoms of Concussion Fact Sheet</td>
</tr>
<tr>
<td>Completed the interactive provider training for post-traumatic headache web-based training</td>
<td>Concussion mTBI and Post-TBI Fact Sheet</td>
</tr>
<tr>
<td>Finalized Clinical Recommendations on Cognitive Rehabilitation for Service Members and Veterans Following Mild to Moderate Traumatic Brain Injury. The 2019 release of these recommendations will include a web tool and training materials, incorporating input and feedback from a community of end-users across the DVBIC network sites</td>
<td>Mid TBI Symptom Management Fact Sheet</td>
</tr>
<tr>
<td>Initiated revision of the 2014 DVBIC Clinical Recommendation: The Management of Sleep Disturbances Following Concussional/Mild Traumatic Brain Injury</td>
<td>What You Should Know About TBI Fact Sheet</td>
</tr>
<tr>
<td>Initiated revision of the 2014 DVBIC Clinical Recommendation: The Management of Sleep Disturbances Following Concussional/Mild Traumatic Brain Injury</td>
<td>Return to Activity Educational Brochure</td>
</tr>
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<td>TBI Awareness Educational Brochure</td>
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DVBIC 2018 ANNUAL REPORT

DVBIC 2018 ANNUAL REPORT
Newsletters
In 2018, DVBIC published three newsletters, which were intended as resources for health care providers and the DVBIC community.

Hot Topics
This newsletter contextualizes the latest scientific studies, advances and discoveries. DVBIC experts summarize and provide commentary on studies receiving attention in the popular press. Studies are selected by their media impact as determined through quantitative analysis of Google News and PubMed searches and qualitative assessment by DVBIC personnel. This newsletter also includes some news stories not derived from scientific studies but relevant to TBI stakeholders. In 2018, there were three publications of this newsletter.

Tech Watch
This newsletter tracks the latest TBI technologies. DVBIC technology specialists summarize and provide commentary on news articles, trade publications and scientific studies about technological developments related to TBI research, diagnostics, treatment and rehabilitation. The articles included are selected based on a subjective evaluation of relevance, importance, and interest. In 2018, there was one publication of this newsletter.

Research Reviews
In 2018, DVBIC research reviews clarified general topics of interest related to TBI by producing two new research reviews, which are posted on the DVBIC website. The January study discusses the inconclusive evidence for a relationship between TBI and amyotrophic lateral sclerosis (Lou Gehrig’s disease). The rarity of this condition meant that it was difficult to recruit a sufficiently large sample size to draw definitive conclusions. The November study discusses the comorbidity between TBI and suicide. As the study noted, “It is unclear to what extent TBI history contributes to the risk of suicide or suicide attempt, but evidence described in this research review suggests there is a modest effect.”

Podcasts
An increasingly popular form of audio media are podcasts. They enable widespread information sharing across diverse audiences. Beginning in 2016, DVBIC has been subsequently expanding its podcasts offerings.

TBI Family
Launched in November 2016, this podcast is for caregivers of service members and veterans with TBI. Each episode offers information, resources and tips for caregivers and shares caregiver stories. In 2018, TBI Family episodes were played 3,112 times, and topics discussed included the following:
- Caregivers Helping Caregivers
- Advocating For Your Loved Ones/What Doctors Want You To Know
- Sleep Issues and TBI/Women and TBI
- Pathway of Care/The Caregiver Journey Map
- Irritability and Anger

Clinical Updates in Brain Injury Science Today (CUBIST)
Launched in May 2017, Clinical Updates in Brain Injury Science Today, or CUBIST, is a podcast for health care providers treating service members and veterans with TBI. Each episode offers a brief analysis of current research relevant to clinicians. While there were no new episodes released in 2018, CUBIST episodes were played 2,821 times, and there are plans to re-launch this in the upcoming year.

Ongoing Initiatives
As an established organization with over a quarter century of experience supporting service members, veterans, family members and providers, DVBIC leads and collaborates on a number of ongoing projects and mission support activities.

