



DEFENSE AND VETERANS BRAIN INJURY CENTER

2016

Annual Report



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About DVBIC

24 Years of Service

As manager of the Pathway of Care, the Defense and Veterans Brain Injury Center (DVBIC) promotes access to state-of-the-science care for service members, veterans, and their families to prevent and mitigate the consequences of traumatic brain injury (TBI).

Since 1992, DVBIC has served military and civilian TBI stakeholders through a network of medical sites across the Departments of Defense (DoD) and Veterans Affairs (VA) that conduct research, support clinical care, provide education and advance policy. DVBIC has evolved as its network of care and treatment sites has grown to meet the changing needs of the Military Health System (MHS).

Today, DVBIC has 18 network sites and is the TBI operational component of the Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury (DCoE). DCoE is a division of the Defense Health Agency (DHA) Operations directorate. DHA is a joint, integrated combat support agency that supports the MHS.

Letter from the National Director

Dear Colleagues:

Thank you for your hard work and dedicated efforts over the past year. 2016 saw many successes within the organization despite challenges associated with changes in leadership and the transition to DHA. Your efforts advanced the state of the science for TBI care, led to new, evidence-based clinical guidelines, and produced training curricula for practitioners, patients, family members and TBI stakeholders.

Our relationship with the TBI community of interest is stronger than ever. We remain unified in our mission to help mitigate the effects of brain injury on service members, veterans and their families and committed to managing the Pathway of Care. With the TBI service leads and other stakeholders, we agreed upon a definition of the Pathway of Care in 2016 and began to develop policies promoting excellence in care not contingent upon geographic organizational affiliations. We will continue leading this policy effort in 2017 as chair of the TBI Advisory Committee, an entity through which all stakeholders promote policies advancing our collective goals. TBI program leads from the Army, Air Force, Navy, Marine Corps and DHA work within this committee and through subgroups to expedite review, consensus and implementation of new policies and products across the enterprise.

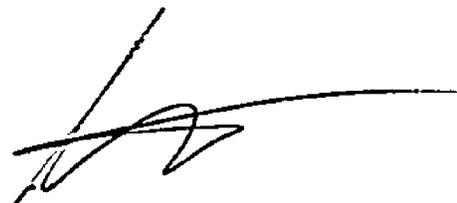
In the past year, our network grew to 18 sites with new teams at Fort Gordon, Fort Drum, and the San Antonio VA hospital. Our network sites collaborated with local commands to advance TBI research, education and clinical support. By working closely with the Joint Program Committees at Medical Research and Materiel Command and the J9 (research) in DHA, we continued to assess research gaps and deploy new research efforts driven by requirements.

2016 highlights from DVBIC divisions include publishing 45 peer-reviewed papers advancing TBI science (Research Division), releasing an invaluable guide on post-traumatic headache (Clinical Affairs Division), and refining our product pipeline and lifecycle management (Education Division). Our efforts to inform providers about TBI care included collecting metrics to determine our impact beyond the use of materials, and we actively engaged national experts to refresh existing clinical support tools. In addition to expanding our social media presence, direct marketing and trainings, we also released our first podcast in 2016. Called "The TBI Family," the podcast informs caregivers about resources available through the DoD and VA. All of these efforts were driven by requirements determined, in part, by our surveillance team which made great strides not only in tracking prevalence but also in collecting more granular data on patients and families affected by TBI.

DVBIC's 2016 accomplishments are the result of cumulative, collaborative, successful service to the military and veteran TBI communities. In 2017, DVBIC will celebrate its 25th anniversary. As we reach this important milestone, we will continue to make the bold decisions that directly benefit patients and their families. We look forward to working with the National Intrepid Center of Excellence and the Center for Neuroscience and Regenerative Medicine to leverage our collective expertise to improve efficiencies to best accomplish our missions.

I am honored to have served with DVBIC, and I look forward to witnessing amazing accomplishments yet to come.

Sincerely

A handwritten signature in black ink, appearing to read "G. Grammer", with a long horizontal stroke extending to the right.

Army Col. (Dr.) Geoffrey G. Grammer

Leadership



Army Col. (Dr.) Geoffrey G. Grammer National Director

Army Col. (Dr.) Geoffrey G. Grammer is the national director of DVBIC. He oversees all aspects of the organization's mission, which is to serve active-duty service members, veterans and their family members with traumatic brain injury through state-of-the-science medical care and care coordination, and innovative clinical research and educational programs.

Until recently, Grammer was the department chief of research at the National Intrepid Center of Excellence. Prior to that, he served for eight years as the chief of inpatient psychiatric services at Walter Reed National Military Medical Center in Maryland.

Grammer completed two deployments to Iraq. During his first deployment, he served as the medical director for the 785th Combat Stress Control Company; during his second deployment, he served as a psychiatrist at the combat support hospital at Contingency Operating Base Speicher. He also deployed to Afghanistan as a psychiatrist at the combat support hospital in Bagram.

Grammer completed his Bachelor of Science in Biology at Virginia Polytechnic Institute in Blacksburg, Virginia. In 1996, he graduated from the Uniformed Services University of the Health Sciences in Bethesda, Maryland, with his medical degree. Subsequently, he completed his residency in internal medicine and general psychiatry at Walter Reed National Military Medical Center, followed by a fellowship in geriatric psychiatry.

Grammer currently holds board certification in psychiatry, geriatric psychiatry, and behavioral neurology and neuropsychiatry. He is also currently an assistant professor of psychiatry at the Uniformed Services University of the Health Sciences.

Grammer's military awards include the Bronze Star Medal, Meritorious Service Medal, Army Commendation Medal (three awards), Army Achievement Medal (three awards), Army Superior Unit Award, National Defense Service Medal (two awards), Afghanistan Campaign Medal, Iraq Campaign Medal (three stars), Global War on Terrorism Service Medal, Army Service Ribbon, Overseas Service Ribbon (three awards), and NATO International Security Assistance Force Medal.



Katherine M. Helmick, M.S., CRNP, ANP-BC, CNRN Deputy Director

Ms. Katherine Helmick is the deputy director of DVBIC. She brings considerable clinical, educational and research experience in the field of neuroscience to include more than 100 regional, national and international presentations and more than 15 peer-reviewed publications.

Helmick has served in a variety of leadership, advisory and operational roles, including deputy director for DCoE, 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.

Helmick holds both bachelor's and master's degrees in nursing from Virginia Commonwealth University, as well as a Bachelor of Science 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.



Divisions

DVBIC accomplishes its mission through its divisions. Each division relies on DVBIC's extensive network to coordinate with the individual services to advance care, conduct clinically meaningful research within the Defense Department and VA, and improve caregiver, patient and clinician awareness.

Clinical Affairs

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



“Clinicians always say that if you’ve seen one TBI, you’ve seen one TBI. Through the work of DVBIC’s Clinical Affairs Division, we hope to support clinicians treating some of the most complex patients. We work closely with DVBIC’s other divisions to equip clinicians across the DoD and VA with the most relevant and up-to-date information to provide the best care to our service members.”

Katharine Stout, PT, DPT, NCS, MBA
Director, Clinical Affairs Division

Research

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



“DoD requirements-driven TBI clinical research is one of the foundational building blocks of DVBIC’s 25-year history. DVBIC has successfully supported numerous high visibility clinical research studies resulting in evidence-based knowledge that informs the clinical care of service members and veterans affected by TBI. DVBIC’s current research portfolio supports known MHS TBI research gaps and priorities, significantly raising return-on-investment compared to other traditional research models. This speaks highly of DVBIC’s clinical research expertise and our responsiveness supporting a medically ready force.”

Saafan Malik, M.D.
Director, Research Division



Image by iStock

Education

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



“Through the education and training of health care providers, service members, veterans and family members, we are changing the notion that traumatic brain injury is an ‘invisible injury’ of war. Through our awareness, outreach and multifaceted educational activities, TBI is becoming the visible invisible wound.”

Scott Livingston, Ph.D., PT, ATC
Director, Education Division

Chief of Staff

Mission: To provide support to advance top DVBIC priorities and ensure infrastructure, regulatory compliance and financial accountability are consistent with DHA and DCoE guidance and DVBIC mission and strategic direction.



“As DVBIC approaches a quarter century as a center of excellence, our longevity can be attributed to our ability to build effective partnerships. DVBIC is the only center serving both the military and veteran communities. It’s the only center with clinical support, clinical research and education staff working side by side with clinicians at military treatment facilities and VA polytrauma centers. It’s the only center with an infrastructure to ensure ongoing collaboration with the four services through the TBI Pathway of Care.”

Captain Charles Cathlin, USPHS, MPH
Chief of Staff

Expansion

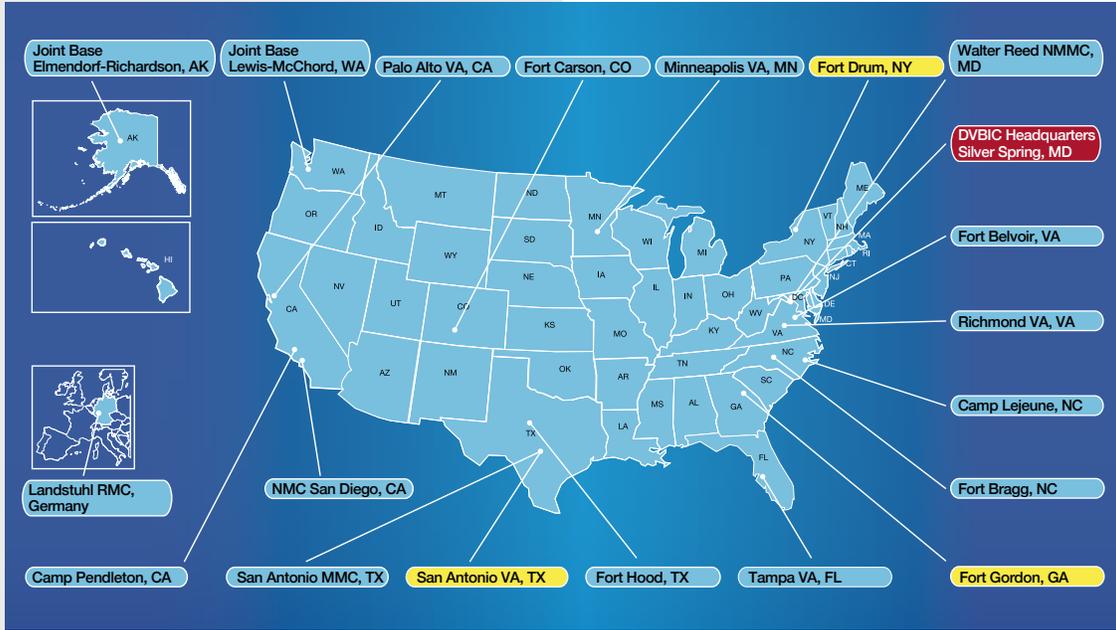
Three new DVBIC network sites launched in 2016: Fort Drum, Fort Gordon and the Audie L. Murphy Memorial Veterans Hospital in San Antonio. DVBIC network sites now total 18 military treatment facilities and VA facilities that conduct research and support military and veteran TBI patients across the United States and abroad. More information about the new sites and the rest of the DVBIC network is in the network sites section of this report (see page 26).

Fort Drum



“Joining DVBIC is an essential part of our strategy forward,” said Dr. Thaddeus Pajak, medical director of the Fort Drum TBI Clinic. “We are the TBI home to one of the Army’s most deployed divisions. The resources DVBIC provides give us another tool to accomplish our mission of improving readiness of the 10th Mountain Division (Light Infantry) and to ensure that the mind, body and spirit of our soldier warriors are prepared for the fight ahead.”

Major (Dr.) Thaddeus Pajak
DVBIC Site Director
U.S. Army Medical
Department Activity
Fort Drum, New York



DVBIC sites are strategically located across the United States and abroad to engage patients and providers where they are.

Fort Gordon



“Being part of a bigger team presents opportunities for discussion of and collaboration around new ideas, allowing us to reap the benefits of other members’ discoveries and contribute our experiences, ultimately resulting in better understanding and treatment of the unique medical issues facing our service members.”

John L. Rigg, M.D.
 DVBIC Site Director
 Dwight D. Eisenhower
 Army Medical Center
 Fort Gordon, Georgia

San Antonio VA



“Although we have already been working with the San Antonio Military Medical Center, DVBIC team and other sites, having boots on the ground will solidify and enrich collaboration and allow our facility and staff to develop additional relevant research translating into better patient care.”

Blessen C. Eapen, M.D.
 DVBIC Site Director
 Audie L. Murphy Memorial
 VA Hospital
 San Antonio, Texas

Advances

As a TBI thought leader, DVBIC supports researchers across its network sites developing and conducting clinical investigations on TBI. DVBIC's extensive internal and external collaborations (see page 32) allow for clinical innovation and research along the entire continuum of TBI care: from initial injury, whether in the deployed or non-deployed setting, through medical evacuation to acute and post-acute medical settings, rehabilitation, and ultimately a return to family, community and work or continued duty.



Study of Cognitive Rehabilitation Effectiveness (SCORE) team members in a lighthearted moment spelled out S-C-O-R-E. (DVBIC photo)

Study of Cognitive Rehabilitation Effectiveness

DVBIC and the Brooke Army Medical Center's Brain Injury Rehabilitation Service led the congressionally mandated "Study of Cognitive Rehabilitation Effectiveness," or SCORE. The results of SCORE, published in September 2016 in the *Journal of Head Trauma Rehabilitation*, demonstrated that therapist-directed methods most effectively improve functional cognitive abilities, including memory and attention.

The SCORE study supported a report to Congress responding to section 723 of the National Defense Authorization Act of 2010 on the efficacy of cognitive rehabilitation. The report will be submitted to Congress in 2017. Following the SCORE milestone, researchers will continue to study cognitive rehabilitation therapy with "Imaging Support of the Study of Cognitive Rehabilitation Effectiveness in Mild Traumatic Brain Injury," or iSCORE. With iSCORE, researchers will try to measure physical brain changes that may occur as a result of cognitive rehabilitation.

The SCORE research project evaluated three common methods of delivering cognitive rehabilitation therapies. The goal of the study, which started in late 2010, was to identify and validate cognitive rehabilitation interventions to improve the health and quality of life for service members with concussions. Although previous research had investigated cognitive rehabilitation for patients with moderate to severe TBI, SCORE was the first study to examine cognitive rehabilitation for mild TBI.

DoD TBI Research Gaps and Priorities Report

In 2016, DVBIC formed an internal research gaps committee to conduct a review of guidance documents, examine the most recent peer-reviewed literature, assess the current state of TBI science, and produce a list of existing and emerging TBI research gaps and priorities most relevant to the DoD and MHS. The committee's assessment, strengthened by stakeholder considerations, supports a better understanding

of how TBI research could best address current and emerging clinical research needs for the military and veteran populations in order to optimize state-of-the-science TBI care. In addition, DVBIC produced a report describing its process for determining these gaps and priorities. The report was submitted to DCoE leadership and DHA's J9 research directorate.

