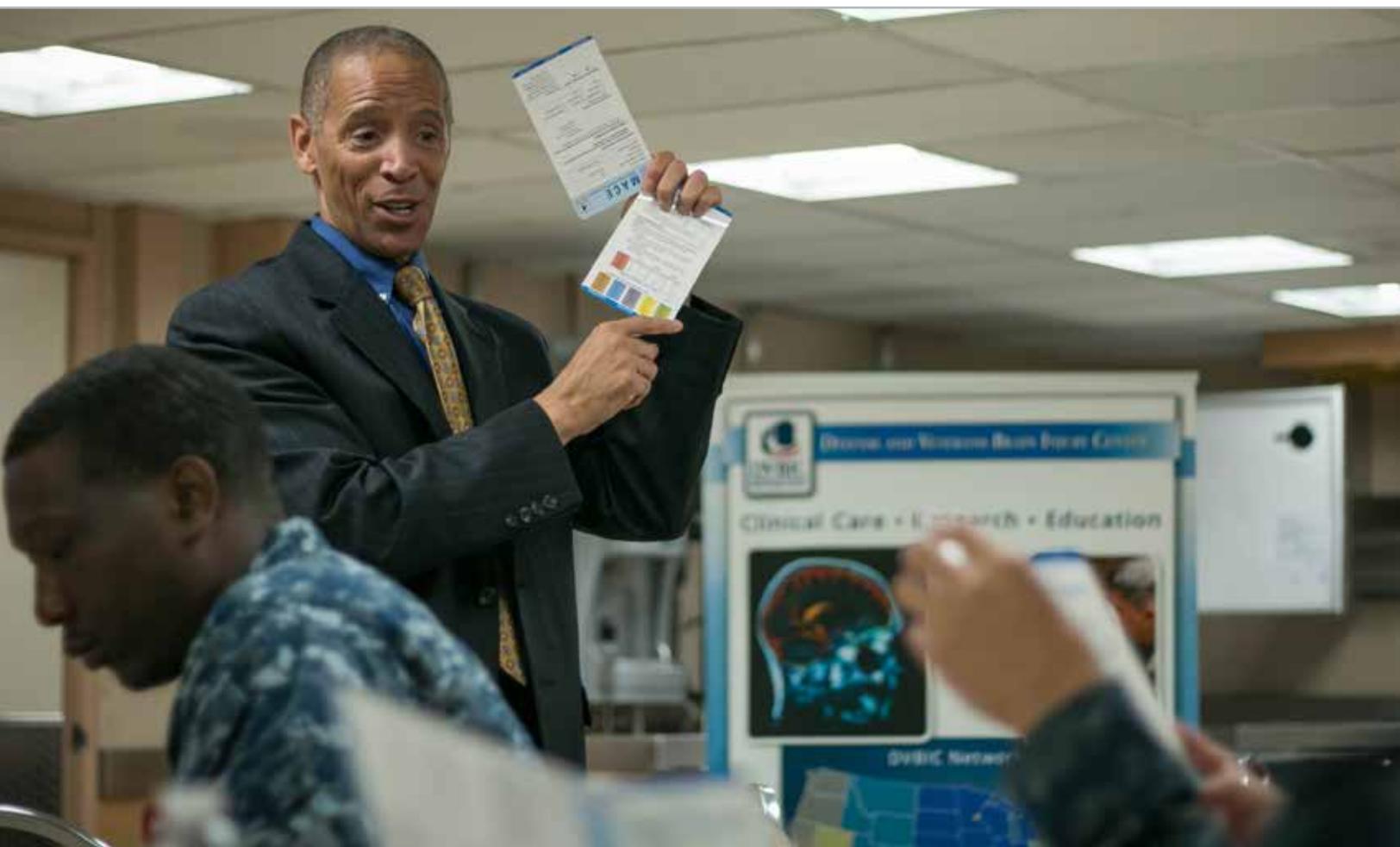


# DEFENSE AND VETERANS BRAIN INJURY CENTER



# ANNUAL REPORT 2017

25 YEARS OF SERVICE



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# MISSION Statement

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



Work group of experts from military hospitals and clinics, Defense Department, Department of Veterans Affairs and academia met to discuss clinical recommendations on cognitive rehabilitation. (DVBIC photo)

# Letter from the Director

## Dear Colleagues and Collaborators:

As DVBIC celebrates its 25<sup>th</sup> anniversary, I am proud of how far we, as an organization, have advanced evidence-based TBI care for our service members and veterans. Working with partners, collaborating across the Military Health System and Department of Veterans Affairs (VA), and leveraging the expertise at each of our network sites, we continue to develop and deploy the very best assessment and treatment paradigms.

One of DVBIC's signature accomplishments is having had the right footprints at the right places to fulfill our mission. This year is no exception. In 2017, we added four new sites, rounding out our presence across the entire network of Intrepid Spirit centers and enabling us to impact how U.S. Special Operations Command (USSOCOM) addresses TBI. Through research conducted at the network sites, we learn more each year about the relationship between TBI and occupational vulnerabilities from everyday training and work activities, including low level blast exposure. Despite a drawdown in war in recent years, Special Operations Forces are still carrying out missions in over 80 countries. At USSOCOM, DVBIC can engage as a true combat support agency. DVBIC has also been listening to our family caregivers and patients with chronic TBI sequelae to improve daily functioning and quality of life. Our congressionally mandated longitudinal research studies have provided essential findings to help with this endeavor.

Looking back across DVBIC's history, our accomplishments would not have been possible without the astute, accountable leadership of past directors such as Dr. Andres Salazar, who founded DVBIC with George Zitnay of the Brain Injury Association of America, and Dr. Deborah Warden, who led DVBIC through the massive transition following 9/11. After 9/11, TBI came to be recognized as the "signature injury" of Operation Enduring Freedom and Operation Iraqi Freedom. Drs. Salazar and Warden and subsequent national directors elevated the status of TBI as a national challenge and leveraged partnerships to ensure it was addressed as such.

Looking ahead, TBI is not going away any time soon, but I believe we are on the brink of resolving some of the most stubborn knowledge gaps in areas such as chronic traumatic encephalopathy, the physiological basis for concussion, objective biomarkers and prognostication. I am extremely excited about finding answers in these and other areas, which will help us to protect the public and provide more precise evaluation and treatment to our service members and veterans.

After 14 years at DVBIC, I'm personally most proud of our boots-on-the-ground efforts. When I visit network sites, see our products displayed in the halls, observe people reading them, and hear clinicians' stories about their patients' resilience and recovery, I know we are making a difference. I am humbled by the many talented people working for DVBIC. I thank the entire staff, along with all those who worked for DVBIC over the past 25 years, for their dedication and enduring commitment to the mission.

Sincerely,

Katherine M. Helmick

Acting National Director

Defense and Veterans Brain Injury Center

# Leadership

## Acting National Director

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

Helmick is the deputy director of DVBIC. She brings considerable clinical, educational and research experience in the field of neuroscience to include more than 150 regional, national and international presentations and more than 15 peer-reviewed publications.

Helmick has served in a variety of leadership, advisory and operational roles, including deputy director for the Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury, deputy director for the Clinical and Educational Affairs Office for DVBIC, manager of the Office of Clinical Standards at DVBIC, neurological surgery nurse practitioner at Hodes Neurosurgery in Louisville, Kentucky, nurse practitioner and clinical

care coordinator at the University of Louisville Hospital; and clinical research coordinator in the Division of Neurosurgery at the Medical College of Virginia Hospitals.

Helmick holds both a bachelor's and master's degree in nursing from Virginia Commonwealth University, as well as a Bachelor of Science degree in family and child development from Virginia Tech University.

She has earned the following certifications: Adult Nurse Practitioner (ANP) through the American Nurses Credentialing Center and Neuroscience Registered Nurse (CNRN) through the American Board of Neuroscience Nursing



## Divisions

**DVBIC accomplishes its mission through its three divisions: Research, Clinical Affairs and Education, as well as the Office of the Chief of Staff (TBI Mission Support). 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.**

### Research

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

"DVBIC has successfully supported many high visibility clinical research studies over the past 25 years. Driven by DoD requirements, our research has resulted directly in state-of-the-science, evidence-based clinical care for service members and veterans affected by TBI. DVBIC's current research portfolio supports known MHS TBI research gaps and priorities, thereby significantly raising return-on-investment compared to traditional research models and highlighting DVBIC's clinical research expertise and responsiveness supporting a medically ready force."

Saafan Malik, M.D.  
Director, Research Division

Malik is the director of the Research Division at DVBIC. He has been working in the field of TBI for over a decade and has expertise in basic science, translational and clinical research, and care related to TBI. Prior to DVBIC, Malik served as the senior research investigator at the University of Pennsylvania Perelman School of Medicine and at the Texas Tech University Health Sciences Center. He undertook his postdoctoral work at the University of Pennsylvania Perelman School of Medicine and Carolinas Healthcare System and clinical neurosurgery at Cleveland Clinic. He has authored several peer-reviewed publications and book chapters and received multiple academic awards and grants, including the National Institutes of Health-National Research Service Award on TBI and the Murray Goldstein Award from the National Neurotrauma Society. He received his medical degree from King Edward Medical University.



# Leadership

## Divisions

### Clinical Affairs

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

“Clinicians always say that if you’ve seen one TBI, you’ve seen one TBI. The DVBIC Clinical Affairs Division strives to support clinicians treating some of the most complex TBI patients. Over the past 25 years, we have built a close working relationship with DVBIC’s other divisions to equip clinicians across the DoD and VA with the most relevant, state-of-the-science information supporting the best care for our service members and veterans.”

Katharine Stout, P.T., DPT, NCS, MBA  
Director, Clinical Affairs Division



Stout is director of the Clinical Affairs Division at DVBIC. Stout is a board-certified neurological specialist by the American Board of Physical Therapy Specialties. For the last 10 years, she has worked in TBI and military medicine in a variety of roles including direct clinical care, research portfolio management and program management within telehealth. In addition to her work with the military, Stout has taught as an adjunct faculty member at the University of Maryland School of Medicine and served as a board member for the Maryland Board of Physical Therapy Examiners. She has authored several publications and a book chapter. Stout received her doctorate in physical therapy from Northeastern University and her master’s degree in business administration with a concentration in health care administration from the University of Scranton.

**// 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. //**

U.S. Public Health Service Capt. H. Charles Cathlin, MPH  
Chief of Staff

### Education

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

“The education and training of health care providers across the Military Health System remains our most significant priority in the Education Division. We are using educationally sound and scientifically proven methods for translating knowledge about best clinical practices and cutting edge research to the TBI community, thereby enabling health care providers of today and the future to provide the best possible care to our service members, veterans and their families.”

Scott Livingston, Ph.D., P.T., ATC  
Director, Education Division



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

### Chief of Staff (TBI Mission Support)

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

“Our longevity as a center of excellence for 25 years is a direct result of 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.”

U.S. Public Health Service Capt. H. Charles Cathlin, MPH  
Chief of Staff



Cathlin directs the DVBIC Chief of Staff Office. Prior to DVBIC, Cathlin served as chief of the Radiology, Anesthesiology and Neurology Devices Branch at the U.S Food and Drug Administration (FDA), where he regulated the design, manufacturing and marketing of complex medical devices. He also served as an Air Force bioenvironmental engineer responsible for managing occupational health, environmental, and radiation safety programs. Cathlin served for over 20 years as a military and commissioned corps officer and earned decorations for accomplishments while deployed to the Middle East, Albania and Mozambique, as well as to New York after 9/11 and the Gulf Coast and Texas for hurricanes Katrina, Ike and Gustav. Cathlin received his Bachelor of Science in civil and environmental engineering from the U.S Air Force Academy and his Master of Public Health from the Uniformed Services University of the Health Sciences.

# The DVBIC Story

## Celebrating 25 Years of Service

DVBIC is the first and longest running systematic program serving DoD and VA TBI patients.

Prior to DVBIC, military and civilian research on TBI, particularly concussion, was sparse. During the Persian Gulf War, brain injuries accounted for 17 percent of all casualties. The Scud missile attacks conducted by the Iraqi military during the war drew increased attention to head and neck injuries. Responding to these injuries, Congress authorized creation of the Defense and Veterans Head Injury Program (DVHIP) in the Department of Defense Appropriations Act of 1991. Eventually renamed DVBIC, DVHIP launched in February 1992, forming a unique collaboration between the DoD and the VA.

Over subsequent decades, TBI received growing attention among both military and civilian stakeholders. During peacetime in the 1990s, Army researchers studying hospitalization rates found training and motor vehicle accidents accounted for many TBIs. Army hospitalization rates decreased over the decade as efforts in prevention, safety and education increased. Training and regulations (e.g., stricter enforcement of drug and alcohol policies) most likely contributed to this decline.

With the onset of Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF), the hospitalized TBI incident rate doubled between 2000 and 2006 in the active-duty Army population. The rate for TBI attributed to weapons increased 60 percent. Recognition of blast injuries during these conflicts led to screening efforts to identify probable TBI and TBI in individuals with multiple traumas. DVBIC developed the Military Acute Concussion Evaluation (MACE) to enable front line providers to quickly assess cognitive functions in four areas: orientation, immediate memory, concentration, and memory recall. This information, which providers can combine with other clinical data, supported better determinations about treatment and care.

DVBIC was one of the first organizations to recognize combat-related TBI needs and to execute a systematic program of research and treatment to improve outcomes of service members and veterans with TBI. These efforts during OEF, OIF and Operation New Dawn (OND) led to development of more resources devoted to military TBI and collaborations with organized sports to address concerns about concussions. The early partnership of DVBIC and the VA set the stage for the Veterans Health Administration polytrauma centers to treat veterans and service members from OEF, OIF and OND.