TBI Pathway of Care Manager
Since 2014, DVBIC has served as the manager of the DoD TBI Pathway of Care (PWoC) and chair of the DoD TBI Advisory Committee (TAC). The PWoC is a health policy-based algorithm for advancing the level of care across the NHS by synchronizing processes and transitions and improving outcomes and outcome metrics. The TAC is the Department of Defense’s coordinating body charged to promote organized and efficient TBI care from prevention and education through reintegration.

Congressionally Mandated Studies
Background
The John Warner National Defense Authorization Act (NDAA) for Fiscal Year 2007, Section 721, directed the Secretary of Defense to “conduct a longitudinal study on the effects of traumatic brain injury incurred by members of the Armed Forces serving in Operation IRAQI FREEDOM or Operation ENDURING FREEDOM on the members who incur such an injury and their families.”

The Studies
In 2009, the Secretary of Defense directed DVBIC to address the congressional mandate. To comply with this directive, DVBIC supports two component studies:
1. The 15-Year Study
   The 15-Year Study consists of three substudies:
   (1) the natural history study (comprehensive pathway and brief pathway);
   (2) the family caregiver study (longitudinal family caregiver study and traumatic brain injury caregiver quality of life (TBI Care-QOL) development study); and
   (3) archival studies.
   Each sub-study addresses specific subsets of service members, veterans, and their families.
2. Improved Understanding of Medical and Psychological Needs in Service Members and Veterans with Chronic Traumatic Brain Injury (IMAP)
   IMAP was launched approximately two years ago. This study examines the rehabilitation and health care needs of service members and veterans with TBI and supplements the existing infrastructure of the VA Traumatic Brain Injury Model Systems Program lifetime study.
The Natural History of TBI Study (NH Study) was awarded a $1.25 million grant from Congressionally Directed Medical Research Programs to include PET-tau and PET-amloid in the study procedures. The NH Study underwent a major change in operations, merging the old comprehensive and brief pathways into one operating pathway that increases and maximizes participant flow into the intensive clinical evaluations. Analyses with the blood, neuroimaging, neurobehavioral, neurocognitive, and sensory-motor data were completed and worked into manuscripts and conference presentations. As of January 4, 2019, the Natural History of TBI Study completed 756 intensive clinical evaluations and 2,028 telephone/web-based evaluations.

The Longitudinal Caregiver Study (CG Study) integrated the final TBI-CareQOL item banks, which was recently completed. This included two military-specific short forms. The CG Study implemented the expanded test battery (Phase 9), and began adding two control groups (PTSD Caregivers and Non-Caregiver Military Family Members). The CG Study published a series of analyses using data from Phase 1 dataset and will launch Phase 2 presentations. As of January 4, 2019, the Natural History of TBI Study completed 756 intensive clinical evaluations and 2,028 telephone/web-based evaluations.

In 2018, the 15-Year TBI Study produced 28 manuscripts for publication, 16 published abstracts, and 32 conference presentations. The 15-Year Study participated in publications for three special editions, the DVBIC special edition (published 2018) and two TBI-CareQOL special editions (published 2018 and 2019).

The Longitudinal Caregiver Study (CG Study) integrated the final TBI-CareQOL item banks, which was recently completed. This included two military-specific short forms. The CG Study implemented the expanded test battery (Phase 9), and began adding two control groups (PTSD Caregivers and Non-Caregiver Military Family Members). The CG Study published a series of analyses using data from Phase 1 dataset and will launch Phase 2 dataset analyses in early 2019. The Longitudinal Caregiver Study has completed 1,422 evaluations. Multiple sites were engaged in recruitment efforts to expand the study population.

### Working Groups and Committees

DVBIC serves in leadership on a number of advisory boards and committees:
- TBI Model Systems
- Chronic Effects of Neurotrauma Consortium (CENC) Government Steering Committee and Scientific Advisory Board
- TBI Endpoints Development Government Steering Committee (TED GSC)
- Combat Casualty Care Research Program Integrating Integrated Product Team
- Planning committees for the annual meeting of the International Brain Injury Association and the Military Health System Research Symposium
- Noninvasive NeuroAssessment Devices Integrated Product Team
- Committee on Surgical Combat Casualty Care
- Linking Investigations in Trauma and Emergency Services (LITES)

### Surveillance

As the Department of Defense’s office of responsibility for TBI data in the U.S. military, DVBIC analyzes the number of active-duty service members with a first-time TBI diagnosis since 2000. This information is disseminated in quarterly and annual reports.