The determination of 2016 gaps and priorities was part of a larger, ongoing process. Every year, DVBIC assesses the field of TBI research for the Defense Department and MHS to determine existing and emerging research gaps and priorities. Through continuous involvement in this ongoing assessment process, DVBIC leadership, research staff and subject matter experts ensure that military-relevant research initiatives incorporate feedback and lessons learned.

Such initiatives involve complex collaborative efforts: TBI research work groups, joint review and analysis meetings, integrated product teams (IPTs), in-progress reviews, ongoing capability-based assessments, government steering committees for various TBI consortia, and interagency TBI research conferences. These conferences include the Military Health System Research Symposium and the meetings of the Association of Military Surgeons of the United States.

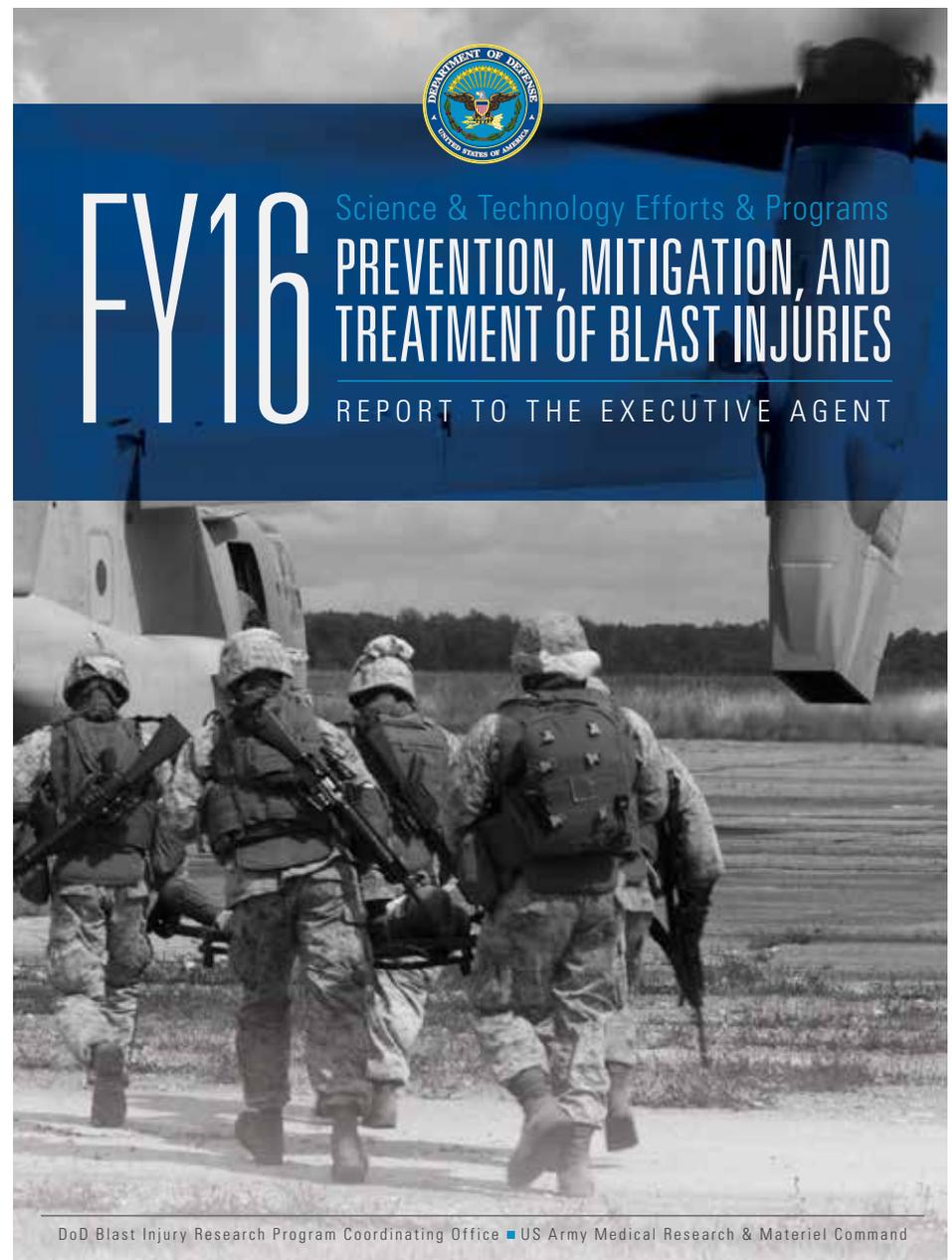
RAND Study on Mild TBI

DVBIC collaborated with the RAND Corporation to review the treatment of mild TBI across the MHS. Specifically, the DVBIC outcomes team, part of the Clinical Affairs Division, contributed knowledge and expertise. RAND published the findings in a 2016 report entitled "Understanding Treatment of Mild Traumatic Brain Injury in the Military Health System." This research addressed a major gap. Previously, no large-scale studies had considered how service members who had been diagnosed with a concussion used health care after their injuries. The goal of the report was "to provide

timely information to DoD that can be used to help assess and improve care" for service members with a mild TBI.

Blast-Related TBI Research

Acknowledging DVBIC's research expertise in the area of blast-related TBI, the DoD Blast Injury Research Program invited DVBIC to contribute a chapter to the program's 2016 annual report. The purpose of the report is to describe DoD efforts to address the full range of blast injuries, highlighting accomplishments and challenges. DVBIC submitted content in 2016 highlighting DVBIC publications on blast-related TBI in 2016. All DVBIC research published in 2016 included blast-related TBIs in the population studied. However, four studies specifically addressed blast-related findings:





U.S. Army photo by Spc. Luke Austin

Impulsivity and Depression

Bjork, J., Burroughs, T., Franke, L., Pickett, T., Johns, S., Moeller, F., & Walker, W. (2016). Laboratory impulsivity and depression in blast-exposed military personnel with post-concussion syndrome. *Psychiatry Research*, 246, 321-325. <http://dx.doi.org/10.1016/j.psychres.2016.10.008>

Service members with blast-related TBI may experience a collection of symptoms known as post-concussive syndrome. Cognitive dysfunction is common in these patients, but they may also display increased impulsivity and impaired mood regulation. These factors may increase the risk of substance abuse and suicidal behavior. This research assessed the relationship between depressive symptoms and behavioral inhibition among 117 service members with blast-related TBI and a diagnosis of post-concussive syndrome. The results are consistent with previous research demonstrating impaired mood regulation and behavioral inhibition in military TBI patients. TBI not only affects thinking but also mood and inhibition. This research may prove useful in identifying TBI patients with affective and inhibition problems.

Headache and Mild TBI

Finkel, A., Yerry, J., Klaric, J., Ivins, B., Scher, A., & Choi, Y. (2016). Headache in military service members with a history of mild traumatic brain injury: A cohort study of diagnosis and classification. *Cephalalgia*, 37(6), 548-559. <http://dx.doi.org/10.1177/0333102416651285>

Post-injury headache is a common symptom after mild TBI. However, no instrument currently exists to categorize or track this symptom. In this study, researchers collected information on demographics, injuries and headache characteristics for 95 patients seen between August 2008 and December 2009 at Womack Army Medical Center, Fort Bragg, North Carolina. Patients reported a total of 166 headaches. The most common type of injury reported was blast (53.7 percent).

The most frequently diagnosed headache type was continuous with migraine features (18.7 percent), then chronic migraine (8.4 percent), migraine with aura (6 percent), hemicrania continua (7.2 percent), chronic cluster (3.6 percent), and non-classifiable (3 percent). The frequency of migraine headache among patients with concussion appears higher than expected, but this finding necessitates further research. Headache is a common symptom after concussion. However, less is known about its variation among TBI patients. This research impacts the service member by describing the frequency and type of headaches in a military TBI patient population.

Chronic Mild TBI and PTSD

Franke, L.M., Walker, W.C., Hoke, K.W., & Wares, J.R. (2016). Distinction in EEG slow oscillations between chronic mild traumatic brain injury and PTSD. *International Journal of Psychophysiology*. 106:21-29. doi: 10.1016/j.ijpsycho.2016.05.010

Resting state electroencephalogram (EEG) information differs between patients with mild TBI and healthy controls. However, experts disagree on whether this change is stable. In addition, comorbid psychiatric conditions such as PTSD may contribute to long-term changes in EEG patterns. Recognizing the potential for comorbidity is particularly relevant in combat veterans who often experience post-deployment stress. This research addressed the problem of comorbidity by measuring spectral power (type of EEG information) in a large sample of service members with blast exposure but varying degrees of TBI and PTSD severity. Results indicated that EEG may help to track neurophysiological effects and monitor recovery after TBI and differentiate pathophysiologies associated with TBI and PTSD. This research impacts the service member by identifying spectral patterns distinctive of TBI and PTSD.

Postconcussion Symptoms

O'Neil, M., Callahan, M., Carlson, K., Roost, M., Laman-Maharg, B., & Twamley, E. (2016). Postconcussion symptoms reported by Operation Enduring Freedom/Operation Iraqi Freedom veterans with and without blast exposure, mild traumatic brain injury, and posttraumatic stress disorder. *Journal of Clinical and Experimental Neuropsychology*, 39(5), 449-458. <http://dx.doi.org/10.1080/13803395.2016.1232699>

The 10th Edition of the International Statistical Classification of Diseases and Related Health Problems (ICD-10) outlines criteria for post-concussive syndrome. This study addressed the validity of these criteria among veterans of Operation Enduring Freedom and Operation Iraqi Freedom by identifying relevant subscales from the British Columbia Postconcussion Symptom Inventory (BC-PSI) and examining group differences between veterans with and without blast exposure, mild TBI and PTSD. Vestibular, affective, and somatic factors were significantly higher for veterans with blast exposure plus mild TBI than for controls but not significantly different for those with blast exposure but no mild TBI. These results remained significant when PTSD symptom severity was included as a covariate. In addition, cognitive, anger, and somatic subscales were higher for veterans with PTSD, though there was no interaction effect of PTSD and mild TBI or blast history. The study demonstrates that the BC-PSI subscales can differentiate veterans based on blast exposure, mild TBI history and PTSD. The BC-PSI inventory may prove useful in categorizing the symptoms experienced by service members with TBI.

New Directions

As the TBI landscape has changed, DVBIC efforts have evolved to meet the needs of service members, veterans, families and providers. In 2016, DVBIC took on several emerging issues described below.

Women and Concussions



Kathy Helmick, DVBIC deputy director, spoke at a Pink Concussions event during Brain Injury Awareness Month 2016. Pink Concussions is a nonprofit organization dedicated to improving pre-injury education and post-injury medical care for women who have sustained a TBI. (DVBIC photo by Carlson Gray)

DVBIC staff were invited and represented at the PINK Concussions Symposium on Female Brain Injury held October 6-7, 2016, and hosted by the VA Palo Alto Health Care System. DVBIC subject matter experts gave keynote remarks and presented, moderated, and facilitated workshops over the two-day symposium. Over 120 participants attended the symposium that featured researchers and clinicians from around the country. Presenters shared brain injury research focused on females through presentations, work groups and poster sessions. A reception showcased and honored the efforts of several community members who focused their efforts on female TBI from sports, domestic violence, trauma and military service.

DVBIC staff also hosted the 6th Annual TBI Research Forum on March 18, 2016, at the Palo Alto VA. This event highlighted the theme of "TBI and the Female Veteran." Over 150 researchers and clinicians networked, presented new clinical updates and increased awareness of recent innovations in TBI research. Twenty-four posters represented abstracts submitted from a wide region both within and outside northern California, including large academic and community hospitals. The DVBIC Palo Alto recovery support specialist hosted a DVBIC education booth, and an exhibitor session showcased many VA and community stakeholders who came to support DVBIC's work and women veterans.

Research published by DVBIC in 2016 suggests that recovery and reintegration may benefit from gender-specific guidance. For example, bias inherent in self-reporting (women report more symptoms than men) supports development of more objective measures of reporting following concussion. Since women comprise 16 percent of the armed forces, including the military service academies, a commitment to conducting research that includes a female cohort is important.

Caregivers

According to a recent study by RAND Corporation, there are 5.5 million military family caregivers in the United States and 29 percent of them are helping someone who experienced a TBI. Although DVBIC has always included caregivers in its mission, outreach to this group broadened significantly in 2016. To support military and veteran caregivers and help drive their recognition, appreciation and empowerment, DVBIC partnered with the Elizabeth Dole Foundation in 2016. This partnership advanced

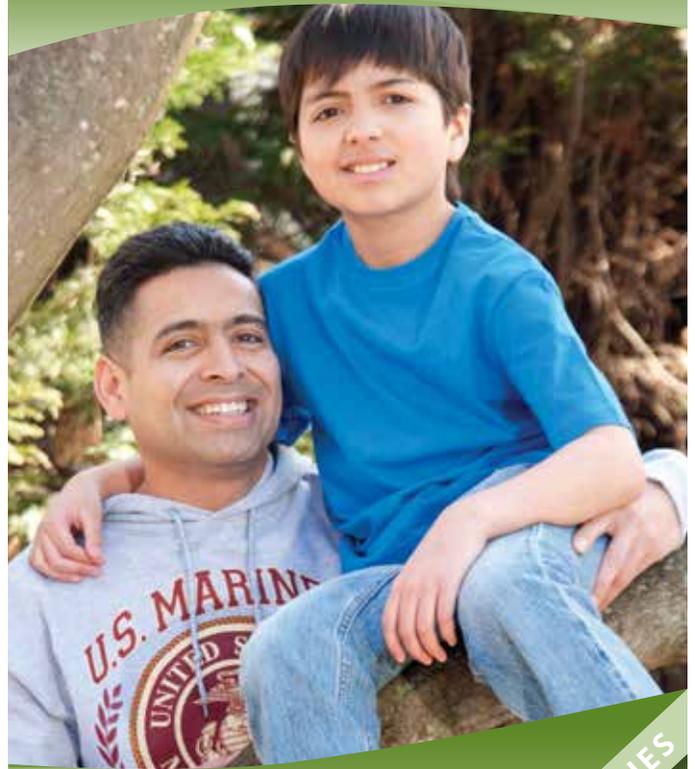
There are 5.5 million military family caregivers in the United States and 29 percent of them are helping someone who experienced a TBI.

DVBIC's A Head for the Future public awareness, social media initiative, as well as the production of a caregiver podcast DVBIC launched in 2016. DVBIC also represented DoD at the Elizabeth Dole Foundation's Hidden Heroes Campaign for Military Caregivers. Col. Grammer, DVBIC national director, spoke about the future needs of military caregivers. In addition, DVBIC's congressionally mandated research on long-term TBI outcomes ("15-year longitudinal studies on TBI") is generating extensive information about caregiver needs and challenges.