As patient needs evolved, DVBIC evolved to meet those needs and came to be widely recognized for substantial contributions to the evidence base for TBI treatment in both military and civilian communities. DVBIC studies conducted in partnership with a wide range of multidisciplinary clinicians and researchers have produced, to date, over 480 publications contributing to improved levels of evidence on issues critical to the identification of, treatment for and education about TBI in military and veteran populations. DVBIC studies (randomized controlled trials, as well as observational, epidemiological, retrospective and longitudinal analyses) address gaps in knowledge about military and veteran TBI.

DVBIC's influence extends beyond deployed U.S. forces. In 2009, the NATO Science and Technology Organization formed Task Group 193. This international group synthesized existing knowledge and clinical practices for managing mild traumatic brain injury (mTBI) in a military operational setting for task force NATO countries. Representatives from the United States, United Kingdom, Sweden, Canada, France and the Netherlands participated. The U.S. delegation included DVBIC subject matter experts and leadership. The task group's final report was published in January 2015.

In 2007, DVBIC became the TBI component center of the Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury, which merged in 2016 with the Defense Health Agency.

DVBIC's success in its first 25 years resulted from active collaboration with providers and researchers within the DoD, other federal agencies and academia. The DVBIC mission of preventing TBI and improving the lives of service members and veterans with TBI continues. Twenty-five years of contributions and innovations set a strong foundation for the next 25 years of DVBIC service and leadership in TBI education, research and care.

### Focusing on research, clinical support and education, DVBIC today plays a major role in advancing and standardizing TBI treatment and rehabilitative services among military service members and veterans by:

- Serving as the single point of contact for TBI for the MHS.
- Publishing quarterly reports on all DoD TBI-related incidences and prevalence, as well as capturing and classifying TBI severity data.
- Identifying and analyzing gaps in TBI knowledge to encourage research in areas identified as critical to the military.
- Strengthening communication among health care providers.
- Refining definitions of TBI severity.
- Conducting joint research projects and educational efforts.
- Developing clinical recommendations and new clinical practice guidelines.



Katherine Helmick, DVBIC acting director, addresses an expert work group session on developing clinical recommendations for cognitive rehabilitation. (DVBIC photo)

# The DVBIC Story Timeline

From the beginning, DVBIC adopted “learn as we treat” as a guiding principle and benefitted from past national directors’ clinical and research experience with TBI patients during deployment. The success of DVBIC as an organization would not have been possible without their expertise, guidance and leadership



## Andres M. Salazar, M.D. (1992-2001)

Salazar, an Army neurologist, was DVBIC’s first national director. Prior to DVBIC, Salazar led an intensive investigation of penetrating head injuries incurred in Vietnam (subsequent to the death of the study’s original investigator). The landmark Vietnam Head Injury Study, as it is known, identified the consequences of penetrating head injury following a cohort of these patients over 40 years and resulted in over 100 publications. Working with George Zitnay, president of the Brain Injury Association of America (BIAA), Salazar was instrumental in cultivating a unique collaboration between the Departments of Defense and Veterans Affairs and the Brain Injury Association of America. Under Salazar’s leadership, DVBIC completed its first decade with many notable accomplishments.

## 1992

- The Defense and Veterans Head Injury Program (DVHIP), later renamed DVBIC, launched in February 1992 with six TBI centers to treat troops with head and neck injuries. The program was mandated by the Department of Defense Appropriations Act of 1991, which added “\$18,000,000 ... for a facility to enable collaborative research and training for Department of Defense and military personnel in trauma care, head, neck, and spinal injury, paralysis, and neuro-degenerative diseases.”
- DVHIP developed the Brain Injury Resource Center with BIAA.

## 1993

- DVHIP documented peacetime TBI.
- DVHIP began the first large randomized clinical trial of TBI rehabilitation at the Walter Reed Army Medical Center.

## 1994

- DVHIP added new sites at National Naval Medical Center San Diego, California, and McGuire VA Medical Center in Richmond, Virginia.

## 1995

- Recruitment and data collection continued for the randomized controlled trial of TBI rehabilitation and DVHIP multicenter study of TBI patients.

## 1996

- DVHIP’s VA randomized controlled trial of cognitive rehabilitation began recruiting patients at VA medical centers.

## 1997

- DVHIP Tampa and DVHIP Minneapolis became the first VA sites in the nation to achieve Commission of Accreditation of Rehabilitation Facilities (CARF) accreditation, the civilian world’s gold standard for brain injury rehabilitation.

- VA developed a TBI network of care following guidelines created by the DoD and DVHIP Criteria and Standards for TBI Rehabilitation Programs.

## 1998

- Fort Bragg started clinical assessments of concussed paratroopers to help medical providers and unit leaders assess function after a TBI — the first coordinated military program to track soldiers within a week after their head injury through their recovery.

- Collaboration began with the United States Military Academy at West Point to study concussion recovery from boxing injuries.

## 1999

- Recruitment began for the Fort Bragg paratrooper study.

- DVHIP established a concussion clinic at Camp Pendleton, California.

## 2000

- DVHIP published results from the first ever randomized controlled trial of rehabilitation treatments in a TBI population in the Journal of the American Medical Association.



Original DVHIP logo

## Deborah L. Warden, M.D. (2001-2007)

Warden, a neurologist and psychiatrist at Walter Reed National Military Medical Center and the Uniformed Services University, led DVBIC following 9/11. Her 2006 publication Military TBI during the Iraq and Afghanistan Wars was a major milestone setting the stage for conceptualizing and describing wartime TBIs and remains one of the most cited TBI publications. During her term as director, early versions of DVBIC programs and projects were adapted and revised to meet the needs of wounded service members from OEF, OIF and OND. Under her leadership, DVBIC contributed to the development of in-theater concussion clinics and guidance for in-theater TBI evaluation and care, along with many other accomplishments.



## 2001

- DVHIP West Point study was published in the journal Neurology showing that concussion is associated with slowed reaction time.
- DVHIP established site in Charlottesville, Virginia.
- Operation Enduring Freedom began in Afghanistan.

## 2002

- DVHIP was renamed the Defense and Veterans Brain Injury Center (DVBIC).
- The Vietnam Head Injury Registry was changed to the DVBIC Registry, which is available to deployed doctors.
- DVBIC Walter Reed team screened all OEF wounded service members at risk for TBI. TBI-specific clinical evaluations and education were provided as indicated and entered into approved research database.

## 2003

- Operation Iraqi Freedom began.
- DVBIC sites provided multidisciplinary evaluations and education for injured service members with TBI.
- VA sites provided intensive treatment for injured service members with all severities of TBI and with polytrauma.

# The DVBIC Story

## Timeline

### 2004

- DoD and VA memorandum of agreement allowed active-duty service members who sustain a spinal-cord injury, TBI or blindness to seek health care and rehabilitative services at VA medical facilities.
- VA augmented DVBIC resources to create the polytrauma system of care at four VA hospitals.
- U.S. embassy opened in the Green Zone where DVBIC provided Department of State medical personnel with concussion evaluation materials and held weekly concussion management phone conferences with experts at Walter Reed Army Medical Center and the State Department's site in Baghdad.
- DVBIC began coordinating with Landstuhl Regional Medical Center in Germany to support their TBI screening program and consult on care of service members with polytrauma and mTBI.
- DVBIC's first site director at Landstuhl was appointed.
- DVBIC initiated teleconferencing for patient care transitions.
- DVBIC Fort Carson initiated post-deployment TBI screening with the Army 2nd Brigade of the 2nd Infantry Division (line command directed).

### 2005

- TBI surveillance mission for OEF/OIF service members began at the direction of the Army Office of the Surgeon General (OTSG) and Assistant Secretary of Defense for Health Affairs (ASD/HA).

### 2006

- DVBIC coordinated with the Brain Trauma Foundation to develop guidelines for field management of combat-related head trauma.
- DVBIC held consensus conference for the deployment of acute management of mild traumatic brain injury in-theater guidelines.
- DVBIC led team of national experts in publication of Evidence-Based Guidelines on Pharmacologic Treatment of Neuropsychiatric Sequelae of TBI.



### Air Force Col. Michael S. Jaffee, M.D. (2007-2010)

With expertise in neurology, psychiatry, sleep medicine and brain injury medicine, Jaffee also brought to DVBIC wartime experience as the chief of the medical staff for the largest U.S. military hospital in Iraq and neurology consultant to the U.S. Air Force surgeon general. In addition, he had served as the U.S. Department of Defense liaison to two White House-appointed panels of the Defense Health Board. At DVBIC, he oversaw deployment of the DVBIC developed MACE tool, among other accomplishments.

### 2007

- DVBIC held first annual TBI military training conference for providers within the MHS and VA.
- A five-agency initiative, TBI Common Data Elements began.

- Section 721 of the National Defense Authorization Act (NDAA) for 2007 mandated a "Longitudinal study on traumatic brain injury incurred by members of the Armed Forces in Operation Iraqi Freedom and Operation Enduring Freedom."

- Section 744 of the NDAA mandated the development of "Training curricula for family caregivers on care and assistance for members and former members of the Armed Forces with traumatic brain injury."

- TBI screening of service members returning from OEF/OIF began within DoD and VA based on DVBIC Brief TBI Screen.

- Retired Army Gen. Colin Powell provided opening for the DVBIC documentary titled "Survive, Thrive and Alive".

- DVBIC deployed the first in-theater guidance for evaluating concussion: the Military Acute Concussion Evaluation (MACE).

- Camp Lejeune joined the DVBIC network.

- Regional education coordination program launched to support the DVBIC network.

- DVBIC created regional care coordination program to help keep wounded warriors connected to care.

- DVBIC created TBI consult email service for in-theater consultations.

- DVBIC became office of responsibility for TBI surveillance.

### 2008

- Second annual TBI military training conference held.

- DVBIC became the primary TBI operational component center of the Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury (DCoE).

- Pre-deployment Automated Neuropsychological Assessment Metrics (ANAM) testing began; DVBIC developed related educational resources for the services.

- DVBIC led U.S. delegation to meet with the NATO exploratory team for mTBI international standards.

- DVBIC collaborated with WETA to develop BrainLine.org.

- Organizational mission expanded to include force health protection and management support to ASD/HA.

- DVBIC began collaboration with Labor Department program, America's Heroes at Work, to help veterans who sustained TBIs find jobs.

- DVBIC initiated comprehensive head-to-head study, which compared computerized cognitive assessment tools.

- DVBIC-led multi-agency workgroup published new ICD-9 case definitions.

- Armed Forces Institute of Pathology collaborated with DVBIC on several research projects.

- NFL commissioner credited DVBIC-NFL Symposium for laying the foundation for enhanced concussion safety and evaluation guidelines in NFL.

- DVBIC-VA randomized controlled trial comparing two cognitive rehabilitation treatments was published.

### 2009

- DVBIC held third annual military training conference.

- Recruitment began at Fort Carson for the longitudinal study of the brief TBI screen, which was funded through the Congressionally Directed Medical Research Programs.

- DVBIC served as a member of the Gray Team III, a tri-service, multi-agency team that examined in-theater TBI care.

- First case report published showing neuroimaging findings for a service member exposed to primary blast waves.

# The DVBIC Story

## Timeline



### Army Col. Jamie Grimes, M.D. (2010-2013)

Neurologist and psychiatrist Grimes served on the Gray Team, along with DVBIC director Michael Jaffee. Founded in 2009, the Gray Team was the first military medical assessment team to evaluate and provide recommendations for in-theater TBI care. As part of the Gray Team in 2011, Grimes traveled to each of the major concussion care sites, deployed to the Afghanistan theater of operation, and served on the Gray Team's tour at Baghram Airfield and other NATO locations. At DVBIC, Grimes oversaw many advances, including the start of recruitment for the congressionally mandated 15-Year Study.

## 2010

- DVBIC held fourth annual military training conference.
- DoD released landmark guidance on the treatment of mTBI in theater (DTM 09-033).
- DVBIC launched virtual TBI clinic.
- DVBIC and DCoE issued first modules of the multimedia family caregiver curriculum.

## 2011

- DVBIC held fifth annual military training conference.
- Recruitment began for the 15-Year Study of mild, moderate and severe TBI mandated by the John Warner National Defense Authorization Act for Fiscal Year 2007.
- First public service announcement (PSA) aired on the American Forces Network and online.
- DVBIC and WETA launched BrainLineMilitary.org, a website geared towards service members and veterans.
- Mobile sites were launched for both BrainLine.org and BrainLineMilitary.org.
- DVBIC's Education Division distributed approximately one million products to promote awareness, prevention and education.

## 2012

- Retired Army Staff Sgt. Reanita Gray and former Army Sgt. Adam Anicich, veterans of the Iraq war, encouraged other TBI survivors to use BrainLineMilitary.org in a new PSA that aired on the American Forces Network.
- DoD issued updated guidance on how to manage concussion in the deployed setting (DoDI 6490.11).
- DVBIC expanded outreach to Times Square with a digital public service announcement (PSA) urging people to protect their heads by wearing a helmet.



DVBIC PSA plays in Times Square. (DVBIC photo)



### Army Col. Sidney R. Hinds, M.D. (2013-2016)

Neurologist and nuclear medicine specialist Hinds, along with previous DVBIC directors, served as an in-theater neurology consultant in Afghanistan, where he oversaw concussion care centers and three magnetic resonance imaging machines (MRIs) prior to his service at DVBIC. As DVBIC's director, Hinds brought an integrated, multidisciplinary approach to carrying out the DVBIC mission that led to many accomplishments.

## 2013

- DVBIC developed and distributed clinical recommendations: Assessment and Management of Visual Dysfunction Associated with mTBI and Neuroimaging Following mTBI in Non-Deployed Settings.
- DVBIC developed an online training course for clinical providers on deployment-related TBI and co-occurring conditions to meet DoD requirements for pre-deployment training.
- Defense Secretary Hagel hosted a TBI symposium to share recent advances in TBI with 35 military and civilian leaders

## 2014

- The DoD designated DVBIC as the manager of the TBI Pathway of Care for the MHS.
- DVBIC hosted the second Global Synapse, a live and virtual symposium.
- DVBIC collaborated with the VA and National Institute on Disability and Rehabilitation Research (NIDRR) on a study titled Improved Understanding of Medical And Psychological Needs in Veterans and Service members with chronic TBI (IMAP) to examine disability care needs in the first five years after injury.