### DoD Numbers for Traumatic Brain Injury Worldwide — Totals

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<th>Year</th>
<th>Penetrating</th>
<th>Severe</th>
<th>Moderate</th>
<th>Mild</th>
<th>Not Classifiable</th>
<th>Total - All Severities</th>
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### A Head for the Future

DVBIC’s initiative to provide resources on TBI prevention, recognition, and recovery is called A Head for the Future (AHFTF). This initiative creates videos, social media content and educational materials targeted to the military community, particularly service members, veterans and their families. In 2018, this DVBIC public awareness campaign included the following:
- Created five new TBI Champion series videos, which can be found on the DVBIC website
- Attended 38 events, including new initiatives with the Washington Nationals, Healthy Lifestyle and patient appreciation events at local military bases and multiple Brain Injury Awareness Month (BIAM) events
- Distributed 2,396 DVBIC/AHFTF creative and educational products at events
- Secured five media placements, in outlets like The Coastal News
- Received 15,971 social media engagements via Twitter and Facebook
- Shared 11 blog posts
- Received seven awards

Brain Injury Awareness Month

March is nationally recognized as Brain Injury Awareness Month. For this annual, month-long spotlight on TBI, DVBIC amplifies its education and social media efforts to share information about TBI with an emphasis on reaching service members, veterans, families, and caregivers.

During Brain Injury Awareness Month 2018, the DVBIC RECs held 781 events and reached nearly 700,000 people.

DVBIC also organized a Facebook Town Hall event on March 28. The virtual event provided a forum to inform and engage with providers who treat TBI, service members and veterans who had sustained a TBI, and their caregivers. Hosted by Kathy Lee, then DVBIC acting national director, the event reached more than 4,900 stakeholders and has been viewed for more than 4,300 minutes. Lee answered pre-submitted and live event questions while sharing DVBIC resources available for TBI caregivers, providers, service members, and veterans. DVBIC Town Hall can be viewed on the DVBIC Facebook page.

Following the success of Brain Injury Awareness Month 2018, DVBIC was tasked with planning Brain Injury Awareness Month 2019 for the entire Military Health System. Building on the Deputy Secretary of Defense’s warrior brain health memo issued in October, DVBIC developed a communications plan around the theme of “Advancing Warrior Brain Health.” The plan targets an audience of military stakeholders and promotes learning about TBI prevention, recognition, support, recovery, and reintegration.
Collaborations

In addition to the network sites and Intrepid Spirit Centers, DVBIC works with many other collaborators. Without these ongoing collaborations, DVBIC research, including congressionally mandated research, would not be possible.

2018 DVBIC Collaborators

Academic
- Baylor College of Medicine
- Bloomsburg University
- Johns Hopkins University
- Midwestern University
- Northwestern University
- Ohio State University
- Oregon Health and Science University
- Pennsylvania State University
- Princeton University
- University of California, San Diego
- University of Maryland School of Medicine
- University of Michigan
- University of North Carolina, Chapel Hill
- University of North Carolina, Greensboro
- University of Pennsylvania
- University of Pittsburgh
- University of Utah
- Stanford University Medical School (Clayman Institute for Gender Research)
- Wayne State University

DOD/VA/Federal
- Boston Veterans Administration Medical Center
- Center for Neuroscience and Regenerative Medicine
- Fort Sam Houston
- Houston Veterans Administration Medical Center
- Iowa City Veterans Administration
- National Institute on Disability, Independent Living, and Rehabilitation Research
- National Institute of Health
- National Intrepid Center of Excellence
- Naval Health Research Center
- Navy Experimental Diving Unit
- Office of Naval Research South Texas Veterans Health Care System
- Walter Reed Army Institute of Research
- War-Related Illness and Injury Study Center
- Uniformed Services University of the Health Sciences
- United States Army Medical Research and Materiel Command