DVBIC National Director U.S. Army Col. (Dr.) Geoffrey Grammer participated in "Empowering Hidden Heroes: Pathways to Innovation" conference. (DVBIC photo by Terry Welch)

A Parent's Guide to Returning Your Child to School After a Concussion



FAMILIES

Children and Concussions

DVBIC served as the DoD representative to the National Collaborative on Children's Brain Injury. In this capacity, DVBIC education staff collaborated with other stakeholders such as the National Institute on Disability and Rehabilitation Research and the Centers for Disease Control and Prevention to develop the first national "Return-to-Learn Consensus Statement" for children with concussions. As a content reviewer, DVBIC also supported the Centers for Disease Control and Prevention (CDC) in the development of guidance for treating children with concussion. This guidance, entitled "Report from the Pediatric Mild Traumatic Brain Injury Guideline Workgroup," when finalized, will provide the CDC's recommendation for a standardized approach for health care providers for the diagnosis and management of mild TBI among children.

New Products

2016 marked the release of numerous state-of-the-science education and training products. In addition to print, new products this year included new media platforms such as podcasts. This expanded portfolio of production and distribution methods enhanced DVBIC’s ability to reach target audiences.

Clinical Recommendations

Clinical recommendations (CRs) provide TBI guidance to health care providers. In February 2016, DVBIC released one CR: “Management of Headache Following Concussion/Mild TBI: Guidance for Primary Care Management in Deployed and Non-Deployed Settings.” Known as the headache CR, this clinical recommendation addressed the number one symptom following concussion. DVBIC received a grant from the U.S. Army Medical Research and Materiel Command to test the effectiveness of the headache CR among primary care providers.

In addition to releasing and beta testing the headache CR, DVBIC initiated a research pilot study to evaluate the effectiveness of a face-to-face provider training education program on another CR: “Progressive Return to Activity following Acute Concussion/Mild TBI: Guidance for the Primary Care Manager.”

Periodically, CRs need revision to reflect the latest science. In 2016, the TBI Advisory Committee — the DoD entity chaired by DVBIC that coordinates how to address TBI issues — approved a revision plan for CRs. Revisions on five DVBIC CRs began in 2016 and were at various stages of completion and approval at the end of December.

DoD Clinical Recommendation | February 2016

Management of Headache Following Concussion/Mild Traumatic Brain Injury: Guidance for Primary Care Management in Deployed and Non-Deployed Settings

Introduction
More than 359,000 service members sustained a traumatic brain injury (TBI) between 2003 and 2015. Most (approximately 82 percent) were classified as mild traumatic brain injury (mTBI) concussions. Headache is the most common symptom reported following a concussion. Operation Enduring Freedom/Operation Iraqi Freedom (OEF/OIF) veterans, 74 percent report headaches (PTH) occurring within 30 days of sustaining a concussion.¹

Current Department of Defense (DoD) guidance on the acute management of headaches is briefly addressed in the deployed clinical management algorithm (CMA) and the Army Concussion in the Garrison Settings Algorithm.² The assessment and management of sub-acute and chronic in the “Department of Veterans Affairs (VA) DoD Clinical Practice Guideline (CPG) for mTBI Concussion/Mild Traumatic Brain Injury.”³ These recommendations were developed to provide guidance for acute, sub-acute and chronic PTH based on current criteria from the “International Headache Disorders,” 3rd edition,⁴ as well as recent research and expert contributions,⁵ updated state-of-the-science information with an emphasis on non-pharmacologic, as well as treatment of PTH. This clinical recommendation (CR) identifies best practices and provide for the primary care manager (PCM) in deployed and non-deployed settings for the assessment and treatment of PTH.

Background
This CR, companion clinical support tool (CST) and patient fact sheet were created for currently published literature and expert contributions from the Defense Centers of Excellence Health and Traumatic Brain Injury (DCE) in collaboration with clinical subject matter expert academic, research and civilian sectors: the DoD Armed Forces, and the VA, Representative Quad Services — Army, Navy, Marine Corps, Air Force — Defense and Veterans Brain Injury Army Medical Research and Materiel Command, Joint Trauma Analysis and Prevention program, National Intrepid Center of Excellence Institute, U.S. Central Command, Ready Defense Health Agency, the Coast Guard and VA have reviewed and approved this recommendation. Working group participants may be viewed at: <https://dodcic.dau.mil/working-group/index.html>

This CR is in accordance with DoD TBI policy. However, service-specific requirements regarding the management of PTH may exist, and provider judgment and operational requirements supersede any of these recommendations for an individual patient.

Summary
PTH may occur from injury to the head, neck or face. PTH is classified as acute or persistent based on duration of the headache.^{6,7} Headaches that occur in the first three months after injury are considered acute. Headaches that continue beyond three months are considered persistent.

The diagnosis of PTH depends largely on the temporal relationship between the trauma or injury and headache onset. Four of the most common types of headaches following concussion are covered in this CR and include migraine, tension-type, cervicogenic and headache related to neuropathic pain.^{8,9,10}

The differential diagnosis of PTH is based on a focused headache history and physical examination, which include a detailed description of the characteristics of the headache (Tables 1.0 and 2.0). These may include including events, positional signs or symptoms, features of the pain, and associated visual or other sensory symptoms. In some cases, the individual may have headaches with characteristics of more than one type of PTH.¹¹ Differentiating between headache types may be facilitated through use of Table 5.0, Characteristics of Headache Types.

Provider Training and Education

DVBIC regularly produces education and training materials for health care providers:

- Training curriculum to support face-to-face health care provider training on the CR “Progressive Return to Activity following Concussion/Mild Traumatic Brain Injury Guidance for the Primary Care Manager”
- Fact sheet and provider training slides for the CR “Headache Management Following Concussion/Mild TBI”
- ICD-10 diagnostic coding guidance for TBI fact sheet

Total TBI product downloads from the DVBIC website increased by almost 21 percent from 12,200 in 2015 to 17,340 in 2016. The top 10 downloaded products were:

- MACE: Military Acute Concussion Evaluation Pocket Card
- Concussion Signs and Symptoms Fact Sheet (English version)
- Management of Headache Following Concussion/Mild TBI: Guidance for Primary Care Management in Deployed and Non-Deployed Settings Clinical Recommendation
- ICD-10 Diagnostic Coding Guidance for Traumatic Brain Injury Training Slides
- Mild TBI Symptom Management Fact Sheet: Healthy Sleep



DVBIC illustration by Melanie Sexton

- Concussion/Mild Traumatic Brain Injury and Posttraumatic Stress Disorder Fact Sheet
- Traumatic Brain Injury Awareness Fact Sheet
- Mild TBI Symptom Management Fact Sheet: Managing Headaches
- Mild TBI Symptom Management Fact Sheet: Ways to Improve Your Memory
- Moderate or Severe Traumatic Brain Injury Fact Sheet

Research Reviews

DVBIC research reviews summarize relevant scientific literature pertaining to specific issues. In 2016, the Research Division developed three new research reviews available on the DVBIC website:

TBI, Irritability and Aggression (February)

- Provides a summary of recent research on relationships between TBI, irritability and aggressive behavior
- Describes findings on prevalence and risk factors
- Discusses risk factors for aggressive behavior in non-clinical military, veteran and civilian populations as well as findings regarding TBI and legal involvement potentially due to aggressive behavior

Acute Management of Intracranial Pressure in Severe TBI (February)

- Provides an update on acute treatment of severe closed-head TBI in adults
- Discusses issues on the forefront of research inquiry related to management of intracranial pressure: therapeutic hypothermia, effectiveness of hypertonic saline, and whether decompressive craniectomy improves patient outcomes

Mild TBI and Posttraumatic Stress Disorder (April)

- Provides an overview of comorbid mild TBI and posttraumatic stress disorder (PTSD)
- Focuses on symptoms, diagnosis and treatment of PTSD and mild TBI symptoms in patients with mild TBI history



Caregiver Podcast

In recognition of Warrior Care Month and National Family Caregivers Month, DVBIC launched a new podcast for family caregivers of service members and veterans with a TBI. Called “The TBI Family,” the 10-episode podcast shares caregiver stories and provides information about TBI relevant to family members and caregivers. 2016 content covered topics such as practicing mindfulness, dealing with balance issues, caregiver respite programs, caregiver training and coming to terms with the caregiver role.



Dr. Samantha Finstad, DVBIC chief of strategy, plans and programs, was the first host of DVBIC’s The TBI Family podcast. (DVBIC photo by Terry Welch)

Newsletters

DVBIC launched two quarterly newsletters in 2016 intended as resources for health care providers. DVBIC will continue to publish these newsletters in 2017.

TBI Hot Topics

This newsletter brings context to discussion surrounding the latest scientific studies, advances and discoveries. DVBIC experts summarize studies that receive attention in the popular press and provide brief comments. The specific studies included are selected by their media impact as determined through quantitative analysis of Google News and PubMed searches. Final determination includes qualitative assessment by DVBIC personnel. This newsletter also includes some news stories not derived from scientific studies, but nonetheless relevant to TBI stakeholders. News stories are selected based in part on the quantity of news coverage, and in part on a subjective evaluation of story relevance and import.

TBI 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. TBI Tech Watch is not intended as a comprehensive report on all TBI-related scientific technical advancements. The articles included are selected based on a subjective evaluation of relevance, import and interest.



Army Research Laboratory photo by David McNally

Ongoing Initiatives

In 2017, DVBIC will celebrate its 25th anniversary. As an established organization with more than two decades of experience supporting service members, veterans, family members and providers, DVBIC leads and collaborates on a number of long-term projects and mission support activities. Below are 2016 highlights from these initiatives.

TBI Surveillance

DVBIC is the Defense Department's office of responsibility for TBI data in the U.S. military. DVBIC produces annual and quarterly reports that provide data on the number of active-duty service members — anywhere U.S. forces are located — with a first-time TBI diagnosis since 2000.



DoD Numbers for Traumatic Brain Injury Worldwide – Totals

2000-2016 Q4

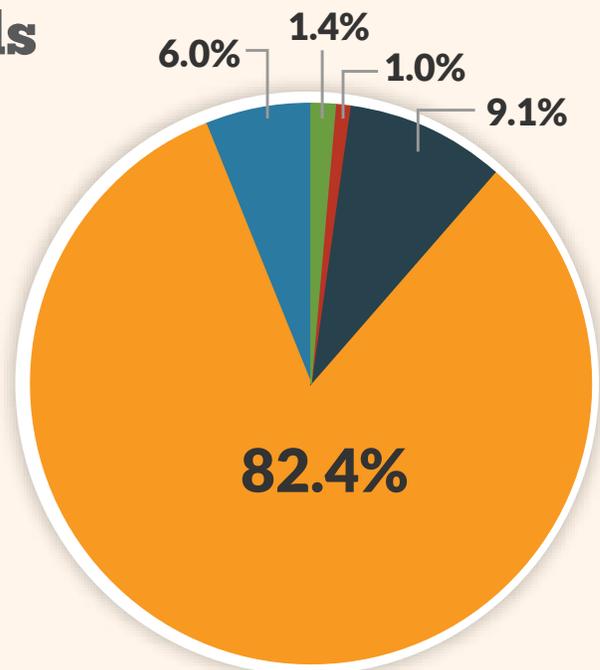
■ Penetrating	5,065
■ Severe	3,770
■ Moderate	32,951
■ Mild	297,478
■ Not Classifiable	21,828

Total - All Severities 361,092

Source: Defense Medical Surveillance System (DMSS), Theater Medical Data Store (TMDS) provided by the Armed Forces Health Surveillance Center (AFHSB)

Prepared by the Defense and Veterans Brain Injury Center (DVBIC)

**Percentages do not add up to 100% due to rounding*



2000-2016 Q4, as of Feb 17, 2017

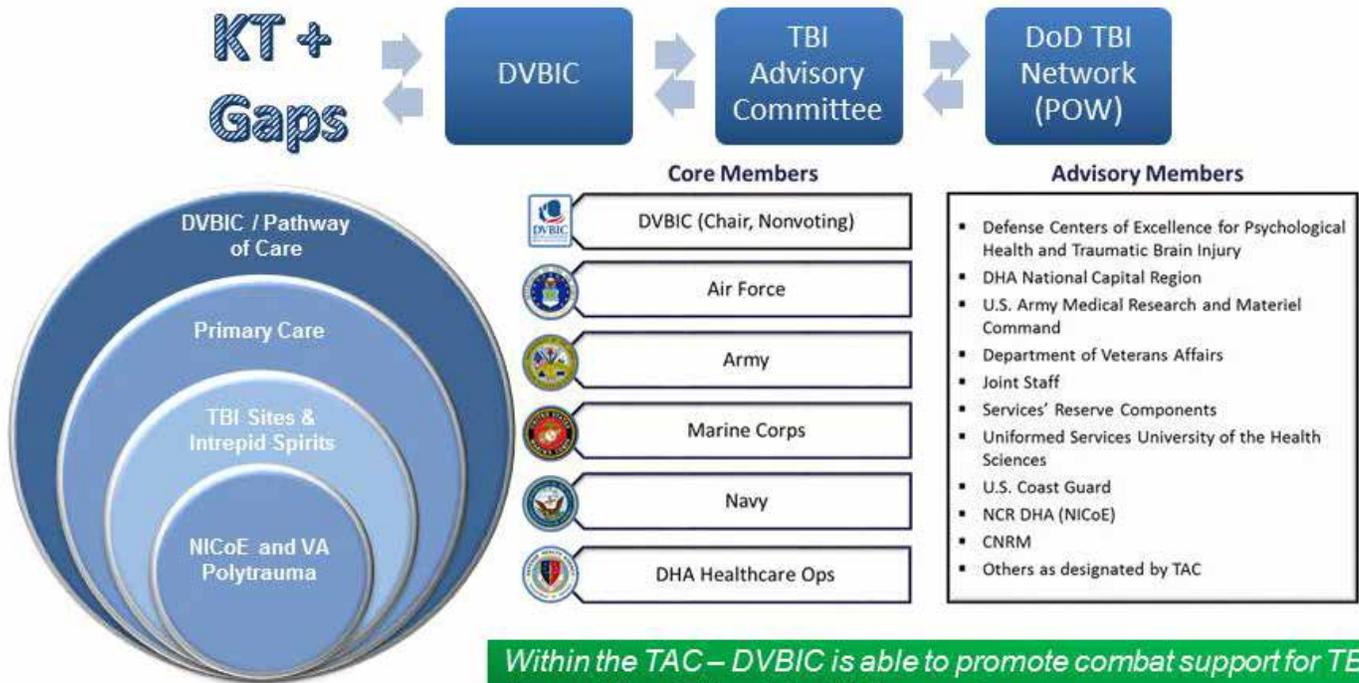
TBI Pathway of Care

The DoD TBI Pathway of Care provides an evidence-based, clinically-focused process advancing high clinical standards and decreasing variance across the DoD through continuous performance improvement.

The TBI Advisory Committee (TAC) is the chartered entity that addresses issues related to the Pathway of Care across DoD and provides a collaborative and transparent forum supporting enterprise-wide coordination. DVBIC serves as the manager of the Pathway of Care and chair of the TAC.