- Navy Medical Center San Diego received funding for two studies exploring neurological damage caused by low-level blast exposure.
- DVBIC released a clinical recommendation on progressive return to activity following acute concussion/mild TBI in deployed and non-deployed settings.
- DVBIC received funding to evaluate the clinical recommendation on progressive return to activity.
- DVBIC released a clinical recommendation on management of sleep disturbances following concussion/mild TBI.
- DVBIC presented training per DoD Instruction 6490.13 on policy on neurocognitive assessments in the military services.
- DVBIC hosted 10 webinars providing education to over 12,000 clinical providers and awarding over 3,000 hours of continuing education credits.
- DVBIC partnered on the National Collegiate Athletic Association's Mind Matters Challenge.
- DVBIC hosted more than 600 events nationwide highlighting DoD efforts to prevent TBI and provide support to service members, veterans and their families during Brain Injury Awareness Month.
- DVBIC collaborated with DCoE on a third live and virtual summit reaching 1,800 DoD and VA clinical providers.
- Camp Lejeune procured a grant for a comparative study of headache treatments.
- VA Palo Alto hosted its fifth TBI research forum.
- DVBIC released a new concussion/mTBI fact sheet for patients on help with ongoing symptoms
- "TBI 201: An Overview of TBI for Military Health Care Providers" presented an interactive web-based educational platform.
- DVBIC completed data collection for the congressionally mandated Study of Cognitive Rehabilitation Effectiveness for mild TBI (SCORE) and posted study manuals on the DVBIC website.
- DVBIC published findings for the head-to-head study on the reliability and validity of computerized neurocognitive assessment tests.

## 2015

# The DVBIC Story

## Timeline

### Army Col. Geoffrey Grammer, M.D. (2016-2017)

Before becoming DVBIC national director, Grammer served as medical director for the 785th Combat Stress Control Company and as a psychiatrist at the combat support hospital at Contingency Operating Base Speicher and in Baghram. At DVBIC, Grammer led the transition to DHA, oversaw DVBIC expansion to new network sites, and supported new initiatives such as the launch of DVBIC's first podcast series, along with other accomplishments.

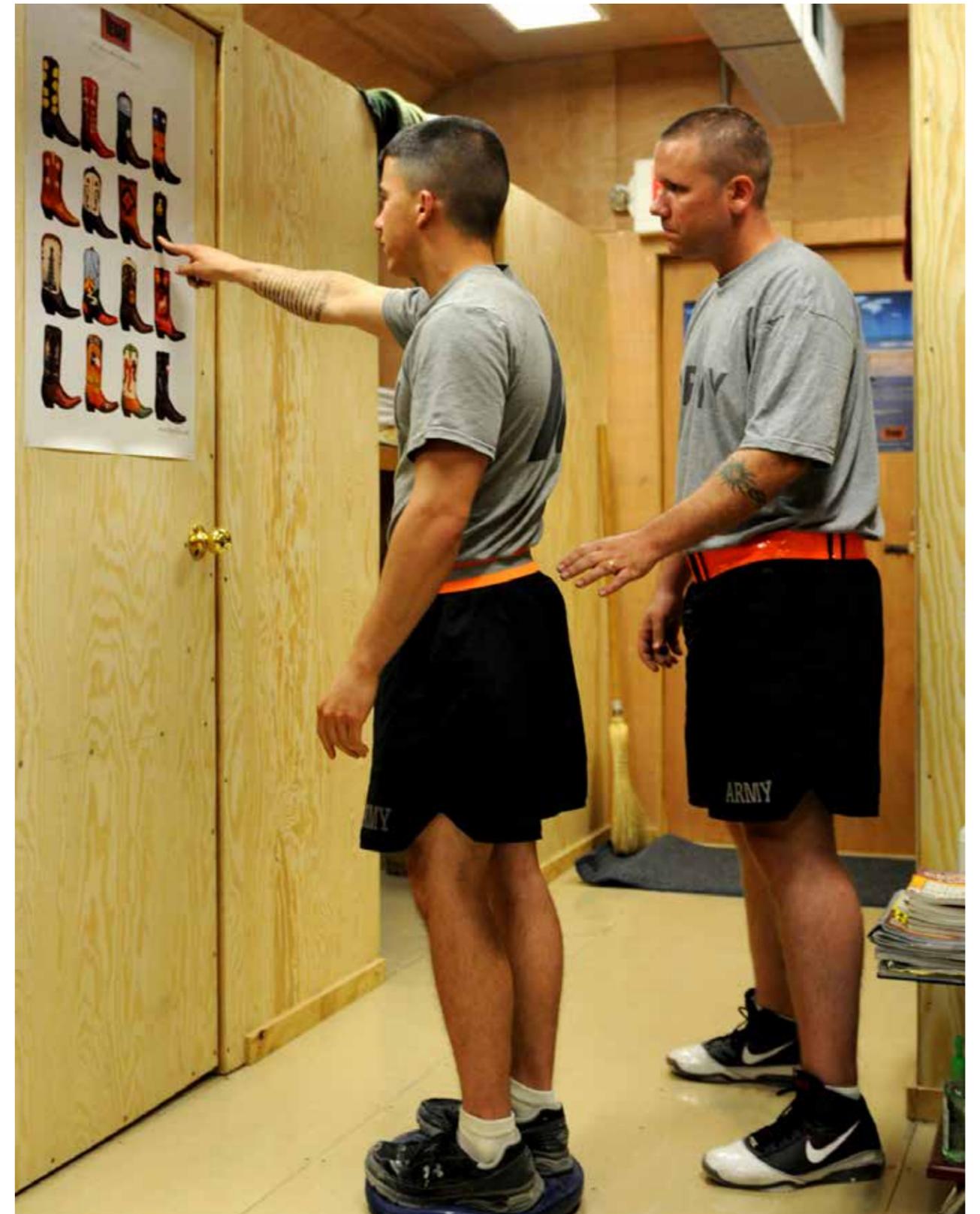


## 2016

- DVBIC became DHA center of excellence.
- DVBIC added three network sites: Fort Drum, Fort Gordon and the Audie L. Murphy Memorial Veterans Hospital in San Antonio.
- Results of the Study of Cognitive Rehabilitation Effectiveness (SCORE) were published in September in the Journal of Head Trauma Rehabilitation demonstrating that therapist-directed methods most effectively improve functional cognitive abilities after TBI.
- DVBIC produced a report on existing and emerging TBI research gaps and priorities most relevant to the DoD and MHS.
- DVBIC released the clinical recommendation Management of Headache Following Concussion/Mild TBI: Guidance for Primary Care Management in Deployed and Non-Deployed Settings.
- The DVBIC communications team launched a podcast for caregivers of service members and veterans with TBI called The TBI Family.
- DVBIC organized a national meeting bringing together staff members from across the DVBIC network sites for the first time in five years.

## 2017

- DVBIC added four new network sites: Fort Bliss, Fort Campbell, Joint Base Lewis-McChord, and U.S. Special Operations Command.
- DVBIC submitted a report to Congress summarizing findings from the past seven years of the 15-Year Study and the past two years of Improved Understanding of Medical and Psychological Needs in Service Members and Veterans with Chronic Traumatic Brain Injury (IMAP).
- Under the task direction of the deputy assistant secretary of defense for health affairs, DVBIC launched the TBI consensus statement project.
- DVBIC initiated a one-year outcomes support contract to obtain TBI outcomes information from the Intrepid Spirit Centers, advancing the goal of monitoring and tracking TBI outcomes.



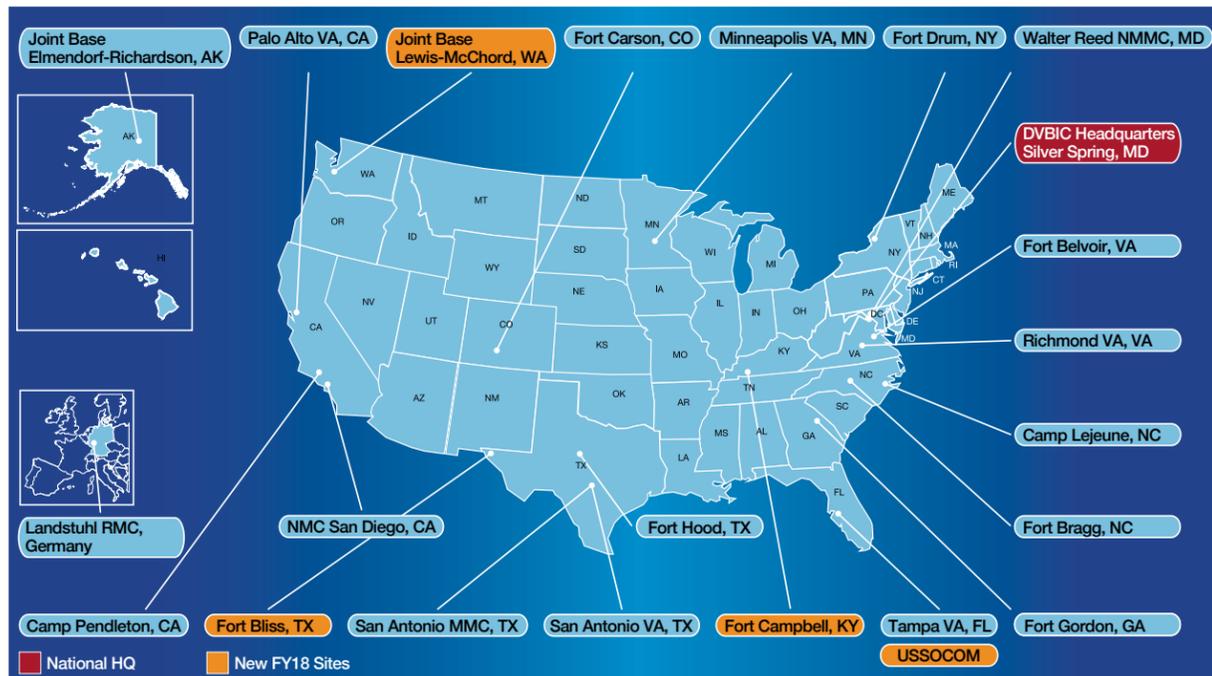
Specialist Michael Ossa of Newark, Ohio, Headquarters and Headquarters Company, 1st Battalion, 327th Infantry Regiment, Task Force Bulldog points to the boots on the wall while Sergeant Raymond M. Borrego of Miami, Florida, Company C, 426<sup>th</sup> Brigade Support Battalion, mTBI clinic non-commissioned officer in charge, assists him to keep his balance on the balancing ball. (U.S. Army photo by Specialist Richard Daniels Jr.)

# The Year in Review

## Expansion

DVBIC maintains network sites at 17 military hospitals and clinics and five VA hospitals, anchored by headquarters in Silver Spring, Maryland. DVBIC added four sites in 2017 to engage TBI stakeholders where the need is greatest. With the addition of these sites, there are now DVBIC sites collocated at all nine Intrepid Spirit Centers.

### DVBIC Network Sites



DVBIC added four new sites in 2017.

## NEW NETWORK SITES



**Fort Bliss**  
Sean C. Sebesta, M.D., site director

“Being invited into the DVBIC team is a unique honor that allows us to move forward with our vision for the TBI and Intrepid Spirit Center programs. As a DVBIC site, we will receive the resources and expertise of a formidable research team to join other research endeavors and to initiate our own unique research projects to help provide evidence-based advances in care and knowledge. Being a DVBIC site allows us to collaborate with experts familiar with the unique medical needs of our warfighters. We are very much looking forward to all our future work with DVBIC.”



**Fort Campbell**  
Bret W. Logan, M.D., site director

“It is indeed a pleasure to be one of the newest DVBIC sites, and we look forward to great things to come!”



**U.S. Special Operations Command**  
Navy Capt. Scott Cota, M.D., site director

“We are very excited about the USSOCOM partnership with DVBIC. This is an opportunity that will support USSOCOM efforts to get “left of the boom” with regard to traumatic brain injury and blast exposure. I believe that through innovative, responsive, prehabilitative programs focusing on surveillance, education and research we will optimize our warfighters at the tip of the spear.”



**Joint Base Lewis-McChord**  
Marine Corps Col. Beverly R. Scott, M.D., site director

“Becoming the 19<sup>th</sup> DVBIC site will allow the team to match our successful clinical and educational advancements with growing research opportunities and initiatives. We are grateful for DVBICs support over the years and look forward to years of successful work and collaboration ahead.”

# The Year in Review

## Advances

DVBIC has led efforts to advance TBI knowledge supporting state-of-the-science care for 25 years. As a longtime TBI thought leader, DVBIC supports clinical research across its network. DVBIC's extensive internal and external research collaborations drive innovation 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.

## 15-Year Study

On July 19, 2017, DVBIC submitted a report to Congress summarizing findings from the past seven years of the 15-Year Study and the past two years of Improved Understanding of Medical and Psychological Needs in Service Members and Veterans with Chronic Traumatic Brain Injury (IMAP).

### Background

The John Warner National Defense Authorization Act (NDAA) for Fiscal Year 2007, Section 721, directed the secretary of defense to "conduct a longitudinal study on the effects of traumatic brain injury incurred by members of the Armed Forces serving in Operation IRAQI FREEDOM or Operation ENDURING FREEDOM on the members who incur such an injury and their families." Congress directed the research to occur for a period of 15 years, with reports to Congress on the third, seventh, 11<sup>th</sup>, and 15<sup>th</sup> years of the study.