Civilian Medical Research Foundations, Organizations, and Hospitals
- Courage Kenny Research Center
- Craig Hospital
- The David H. Murdock Research Institute
- Detroit Medical Center Rehabilitation Institute of Michigan
- TRF Memorial Hermann
- Kessler Foundation

Industry
- Ibs Biosciences Inc.
- Neural Analytics Inc.
- NeuroKinetics Inc.
- RTI International

DVBIC Locations

As a joint collaboration between the Department of Defense and VA, DVBIC partners with military hospitals and clinics and VA hospitals across the U.S. and in Germany. Clinical research staff conduct studies, and RECs provide information and engage in outreach and training activities for service members, veterans, families, caregivers, and health care providers.

Network Site Updates

DVBIC supports a network of 22 sites, operating out of 17 military hospitals and clinics and five VA medical centers. The specific activities vary at each site and can include the following: conducting research; providing education in military and civilian settings; providing direct care to service members; helping service members, veterans and their families locate services; and assessing TBI injury data.

Research Highlights

DVBIC sites partner with each other, as well as regional academic medical centers. Also, studies on related themes are often conducted at different DVBIC sites simultaneously.

Post-Traumatic Headache Studies

One of the major clinical outcomes associated with TBI is headaches. In an ongoing collaborative study between the Uniformed Services University of the Health Sciences, Walter Reed National Military Medical Center, Fort Belvoir Community Hospital, Womack Army Medical Center (Fort Bragg), University of North Carolina - Chapel Hill, and NIH, researchers are examining whether a diet that contains omega-3s and omega-6s fatty acids (found in fish) reduces headache pain and contributes to quality of life among those who have experienced TBI. The study is a randomized clinical trial that plans to recruit 310 subjects. All subjects are Department of Defense beneficiaries eligible to receive care at one of the listed military facilities. The trial began in August 2017 with an anticipated completion at the end of 2019.

The Evaluation of the DVBIC Clinical Recommendation for Management of Headache Following Concussion study (PTH-CR Study) entered its second phase of data collection at both Fort Hood and Fort Bliss.
Blast Exposure and TBI
After receiving a $2.2 million dollar grant in early 2018, Camp Lejeune began a collaborative research study with Wayne State University, Princeton University, and University of Pittsburgh on a longitudinal study to determine biomarkers of blast related TBI. The Naval Medical Center San Diego has also studied blast injury as part of the Department of Defense blast injury research program.

rTMS and Cognitive Rehabilitation
This research is being pursued by multiple DVBIC sites independently — the Palo Alto Veterans Institute for Research (in collaboration with Stanford University), the Hunter Holmes McGuire Veteran Affairs Medical Center (in collaboration with Virginia Commonwealth University), and Fort Gordon with university colleagues. The Palo Alto and Virginia studies have been actively recruiting participants since the latter half of 2018, and involve testing the therapeutic benefits of repetitive Transcranial Magnetic Simulation (rTMS). rTMS is an FDA-approved device for the treatment of depression and migraine, but recent research has suggested that it might also help to improve cognition. In the Palo Alto study, the focus will be on whether rTMS can improve memory in older adults with mild or moderate TBI who are experiencing memory and cognitive problems that affect daily functioning. Similarly, the Virginia study will assess the effects of rTMS on cognitive impairment. Roughly the same sample size (40 participants for the Virginia study and 50 participants for the Palo Alto study), they differ in study design. The Virginia study uses a crossover design whereas the Palo Alto study uses parallel assignment. At Fort Gordon, the research team is currently preparing to support a multi-site, multi-year, collaborative study (with coordinating principal investigator/sites at the Uniformed Services University of the Health Sciences and DVBIC Landstuhl) called ADEPT. Adaptive that for the treatment of depression associated with concussion using repetitive transcranial magnetic stimulation protocols.

TBI and Stigma
Launched in 2018 at Fort Hood during Brain Injury Awareness Month, the TBI and Stigma project involved distributing an anonymous survey. The same questionnaire has been distributed at Fort Bliss (with an additional question on how the TBI occurred) and Landstuhl. The Fort Hood findings were reported at the Fourth Federal Interagency Conference on TBI and Stigma Research Symposium.