In 2016, the TAC formalized and codified the review process for TBI products (e.g., DVBIC CRs). The TAC also welcomed four new service representatives in 2016: Air Force and Navy (January), Army (March), and Marine Corps (May). The DVBIC national director, and new TAC chair, arrived in April. In addition, the TAC:

- Drafted the TBI program description, a formal deliverable to the Tri-Service Specialty Care Board that inventoried and outlined the services' TBI programs as well as the history, successes and challenges of the MHS TBI community.
- Reviewed and mapped the services' TBI education policies facilitating an end state of a unified education policy across the services (led by DVBIC Education Division).
- Identified gaps in referral and transition patterns (led by DVBIC Clinical Affairs Division).



Working Groups and Committees

In addition to its role as manager of the TBI Pathway of Care, DVBIC performs important functions as a key member of numerous executive committees, working groups and other TBI-related professional entities. In 2016, DVBIC participated in a leadership capacity in the following: TBI End Points Development Initiative, Chronic Effects of Neurotrauma Consortium, Committee on Surgical Combat Casualty Care, Neurotrauma Steering Committee, Brain Trauma Evidence-Based Consortium, Non-Invasive Neuro-assessment Devices Integrated Project Team, and capability-based assessment integrated project teams for Joint Program Committee-5 and Joint Program Committee-8.

2016 also marked the sunset of the Neurocognitive Assessment Implementation Work Group (NAIWWG), a chartered working group led by DVBIC and dedicated to tracking progress on Automated Neuropsychological Assessment Metrics (ANAM) testing before deployment. Launched in 2013, NAIWG finally reached all of its goals in 2016. Although ongoing needs persist for tracking deployment-related cognitive testing, NAIWG transferred responsibility to the TAC since both groups include the same members.

15-Year Studies

Researchers at the DVBIC network site at Walter Reed National Military Medical Center (WRNMMC) are leading a set of longitudinal studies on TBI in service members and veterans who served in Operation Enduring Freedom and Operation Iraqi Freedom, as well as the impact of TBI on their families. Under the umbrella name of “the 15-year studies,” several studies launched in 2010 and are conducted in collaboration with the Center for Neuroscience and Regenerative Medicine, VA and other DVBIC sites.

The goals of these projects include developing a data repository of clinical and health data and bio specimens collected from injured and non-injured service members, documenting long-term outcomes over the course of 15 years to improve understanding of TBI in a military cohort, investigating the effects of caring for a service member with TBI on the caregiver’s health and well-being, and examining the effects of the TBI on the health and behavior of service members’ children.

Since 2010, researchers working on the 15-year studies have published 62 peer-reviewed manuscripts and 112 abstracts and presented 134 conference talks and posters. The findings from these publications and presentations contributed to the Year 7 Report to Congress submitted to DVBIC senior leadership for review in November 2016 prior to delivery to Congress in 2017. During 2016, the longitudinal family caregiver study underwent an expansion in scope and integrated four of the new TBI-care quality-of-life short forms. The natural history study started analyses with blood from intensive clinical evaluations looking at tau and amyloid-beta 42. As of December 2016, the natural history study had 1147 participants actively enrolled and the family caregiver study had 300. While some study procedures were paused due to staffing challenges this year, the break provided an opportunity to refine procedures, tackle a backlog of referrals and analyze existing data for conference presentations.

A Head for the Future

A Head for the Future is DVBIC’s TBI awareness initiative. A Head for the Future provides resources to help the military community prevent, recognize and recover from TBI. In 2016, A Head for the Future expanded its social media reach, collaborated with other TBI stakeholders and developed a variety of educational products, including public service announcements. Among its 2016 accomplishments, A Head for the Future:

- Exceeded 2.8 million Facebook page interactions with over 230,000 TBI Champion video views and 65,000 “likes”
- Reached over 3.5 million Twitter users, including 3,900 followers and over 163,000 videos views
- Collaborated with Centers for Disease Control and Prevention’s HEADS UP campaign to publish a joint blog on Huffington Post on Veterans Day 2016
- Participated in the Hidden Heroes campaign launch sponsored by the Elizabeth Dole Foundation
- Participated in Office of Warrior Care Policy Facebook Townhall to address questions regarding resources available for wounded warriors. The event reached more than 8,300 users and was engaged over 490 times.
- Published 11 TBI champion videos, shot six additional videos, and launched three public service announcements. The public service announcements ran on Armed Forces Network channels and DHHQ, with the A Head for the Future logo and brand, 14 to 42 times a week, reaching over 300,000 service members.

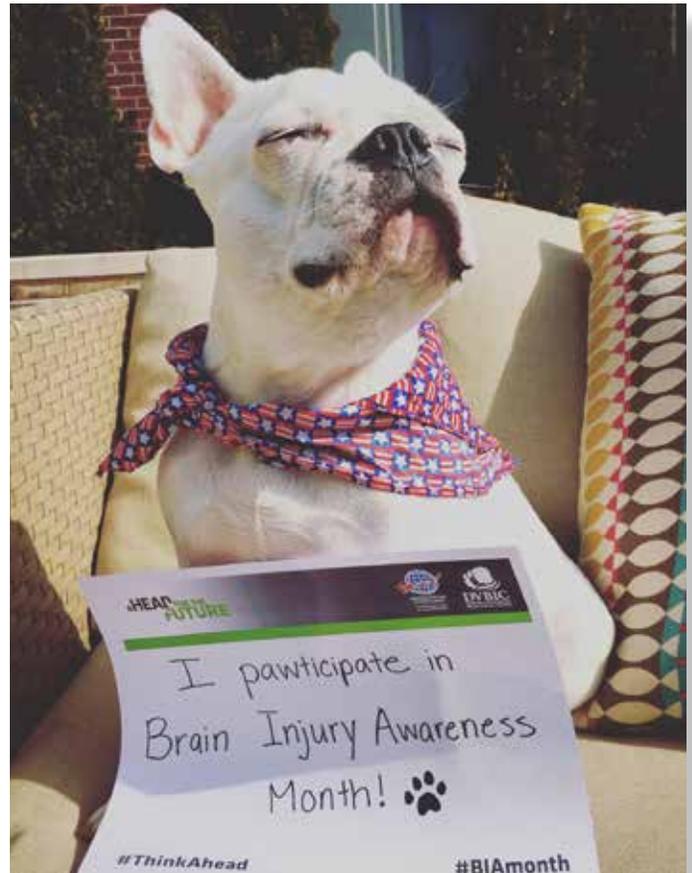
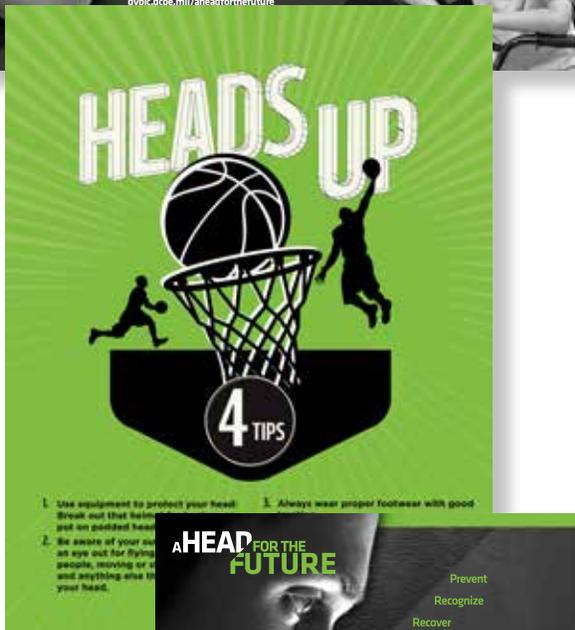
■ Secured news coverage including:

- “A Head for the Future initiative Raises Awareness of Traumatic Brain Injury Among Service Members” — Quantico Sentry, Quantico VA http://www.quanticosentryonline.com/news/article_91d66458-ce66-11e5-849d-6b1607dd7cc2.html
- “Veteran and Service Dog Sharing Message about Brain Injury, PTSD” — Las Vegas-Review Journal, Las Vegas NV <http://www.reviewjournal.com/life/health/henderson-veteran-service-dog-sharing-message-about-brain-injury-ptsd>

Brain Injury Awareness Month

March is nationally recognized as Brain Injury Awareness Month (BIAM). Every year, DVBIC collaborates with the TBI program directors of the Army, Navy, Marine Corps, and Air Force, as well as the VA on TBI educational efforts for this annual, month-long spotlight on TBI. The theme for BIAM 2016 was THINK AHEAD: Be Safe, Know the Signs, and Get Help. During BIAM 2016, the DVBIC network:

- Conducted 481 education, outreach and training events related to TBI, reaching a total audience of over 99,303 stakeholders (a 58 percent increase over BIAM 2015)
- Conducted a satellite media tour consisting of 14 television interviews and 10 radio interviews resulting in over 338,000 television interview impressions and over 5.3 million radio interview impressions
- Participated in Brain Injury Awareness Day on Capitol Hill on March 16, which included the Brain Injury Health Fair and the “Concussion: It’s Not Just a Concussion” panel presentation



DVBIC led a social media campaign during Brain Injury Awareness Month encouraging people to share supportive messages using the hashtag #ThinkAhead. (Photo by DVBIC social media follower)

In-Person Education Events

Regional education coordinators (RECs) across the DVBIC network completed 4,419 events, thereby providing TBI education and outreach to over 359,000 providers, service members, family members and veterans. RECs provided 297 in-person training briefings to 14,120 service members and military and civilian health care providers. They also disseminated approximately 350,000 hard copy TBI educational resources, including approximately 5,000 products in-theater.



DVBIC staff at San Antonio Military Medical Center shared educational materials at veterans “Welcome Home” event. (Photo by SAMMC staff)

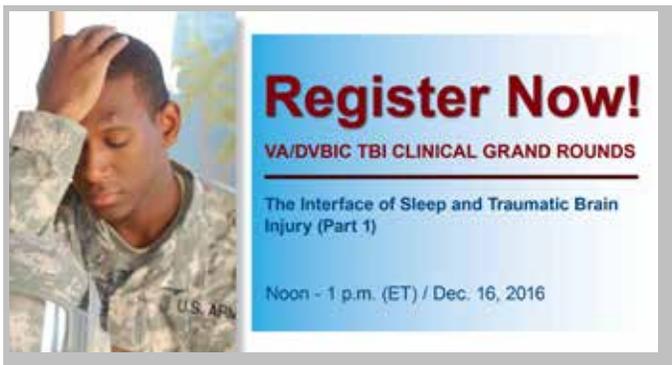
Online Training and Information

The Education Division produced 10 monthly TBI webinars and four VA/DVBIC Clinical Grand Rounds presentations, training a total of approximately 3,775 military, VA and civilian health care providers. Presentations for the TBI webinar series included:

- Do Head Injuries Cause Chronic Traumatic Encephalopathy (CTE)?
- Concussion and Winter Sports
- Management of Sleep Disturbances Following Concussion
- Management of Headache Following Concussion/ Mild TBI: Guidance for Primary Care Management in Deployed and Non-Deployed Settings
- Cognitive Rehabilitation in Mild Traumatic Brain Injury: Applications in Military Service Members and Veterans
- Using the Performance Triad for Optimal Brain Injury Recovery
- Animal-Assisted Therapy: An Alternative Treatment for Traumatic Brain Injury Rehabilitation
- Unique Perspective for Women with Traumatic Brain Injury: Gender Differences and Coping Strategies
- Advancement of Traumatic Brain Injury Research and Clinical Care in the Department of Defense
- Return to Duty Following Mild TBI: Lessons Learned from Sports Concussion Management

Presentations in the VA/DVBIC Clinical Grand Rounds quarterly series included:

- Using Technology to Help Students with TBI Transition from College to Employment
- The VA/DoD Clinical Practice Guideline for the Management of Concussion/Mild Traumatic Brain Injury
- Creative Arts Therapy and Mind-Body Medicine for Service Members with Traumatic Brain Injury
- The Interface of Sleep and Traumatic Brain Injury



DVBIC hosted a quarterly series of “Grand Rounds” presentations for clinicians.



Colonel Geoffrey Grammer, DVBIC national director, presented the Deborah L. Warden Lectureship Award to Dr. Louis French. (DVBIC photo by Carlson Gray)

The Deborah L. Warden Lectureship Award

Dr. Louis French received the 2016 Deborah L. Warden Lectureship Award. French is a clinical psychologist and deputy director of operations at the National Intrepid Center of Excellence at Walter Reed National Military Medical Center.

The award is dedicated to Dr. Deborah Warden, a neurology professor and former national director of DVBIC. It is presented annually to professionals who have exhibited outstanding devotion, guidance and commitment to medical science, clinical care and the well-being of TBI patients.



Dr. Deborah L. Warden, former DVBIC national director, attended the award ceremony named in her honor. (DVBIC photo by Carlson Gray)

The screenshot shows the DVBIC Facebook page interface. The top navigation bar includes 'Like', 'Share', 'Suggest to like', and 'Send Message'. The page header identifies the organization as 'DVBIC - Defense and Veterans Brain Injury Center' with a December 8, 2016 timestamp. The main content area features three posts:

- Post 1:** A text-based announcement about the recent loss of a TBI and PTSD advocate, Luis Carlos Montalván, who died at 43. It includes a link to a New York Times article and a video thumbnail of Montalván speaking at a podium.
- Post 2:** A video post titled 'A Head for the Future TBI Champion Luis Carlos Montalván' with a YouTube thumbnail showing Montalván in a military uniform.
- Post 3:** A text-based announcement for a new podcast episode of 'The TBI Family' titled 'Balance and Mantras', with a SoundCloud thumbnail.

The right-hand sidebar contains a 'Government Organization' profile card for DVBIC, showing 2,515 likes and contact information. Below this are links to other related organizations like 'DOE - Defense Centers of Excellence' and 'U.S. Army Fort Carson'.

DVBIC was active on social media throughout 2016



DVBIC photos by Carlson Gray

National Meeting

Held in September 2016 at DVBIC headquarters in Silver Spring, Maryland, the DVBIC National Meeting brought together staff members from across DVBIC network sites for the first time in five years. Site directors, senior clinical research directors and leadership from DVBIC headquarters discussed strategy, research priorities and new processes for the network.



DVBIC leadership and division directors led a panel at the national meeting to address questions from network staff.



DVBIC staff participated in numerous working group sessions during the national meeting.



DVBIC staff members participated in a working group during the national meeting.