## The Studies

In 2009, the secretary of defense directed DVBIC to address the congressional mandate. This research is collectively known as the 15-Year Study, as is the first of the two component studies that DVBIC developed to comply with the directive:

### 1) The 15-Year Study

The 15-Year Study consists of three substudies: (1) the natural history study (comprehensive pathway and brief pathway); (2) the family caregiver study (longitudinal family caregiver study and traumatic brain injury caregiver quality of life [TBI-CareQOL] development study); and (3) archival studies. Each substudy addresses specific subsets of service members, veterans, and their families.

### 2) Improved Understanding of Medical and Psychological Needs in Service Members and Veterans with Chronic Traumatic Brain Injury (IMAP)

IMAP launched approximately two years ago. This study examines the rehabilitation and health care needs of service members and veterans with TBI and supplements the existing infrastructure of the VA Traumatic Brain Injury Model Systems Program lifetime study.

## Findings to Date

Since 2010, the 15-Year Study produced 81 peer-reviewed publications and 125 abstracts, as well as 143 conference presentations (invited talks and posters). IMAP produced additional presentations and publications. The six major conclusions from this research summarized in the report to Congress were:

- The prevalence of posttraumatic stress disorder, acute stress, depression, and sleep disruption complicates TBI recovery and impacts prognosis.
- Wide variance exists in reporting patterns with self-report rating scales. Subjective symptoms after TBI occur in other injuries and illnesses, further confusing interpretation of these metrics.
- Women and men have different patterns of presentation and recovery after TBI.
- Patients recovering from moderate and severe TBI after discharge from the hospital need care for medical comorbidities and mental health symptoms, TBI rehabilitation, vocational training and support, caregiver assistance, and community reintegration services.
- Although most patients utilize programs and services after a TBI, some fail to engage in care despite their care needs and the availability of services.
- Family caregivers report a significant burden and many feel ill equipped to fulfill their role.

# The Year in Review

## Advances

### Consensus Statement

Under the task direction of the deputy assistant secretary of defense for health affairs, DVBIC launched a TBI consensus statement project. The project represents a significant step in DVBIC's ongoing commitment to improve the health and quality of care for service members and veterans with TBI. The threefold goal of the project is to:

- Review the current state-of-the-science applicable to TBI clinical care.
- Inform knowledge translation efforts to transform recent TBI research findings into clinical practice.
- Identify areas deserving further investigation.

This project extends the Defense Department's longstanding commitment to investing in state-of-the-science TBI research supporting world-class health care for TBI patients. Since DVBIC's launch in 1992, the Defense Department has advanced clinical standardization and guidelines to address TBI. The TBI consensus statement project continues this work by reviewing, analyzing and synthesizing current MHS TBI research.

Prioritizing blast and treatment-related research, the TBI consensus statement project will establish a body of evidence (published and unpublished) that further advances clinical standards of care for TBI. The final product will summarize actionable knowledge translation opportunities and identify continuing research gaps.

The consensus statement project made significant progress throughout 2017. DVBIC research staff conducted literature reviews and synthesized findings. They prioritized literature based on study type (systematic reviews over randomized controlled trials and observational studies), comprehensiveness, publication date, population (military or civilian), and other factors identified by each work group. Work groups dedicated to different topics conducted regular teleconferences to review evidence. Work group topics were:

- Prevention of TBI.
- Acute concussion.
- Peri-injury management.
- Biomarkers.
- Behavioral health.
- Rehabilitation.
- Long-term effects.

Looking ahead to 2018, the work groups will continue to gather evidence and review additional literature to fill gaps and ensure consideration of the most relevant and current information. Work groups will continue to meet, inviting additional subject matter experts to participate as appropriate. Once the consensus statement is finalized, work groups will produce manuscripts for publication in peer-reviewed, military relevant journals for wide distribution on the state of TBI science supporting actionable knowledge translation opportunities

## Emergency Department TBI Care

DVBIC performed a random chart review of over 400 service members diagnosed with TBI in emergency departments to look for patterns in their pathways of care. The TBI Advisory Committee (TAC), chaired by DVBIC, coordinated and supported this effort. Findings showed variance in the TBI care provided by different emergency departments. DVBIC recommended developing tools and trainings to standardize evaluation by emergency department providers as well as patient education after TBI diagnosis. The DVBIC Clinical Affairs Division will continue to develop recommendations in 2018.

## Comprehensive Health Surveillance Capabilities-Based Assessment

DVBIC provided critical input to the Comprehensive Health Surveillance (CHS) Capabilities-Based Assessment (CBA). The CHS CBA is an assessment process within the DoD. Recommendations approved during this process impact how DVBIC conducts surveillance. Input in the CHS CBA allowed the voice of TBI surveillance needs and challenges to be heard in a larger discussion of how to improve surveillance capabilities in the DoD.



Dr. Maheen Mausoo Adamson (far left), senior scientific research director at DVBIC Palo Alto, presented at Brain Mapping Day, March 8, 2017 — an event cosponsored by the Congressional Neuroscience Caucus, the Society for Brain Mapping and Therapeutics (SBMT), the Brain Mapping Foundation and the National Center for NanoBioElectronics. (DVBIC photo)

# The Year in Review

## New Directions

As the TBI landscape changes, DVBIC efforts continually evolve to meet the needs of service members, veterans, families and providers. In 2017, DVBIC took on several emerging issues and new initiatives.

### APAN Research Division Launch

All Partners Access Network (APAN) is an unclassified information sharing service for the DoD. The DVBIC Research Network Intranet launched on APAN in June 2017, connecting research staff at all of DVBIC's network sites. APAN allows DVBIC researchers and headquarters staff to share information about upcoming conferences, grants and funding opportunities, the DVBIC research portfolio, sites and staff, discussion of relevant external concussion research ("Don's Picks"), quad chart information, and DVBIC publications. APAN is an important resource supporting internal DVBIC Research Division communication, coordination and collaboration.

### Data Collection and Surveillance Improvements

DVBIC updated and improved the reporting of TBI surveillance data to the services to include unique patients and to identify clinics where TBI care is provided. Previously, only the number of TBI-related medical encounters was reported, but this approach lacked important details. For example, someone looking at the data would not know whether there had been 30 encounters for 30 patients or 30 encounters for one patient. The new reporting system provides a more accurate picture of the impact of TBI on the health of the force.

### Recovery Support

DVBIC assessed the feasibility and value of using DVBIC recovery support specialists to advance DVBIC's outcomes mission. Staff obtained outcomes data from the Wounded Ill Injured Registry (WIIR), a viable platform to collect information. The assessment determined that recovery support specialists can support DVBIC's outcomes mission in the future.

## Women and TBI

DVBIC has been on the forefront of the emerging issue of women and TBI. In December 2017, DVBIC participated in a workshop dedicated to two important goals:

- Identify knowledge gaps, best practices and target populations in research focused on women and sex differences within the field of TBI.
- Share existing knowledge on sex differences in TBI research and identify how these differences can inform pre-clinical and clinical efforts going forward.

The workshop, called Understanding Traumatic Brain Injury in Women, was held December 18-19, 2017, at the National Institutes of Health in Bethesda, Maryland. The National Institute of Neurological Disorders and Stroke organized and sponsored it. Collaborators besides DVBIC included the Center for Neuroregenerative Medicine, National Center for Medical Rehabilitation Research/National Institute of Child Health and Human Development (NICHD), and Office of Research on Women's Health (ORWH).

In addition to attendance by numerous DVBIC staff members and an exhibit of materials from A Head for the Future, DVBIC took a leadership role presenting and moderating four sessions:

- Ms. Katherine Helmick, DVBIC acting director, chaired a session titled, Military Perspective: Sex Differences in TBI among Service Members and Veterans.
- Dr. Odette Harris gave a presentation titled, Sex Differences in Outcomes of Service Members after Polytrauma/TBI.
- Dr. Sara Lippa presented data from the 15-Year Study in her presentation, Sex Differences in Post-Concussion Symptom Reporting among Service Members and Veterans.
- Dr. Don Marion moderated a breakout session on sex differences in TBI among service members and veterans.



Ms. Katherine Helmick, DVBIC acting director, received a Pink Concussions award for outstanding contributions in the field of military service. Ms. Katherine Snedaker, executive director of Pink Concussions, presented the award. (DVBIC photo)

# Resources

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

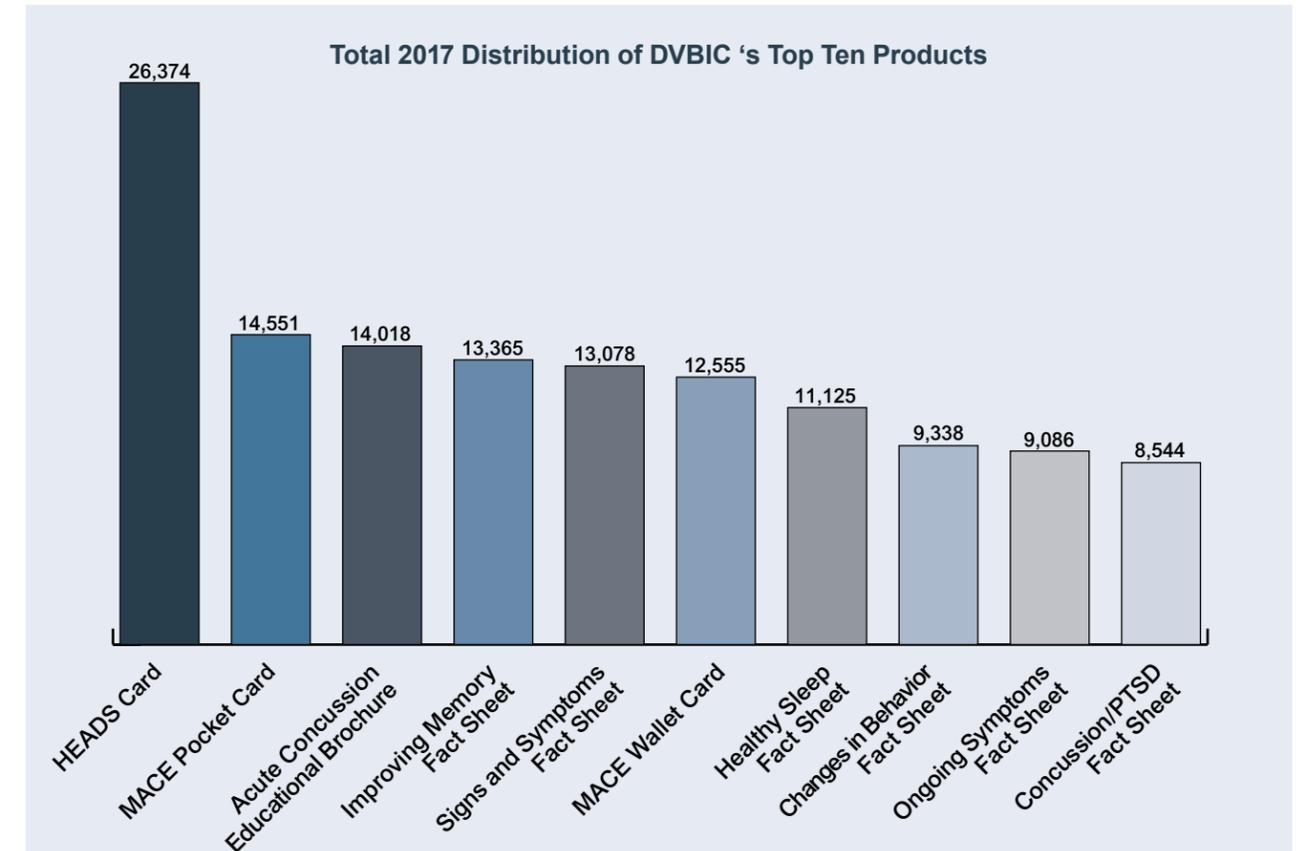
## Print Products Distributed and Downloaded in 2017

DVBIC disseminated approximately 235,000 print copy TBI educational resources across the United States and overseas, including over 3,500 products distributed in-theater to service members and providers. The top 10 print products distributed were:

- HEADS – Protect Your Strongest Weapon (wallet card)
- Military Acute Concussion Evaluation (MACE) (pocket card)
- Acute Concussion Education (brochure)
- Ways to Improve Your Memory (fact sheet)
- Signs and Symptoms of Concussion/Mild Traumatic Brain Injury (fact sheet)
- Military Acute Concussion Evaluation (MACE) (wallet card)
- Healthy Sleep: Mild TBI Symptom Management (fact sheet)
- Changes in Behavior, Personality or Mood (patient fact sheet)
- Help with Ongoing Symptoms: Concussion/Mild Traumatic Brain Injury (fact sheet)
- Concussion/Mild Traumatic Brain Injury and Post-Traumatic Stress Disorder (fact sheet)

The total number of product downloads from the DVBIC website was almost 17,000. The top 10 products downloaded were:

- Military Acute Concussion Evaluation (MACE) (pocket card)
- Traumatic Brain Injury Awareness (fact sheet)
- Ways to Improve Your Memory (fact sheet)
- Concussion/Mild Traumatic Brain Injury and Posttraumatic Stress Disorder (fact sheet)
- Changes in Behavior, Personality or Mood (fact sheet)
- Managing Headaches Following Concussion (fact sheet)
- Mild TBI Pocket Guide
- Signs and Symptoms of Concussion/Mild Traumatic Brain Injury (fact sheet)
- Concussion Management Algorithm (CMA) (pocket card)
- Healthy Sleep: Mild TBI Symptom Management (fact sheet)



## New Print Products

To support outreach and keep health care providers informed and up to date on best clinical practices, DVBIC developed five major new clinical products:

- Electronic Clinical Support Tool (eCST) for Headache Management Clinical Recommendation (March 2017)
- Interactive Provider Training on the Management of Sleep Disturbances Following Concussion/Mild TBI Clinical Recommendation (March 2017).
- Training slide decks for REC network targeting health care providers and service members, veterans, family and community) (June 2017)
- Clinical training materials for the MACE (June 2017)
- Provider training slides for the Joint Trauma System's clinical practice guideline on neurosurgery and severe head injury for the Education and Performance Improvement Directorate of the Joint Trauma System, Joint Base San Antonio (September 2017)

DVBIC also developed two new products for service members, veterans, family members and the community:

- Head Check — Know Your Helmet (flyers for skiing and snowboarding, baseball and football, and cycling and motorcycle riding) (July 2017).
- Management of Neck Pain Following Concussion (fact sheet) (March 2017)

# Resources

## Webinars

Subject matter experts conducted six virtual webinars for 2,000 MHS health care providers, awarded 1,140 continuing education units and 376 certificates of attendance. Webinar titles and speakers in 2017 were:

- TBI and Substance Use: This Is Your Injured Brain on Alcohol. Ezra J. Aune, MBA, ADCII, CCS. (January)
- Outcomes after Mild TBI in Soldiers Returning from OEF and OIF: Evidence Including the Warrior Strong Study. Karen A. Schwab, Ph.D. (March)
- Putting Clinical Recommendations into Practice: Progressive Return to Activity Following Acute Concussion/Mild Traumatic Brain Injury. Scott C. Livingston, Ph.D., P.T., ATC; Jessicah Ray, PA-C; Maryanne Sacco, M.A., OTR/L (May)
- Prevalence of and Screening for Neuroendocrine Dysfunction Post Mild Traumatic Brain Injury. Charles W. Wilkinson, Ph.D. (July)
- Emerging Technologies for Assessment and Rehabilitation of Traumatic Brain Injury. Mark L. Ettenhofer, Ph.D. (October)
- Understanding Behavioral Health Conditions Resulting from Traumatic Brain Injury. Army Captain John F. Chaves, M.D., CPT, MC (November)



This illustration is part of a DVBIC Interactive Provider Training (IPT) on headaches. DVBIC IPTs offer health care providers the opportunity to earn continuing education credits. This IPT began development in 2017 and is expected to be complete and available in 2018. (DVBIC illustration by Melanie F. Sexton)

## Revisions and Updates

In addition to developing new materials, DVBIC regularly updates existing resources.