REC Highlights
In addition to conducting quarterly trainings for recovery care coordinators through the Office of Warrior Care Policy, staff members from the Education Division regularly engage significant numbers of TBI stakeholders through a variety of events and other outreach activities.

REC had their most successful year, providing 4,950 outreach, education and training events and reaching 1,343,335 providers, service members, veterans and families. In comparison to 2017, this marks an increase of over a half a million stakeholders reached. This includes the RECs most successful Brain Injury Awareness Month where just under 700,000 DVBIC stakeholders were reached through TBI events.

Of the 5,125 respondents (all from the Army), 10 percent reported having one or more TBIs, and of these 69 percent sought treatment. For those who did not seek treatment, 69 percent did not believe that treatment was required, and 15 percent thought it would negatively impact their careers. While these results are preliminary, other DVBIC sites are conducting similar surveys. The same questionnaire has been distributed at Fort Bliss (with an additional question on how the TBI occurred) and Landstuhl. The Fort Hood findings were reported at the Fourth Federal Interagency Conference on TBI and the Military Health Systems Research Symposium.

DHA Leadership with DVBIC Staff at AMSUS Conference
Vice Adm. Raquel Bono, director of DHA, and Rear Adm. Mary Riggs, director of DHA’s Research and Development Directorate, visited the DVBIC booth at AMSUS in November. AMSUS, the annual meeting of the Society of Federal Health Professionals, is a non-profit, member-based educational and professional association serving the Department of Defense, VA, Health and Human Services, and Homeland Security, as well as federal health professionals and their families. Pictured from left to right are Rear Adm. Riggs, Vice Adm. Bono, Heather Kopf, DVBIC education network coordinator, and Randy Ginos, Richmond VA REC, (DVBIC photo)

Participants in the “Explorations in Female Brain Injury Summit” with PINK Concussions at Tampa VA
The summit brought together over 150 military and veteran medical providers, researchers, and civilian leaders. Attendees included Representatives from the Army, Air Force, and Navy, Tampa VA Hospital director, Joe Battle, and hospital Chief of Staff, Dr. Colleen Jakel, Over 40 physicians, 25 nursing professionals, and 10 social workers. It featured 20 presentations by leaders in TBI research and treatment, as well as research posters from the Chronic Effects of Neurotrauma Consortium (CENC), Optometry, Physical Therapy, and the University of South Florida Medical Residents. Kathy Lee, then deputy director of DVBIC, made one of the two keynote addresses. The summit was coordinated by Tampa VA REC Gabriela Ryan, and occurred on December 17, 2018. (DVBIC photo)

US Senator Dan Sullivan with DVBIC Staff at Stand Down Event in Anchorage
Representatives from the Army, Air Force, and Navy, Tampa VA Hospital director, Joe Battle, and hospital Chief of Staff, Dr. Colleen Jakel, Over 40 physicians, 25 nursing professionals, and 10 social workers. It featured 20 presentations by leaders in TBI research and treatment, as well as research posters from the Chronic Effects of Neurotrauma Consortium (CENC), Optometry, Physical Therapy, and the University of South Florida Medical Residents. Kathy Lee, then deputy director of DVBIC, made one of the two keynote addresses. The summit was coordinated by Tampa VA REC Gabriela Ryan, and occurred on December 17, 2018. (DVBIC photo)

US Senator Dan Sullivan with DVBIC Staff at Stand Down Event in Anchorage

Camp Lejeune REC, Jamie Pope-Holcomb married a DVBIC display at Eastern Carolina’s 1st Annual Lantern Festival. The festival honors loved ones who have passed on and is attended by the military community. Pope-Holcomb provided resources to help those recovering from a traumatic brain injury. (DVBIC photo)

Eastern Carolina’s 1st Annual Lantern Festival

Over 40 physicians, 25 nursing professionals, and 10 social workers. It featured 20 presentations by leaders in TBI research and treatment, as well as research posters from the Chronic Effects of Neurotrauma Consortium (CENC), Optometry, Physical Therapy, and the University of South Florida Medical Residents. Kathy Lee, then deputy director of DVBIC, made one of the two keynote addresses. The summit was coordinated by Tampa VA REC Gabriela Ryan, and occurred on December 17, 2018. (DVBIC photo)