Interaction among staff across divisions created many opportunities to help inform work over the next year. Session topics included, but were not limited to: leadership priorities, division overviews, site director brainstorming, the Human Research Protection Program, policy and procedure gaps, role of the public affairs office, network site needs, and education initiatives. Most sessions concluded with due outs for leadership and staff to conduct following the meeting. Due outs included, but were not limited to:

- Develop site director orientation book with information on role, policies and procedures
- Devote more time on monthly national and research calls to resolve obstacles to multisite studies
- Identify a platform for sharing information and a discussion forum
- Provide information or policies about when and what type of support agreement is needed



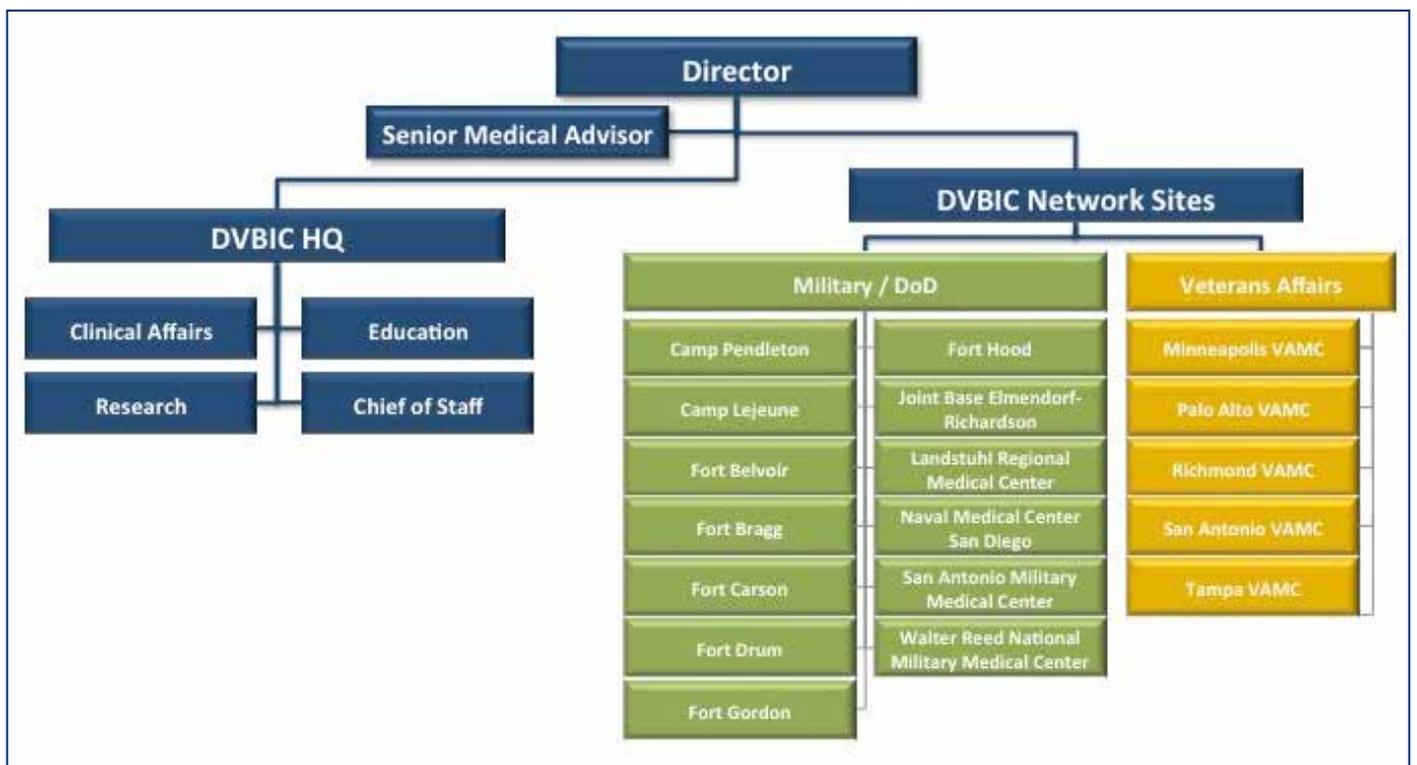
Samantha L. Finstad, Ph.D. was DVBIC's strategy, plans, and programs chief and acting communications and technology chief. She played a key role in organizing the national meeting.



Karen A. Schwab, Ph.D., has contributed significantly to DVBIC research since in 1992.

Network Site Updates

A DVBIC network site is a collaborative relationship between DVBIC and a military treatment facility or VA medical center. Each DVBIC network site conducts clinical research; educates service members, medical personnel and caregivers; and consolidates and reports DoD and VA TBI-related incidence and prevalence data. Network sites sign a support agreement with DVBIC. The network site and DVBIC both provide resources, including facilities, equipment and personnel. In 2016, DVBIC added three new network sites: Fort Drum, Fort Gordon and the San Antonio VAMC (see page 8).



Partnerships with military training facilities and VA medical centers are integral to DVBIC.

Camp Lejeune



Navy Captain Thomas Johnson, pictured here, served as the DVBIC site director at Camp Lejeune. (Photo by Camp Lejeune staff)

The Intrepid Spirit Concussion Recovery Center at Naval Hospital Camp Lejeune concluded the year with new research studies on the effects of repetitive low-level blast exposure, relaxation training, acupuncture for treatment of TBI-related headaches, and neuroendocrine, genetic and epigenetic correlates in cognitive assessment. Research agreements supported this active research agenda with East Carolina University, University of California, Irvine, Wayne State University, Princeton University, Chatham University, as well as the Syracuse VA Medical Center.

The number of poster presentations by DVBIC staff at professional conferences grew by 60 in 2016. These presentations reached a wide audience at prestigious gatherings in the U.S. such as the Military Health System Research Symposium. DVBIC staff members from Camp Lejeune also presented at conferences in Chile and Puerto Rico, conducted a webinar on Camp Lejeune Intrepid Spirit's "Return to School" program at the DCoE Summit in September, and created a "battlebook" to inform special operations patients about the Intrepid Spirit Center at Camp Lejeune. The outreach to special operations proved successful in increasing clinic referrals.

Camp Pendleton



Keith Steussi, M.D., served as DVBIC medical director at Camp Pendleton. (DVBIC photo by Carlson Gray)

DVBIC Camp Pendleton conducts TBI research with a particular emphasis on investigating the short and long-term effects of blast exposure. In 2016, DVBIC researchers completed the study entitled "Neurocognitive Assessment of Blast Exposure Sequelae in Training (NC-BEST Study)." This study examined the effects of repetitive low-level

blast exposure on service members, provided new information pertaining to blast exposure from shoulder-mounted rocket launchers (a common anti-tank weapon for our military), and assessed concerns of potential neurological consequences.

DVBIC staff at Camp Pendleton initiated a study entitled "Investigating the Neurologic Effects of Training Associated Blast (I-TAB Study)." This study offered a unique approach to investigating neurotrauma from combat training operations. The study examined advanced assessment techniques to include processing of blood biomarkers, audiology, neurotologic and neurophysiologic diagnostics, and transcranial Doppler imaging all in remote settings. Two custom designed trailers allowed for private assessment rooms, freezers for biologics, centrifuges, and high powered generators capable of traversing remote terrains and maintaining full functionality. The trailers debuted in October of 2016.

Fort Belvoir

DVBIC researchers made significant progress initiating multiple research studies by receiving institutional review board approval and starting patient recruitment. "The Chronic Effects of Neurotrauma Consortium" is the largest of the studies that started recruiting in 2016. DVBIC staff members were also invited to three international conferences to present on models of stress and TBI, Fort Belvoir's university model clinical program, and other topics.

This year marked the first full year of the university model program. This new program helped patients "graduate" from active treatment to significant functional gains in their duties as service members, family members and citizens. The recovery support specialist integrated new standardized protocols, procedures and policies for data entry into the Wounded, Ill and Injured Registry to strengthen outcomes for TBI health care delivery across the continuum of care.

In 2016, the regional education coordinator at Fort Belvoir provided TBI outreach and DVBIC materials to over 7,600 individuals (providers, service members, veterans, caregivers, military families and stakeholders). Additionally, the regional education coordinator focused on caregiver peer education; concussion education, prevention and helmet use to military children; and the dissemination of DVBIC resources and education to Fort Belvoir Community Hospital Behavioral and Mental Health medical residents. Outreach efforts included regional site visits to military treatment facilities and VA polytrauma centers, the National Capitol Regions Chaplain Association, and the National Museum of Health and Medicine. The regional education coordinator was also invited to co-teach a new TBI course with providers at the TBI clinic.

Fort Bragg

The Intrepid Spirit Center at Womack Army Medical Center opened in January 2016 with a ribbon cutting ceremony in March attended by Col. Grammer and many other dignitaries. As part of the event, DVBIC subject matter experts gave talks on chronic traumatic encephalopathy and posttraumatic headache.

The research team authored or co-authored six peer-reviewed publications, submitted five other manuscripts, and presented 11 posters at professional conferences. Throughout the year, DVBIC researchers were involved in multiple active research studies, developed protocols to begin at least three new studies in the next year and collaborated on two grant proposals.

The recovery support specialist facilitated adding TBI services to the NCServes–RDU/Fayetteville network, a component of AmericaServes. The regional education coordinator began giving regular TBI education sessions to the Fort Bragg Reception Company newcomers brief, the new provider orientation at Womack Army Medical Center, and the Drop Zone Medical Officers Brief. The REC also joined the Installation Prevention Team and Me Too Program at Fort Bragg.

Fort Carson



Robin Cornwell, Ph.D., a DVBIC research scientist at Fort Carson, explained her research interests during the national meeting. (DVBIC photo by Carlson Gray)

Researchers at DVBIC Fort Carson continued to enroll service members and veterans in a neurofeedback study funded by the Telemedicine and Advanced

Technology Research Center (TATRC), an office of the U.S. Army Medical Research and Materiel Command. TATRC supports studies that address gaps in military medical research through technology. The neurofeedback study tests a non-invasive novel treatment option for TBI. DVBIC took possession of the Outcomes Assessment Center, an off-post facility with equipment for vestibular, auditory and ocular-motor research. The regional education coordinator continued to brief soldiers deploying from, and returning to, Fort Carson and partnered with Evans Army Community Hospital to secure additional TBI training for all medical providers.

Fort Drum

The TBI Clinic at Fort Drum, which launched in December 2016, is the newest DVBIC network site. Major (Dr.) Thaddeus Pajak serves as the DVBIC site director. Rebecca S. Newton serves as TBI program director. “The DVBIC regional education coordinator joining our team will help the soldiers and family members of the 10th Mountain Division have a better understanding of prevention and treatment of traumatic brain injury,” Newton said. “We are excited for her to join our team!”

Fort Drum provides comprehensive TBI care and recovery support to soldiers and family members of the 10th Mountain Division. Clinic staff includes a primary care physician, neurologist, psychologist, speech pathologist, social worker, occupational therapist, physical therapist. Some of the unique services offered are Botox injections for migraines, alpha stimulation for reduction of headaches, and visual perception training.

Fort Gordon

Launched in 2016, the DVBIC site at Fort Gordon is co-located with the Neuroscience and Rehabilitation Center at the Dwight D. Eisenhower Army Medical Center (DDEAMC). The Neuroscience and Rehabilitation Center integrates the TBI clinic and neurology services. DDEAMC’s TBI clinic was the first program to be awarded full validation as a Category 1 TBI Center in accordance with the Office of the Surgeon General’s Proponency for Rehabilitation and Reintegration.

Treatment at this site encompasses a myriad of patient-centered approaches including medical management of symptoms, psychotherapy, education, cognitive rehabilitation, occupational and physical therapies, interdisciplinary pain management, biofeedback, acupuncture, yoga, mind-body medicine approaches, substance abuse services and recreational outings. Treatment also includes options to address the most common comorbidities (e.g., PTSD, pain, sleep disorders, substance abuse). DVBIC Fort Gordon offers a three-week multidisciplinary intensive outpatient program which includes post-concussive symptom management, neuropsychological screening and comprehensive testing, Automated Neuropsychological Assessment Metrics (ANAM-IV), pre-deployment baseline cognitive testing, driving simulator training and evaluation, and encephalogram studies.

Close collaborations with other programs at DDEAMC bolster the Fort Gordon DVBIC site and Neuroscience and Rehabilitation Center capabilities. Collaborators include the Residential Treatment Facility (a 28-day inpatient substance abuse program), Interdisciplinary Pain Management Center and Outpatient Behavioral Health Service (including interventional psychiatry via transcranial magnetic stimulation). Fort Gordon also serves as the host for the Regional Health Command-Atlantic Virtual Behavioral Health Hub.

Fort Hood



Edison Wong, M.D., DVBIC senior clinical research director at Fort Hood, posed for a photo at the national meeting. (DVBIC photo by Carlson Gray)

Working extensively on the posttraumatic headache CR study, the DVBIC Fort Hood team developed protocols, managed institutional review board submissions, recruited providers, and cultivated relationships with Fort Hood clinics, Fort Bliss, the Uniformed Services University of the Health Sciences, and other DVBIC sites. In collaboration with researchers at the new Carl R. Darnall Medical Center (CRDAMC), the DVBIC team also developed a research consortium to bring together researchers on post for a forum to discuss research efforts across the post and Army wide.

The DVBIC recovery support specialist and regional education coordinator participated in the 42nd Annual Retiree Fair at the CRDAMC and collaborated with the Army Wounded Warrior Program to introduce veterans to Defense Department TBI and support services at CRDAMC. The clinical team provided clinical support at the TBI clinic at the Intrepid Spirit Center to include the following programs: intensive outpatient sessions, psychiatric specialty care in pain management, coverage for primary care management of TBI, and development of the pain management section at the Intrepid Spirit Center.

Joint Base Elmendorf-Richardson

The Joint Base Elmendorf-Richardson (JBER) Mild Traumatic Brain Injury Clinic is DVBIC's sole Air Force-based TBI facility. JBER's population includes more than 50,000 Alaska-based service members and dependents and approximately 73,000 veterans. The clinic led the base-wide Automatic Neuropsychological Assessment Metric, known as ANAM, screening 673 service members and civilians prior to deployment.

The Recovery Support Program network assisted more than 60 service members and veterans and worked with their family members during their care transition throughout the year from JBER. The regional education coordinator reached more than 25,000 Alaska and Hawaii-based service members, veterans, family members, medical and mental health providers, education professionals and community organizations, sharing information about TBI prevention, screening and care.

To provide optimum service to its stakeholders, DVBIC JBER continued to increase collaboration with other medical and complementary care professionals. JBER is one of five DoD sites chosen by the National Endowment for the Arts to assist in adding art and music therapy services beginning in 2017.

Landstuhl

The Regional Health Command Europe, DVBIC Landstuhl site became fully operational in 2016 with the addition of the senior clinical research director, regional program manager, regional education coordinator and recovery support specialist in place. DVBIC staff members aggressively met stakeholder expectations for recovery support service coordination and research development across the region. Notably, the senior clinical research director implemented full TBI data portal utilization across Europe for tracking TBI health outcome metrics. With the recent advent of the new regional education coordinator, DVBIC Landstuhl anticipates achieving the same success with educational activities.