**Cognitive Rehabilitation Clinical Recommendation**  
Throughout 2017, the DVBIC Clinical Affairs Division devoted significant effort to revising cognitive rehabilitation clinical guidance for mild TBI. DVBIC published clinical guidance on this topic in 2009. Scientific updates since that time warrant review and revisions to these clinical documents. An expert workgroup supported the revision process. A report to Congress addressing cognitive rehabilitation and TBI incorporated some of these updates.

Specifically, the expert workgroup reviewed the 2009 cognitive rehabilitation clinical package with the goal of building it into a clinical recommendation supporting standardization of cognitive rehabilitation for service members and veterans with mild TBI. The workgroup addressed clinical questions in the areas of:

- Cognitive rehabilitation interventions and strategies.
- Cognitive rehabilitation delivery.
- Special considerations for service members and veterans.

Expected deliverables include a functional, practical clinical tool plus a set of digital learning tools to support cognitive rehabilitation providers (e.g., speech language pathologists, occupational therapists and neuropsychologists). In order to accomplish this task, the workgroup convened a meeting in August during which clinicians and researchers from the Defense Department, VA and academia reviewed evidence produced since 2009, including findings from a congressionally mandated clinical trial called “Study of Cognitive Rehabilitation Efficacy,” or SCORE. The workgroup deliverables are still in progress at the time of this report. This major knowledge translation initiative will ensure continuing DoD leadership in developing TBI clinical standards of care.

### Military Acute Concussion Evaluation

In 2017, DVBIC initiated its latest revision of the Military Acute Concussion Evaluation (MACE). The MACE is a concussion screening tool for the acute assessment of service members involved in a potentially concussive event. Initially developed in 2006, the MACE was last updated in 2012 by subject matter experts from the Army, Navy, Air Force and Marine Corps, as well as DVBIC and National Intrepid Center of Excellence to reflect the latest scientific research and enhance ease of use.

The 2017 MACE revision — and a corresponding training that DVBIC also concurrently began developing — will better address the needs of active-duty service members and the medical personnel who treat them. The 2017 revision process, which will continue into 2018, broke the tool into two parts — one for the medic/corpsman and the other for providers. The 2006 and 2012 iterations of the MACE targeted only the medic/corpsman. A major goal of the 2017/2018 revision is to support triage and rapid screening of suspected concussions by streamlining medic/corpsmen responsibilities and promoting use of the tool on the battlefield and in garrison.

Attesting to the value of the MACE as a concussion screening tool, DVBIC received a request from the commander of the U.S. Navy Ship Mercy to deliver MACE training to all deploying providers. Since the U.S. Navy Ship Mercy is a hospital ship, this training would take the form of live in-person or virtual training for all military medical personnel stationed aboard the ship prior to their deployment, including corpsman, nurses and providers. DVBIC leadership viewed this extraordinary request as the catalyst to modernize the existing MACE training. The resulting training guide will be used throughout the DoD, thereby providing a consistent baseline for the MACE across all deployed medical personnel. This guide consists of teaching materials, an instructor’s guide and student classroom materials to be distributed electronically and printed as needed at training sites.

The training covers:

- Events requiring MACE.
- Administering each of the MACE sections: concussion screening, cognitive exam, neurological exam and symptom screening.
- Scoring and recording MACE findings.
- Identifying and avoiding common problems in administering the MACE.

### Mild TBI Pocket Guide

The Clinical Affairs Division completed a major overhaul of the Mild TBI Pocket Guide, a popular resource for health care providers. Since the pocket guide had not received an update since 2012, the revised version removed outdated material and incorporated new material, including information from several DVBIC clinical recommendations released after publication of the 2012 pocket guide.

# Resources

## Newsletters

DVBIC published two newsletters in 2017 intended as resources for health care providers.

### Hot Topics

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

DVBIC published three issues of Hot Topics in 2017. Study topics included but were not limited to: early clinical predictors of five-year outcomes after blast TBI, a major consensus statement on sport concussion, direct brain stimulation, circadian rhythms in severe TBI patients, and saliva biomarkers.

### Tech Watch

This newsletter tracks the latest TBI technologies. DVBIC technology specialists summarize and provide commentary on news articles, trade publications and scientific studies about technological developments related to TBI research, diagnostics, treatment and rehabilitation. The articles included are selected based on a subjective evaluation of relevance, import and interest.

DVBIC published one issue of Tech Watch in 2017. Topics included but were not limited to: blood and hearing tests for concussion, research on materials designed to protect against TBI, mechanisms for products needing FDA clearance, and a visual cortex implant that may improve vision in brain damaged patients.

## Podcasts

Podcasts are an increasingly popular form of audio media. They enable widespread information sharing across diverse audiences. DVBIC began producing podcasts in 2016 and expanded its offerings in 2017 to include new episodes of a podcast for family caregivers and a new podcast for health care providers

### The TBI Family

Launched in November 2016, this podcast is for caregivers of service members and veterans with TBI. Each episode offers information, resources and tips for caregivers and shares caregiver stories. Topics discussed in 2017 include:

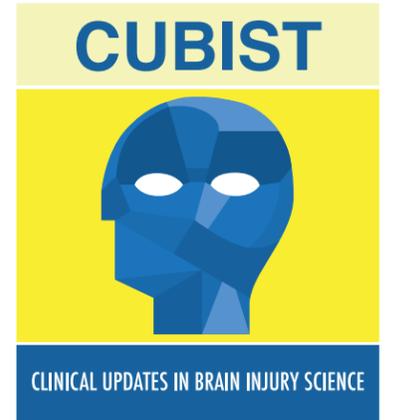
- Art as self-care for caregivers.
- Caregiver study.
- Brain Injury Awareness Month.
- Substance use and TBI.
- Medical foster homes.
- Cognitive rehabilitation.
- Driving after TBI.
- VA caregiver support program.
- Talking to kids about TBI.



### Clinical Updates in Brain Injury Science Today (CUBIST)

Launched in May 2017, Clinical Updates in Brain Injury Science Today, or CUBIST, is a podcast for health care providers treating service members and veterans with TBI. Each episode offers a brief analysis of current research relevant to clinicians. Topics discussed include:

- Sport concussion consensus statement.
- Wearable sensors to detect head impact.
- Depression, gender and TBI.
- Cortical thickness, age and TBI.
- Roller coasters and TBI.
- Concussion, genetics and Alzheimer's disease.
- Outcome predictors for blast TBI.
- Concussion and neurocognitive assessment tools (NCATs).
- Cortical thickness, age and TBI.
- Sport concussion and neuroimaging.
- Sport-related concussion and NCATs.
- Effect of memantine.
- Time trends in concussion symptom presentation and assessment methods in high school athletes.



## Research Reviews

DVBIC research reviews provide clarification on general topics of interest related to TBI. DVBIC subject matter experts produced one new research review and updated another in 2017. They are posted on the DVBIC website.

More studies are needed to determine the impact of social, medical, psychological and environmental factors.

### Misuse and Abuse of Alcohol after Traumatic Brain Injury (January)

This new research review summarizes scientific literature addressing alcohol use disorder (AUD) after TBI. Civilian and military or veteran studies differ on the impact of TBI. Civilian studies show that alcohol use is typically lower during the first year after injury than prior to injury. Among military and veteran populations, some studies suggest the risk of AUD increases after military-related TBI, but results are not consistent. Posttraumatic stress disorder and combat exposure also correlate with alcohol misuse.

### Chronic Traumatic Encephalopathy (August)

This updated research review summarizes the available peer-reviewed scientific literature regarding the definition, epidemiology, risk factors, pathology and clinical manifestations for chronic traumatic encephalopathy (CTE). A list of specific gaps in understanding of the disease is provided that, if addressed, could inform the most appropriate prevention recommendations and allow clinicians to more effectively diagnose, manage and treat CTE.



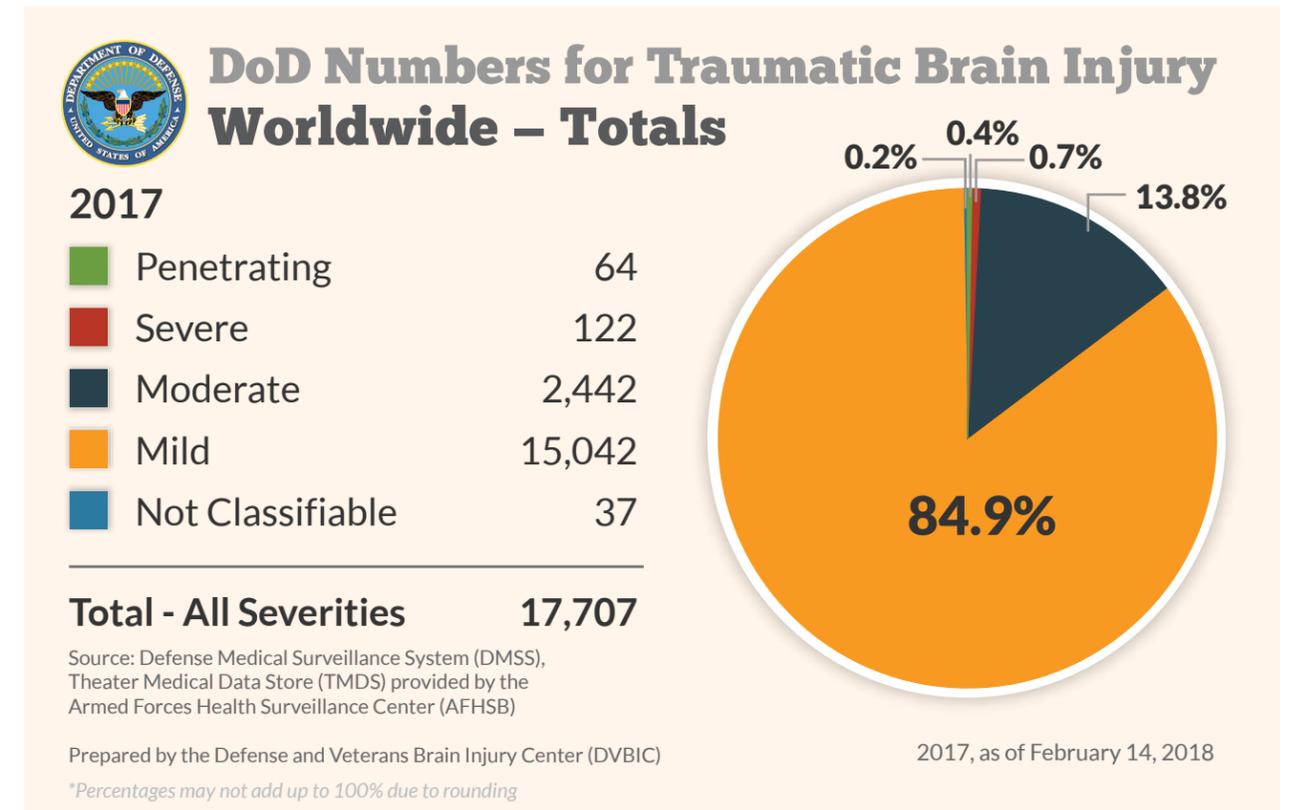
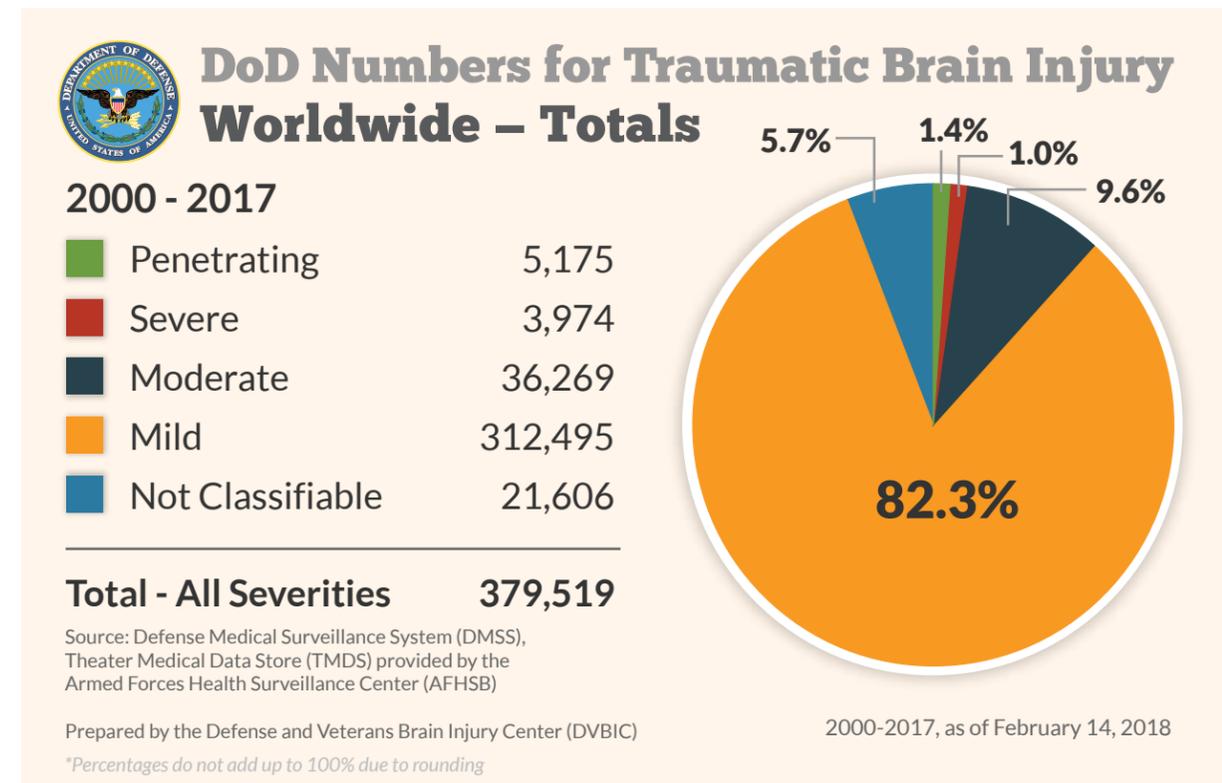
DVBIC contract staff members (left to right) Drs. Don Marion, Anne Bunner and Deborah Bailin record a podcast. (DVBIC photo)