US Senator Dan Sullivan with DVBIC Staff at Stand Down Event in Anchorage
Stand Down is an annual event for homeless veterans that brings together resources from federal, state, municipal, and public places to provide assistance with medical, legal, housing, and employment. Over 50 vendors participated on October 19, 2018. Joint Base Elmendorf-Richardson REC Patty Raymond Turner posed with Senator Dan Sullivan who serves on both the Armed Services Committee and the Veterans Affairs Committee. (DVBIC photo)
Publications

Since 1992, DVBIC staff members have published more than 540 peer-reviewed manuscripts and regularly serve on the editorial boards of major journals in the field of TBI including the Journal of Neurotrauma and Journal of Head Trauma Rehabilitation. In 2018, DVBIC staff members published 62 peer-reviewed papers. This list includes some print publications that may have appeared electronically ahead of print in 2017.


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Presentations

DVBIC subject matter experts across the network were active throughout 2018 in sharing their research. They gave presentations at multiple conferences across the U.S. and internationally. Many of these presentations were collaborative studies between sites.

Highlights

DVBIC was prominently represented at the 4th Federal Interagency Conference on Traumatic Brain Injury and the Military Health System Research Symposium. At these conferences, DVBIC presented on a wide range of topics.

4th Federal Interagency Conference on Traumatic Brain Injury (June 2018)

This conference is held every 6-7 years, and serves as a major professional networking event for clinicians, researchers, policy makers, and advocates in the field of traumatic brain injury. All abstracts were peer reviewed and published in Archives of Physical Medicine and Rehabilitation (the most cited journal in rehabilitation).

DVBIC contributed 15 oral presentations and 33 poster presentations.

Military Health System Research Symposium

DVBIC had a significant presence at the Military Health System Research Symposium (MHSRS), the premier Department of Defense scientific meeting, which took place August 20-23, 2018, in Kissimmee, Florida. MHSRS provided a venue for DVBIC to present new scientific knowledge resulting from military-unique research at the only military or civilian meeting focused specifically on the unique medical needs of the warfighter.

DVBIC contributed 81 presentations overall with 18 oral presentations, 57 poster presentations, and eight breakout sessions.

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Common Topics in DVBIC presentations at the 4th Interagency Conference and MHSRS

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<tr>
<th>TOPIC</th>
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<td>Provider training tools and validity assessment</td>
<td>Whether and how diagnostic tools and therapeutic interventions actually accomplish their stated goals, and which ones should providers adopt.</td>
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<tr>
<td>Caregiver burden</td>
<td>What can contribute to better quality of life among caregivers and what technologies can aid caregivers.</td>
</tr>
<tr>
<td>Sex and gender</td>
<td>Whether and how sex and gender affect TBI.</td>
</tr>
<tr>
<td>Rehabilitation studies</td>
<td>What strategies aid in recovery from TBI.</td>
</tr>
<tr>
<td>Psychological and behavioral outcomes associated with TBI</td>
<td>Relationship to PTSD, depression, employability after sustaining a TBI.</td>
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</table>

In addition to these prominent conferences, DVBIC subject matter experts presented at a number of other locations. The table below records the number of presentations and posters based on the affiliation of the lead author. Many conferences contained presentations from multiple DVBIC experts.

All Conference Presentations at a Glance

20 different conferences
149 total presentations and posters

<table>
<thead>
<tr>
<th>NETWORK SITE</th>
<th>PRESENTATIONS AND POSTERS</th>
<th>NETWORK SITE</th>
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<td>Landstuhl</td>
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</tr>
<tr>
<td>Fort Gordon</td>
<td>2</td>
<td>DVBIC HQ</td>
<td>15</td>
</tr>
</tbody>
</table>

Military health care providers practiced performing Vestibular/Ocular Motor Screening (VOMS) during the National Provider Training in September at Fort Belvoir. (DVBIC photo by Carlson H. Gray)