Minneapolis VA

DVBIC staff collaborated with VA research staff on two separate studies reviewing the use of deep transcranial magnetic stimulation for treatment of mild depression and alcohol use disorder. Studies on longitudinal neurodegeneration and cognitive control continued to recruit, screen and conduct follow-up at the Minneapolis VA location. A study on visual sensory impairment and progression following mild TBI started collecting data in 2016, and a study on retinal imaging with adaptive optics for early diagnosis in TBI was proposed and will begin in early 2017. The regional education coordinator remained actively involved with the polytrauma center staff and helped with the development of a future study investigating acupuncture in the polytrauma population.

Naval Medical Center San Diego



Lars Hungerford, Ph.D., DVBIC senior clinical research director at Naval Medical Center San Diego, participated in a working group session at the national meeting. (DVBIC photo by Carlson Gray)

DVBIC at Naval Medical Center San Diego (NMCSD) works collaboratively with the Office of Neurotrauma at NAVMED West and TBI Clinical Services at NMCSD to provide improved access to care for service members. DVBIC at NMCSD also conducts state-of-the-science research aimed at improving care for service members with TBI. The 2016 clinical research portfolio included studies examining short-term and long-term outcomes after TBI for patients and caregivers, evaluating

advanced technologies for assessment and rehabilitation of TBI — such as mobile eye tracking, EEG, and virtual reality — and investigating the real-world implementation and impact of clinical practice guidelines for progressive return to activity after TBI.

DVBIC coordinated care for TBI patients and provided extensive educational services. For example, DVBIC initiated a far-reaching “TBI Roadshow” to provide a face-to-face introduction to the NMCS D TBI Evaluation Clinic and DVBIC as well as introduce and disseminate available resources for TBI referrals, education and treatment. The regional education coordinator facilitated 135 education and training events reaching over 17,397 stakeholders. The Third Annual TBI Symposium at NMCS D, a high-level event targeting providers, was well attended and highly praised.

Palo Alto VA

The unique collaboration developed by DVBIC Palo Alto’s clinical investigative research program working in tandem with the VA Palo Alto Health Care System (VAPAHCS) and Stanford University made possible the implementation of local and multi-center TBI studies in active duty and veteran groups. The DVBIC Palo Alto research program helped initiate a new VA Office of Academic Affairs Polytrauma System of Care (PSC) Research Fellowship program due to begin in 2017. Further, DVBIC Palo Alto researchers formed a multidisciplinary Rehabilitation Research Committee within the VA. Going forward, this committee will leverage the combined expertise, interests and resources from DVBIC, the polytrauma system of care, spinal cord injury, assistive technology, and vision rehabilitation to develop new lines of research, expand ongoing interests, and forge new collaborations and relationships.

This year, the regional education coordinator focused on supporting PSC clinical providers in their education and supporting community stakeholders in a variety of settings. Looking ahead to 2017, the regional education coordinator plans to expand education outreach to PSC and DVBIC researchers and study participants in an effort to improve on-site research awareness and recruitment.

Richmond VA



DVBIC regional education coordinator Randy Gross talks with a service member about TBI. (Photo by Richmond VA staff)

The DVBIC research team at McGuire Veterans Affairs Medical Center published four manuscripts and delivered five presentations using DVBIC study data in 2016. The team also contributed to several grant applications to the Commonwealth Neurotrauma Fund and Congressionally Directed Medical Research Programs. Additionally, over the past year, enrollment across Richmond longitudinal studies surpassed 1,000. Satellite media tours coordinated by DVBIC HQ were conducted on January 11 and February 26, 2016, with DVBIC’s deputy director and the Richmond regional education coordinator.

San Antonio Military Medical Center



The DVBIC REC at the San Antonio Military Medical Center shared information about TBI at a veterans “Welcome Home” event. (DVBIC photo)

In 2016, the recovery support specialist completed over 300 encounters with service members and veterans recovering

from TBI and developed new contacts with 26 supportive service organizations in the region. The regional education coordinator provided clinical education support to nearly 1,800 providers and conducted education outreach to over 5,300 service members, veterans, and families through presentations and community outreach.

Researchers published three peer-reviewed journal articles, two book chapters, and five abstracts and gave 11 presentations at national meetings based on the SCORE study of cognitive rehabilitation. Researchers also submitted a grant proposal on complex TBI for funding to Joint Program Committee-8/ Clinical and Rehabilitative Medicine Research Program, developed a return-to-driving study in collaboration with the BAMC Brain Injury Rehabilitation Service, administered an online survey of TBI education to a sample of Army primary care providers, and received administrative and financial support from the BAMC Division of Clinical Investigation for a DVBIC-led epigenetic study of TBI.

San Antonio VA

The Audie L. Murphy Memorial Veterans Hospital (ALMMVH) is a quaternary care facility affiliated with the University of Texas Health Science Center at San Antonio. Comprehensive health care is provided through acute medical, surgical, mental health, physical medicine, rehabilitation, geriatric and primary care services. Attached to ALMMVH, the San Antonio Polytrauma Rehabilitation Center (PRC) is the newest of five facilities in the country designed to provide intensive rehabilitative care to veterans and service members with severe injuries (including brain injuries) to more than one organ system. In late 2016, DVBIC partnered with the San Antonio PRC to enhance research efforts.

Tampa VA

DVBIC staff members formed a partnership with MacDill AFB, allowing DVBIC research psychologists to see active-duty patients outside of the VA setting, providing convenience for patients and increasing patient involvement in local research opportunities. The regional education coordinator facilitated a series of “Lunch & Learn” events at MacDill AFB, educating the public on various aspects of TBI and offering continuing medical education credits for medical providers. DVBIC is also part of the curriculum presented at the Senior Enlisted Academy portion of the Joint Special Operations University with Special Operations Command.

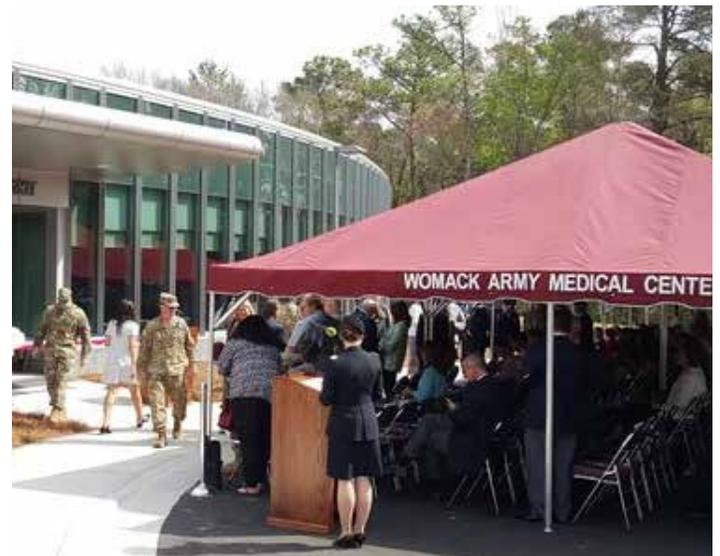
Several longitudinal studies on TBI continued to enroll subjects and gather data at the Tampa VA. DVBIC staff, in partnership with the VA, presented the Smart Home project at the VA Brain Trust InnoVation meeting in Washington, D.C. The team placed third out of over 100 submissions and received recognition directly from the Secretary of the VA.

Walter Reed National Military Medical Center

2016 continued to see the evolution of the National Intrepid Center of Excellence (NICoE) as a directorate of Walter Reed National Military Medical Center (WRNMMC) and as a key component within the MHS’s TBI Pathway of Care. NICoE’s clinical operations department focused efforts on maturing the integration of the DVBIC outpatient clinic with the NICoE legacy four-week Intensive Outpatient Program. Through these efforts, the portfolio of care options spans the full scope of TBI treatment and has enhanced each patient’s ability to access a wide variety of holistic services under one roof. The Brain Fitness Center also continued its successful growth this year.

In addition to the 15-year studies WRNMMC research that supports clinical care passed a milestone in August 2016 with the submission of an analysis plan for its longitudinal database to the intuitional review board. This protocol was submitted with several internal collaborators (departments of gynecologic-oncology and neuro-oncology and the National Military Audiology and Speech Pathology Center) as well outside collaborators (Fort Belvoir Community Hospital, University of British Columbia’s Division of Physical Medicine and Rehabilitation, and Wisconsin VA). This wide ranging collaboration is expected to yield important answers about the treatment of cognitive dysfunction in military and veteran populations.

In November 2016, Dr. Lou French, DVBIC site director at WRNMMC, received the 8th annual Dr. Deborah L. Warden Lectureship Award. Warden succeeded Dr. Andres M. Salazar as the second DVBIC national director. The award honors outstanding contributions in the field of TBI research. The lectureship event was held at NICoE.



The Fort Bragg TBI community celebrates the opening of the new Intrepid Spirit Center. (DVBIC photo)



Photo by DVBIC Fort Bragg Intrepid Spirit Center Staff

External Partnerships

DVBIC relies on different types of partnerships to carry out its mission. Partnership types include relationships integral to DVBIC's structure, such as the network sites, as well as military, government and civilian stakeholder entities. Across the spectrum, partnerships encourage effective collaboration, drive proactive stakeholder engagement, enhance efficiency, and improve the impact of DVBIC research, educational and clinical initiatives.

In addition to the network sites, DVBIC partners with other federal agencies, academic institutions and non-profits to support its mission. These organizations serve similar stakeholders or provide similar services to DVBIC. Many of these organizations collaborate on research protocols, conduct outreach to those impacted by TBI, or serve those impacted by TBI.

In 2016, DVBIC conducted an assessment of its partnerships. The assessment determined that DVBIC's partnership goal should be to establish a standardized, measurable, and sustainable partnership program to identify and facilitate collaborative, mutually beneficial partnerships that support DVBIC's ability to accomplish its mission. To achieve this, DVBIC outlined objectives and activities for each of its divisions. As DVBIC's partnership program matures, additional objectives and metrics will be defined and assessed through ongoing reviews of the program.

The table lists key partner organizations in 2016. It reflects the scope of DVBIC’s partnerships but does not include all partners

Government, Military and Nonprofit Organizations

Armed Forces Health Surveillance Center	Center for Neuroscience and Regenerative Medicine (CNRM)	Centers of Excellence Research Directorates, Office of the Assistant Secretary of Defense for Research & Engineering	Centers for Disease Control and Prevention
Chronic Effects of Neurotrauma Consortium	Elizabeth Dole Foundation	Federal Recovery Coordination Program	Fort Bliss Intrepid Spirit, Fort Bliss TX
Fort Campbell, KY	Joint Base Lewis-McChord Tacoma, WA	Joint Program Committee 5 (Military Operational Medicine Research Program)	Joint Program Committee 6 (Combat Casualty Care Research Program)
Joint Program Committee 8 (Clinical and Rehabilitative Medicine Research Program)	MacDill Air Force Base, Tampa, FL	National Collegiate Athletic Association	National Football League
National Institute of Neurological Disorders and Stroke	National Institute on Disability, Independent Living, and Rehabilitation Research	National Intrepid Center of Excellence	One Mind
Rosalynn Carter Institute for Caregiving	TBI End Points Development (TED) Government Steering Committee	TBI Model Systems Program	Transforming Research and Clinical Knowledge in TBI
U.S. Army Aeromedical Research Laboratory	U.S. Coast Guard		

University Partners

Dartmouth College	Georgetown University	Harvard Medical School	Institute of Soldier Nanotechnologies at MIT
University of California, San Diego	University of Pennsylvania	University of Pittsburgh	Uniformed Services University of the Health Sciences
Virginia Commonwealth University			

Publications

Since 1992, DVBIC subject matter experts have published more than 400 peer-reviewed manuscripts. In 2016, they served on the editorial boards of the *Journal of Neurotrauma* and *Journal of Head Trauma Rehabilitation* and published the peer-reviewed papers listed below. As indicated, some papers were published online in 2016 ahead of subsequent print publication:

Allan, A. C., Edmed, S. L., Sullivan, K. A., Karlsson, L. J., Lange, R. T., & Smith, S. S. (2017). Actigraphically measured sleep-wake behavior after mild traumatic brain injury. *Journal of Head Trauma Rehabilitation*, 32(2). Advance online publication March 2016. doi:10.1097/htr.0000000000000222

Armistead-Jehle, P., Cooper, D., & Vanderploeg, R. (2016). The role of performance validity tests in the assessment of cognitive functioning after military concussion: A replication and extension. *Applied Neuropsychology: Adult*, 23(4), 264-273. <http://dx.doi.org/10.1080/23279095.2015.1055564>

Bailie, J. M., Kennedy, J. E., French, L. M., Marshall, K., Prokhorenko, O., Asmussen, S., . . . Lange, R. T. (2016). Profile analysis of the neurobehavioral and psychiatric symptoms following combat-related mild traumatic brain injury. *Journal of Head Trauma Rehabilitation*, 31(1), 2-12. doi:10.1097/htr.0000000000000142

Belanger, H.G., Lange, R.T., . . . Bailie, J. (2016) Interpreting change on the neurobehavioral symptom inventory and the PTSD checklist in military personnel. *Journal of Clinical Neuropsychology*, 30(7), 1063-73.

Belanger, H. G., Vanderploeg, R. D., & Mcallister, T. (2016). Subconcussive blows to the head. *Journal of Head Trauma Rehabilitation*, 31(3), 159-166. doi:10.1097/htr.0000000000000138

Belanger, H.G., Vanderploeg, R.D. & Sayer, N. (2016). Screening for remote history of mild traumatic brain injury in VHA: A critical literature review. *Journal of Head Trauma Rehabilitation*, 31(3), 204-214.

Bell, K., Fann, J., Brockway, J., Cole, W., Bush, N., . . . and Temkin, N. (2016). Telephone problem solving for service members with mild traumatic brain injury: A randomized, clinical trial. *Journal of Neurotrauma*, 34(2), 313-321. <http://dx.doi.org/10.1089/neu.2016.4444>

Bjork, J. M., Burroughs, T. K., Franke, L. M., Pickett, T. C., Johns, S. E., Moeller, F. G., & Walker, W. C. (2016). Laboratory impulsivity and depression in blast-exposed military personnel with post-concussion syndrome. *Psychiatry Research*, 246, 321-325. doi:10.1016/j.psychres.2016.10.008

Brickell, T. A., Lippa, S. M., French, L. M., Kennedy, J. E., Bailie, J. M., & Lange, R. T. (2016). Female service members and symptom reporting after combat and non-combat-related mild traumatic brain injury. *Journal of Neurotrauma*, 34(2), 300-312. Advance online publication July 2016. doi:10.1089/neu.2016.4403

Carlozzi, N., Brickell, T., French, L., Sander, A., Kratz, A., & Tulsy, D. et al. (2016). Caring for our wounded warriors: A qualitative examination of health-related quality of life in caregivers of individuals with military-related traumatic brain injury. *Journal of Rehabilitation Research and Development*, 53(6), 669-680. <http://dx.doi.org/10.1682/jrrd.2015.07.0136>

Cole, W.R., Arrieux, J.P., Dennison, E.M. & Ivins, B.J. (2017). The impact of administration order in studies of computerized neurocognitive assessment tools (NCATs). Advance online publication October 2016. *Journal of Clinical Experimental Neuropsychology*. doi:10.1080/13803395.2016.1198470

Cooper, D. B., Bowles, A. O., Kennedy, J. E., Curtiss, G., French, L. M., Tate, D. F., & Vanderploeg, R. D. (2017). Cognitive rehabilitation for military service members with mild traumatic brain injury. *Journal of Head Trauma Rehabilitation*, 32(3). Advance online publication September 2016. doi:10.1097/htr.0000000000000254

Cripps, A.E. & Livingston, S. C. (2017). Differentiating concussion from intracranial pathology in athletes. *Journal of Sport Rehabilitation*, 26(1), 101-108. Advance online publication November 2016. doi:10.1123/jsr.2015.0043

Cripps, A.E., Livingston, S.C. & DeSantis B. (2016). The test-retest reliability and minimal detectable change of the sensory organization test and head-shake sensory organization test. *Journal of Sports Medicine and Allied Health Sciences*, 2(2), 1-10.