# Ongoing Initiatives

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

## Surveillance

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



## TBI Pathway of Care Manager

DVBIC has served as the manager of the DoD TBI Pathway of Care and chair of the DoD TBI Advisory Committee (TAC) since 2014. The Pathway of Care is a health policy-based algorithm for advancing the level of care across the MHS by synchronizing processes and transitions and improving outcomes and outcome metrics. The TAC is the DoD's coordinating body chartered to promote organized and efficient TBI care from prevention and education through reintegration by adhering to Pathway of Care standards.

A major 2017 accomplishment for DVBIC in its dual role as Pathway of Care manager and chair of the TAC was the renewal of the TAC's charter. The renewed charter is effective for two years and requires several deliverables, including:

- Further advancing care by developing algorithm(s) to illustrate the Pathway of Care and the capabilities within the MHS from point of injury to reintegration.
- Standardizing terminology and TBI program definitions.
- Standardizing process and outcome metrics with a focus on health outcomes.

# Ongoing Initiatives

## Working Groups and Committees

**In addition to the Pathway of Care and the TAC, DVBIC serves in leadership roles on a number of advisory boards and committees.**

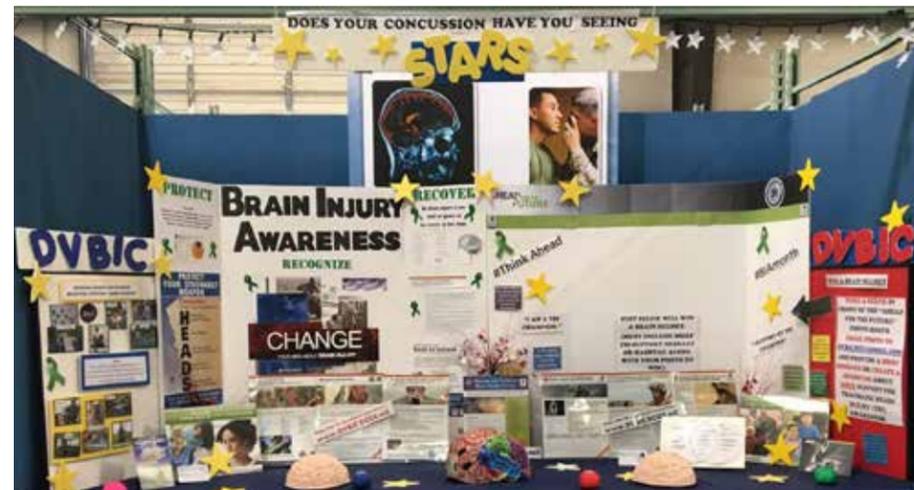
- TBI Model Systems
- Chronic Effects of Neurotrauma Consortium (CENC) Government Steering Committee and Scientific Advisory Board
- Target Endpoint Development Government Steering Committee (TED GSC)
- Combat Casualty Care Research Program Integrating Integrated Product Team
- Planning committees for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

## Outreach and Events

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

### Regional Education Coordinators

In 2017, regional education coordinators provided TBI educational outreach to over 388,456 stakeholders, participated in 3,960 education and outreach events, and conducted 482 in-person trainings and briefings to 36,032 service members and military and civilian health care providers.



Camp Lejeune RECs displayed DVBIC resources at Onslow County Fair, North Carolina. (DVBIC photo)

## A Head for the Future

A Head for the Future (AHFTF) is a DVBIC initiative focused on providing resources on TBI prevention, recognition and recovery. AHFTF creates videos, social media content and educational materials targeted to the military community, particularly service members, veterans and their families.

In 2017, this DVBIC public awareness campaign:

- Increased Facebook page “likes” from 64,964 to 103,363 (37.15 percent) with a total reach of 2.4 million.
- Increased Twitter followers from 3,934 to 8,404 (113 percent) with over 325,000 total impressions.
- Generated 105,274 website visits.
- Generated 96,408 views of TBI Champion videos via social media.



## Brain Injury Awareness Month

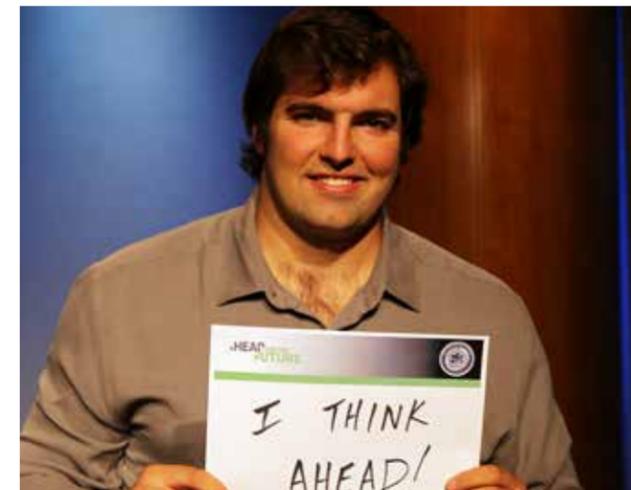
March is nationally recognized as Brain Injury Awareness Month (BIAM). Every year, DVBIC collaborates with the TBI program directors of the Army, Navy, Marine Corps, and Air Force, as well as the VA on TBI educational efforts for this annual, month-long spotlight on TBI. The theme for BIAM 2017 was THINK AHEAD: Be safe, know the signs and get help.

- The DVBIC network conducted 537 education, outreach and training events related to TBI, reaching a total audience of almost 46,000 service members, veterans, families, providers and the community. An additional 361,000 service members throughout EUROCOM were reached via Armed Forces Network.

- Over the 31-day period of BIAM, the #ThinkAhead campaign was mentioned 1,084 times in social media, an increase of 159 percent from March 2016

- A satellite media tour consisting of 28 interviews (18 television, nine radio and one online) with U.S. Army Col. Geoffrey Grammer of DVBIC and NFL player Alejandro Villanueva of the Pittsburgh Steelers. The satellite media tour resulted in 262 airings and a potential viewing/listening audience over 13 million.

- DVBIC senior leadership and staff participated in the Brain Injury Awareness Day on Capitol Hill which included a brain health fair and a congressionally-led panel discussion on TBI.



Alejandro Villanueva, offensive tackle for the Pittsburgh Steelers and former U.S. Army Ranger, poses with a DVBIC hashtag card for Brain Injury Awareness Month. (DVBIC photo)

# Partnerships

The 22 DVBIC network sites are essential to carrying out DVBIC's mission, but DVBIC works with many other partners as well. Some of these partnerships have been formalized with memoranda of understanding. Others are more informal, collaborative relationships. Partnership highlights of 2017, described below, include research, education and clinical support efforts.

## Intrepid Spirit Centers

A major goal for DVBIC, as manager of the TBI Pathway of Care, is monitoring and tracking TBI outcomes. With the addition of collocated DVBIC sites at Fort Campbell and Fort Bliss in 2017, DVBIC now maintains network sites at all nine Intrepid Spirit Centers. One important result of this multi-site partnership was the initiation of a one-year outcomes support contract to obtain TBI outcomes information from the Intrepid Spirit Centers. DVBIC identified three tools and several data points commonly collected in the Intrepid Spirit TBI clinics. In 2018, DVBIC will assess the value of collecting historical data from 2015-2017. This project supports the goal of monitoring and tracking TBI outcomes.

## National Collaborative on Children's Brain Injury

The National Collaborative on Children's Brain Injury (NCCBI) is a national organization working to improve services and support for children with brain injury. NCCBI's current focus is on improving educational services for students with TBI. The director of DVBIC's Education Division served as the DoD representative and contributor to a consensus project led by NCCBI: NCCBI: Establishing Consensus for Essential Elements in Returning to Learn Following a Concussion.

## Administration for Community Living

The Administration for Community Living (ACL) launched in 2012 to consolidate federal advocacy and support programs for older adults and people with disabilities. The agency helps people in these groups live independently in their communities. The Federal Traumatic Brain Injury State Grant Program is housed within the ACL. DVBIC participated in the 2017 ACL Traumatic Brain Injury Stakeholder Day by giving a presentation to a group of state-level TBI champions and stakeholders on TBI care within the DoD and how to access DoD TBI-related documents such as DVBIC clinical recommendations, fact sheets and other resources.

## U.S. State Department

The U.S. State Department reached out to the DVBIC Clinical Affairs Division to collaborate on concussion care. The agency has officers stationed in environments challenged by armed conflicts, often exposing them to threats similar to those faced by military service members. The State Department sought DVBIC's TBI expertise to ensure up-to-date tools and training materials. DVBIC and State Department staff initially met in January 2017 and convened additional meetings and trainings during the spring of 2017 supporting the State Department's review of concussion clinical tools.

## National Endowment for the Arts

DVBIC participated in the Creative Forces Clinical Research Summit in September 2017 and contributed to the literature review for this conference. Hosted by the National Academies of Science in Washington, D.C., the event convened experts from the Defense Department and National Endowment for the Arts (NEA). Participants in the conference discussed clinical research investigating creative arts therapies and developed a five-year agenda for measuring their impact as part of a congressionally supported collaboration established in 2012 called Creative Forces: NEA Military Healing Arts Network.

## VA Brain Trust: Pathways to InnoVations

DVBIC subject matter experts joined leading brain health researchers at the VA's 2017 Brain Trust Pathways to InnoVations annual event. The purpose of this summit was to generate discussion and support broad, partnership-based, collaborative, innovative responses to mild TBI and posttraumatic stress disorder. In addition to leading VA brain researchers, participants included stakeholders from private industry, sports organizations, the government and academia, as well as health care providers, veterans and caregivers. The agenda included sessions on technological innovation, opportunities for collaborative research, advances in sports medicine, and veteran and caregiver stories.

The second day featured a working group session where groups collaborated to develop approaches and implementation plans to advance brain health. Participation helped DVBIC gain visibility on emerging technologies and clinical paradigms and network with other partners and potential partners in TBI care.

## U.S. Air Force Center for Excellence in Medical Multimedia

DVBIC collaborated with U.S. Air Force Center for Excellence in Medical Multimedia (CEMM) to update and revise their TBI website for service members, veterans and their families.

Collaboration with the CEMM included efforts by DVBIC to revise a resource called Traumatic Brain Injury: A Guide for Caregivers of Service Members and Veterans. Resulting from a congressional mandate and cooperation from a panel of TBI survivors, family members and experts appointed by the White House, as well as the Departments of Defense and Health and Human Services, this resource provides information for caregivers of service members and veterans with moderate to severe TBIs.

Since the guide's release in 2010, substantive information became outdated. For this reason, DVBIC devoted significant effort to reviewing and revising it throughout 2017. The review process entailed a detailed product assessment examining the guide's usefulness and how to improve it. This work is expected to continue in 2018.

## Other Partners

- Baylor College of Medicine
- Brainscope
- Center for Neuroscience and Regenerative Medicine
- Children's Medical Center of Philadelphia
- Craig Hospital
- David H. Murdock Research Institute
- Denver VA Medical Center
- DMC Rehabilitation Institute of Michigan
- Ibis Biosciences Inc.
- Iowa City VA
- Johns Hopkins University
- Kessler Foundation
- Madigan Army Medical Center
- Memorial Hermann Institute for Rehabilitation and Research
- National Institutes of Health Clinical Center
- National Intrepid Center of Excellence
- Naval Special Warfare, Group One, Training Detachment (TRADET 1) School of Infantry
- Navy Experimental Diving Unit
- Neural Analytics
- Neuro-Kinetics
- Northwestern University
- Ohio State University
- Princeton Neuroscience Institute
- RTI International
- South Texas Veterans Health Care System
- University of California, Irvine
- University of California, San Diego
- University of Central Florida
- University of Michigan
- University of North Carolina at Chapel Hill
- University of Pennsylvania
- University of Pittsburgh
- War Related Illness and Injury Study Center, VA Palo Alto
- Wayne State University

# Network Site Updates

DVBIC is a joint collaboration between the DoD and VA. Essential partners are the 22 network sites located at military hospitals and clinics and VA hospitals across the United States and in Europe. At these sites, DVBIC provides personnel to perform research, clinical support and education for active-duty military, their dependents and veterans. The overall goal for both DVBIC and its partnering network sites is to return the brain injury survivor to the highest level of function and to educate family and caregivers.