- Dretsch, M. N., Silverberg, N., Gardner, A. J., Panenka, W. J., Emmerich, T., Crynen, G., . . . Iverson, G. L. (2017). Genetics and other risk factors for past concussions in active-duty soldiers. *Journal of Neurotrauma*, 34(4), 869-875. Published online August 2016. doi:10.1089/neu.2016.4480
- Dretsch, M. N., Williams, K., Staver, T., Grammer, G., Bleiberg, J., Degraba, T., & Lange, R. T. (2016). Evaluating the clinical utility of the Validity-10 for detecting amplified symptom reporting for patients with mild traumatic brain injury and comorbid psychological health conditions. *Applied Neuropsychology: Adult*, 24(4), 376-380. doi:10.1080/23279095.2016.1220947
- Finkel, A. G., Yerry, J. A., Klaric, J. S., Ivins, B. J., Scher, A., & Choi, Y. S. (2016). Headache in military service members with a history of mild traumatic brain injury: A cohort study of diagnosis and classification. *Cephalalgia*, 37(6), 548-559. doi:10.1177/0333102416651285
- Franke, L. M., Walker, W. C., Hoke, K. W., & Wares, J. R. (2016). Distinction in EEG slow oscillations between chronic mild traumatic brain injury and PTSD. *International Journal of Psychophysiology*, 106, 21-29. doi:10.1016/j.ijpsycho.2016.05.010
- Gilmore, C. S., Camchong, J., Davenport, N. D., Nelson, N. W., Kardon, R. H., Lim, K. O., & Sponheim, S. R. (2016). Deficits in visual system functional connectivity after blast-related mild tbi are associated with injury severity and executive dysfunction. *Brain and Behavior*, 6(5). doi:10.1002/brb3.454
- Gilmore, C. S., Marquardt, C. A., Kang, S. S., & Sponheim, S. R. (2016). Reduced P3b brain response during sustained visual attention is associated with remote blast mTBI and current PTSD in U.S. military veterans. *Behavioural Brain Research*. doi:10.1016/j.bbr.2016.12.002
- Gregory, E., West, T.A. & Cole, W.R. (2016) Use of a multi-level mixed methods approach to study the effectiveness of a primary care progressive return to activity protocol after acute mild traumatic brain injury/concussion in the military. Published online ahead of print. *Contemporary Clinical Trials*. doi:10.1016/j.cct.2016.11.005
- Hinds, S. & Livingston, S.C. (2016). Traumatic brain injury clinical recommendations: Impact on care and lessons learned. *US Army Medical Department Journal*, Apr-Sep (2-16), 97-101.
- Holcomb, E. M., Schwartz, D. J., McCarthy, M., Thomas, B., Barnett, S. D., & Nakase-Richardson, R. (2016). Incidence, characterization, and predictors of sleep apnea in consecutive brain injury rehabilitation admissions. *Journal of Head Trauma Rehabilitation*, 31(2), 82-100. doi:10.1097/htr.0000000000000230
- Holcomb, E. M., Towns, S., Kamper, J. E., Barnett, S. D., Sherer, M., Evans, C., & Nakase-Richardson, R. (2016). The relationship between sleep-wake cycle disturbance and trajectory of cognitive recovery during acute traumatic brain injury. *Journal of Head Trauma Rehabilitation*, 31(2), 108-116. doi:10.1097/htr.0000000000000206
- Jonas, W., Bellanti, D., Paat, C., Boyd, C., Duncan, A., & Price, A. et al. (2016). A randomized exploratory study to evaluate two acupuncture methods for the treatment of headaches associated with traumatic brain injury. *Medical Acupuncture*, 28(3), 113-130. <http://dx.doi.org/10.1089/acu.2016.1183>
- Kamper, J., Garofano, J., Schwartz, D., Silva, M., Zeitzer, J., & Modarres, M. et al. (2016). Concordance of actigraphy with polysomnography in traumatic brain injury neurorehabilitation admissions. *Journal of Head Trauma Rehabilitation*, 31(2), 117-125. <http://dx.doi.org/10.1097/htr.0000000000000215>
- Lange, R., Brickell, T., Bailie, J., Tulsy, D., & French, L. (2016). Clinical utility and psychometric properties of the traumatic brain injury quality of life scale (TBI-QOL) in us military service members. *Journal of Head Trauma Rehabilitation*, 31(1), 62-78. <http://dx.doi.org/10.1097/htr.0000000000000149>
- Licon, N.E., Chung, J.S., Poole, J., Salerno, R.M., Laurensen, N. & Harris, O.A. (2016). Prospective tracking and analysis of traumatic brain injury in veterans and military personnel. *Archives of Physical Medicine Rehabilitation*. Published online ahead of print. doi:10.1016/j.apmr.2016.09.131
- Lippa, S. M., Axelrod, B. N., & Lange, R. T. (2016). The mild brain injury atypical symptoms (mBIAS) scale in a mixed clinical sample. *Journal of Clinical and Experimental Neuropsychology*, 38(7), 721-729. doi:10.1080/13803395.2016.1161732
- Lippa, S. M., Lange, R. T., Bailie, J. M., Kennedy, J. E., Brickell, T. A., & French, L. M. (2016). Utility of the Validity-10 scale across the recovery trajectory following traumatic brain injury. *Journal of Rehabilitation Research and Development*, 53(3), 379-390. doi:10.1682/jrrd.2015.01.0009
- Lippa, S., Lange, R., Bhagwat, A., & French, L. (2016). Clinical utility of embedded performance validity tests on the repeatable battery for the assessment of neuropsychological status (RBANS) following mild traumatic brain injury. *Applied Neuropsychology: Adult*, 24(1), 73-80. <http://dx.doi.org/10.1080/23279095.2015.1100617>
- Liu, Z., Dong, J., Zhao, X., Chen, X., Lippa, S. M., Caroselli, J. S., & Fang, X. (2016). Assessment of feigned cognitive impairment in severe traumatic brain injury patients with the forced-choice graphics memory test. *Brain and Behavior*, 6(12). doi:10.1002/brb3.593

- Marion, D., Lattimore, T., & Helmick, K. (2016). Military acute concussion evaluation screen in a civilian population. *Journal of Trauma and Acute Care Surgery*, 80(2), 351-352. <http://dx.doi.org/10.1097/ta.0000000000000906>
- O'Neil, M., Callahan, M., Carlson, K., Roost, M., Laman-Maharg, B., & Twamley, E. et al. (2016). Postconcussion symptoms reported by Operation Enduring Freedom/Operation Iraqi Freedom veterans with and without blast exposure, mild traumatic brain injury, and posttraumatic stress disorder. *Journal of Clinical and Experimental Neuropsychology*, 39(5), 449-458. <http://dx.doi.org/10.1080/13803395.2016.1232699>
- Pogoda, T. K., Stolzmann, K. L., Iverson, K. M., Baker, E., Krengel, M., Lew, H. L., . . . Meterko, M. (2016). Associations between traumatic brain injury, suspected psychiatric conditions, and unemployment in Operation Enduring Freedom/Operation Iraqi Freedom veterans. *Journal of Head Trauma Rehabilitation*, 31(3), 191-203. doi:10.1097/htr.0000000000000092
- Regasa, L. E., Thomas, D. M., Gill, R. S., Marion, D. W., & Ivins, B. J. (2016). Military deployment may increase the risk for traumatic brain injury following deployment. *Journal of Head Trauma Rehabilitation*, 31(1). doi:10.1097/htr.0000000000000155
- Schulz-Heik, R. J., Poole, J. H., Dahdah, M. N., Sullivan, C., Date, E. S., Salerno, R. M., . . . Harris, O. (2016). Long term outcomes after moderate-to-severe traumatic brain injury among military veterans: Successes and challenges. *Brain Injury*, 30(3), 271-279. doi:10.3109/02699052.2015.1113567
- Silverberg, N., Crane, P., Dams-O'Connor, K., Holdnack, J., Ivins, B., & Lange, R. et al. (2017). Developing a cognition endpoint for traumatic brain injury clinical trials. *Journal of Neurotrauma*, 34(2), 363-371. Advance online publication June 2016. <http://dx.doi.org/10.1089/neu.2016.4443>
- Tate, D. F., Wade, B. S., Velez, C. S., Drennon, A. M., Bolzenius, J., Gutman, B. A., . . . York, G. E. (2016). Volumetric and shape analyses of subcortical structures in United States service members with mild traumatic brain injury. *Journal of Neurology*, 263(10), 2065-2079. doi:10.1007/s00415-016-8236-7
- Towns, S., Zeitzer, J., Kamper, J., Holcomb, E., Silva, M., Schwartz, D., & Nakase-Richardson, R. (2016). Implementation of actigraphy in acute traumatic brain injury (TBI) neurorehabilitation admissions: A Veterans Administration TBI Model Systems feasibility study. *PM&R*, 8(11), 1046-1054. <http://dx.doi.org/10.1016/j.pmrj.2016.04.005>
- Toyinbo, P. A., Vanderploeg, R. D., Belanger, H. G., Spehar, A. M., Lapcevic, W. A., & Scott, S. G. (2016). a systems science approach to understanding polytrauma and blast-related injury: bayesian network model of data from a survey of the Florida National Guard. *American Journal of Epidemiology*, 185(2), 135-146. doi:10.1093/aje/kww074
- Toyinbo, P. A., Vanderploeg, R. D., Donnell, A. J., Mutolo, S. A., Cook, K. F., Kisala, P. A., & Tulsy, D. S. (2016). Development and initial validation of military deployment-related TBI quality-of-life item banks. *Journal of Head Trauma Rehabilitation*, 31(1), 52-61. doi:10.1097/htr.0000000000000089
- Walker, W. C., Carne, W., Franke, L. M., Nolen, T., Dikmen, S. D., Cifu, D. X., . . . Williams, R. (2016). The Chronic Effects of Neurotrauma Consortium (CENC) multi-centre observational study: Description of study and characteristics of early participants. *Brain Injury*, 30(12), 1469-1480. doi:10.1080/02699052.2016.1219061
- Walsh, D. V., Capó-Aponte, J. E., Beltran, T., Cole, W. R., Ballard, A., & Dumayas, J. Y. (2016). Assessment of the King-Devick® (KD) test for screening acute mTBI/concussion in warfighters. *Journal of the Neurological Sciences*, 370, 305-309. doi:10.1016/j.jns.2016.09.014
- Wickwire, E., Williams, S., Roth, T., Capaldi, V., Jaffe, M., & Moline, M. et al. (2016). Sleep, Sleep disorders, and mild traumatic brain injury. what we know and what we need to know: findings from a national working group. *Neurotherapeutics*, 13(2), 403-417. <http://dx.doi.org/10.1007/s13311-016-0429-3>



U.S. Air Force photo by Staff Sgt. Evelyn Chavez

Presentations

Throughout 2016, DVBIC subject matter experts presented at conferences hosted by both military and civilian professional organizations.

American Academy of Clinical Neuropsychology

Annual Meeting

June 2016 | Chicago, Illinois

- Armistead-Jehle P., Cooper, D.B., Grills, C.E., Cole, W., & Lippa, S.. Validation of the mild brain injury atypical symptoms scale (mBIAS) and NSI validity-10 in military service members.
- Brickell, T.A., French, L.M., Lange, R.T., Bailie, J., Sullivan, J., Thompson, D., Snelling, A., Kacmarek, C. & Lippa, S.M.A. The natural history of individual postconcussion symptoms from the acute/sub-acute recovery phase to one year following mild-moderate TBI: Part 2 of 2.
- Brickell, T.A., Lange, R.T., Lippa, S.M., Bailie, J., Gartner, R., Dilay, A., Driscoll, A., Wright, M. & French, L.M. Self-reported outcome 5-years following mild-moderate traumatic brain injury.
- French, L.M. & Lange, R.T. Does the validity-10 scale incorrectly identify symptom exaggeration when genuine distressing symptoms are endorsed?
- Lange, R.T., French, L.M., Brickell, T.A., Bailie, J. & Lippa, S.M. Cross-Sectional perspective of self-reported postconcussion symptoms across the first 10 years of the recovery trajectory following mild-moderate TBI.
- Lange, R.T., French, L.M., Lippa, S.M., Bailie, J., Pizzano, B., Johnson, L., Nora, D., Mahatan, H. & Brickell, T.A. Impact of mild-moderate tbi on health-related quality of life from one year to two years post-injury in u.s. military service members.
- Lippa, S.M., Brickell, T.A., French, L.M., Bailie, J., Sullivan, J., Thompson, D., Snelling, A., Kacmarek, C. & Lange, R.T. Longitudinal Comparison of postconcussion symptom status from the acute/sub-acute recovery phase to 1-year following mild-moderate TBI: Part 1 of 2.
- Lippa, S.M., Lange, R.T., Brickell, T.A., Bailie, J., Pizzano, B., Johnson, L., Nora, D., Mahatan, H., & French, L. The Relationship between symptom reporting in the acute care phase and neurobehavioral outcome 1-year following mild moderate traumatic brain injury.

American Congress of Rehabilitation Medicine

Annual Conference

November 2016 | Chicago, Illinois

- Cotner, B.A., Carlozzi, N., Lange, R.T., French, L.M., O'Connor, D.R., Nakase-Richardson, R., & Brickell, T.A. Influence of comorbidities of TBI on caregivers' quality of life: Case examples.

American Speech-Language-Hearing Association

Annual Convention

November 2016 | Philadelphia, Pennsylvania

This DVBIC session was one of the mostly highly rated and well attended sessions at this meeting.

- Eshel, I. Keeping up with concussion: Best practices and resources for SLPs.

Association of Military and Osteopathic Physicians

Annual Meeting

April 2016 | Philadelphia, Pennsylvania

2016 marked DVBIC's debut as an organization presenting at this meeting and the first military-specific provider conference for DVBIC in this research field. DVBIC was invited to return and present at future conventions.

- Stout, K., Ray, J. & Wong, K. Military TBI: DVBIC overview, MHS Pathway of Care and TBI 101.
- Stout, K., Ray, J. & Wong, K. Military TBI: Progressive return to activity, headache clinical recommendation and sleep clinical recommendation.

Deborah Warden Lectureship

November 2016 | National Intrepid Center of Excellence | Bethesda, MD

The Deborah L. Warden Lectureship is an award that honors Dr. Deborah L. Warden, DVBICs' national director from July 2001 to July 2007. Dr. Louis M. French received the 2016 award in recognition of his efforts to advance TBI clinical care and research within the MHS. French is the deputy director for operations at the National Intrepid Center of Excellence and director of the DVBIC network site at Walter Reed National Military Medical Center. The title of his presentation was "Advancement of Traumatic Brain Injury Research and Clinical Care in the Department of Defense."

Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury

Annual Summit

September 2016 | Silver Spring, Maryland

- Besterman-Dahan, K. Community reintegration in veterans with TBI.
- Bunner, A. & Bailie, J. Irritability, aggression, and anger after traumatic brain injury.
- Carlson, K., Pogoda, T. & Resnick, S. The provision of supported employment to veterans with TBI in the VHA.
- Chanpimol, S., Lisle, L. & Seamon, B. The TBI interdisciplinary fitness and social engagement (InFUSE) program: Development and initial outcomes.
- Davis, D. Development of a technology-based pilot program to prepare active duty service members to return to school.
- Dieter, J. & Engel, S. An interdisciplinary intensive outpatient program for treating TBI and associated disorders.
- Elias, E., Rumrill, P., & Hendricks, D. Project career: Using technology to help veteran college students with traumatic brain injury achieve academic and employment success.
- Jackson, J. Evaluation and management of auditory processing disorder in patients with PTSD and/or TBI.
- Jorgenson-Wagers, K., Tiede, J., Frankart, J., & McNary, S. Interdisciplinary outpatient program for special operators.
- Nelson-Schmitt, S., Brandler, B., & Guise, B. Neurocognitive driving rehabilitation in virtual environments (NeuroDRIVE): An adjunctive intervention for traumatic brain injury.
- Picon, L.P., Grammer, G.G., & DeGraba, T. 2016 Updates to the VA/DoD clinical practice guideline for the management of concussion/mTBI.
- Rhea, C., Kuznetsov, N., & Jakiela, J. Development of Composite measures using neuromotor and neurocognitive assessments to predict return-to-duty in post-concussive military personnel.

- Riechers, R. & Marion, D. Management of headache following TBI: Guidance for primary care management in deployed and non-deployed settings.
- Vaudreuil, R. & Bronson, H. Considerations of applied neurologic music therapy: Treatment of traumatic brain injury and psychological health in military populations.

International Brain Injury Association

Eleventh World Congress on Brain Injury
March 2016 | The Hague, Netherlands

In addition to the sessions listed below, DVBIC staff members presented a poster on computerized neurological assessment tools and gave oral presentations on DVBIC clinical recommendations (sleep and neuroimaging) and on the Pathway of Care and TBI Advisory Committee.

- Hinds, S. (moderator); Helmick, K., Brickell, T., French, L., Lange, R., Malik, S., & Richardson, R. (speakers). Symposium session: Longitudinal Research on traumatic brain injury in military service members and veterans.

This invited session featured DVBIC research and described longitudinal studies aimed at understanding the long-term effects of TBI in U.S. military service members and veterans. Speakers focused on the role of resilience on outcomes after TBI, examined the trajectory of postconcussion symptom reporting and its association to diffusion tensor imaging findings, and discussed long-term rehabilitation needs in the chronic stage of TBI across severity levels.

- Lange, R.T., Brickell, T.A., Tulsy, D.S., Holdnack, J., & French, L.M. Postconcussion symptom reporting and diffusion tensor imaging findings following mild-moderate traumatic brain injury.

International Neuropsychological Society

Annual Meeting
February 2016 | Boston, Massachusetts

- Tate, D.F., Velez, C.S., Drennon, A.M., Reid, M., Kennedy, J., Bowles, A., & Cooper, D. Subjective reports of cognitive dysfunction and objective neuropsychological test results among active duty service members.
- Velez, C.S., Reid, M., Drennon, A.M., Kennedy, J., Cooper, D., Bowles, A., & Tate, D.F. Base rates neuropsychological performance in service members with mild TBI, PTSD and orthopedic controls.

Military Health System

Research Symposium
August 2016 | Kissimmee, Florida

In addition to supporting the conference planning committee, moderating a plenary session, and presenting several poster sessions, DVBIC research staff gave the following oral presentations:

- Bailie, J.M., Powell, B.E., Suthee, W., Sargent, P.D., & Duckworth, J.D. Impact of height on service member blast exposure levels from shoulder mounted rocket launchers.
- Bailie, J.M., Suthee, W.O., Powell, B.E., Sargent, P.D., & Duckworth, J.D. Post-concussive disorder associated with cognitive changes following sub-concussive blast exposure.
- Ettenhofer, M.L. Neurocognitive correlates of impaired driving after traumatic brain injury: A preliminary analysis.
- Finkel, A.G., Klaric, J.S., Yerry, J.A., & Choi, Y.S.. Headaches in soldiers with mild traumatic brain injury/concussion: Relationships to occupational outcomes.

- French, L.M., Brickell, T.A., Lippa, S.M., Bailie, J., Gartner, R., Dilay, A., Driscoll, A., Wright, M., & Lange, R.T. Neuropsychological outcome 1 year post-injury following mild to moderate traumatic brain injury in a civilian and military sample: Preliminary findings from an NIH/DoD multi-site collaboration.
- Gilmore, C.S., Nelson, N.W., Finn, J.A., Lamberty, G.J., & Lim, K.O. Differential effects of mild tbi severity and ptsd symptomatology on cognitive performance in veterans.
- Gregory, E., Arrieux, J.P., Haran, F.J., & Cole, W.R. Intraindividual cognitive variability: An examination of anam4 tbi-mil simple reaction time data from service members with and without mild traumatic brain injury.
- Kuznetsov, N.A., Robins, R.K., Ross, S.E., Wright, W.G., Haran, F.J., Jakiela, J.T., Bailie, J.M., Yanagi, M.A., Long, B., Duckworth, J.L., & Rhea CK. Neuromotor testing post-mTBI: Reliability of movement metrics from a smartphone application.
- Jolly, M.J., Bailie, J.M., Hussain, M.A., Sargent, P.D., & Duckworth, J.D. The impact of lifetime traumatic brain injury and lifetime blast exposure history on reported neurobehavioral symptoms of service members.
- Schwab, K., Scher, A., Pazdan, R., & Brenner, L. Prognosis of military mild traumatic brain injury (mTBI) for non-hospitalized soldiers returning from Afghanistan (OEF) and Iraq (OIF).
- Van der Merwe, A.J., McNally, S., Brickell, T.A., Lippa, S.M., Lange, R.T., French, L.M., & Chan, L. The influence of PTSD on Outcome from civilian and military-related mild traumatic brain injury: Preliminary findings from an NIH/DoD multi-site collaboration.

Minnesota Multiphasic Personality Inventory-2 (MMPI-2) 2-RF

Research Symposium

May 2016 | Fort Lauderdale, Florida

- Finn, J.A., Lamberty, G.J., & Lim, K.O. Personality and participation: Associations between the MMPI-2-RF and the MPPI-4 in veterans with a reported history of mild TBI.

Minneapolis VA

Research Day

May 2016 | Minneapolis, Minnesota

- Gentz, C.L., Carson, M.R., Gilmore, C.S., Albott, C.S., Lim, K.O., & Nelson, B.G. deep transcranial magnetic stimulation for medication refractory depression in mild traumatic brain injury.
- Gilmore, C.S., Nelson, N.W., Finn, J.A., Lamberty, G.J., & Lim, K.O. Differential effects of mild TBI severity and PTSD symptomatology on cognitive performance in veterans.

National Academy of Neuropsychology

Annual Conference

October 2016 | Seattle, Washington

- Brickell, T.A., French, L.M., Lange, R.T., Bailie, J., Gartner, R.L., Dilay, A.N., Driscoll, A.E., Wright, M.M., Pizzano, B.N., Johnson, L.B., Nora, D.E., Mahatan, H.S., Sullivan, J.K., Thompson, D.M., Snelling, A.C., Kacmarek, C.N., & Lippa, S.M. Predictors of neurobehavioral outcome at 1-year following military-related mild-moderate traumatic brain injury.
- Brickell, T.A., French, L.M., Lange, R.T., Bailie, J., & Lippa, S.M. Neurobehavioral outcome 10-years following mild-moderate traumatic brain injury in U.S. military service members.
- French, L.M., Brickell, T.A., Lippa, S.M., Bailie, J., & Lange, R.T. A longitudinal comparison of the traumatic brain injury quality of life (TBI-QOL) scale from the sub-acute recovery period to 1-year following mild-moderate traumatic brain injury.

- French, L.M., Lange, R.T., Lippa, S.M., Bailie, J., & Brickell, T.A. Base rates and longitudinal trajectories of icd-10 postconcussion symptom status from 1- to 2-years following military-related mild-moderate traumatic brain injury: part 1 of 2.
- Hussain, M.A., Bailie, J.M., Jolly, M.J., Powell, B.E., Sargent, P.D., & Duckworth, J.D. The impact of traumatic brain injury and heavy weapons blast exposure on neuropsychological functioning in the military.
- Lange, R.T., Brickell, T.A., Lippa, S.M., Chan, L., McNally, S., van der Merwe, A.J., & French, L.M. base rates and longitudinal trajectories of individual self-reported postconcussion symptoms from 1- to 2-years following military-related mild-moderate traumatic brain injury: Part 2 of 2.
- Lange, R.T., Lippa, S.M., Brickell, T.A., Gartner, R.L., Dilay, A.N., Driscoll, A.E., Wright, M.M., Pizzano, B.N., Johnson, L.B., Nora, D.E., Mahatan, H.S., Sullivan, J.K., Thompson, D.M., Snelling, A.C., Kacmarek, C.N., & French, L.M. Neuropsychological outcome from concurrent PTSD and mild traumatic brain injury in U.S. military service members: A cross-sectional perspective of recovery in the first 12-months of injury.
- Lippa, S.M., Brickell, T.A., French, L.M., Bailie, J., & Lange, R.T. Self-reported post-traumatic stress symptoms in the subacute recovery period are strong predictors of poor neurobehavioral outcome 2-years following military-related mild-moderate traumatic brain injury.
- Lippa, S.M., Lange, R.T., Brickell, T.A., Bailie, J., & French, L.M. The natural history of neurocognitive outcome from the sub-acute recovery phase to 1-year post-injury in military-related mild-moderate traumatic brain injury.

National Institute of Mental Health

Transcranial Electrical Stimulation: Mechanisms, Technology, and Therapeutic Applications (workshop)
September 2016 | Bethesda, Maryland

- Lim, K.O. (invited speaker). In-progress studies of tDCS augmentation of cognitive remediation in schizophrenia and impulsivity.

North American Brain Injury Association

Annual conference
April 2016 | Tampa, Florida

- Brickell, T.A., Carozzi, N., Sander, A., Kratz, A., French, L.M., Tulsky, D., Hahn, E., Kallen, M., Chiaravalloti, N., & Lange, R.T. Barriers and supports to health care among caregivers of service members or veterans with traumatic brain injury: A qualitative analysis using focus group methodology.
- Brickell, T.A., French, L.M., Bailie, J., Lippa, S., Gartner, R., Driscoll, A., Li, Z., Schmidt, E., Wright, M., Smith, J., Dilay, A., Pizzano, B., Johnson, L., Nora, D., Kilgore, J., Mahatan, H., Miles-Mooney, M., & Sullivan, J., Thompson D, Lange RT. Post-9/11 family caregivers: Examining the characteristics and perceived burden of family members who care for u.s military service members following traumatic brain injury.
- Lange, R.T., French, L.M., Bailie, J., Lippa, S., Gartner, R., Driscoll, A., Li, Z., Schmidt, E., Wright, M., Smith, J., Dilay, A., Pizzano, B., Johnson, L., Nora, D., Kilgore, J., Mahatan, H., Miles-Mooney, M., Sullivan, J., Thompson, D., & Brickell, T.A. Caring for U.S. military service members following mild-moderate traumatic brain injury: examination of access to services, service needs, and barriers to care.
- Lange, R.T., Lippa, S., French, L.M., Bailie, J., Gartner, R., Driscoll, A., Li, Z., Schmidt, E., Wright, M., Smith, J., Dilay, A., Pizzano, B., Johnson, L., Nora, D., Kilgore, J., Mahatan, H., Miles-Mooney, M., Sullivan, J., Thompson, D., & Brickell, T.A. Transitioning home following traumatic brain injury: Examination of the long-term service needs and barriers for caregivers of military personnel following injury.
- McKinney, G., Marion, D., Eshel, I., Panakkal, D., Wong, K., & Stout, K. Management of headache following concussion/ mild traumatic brain injury.

Uniformed Services University of the Health Sciences and the University of Pittsburgh

State of the Science Symposia Series: Caring for Wounded Warriors with Traumatic Brain Injury
September 2016 | Bethesda, Maryland

- Eshel, I. & Livingston S. Clinical recommendations for the management of concussion/mild traumatic brain injury in the Military Health System.
- Stout, K. & Livingston S, Smith J. Recovery support for service members, veterans and their families affected by traumatic brain injury.

State of the Science Symposium Series: Fitness and Health Outcomes — Exercise, Health, and Nutrition for Wounded, Injured, and Ill Veterans

March 2016 | Bethesda, Maryland

- Stout, K. Progressive return to activity following acute concussion/mild TBI.

University of Minnesota Institute for Engineering in Medicine (IEM)

Neuromodulation Symposium

April 2016 | Minneapolis, Minnesota

- Gilmore, C.S., Carson, M.R., Gentz, C.L., Dickmann, P.J., Lamberty, G.J., Armstrong, M.T., & Lim, K.O. Reducing impulsivity and risk-taking behavior using transcranial direct current stimulation (tDCS).

Womack Army Medical Center

Research Day

May 2016 | Fort Bragg, North Carolina

- Arrieux, J.P. & Cole, W.R. An examination of the differences between healthy controls and acute mTBI on ANAM4 TBI MIL simple reaction time subtests.
- Capo-Aponte, J.E., Cole, W.R., Beltran, T.A., Walsh, D.V. & Dumayas, J.Y. Validation of visual objectives biomarkers for acute concussion.
- Finkel, A.G., Klaric, J.S., Yerry, J.A. & Choi, Y.S. Headaches in soldiers with mild traumatic brain injury/concussion: relationships to occupational outcomes.



Colonel Sidney R. Hinds II served as DVBIC's national director from July 1, 2013 to March 16, 2016. (DVBIC photo by Carlson Gray)



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