DVBIC sites are strategically located across the United States and abroad to engage patients and providers where they are. With the addition of new sites in 2017 at Fort Bliss, Fort Campbell and Joint Base Lewis McChord, DVBIC network sites are now collocated with all nine Intrepid Spirit Centers.

## Military Hospitals and Clinics

### Camp Lejeune

Over the past year, Naval Medical Center Camp Lejeune Intrepid Spirit continued to expand research targeting two primary goals: 1) Securing a grant for the repetitive low level blast exposure (RLLBE) study and 2) publishing at least one article before the end of 2017. DVBIC Camp Lejeune received encouraging feedback indicating that the \$1.7 million RLLBE grant had been tentatively approved pending release of funds. Recruitment of SOCOM and heavy weapons instructors at Camp Lejeune is expected to begin in 2018 to implement the RLLBE protocol.

### Camp Pendleton

Under the direction of Navy Cmdr. Paul Sargent, DVBIC Camp Pendleton site director, the latest building in the Intrepid Spirit network began construction in 2017. The new brain injury specialty center will begin serving Marines and other active-duty service members in the spring of 2018.

Collaborative research efforts on the neurological impact of occupational blast exposure resulted in substantial advances. Of particular note, the first peer-reviewed computational modeling of blast overpressure from shoulder mounted rocket

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The first peer-reviewed computational modeling of blast overpressure from shoulder mounted rocket launchers was published in the journal Shockwaves.  
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In addition to research funded by the RLLBE grant, Camp Lejeune had four active DVBIC protocols and applied with academic institutions for several other grants which, if funded, will greatly expand the active research footprint at Camp Lejeune. Among the active studies, the art therapy protocol will be part of the larger data repository amendment, and at least 100 individuals are expected to consent to using their art for research. In terms of publications, a collaborative manuscript with the University of Pennsylvania on predictors of return to duty in blast-related mild TBI patients was accepted by the Journal of Neurotrauma.

Camp Lejeune also added a new regional education coordinator (REC) in January. Some REC highlights over the past year were an exhibition at the American Congress of Rehabilitation Medicine conference, the largest interdisciplinary rehabilitation research conference in the world, and a MACE training for 160 providers. The DVBIC recovery support specialist attended the annual Brain Injury Association Conference in South Carolina, Life with Brain Injury, obtained resources to benefit service members and veterans, and manned (along with the REC) a display table at the annual PTSD/TBI Awareness Day Resource Fair at Wounded Warrior Battalion-East.

launchers was published in the journal Shockwaves this year. Camp Pendleton also contributed six conference presentations demonstrating that low-level blast exposure from combat training can cause transient changes in neurological functioning.

In collaboration with DVBIC headquarters and sites at Fort Bragg and the Naval Medical Center San Diego, Camp Pendleton completed recruitment for a study examining the effectiveness of treatment guidelines for progressively returning a service member to activity following a concussion. The study resulted in a peer-reviewed publication and multiple presentations at scientific conferences.

### Fort Belvoir

In 2017, The Intrepid Spirit Center (ISC) at Fort Belvoir focused on bringing in new research. The Fort Belvoir DVBIC research team has been encouraged to initiate and participate in research addressing military-relevant topics and DoD/MHS clinical research gaps for TBI identified by DVBIC. With the new senior research director, the team submitted a pre-application to the Defense Medical Research and Development Program's Joint Program Committee on Clinical and Rehabilitative Medicine (JPC-8) to fund a research project on the effectiveness of integrative speech and music therapies on cognitive, health and functional outcomes in TBI patients. In addition, two of the research associates at the ISC began recruitment and referral process for Fort Belvoir ISC patients in the 15-Year Studies (natural history blood banking, brief pathway).

# Network Site Updates

## Military Hospitals and Clinics



A Brain Injury Awareness Month event is hosted by Fort Bragg. (DVBIC photo)

The Fort Belvoir recovery support specialist integrated new standardized protocols, procedures and policies for data entry into the Wounded, Ill and Injured Registry (WIIR) to strengthen outcomes and follow-up care for TBI health care delivery across the continuum of care. A focus on best practices for a seamless referral process for patients discharged at the Fort Belvoir ISC, Fort Belvoir Community Hospital Behavioral Health Department, Warrior Transition Unit and all military hospitals and clinics in the region resulted in an increased enrollment for the recovery support program and smooth process for service members transitioning out of the military.

This year, the REC focused on education, training and prevention topics on TBI for clinical providers at the Intrepid Spirit Center and the Fort Belvoir Community Hospital Behavioral Health Department. Additional focus was to increase awareness of the DVBIC provider resources on management of headaches and sleep disturbances following concussion/mild TBI.

### Fort Bliss

Initiated in 2008, the Fort Bliss TBI program has progressively grown and improved. According to site director Sean C. Sebesta, it has been a singular honor for Fort Bliss to be chosen as an Intrepid Spirit Center. The vision of the Fort Bliss TBI program is to be recognized as the future model of patient-centered rehabilitative care to improve quality of life and readiness for active-duty service members through research, high quality health care, and excellent customer service.

As one of the newest DVBIC sites, the Warrior Care Clinic's TBI program at Fort Bliss is dedicated to serving and improving the quality of life, function, and duty status of active-duty and reserve component soldiers with TBI and comorbid conditions through state of the art evaluation, treatment, education, and administration driven by a multidisciplinary, biopsychosocial approach.

### Fort Bragg

2017 proved an outstanding year for educational outreach activities. The DVBIC REC organized one of the most active and well-received Brain Injury Awareness months at Fort Bragg. The REC was also instrumental in getting brain injury incorporated into the #BeenThere campaign at Fort Bragg, which encourages service members to talk about and seek services for injuries and trauma they have experienced. Additionally, the number of clinicians across Fort Bragg receiving formal training on DVBIC's clinical recommendations on progressive return to activity increased. In 2017, more than 150 clinicians and medics received this training, now integrated into the medics' standard annual training.

Fort Bragg's recovery support specialist successfully on-boarded DVBIC's TBI Recovery Support Program to the NCServes - Central Carolina network. NCServes - Central Carolina is part of AmericaServes, a network of public, private and non-profit organizations serving veterans, service members and their families in the Greensboro, Raleigh-Durham and Fort Bragg/Fayetteville areas. Through this partnership, the TBI Recovery Support Program is getting exposure to active-duty service members and veterans in the Central North Carolina area. To date, several clients from the NCServes Central Carolina network have been enrolled into the TBI Recovery Support Program from various branches of the Armed Forces including Navy and Air Force.

The research staff completed data collection for a study funded by Congressionally Directed Medical Research Programs (CDMRP) and initiated and completed data collection for a study funded by the Advanced Medical Technology Initiative (AAMTI).

Staff also initiated four additional studies — two CDMRP studies and two AAMTI studies, all of which continue to enroll and collect data.

### Fort Campbell

The Intrepid Spirit Center at Fort Campbell joined DVBIC in October. The center operates in 37,000 square feet of clinical space with a staff of 65 personnel working in coordinated collaboration. The staff is composed of neuropsychologists, physiatrists, occupational therapists, physical therapists, speech and language therapists, pulmonologists, anesthesiologists, neurologists, neuro-optometrists, and mental health providers. The center sees 50 new patients per month with 3,500 patient encounters per month.



Coba Hoban of 103.9 KRXP-FM interviewed Robyn Wininger, Fort Carson DVBIC regional education coordinator, during Brain Injury Awareness Month. (DVBIC photo)

# Network Site Updates

## Military Hospitals and Clinics

### Fort Carson

DVBIC Fort Carson welcomed Jorge I. Arango as clinical research director in 2017. Dr. Arango brings over 15 years of clinical research experience and extensive knowledge in research design, management and regulation, as well as research interests in acquired neuronal injury diagnostics and neuroplasticity.

U.S. Public Health Service Capt. Alicia Souvignier, Fort Carson's DVBIC site director and a recognized expert in vestibular rehabilitation, began directing efforts to learn more about approaches to diagnose and measure treatment response in post-traumatic vestibular complications. The availability of an off-site facility for this research will enable the research team to use state-of-the-science devices to objectively test treatment response and compare findings with clinical measures and subject-reported changes. This work generated local and national collaborations resulting in five different research proposals. Collaborators include the University of Colorado at Colorado Springs, the University of Pittsburgh, the Oregon Health and Science University, and the United States Air Force Academy. These partnerships are expected to strengthen capacity to improve care for service members dealing with post-concussive complications.

The DVBIC research team has also been analyzing data from the recently completed neurofeedback study funded by the Telemedicine and Advanced Technology Research Center, as well as comparing military and civilian brain injury data through a partnership between the Warrior Strong study and Craig Hospital, one of the top brain injury rehabilitation hospitals in the country. Publications on these studies are expected in 2018.

### Fort Drum

The TBI clinic at Fort Drum relaunched an intensive outpatient program for those affected by TBI. Called the Integrated Warrior Recovery Program, the program incorporates multidisciplinary, cohort-based treatment. To provide optimal care for service members, the DVBIC site director began Botox injections for migraines and Alpha-Stim therapy for reducing headaches. The site director and physical therapist also started implementing the Buffalo Concussion Treadmill Test (BCTT) in assessing patients.

The regional education coordinator began giving regular TBI education for incoming providers and to all mobilizing and demobilizing soldiers at Fort Drum's soldier processing center. The REC established collaboration with Fort Drum's motorcycle safety course by providing TBI prevention, safety tips and resources. The REC provided information about TBI to more than 18,000 service members, veterans, family members and medical providers.

### Fort Gordon

Launched in 2016, the DVBIC network site at Fort Gordon, Georgia, is co-located with the Neuroscience and Rehabilitation Center at the Dwight D. Eisenhower Army Medical Center.

The research team has been supporting two multi-site, multi-year, multi-million dollar grant funded studies: 1) The Chronic Effects of Neurotrauma Consortium (CENC) study titled "Observational study on late neurological effects of combat," and 2) a Walter Reed study titled "A study of bilateral prefrontal transcranial magnetic stimulation to treat the symptoms of mild TBI and PTSD." Since the site launched, the research team also has coauthored a grant submission currently under review, submitted two research posters for presentation at national level professional conferences and presented a research poster at a professional conference. Protocol development is underway for two new studies: investigating neuroendocrine dysfunction in a military mTBI population and comparing the relative efficacy of acupuncture and Botox in the treatment of post-traumatic headaches.

The RSS enrolled more than 250 service members into the Wounded, Ill and Injured Registry as part of a DVBIC TBI clinical care outcomes pilot project. The recovery support specialist continued to provide support to service members transitioning from active-duty to retirement and assisted in facilitating a successful Brain Injury Awareness month program, walk and community presentations.



National Intrepid Center of Excellence at Fort Hood.(DVBIC photo)

### Fort Hood

The DVBIC Fort Hood research team serves as the lead site on the post-traumatic headache clinical recommendation study. The team managed institutional review board submissions and cultivated relationships with Fort Hood's clinical leadership to strengthen provider and patient recruitment. They also established relationships with other units across Fort Hood to facilitate access to more patients.

The DVBIC regional education coordinator visited facilities in Oklahoma to educate personnel about DVBIC resources, programs, and activities. Other REC highlights include conducting briefings at the Soldier Readiness Processing (SRP) Center for mobilizing and de-mobilizing service members, organizing outreach events that reached more than two thousand people, assisting patients in the Recovery Support Program, and co-facilitating over 50 classes for the Intrepid Spirit's Intensive Outpatient Program.

### Joint Base Elmendorf-Richardson

The Joint Base Elmendorf-Richardson (JBER) Traumatic Brain Injury Clinic is DVBIC's sole Air Force-based TBI facility. DVBIC JBER uses state-of-the-science diagnostic and rehabilitative equipment and complementary interventions, such as acupuncture, to provide holistic care. In 2017, DVBIC JBER received over 200 new patient referrals and completed 5,814 total patient visits. The clinic led the base-wide Automatic Neuropsychological Assessment Metric screening of 3,871 service members and civilians prior to deployment, a 475 percent increase over 2016.

DVBIC JBER was one of five Department of Defense sites chosen by the National Endowment for the Arts in 2016 to assist in adding art and music therapy services. Clinical music therapy services began in June 2017 and included 171 patient encounters in individual or group sessions for the year.

Among other highlights, the DVBIC REC reached more than 36,000 Alaska and Hawaii-based stakeholders, a 44 percent increase over 2016. The site also began offering the sphenopalatine ganglion block (SPG) procedure to treat chronic headache.

### Joint Base Lewis-McChord

The Intrepid Spirit Center opened December 18, 2017, with an expanding clinical team under the direction of Marine Corps Col. Beverly Scott, M.D., where both the TBI and Intrepid Spirit programs are housed. The TBI clinic at Madigan Army Medical Center became a DVBIC site in July 2017, allowing Madigan to match successful clinical and education advancements within their programs with growing research opportunities and initiatives. Two research projects soon to launch include the use of Prazocin for post-traumatic headaches and the assessment of heart rate variability as a measure of autonomic functioning in service members.



MACE training aboard U.S. Navy Ship Mercy. (U.S. Navy photo by Petty Officer 1<sup>st</sup> Class Ralph Doria, USNS Mercy)

# Network Site Updates

## Military Hospitals and Clinics

### Landstuhl Regional Medical Center

The Regional Health Command Europe (RHCE) DVBIC Landstuhl site serves the entire European theater including Africa and the Middle East. 2017 was a year of expansion with several performance improvement efforts on multidisciplinary care and pediatric concussion coming to fruition and several research protocols examining acute concussion incidence and multidisciplinary care models under development.

Other 2017 accomplishments include presentations by Juan Rivera, DVBIC site director, and Kendra Jorgensen-Wagers, senior clinical research director, on their multidisciplinary outcome results at the DCoE summit in September. In addition, the RHCE efforts to improve pediatric guidelines for pediatric concussion in military dependents were presented at the International Brain Injury Conference in New Orleans, the American Congress of Rehabilitation Medicine Conference in Atlanta and the International Pediatric Brain Injury Symposium in Rome.

Landstuhl remains focused on health outcomes to enhance warfighter return to duty and performance optimization involving emerging technologies and remote telehealth applications to enhance service delivery across a very broad geographic region. Clinical staff members have fully implemented the TBI data portal utilization across Europe for tracking TBI health outcome metrics. With the recent advent of new research staff, DVBIC Landstuhl anticipates even more evidence-based results for our TBI patients.

### Naval Medical Center San Diego

DVBIC at Naval Medical Center San Diego (NMCS D) works collaboratively with the Office of Neurotrauma/Navy Medicine West and the TBI Program at NMCS D to improve access to care for Navy SEALs, sailors, Marines, and soldiers and provide them with education, clinical services, care coordination and opportunities to participate in TBI research. An early identification system was collaboratively developed with Comprehensive Combat and Complex Casualty Care (C5) staff to streamline access to care for elite forces with high operating tempos. DVBIC NMCS D has continued to lead efforts in collaboration with Camp

Pendleton to develop and refine the NeuroTRACT System — a state-of-the-art data registry that bridges the gap between researchers and clinicians.

DVBIC at NMCS D's primary mission is to conduct state-of-the-science research aimed at improving diagnostic and treatment algorithms for service members with TBI. This research mission is accomplished in collaboration with other DVBIC sites as well as through externally funded research initiated by local study investigators. DVBIC NMCS D is proud to announce that it has been invited to submit three full applications for Congressionally Directed Medical Research Programs consideration. The current clinical research portfolio includes studies that:

- Evaluate advanced technologies for assessment and rehabilitation of TBI such as mobile eye tracking, EEG, and virtual reality.
- Compare treatment as usual (speech therapy) with computer-based cognitive remediation, examining short- and long-term outcomes after TBI for patients and caregivers.
- Investigate the real-world implementation and impact of clinical practice guidelines for progressive return to activity after TBI.

DVBIC at NMCS D coordinates care for TBI patients and provides extensive educational services. This year staff conducted multiple trainings for medical providers aboard the USNS Mercy. This relationship continues to grow as DVBIC NMCS D is now slated to provide recurring TBI updates for staff aboard the ship. In addition, the regional education coordinator delivers weekly emails to over 400 members of the DVBIC NMCS D TBI listserv, keeping providers apprised of the latest research, webinars and conferences related to brain injury. Lastly, the fourth annual NMCS D TBI symposium had the highest participation numbers yet, with 172 attendees — an increase of over 50 percent since the inaugural event and now reaching a nationwide audience by virtual broadcast.



Safety Day table displays DVBIC resources at San Antonio Military Medical Center. (DVBIC photo)

### San Antonio Military Medical Center

DVBIC researchers at San Antonio Military Medical Center (SAMMC) published 10 peer-reviewed journal articles and gave 10 presentations at national meetings. Researchers began enrollment in a data repository study for military service members with orthopedic injuries and uninjured service members and developed an automated data entry and management system for their large TBI data repository. They continued recruitment and enrollment into ongoing studies involving fMRI, epigenetics and long-term outcomes following mild TBI.

DVBIC SAMMC also maintained high involvement in military health care provider training. Over a thousand military providers at the U.S. Army Medical Department Center and School Health Readiness Center of Excellence received multifaceted TBI training from DVBIC SAMMC staff. The regional education coordinator continued to provide monthly education sessions reaching nearly 1,400 military health care professionals at SAMMC and over 2,500 service members, veterans, and families.

### United States Special Operations Command

United States Special Operations Command (USSOCOM) is the newest DVBIC network site. Navy Capt. Scott Cota serves as the USSOCOM DVBIC site director. Since 1987, USSOCOM has been a unified combatant command and is unique in that it performs combatant command-like functions and has Title 10 military department-like responsibilities and authorities. USSOCOM is a global enterprise consisting of Army Special Operations Command, Naval Special Warfare Command, Air Force Special Operations Command, Marine Corps Special Operations Command, and Joint Special Operations Command, as well as seven Theater Special Operations Commands aligned with the Geographic Combatant Commands, two Joint Task Force Commands, and support to NATO Special Operations Forces (SOF) Headquarters. USSOCOM's mission is to synchronize the planning of Special Operations worldwide and provide SOF to support persistent, networked, and distributed Global Combatant Command operations in order to protect and advance U.S. interests.

The USSOCOM Command Surgeon supports SOF warriors and their families. Current USSOCOM research studies cover the use of transcranial magnetic stimulation for the treatment of TBI and post-traumatic stress and clinical evaluation of the use of transcranial electrical stimulation to modulate sleep and pain. USSOCOM also directly and indirectly support studies on low level blast effects and blast surveillance with the goal of rapidly operationalizing the results and recommendations.

# Network Site Updates

## Military Hospitals and Clinics

### Walter Reed National Military Medical Center

Walter Reed National Military Medical Center (WRNMMC) is the lead DVBIC site conducting the congressionally mandated 15-Year Study, a longitudinal research initiative comprised of several substudies. As the TBI-care and quality of life (TBI-Care-QOL) development study came to an end, the longitudinal caregiver study expanded in methodology, integrating the new TBI-Care-QOL short forms, validated Patient-Reported Outcomes Measurement Information System (PROMIS) measures, family functioning and relationship measures, and PROMIS pediatric parent proxy short forms. The natural history study completed all data entry backlog. Analyses with the blood, neuroimaging, neurobehavioral, and neurocognitive data were completed and memoranda of understanding and data sharing agreements were finalized with collaborating sites to commence sensory-motor data analyses. As of November 2017, the natural history study completed 1,048 baseline evaluations, and the longitudinal caregiver study completed 368 baseline evaluations.

In addition to research at WRNMMC, the Brain Fitness Center (BFC) continues to offer commercially available brain training and biofeedback programs to military service members and beneficiaries who have subjective cognitive complaints. In 2017, the BFC received over 400 referrals, conducted 350 new participant evaluations, and completed over 2,800 total participant visits.

WRNMMC is collocated with the National Intrepid Center of Excellence (NICoE), and NICoE's neuropsychology service continued to work collaboratively with providers both within and outside of WRNMMC to strengthen best patient practice and improve patient centered care. NICoE's clinical operations department continued to focus collaborative efforts with other national Intrepid Spirit Centers to standardize outpatient/inpatient assessments and treatment. In addition to launching a 12-session speaker series offering continuing education units on TBI treatment, care and management, this department began to integrate and cross-train NICoE case managers and family therapists for better clinical operation feasibility.



Connie Du, DVBIC research assistant, shares DVBIC materials at the 2017 TBI Symposium hosted by DVBIC at the Minneapolis VA Health Care System. (DVBIC photo)

## VA Medical Centers

### Minneapolis VAMC

Research staff in Minneapolis completed recruitment and enrollment for three CENC studies: "Longitudinal Multidomain Assessment of Neurodegeneration in Veterans," "Visual and Sensory Impairments and Progression Following Mild TBI," and "Retinal Imaging with Adaptive Optics."

Staff presented results from studies in posters and talks at eight local, national, and international conferences, completed six grant submissions for external funding, developed three new protocols, and published a paper in the journal *Brain Stimulation* on the first study investigating an intervention combining cognitive training and transcranial direct current stimulation to reduce impulsivity in veterans. Staff also facilitated the first annual Traumatic Brain Injury Awareness Fair at the VA and participated in several other events including Caregiver Appreciation Day and Epilepsy Awareness Day.

### Palo Alto VAMC

Dr. Maheen Mausoo Adamson, senior scientific research director at DVBIC Palo Alto and clinical associate professor of neurosurgery, psychiatry and behavioral sciences at Stanford University School of Medicine, presented at the sixth annual Brain Mapping Day. Held March 8, 2017, at the Dirksen Senate Office Building in Washington, D.C., this event was organized by the Congressional Neuroscience Caucus, the Society for Brain Mapping and Therapeutics, the Brain Mapping Foundation and the National Center for NanoBioElectronics. The presentation showcased a broad array of cutting edge neurotechnologies, translation neuroscience research, and clinical trials advancing prevention of and diagnostics and treatments for neurological and psychological disorders.

Gender and TBI was an important focus of attention for DVBIC. Dr. Odette Harris, principal investigator at DVBIC Palo Alto as well as the director of brain injury and a clinical associate professor in neurosurgery at Stanford University School of Medicine, presented as an invited expert on this issue at the Workshop on Female Brain Injury at the National Institutes of Health in December.

DVBIC Palo Alto also initiated a student summer volunteer/intern research assistant program. Students who completed this program represented medical schools including Stanford University, the University of Illinois, Chicago, and the University of Texas, as well as the Neurosurgery Research and Education Foundation. They performed data analysis resulting in posters and manuscripts.

### Richmond VAMC

The Richmond DVBIC research team published three manuscripts, delivered 11 presentations using DVBIC study data, submitted a Congressionally Directed Medical Research Programs grant proposal, and obtained local regulatory approvals for a transcranial magnetic stimulation project funded by the Commonwealth of Virginia Department for Aging and Rehabilitative Services.

The recovery support specialist networked with colleagues and established connections with community partners at the Brain Injury Association of Virginia Annual Conference and Navy Safe Harbor Family Symposium. The recovery support specialist also expanded the catchment area, which now includes Virginia, West Virginia, Kentucky, Indiana and Michigan.

The REC networked with colleagues at the Society for Neuroscience Annual Meeting, provided outreach services at several local veteran and service member events, and established an important connection and working relationship with the Warrior Concussion Clinic at Portsmouth Naval Hospital.

### San Antonio VAMC

Several longitudinal studies on neurotrauma continued to enroll subjects and gather data at the San Antonio VAMC. The studies recruited over one hundred new participants in 2017. Using data from those and other studies, researchers published 11 peer-reviewed journal articles and two book chapters and presented six abstracts at the Military Health Symposium and the American Academy of Psychiatrist Annual Meeting.

This is the first year that DVBIC personnel were assigned directly to the San Antonio VA Polytrauma Rehabilitation Center. The new research assistant and senior clinical research director will help the San Antonio VA fulfill its TBI research mission. Already assisting with the DVBIC supported studies, establishing connections with several organizations throughout San Antonio to facilitate recruitment, and planning for future studies, the DVBIC team is rapidly becoming an important asset to the San Antonio VA. The senior clinical research director's knowledge of capabilities and assets at the San Antonio Military Medical Center will enable greater collaboration between the two facilities and generate multiple possibilities across the network.

### Tampa VAMC

This year, the DVBIC Tampa team collectively gave 35 presentations, published 24 papers, and maintained nine active research grants related to TBI. Among highlights, members of the DVBIC Tampa team presented the Smart Home project at the VA Center for Innovation Demo Day in Washington, D.C. The team placed second out of over 100 presentations and was picked up by the Office of VA Connected Care for the mobile app development.

DVBIC and the Tampa VA worked hard this year to continue the strong alliance with SOCOM headquarters at MacDill Air Force Base. This collaboration resulted in the development of SOCOM as a new DVBIC site. In addition, DVBIC Tampa and its coordination with SOCOM led to new DVBIC staff, a symbiotic research partnership on a grant proposal, and numerous combined efforts aimed at optimizing performance of the SOF warfighter.

# Publications

Since 1992, DVBIC staff members have published more than 480 peer-reviewed manuscripts and regularly serve on the editorial boards of major journals in the field of TBI including the *Journal of Neurotrauma* and *Journal of Head Trauma Rehabilitation*. In 2017, DVBIC staff members published 53 peer-reviewed papers. This list includes some print publications that may have appeared electronically ahead of print in 2016.

- Armistead-Jehle, P., Cole, W. R., & Stegman, R. L. (2017a). Performance and symptom validity testing as a function of medical board evaluation in U.S. Military service members with a history of mild traumatic brain injury. *Archives of Clinical Neuropsychology*, 1-5. doi: 10.1093/arclin/acx031
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- Bailey, E. K., Nakase-Richardson, R., Patel, N., Dillahunt-Aspillaga, C., Ropacki, S. A., Sander, A. M., . . . Tang, X. (2017). Supervision needs following veteran and service member moderate to severe traumatic brain injury: A VA TBI Model Systems study. *J Head Trauma Rehabil*, 32(4), 245-254. doi: 10.1097/HTR.0000000000000317
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# Presentations

DVBIC subject matter experts across the network actively shared their research throughout 2017. They gave presentations at multiple conferences across the U.S. and internationally.

## Military Health System Research Symposium

Of particular note was DVBIC's presence at the Military Health System Research Symposium (MHSRS), the premier DoD scientific meeting, which took place August 27-30, 2017, in Kissimmee, Florida. MHSRS provided a venue for DVBIC to present new scientific knowledge resulting from military-unique research at the only military or civilian meeting focused specifically on the unique medical needs of the warfighter. While in attendance, DVBIC presented 42 research posters and conducted six oral presentations. Additionally, DVBIC served as the lead for the plenary session "Recovery Trajectory in Acute Concussion: Importance of Adherence to Progressive Return to Activity Guidelines for Activity." DVBIC's efforts at MHSRS culminated in the presentation of 80 draft MHS consensus statements on the prevention, diagnosis and treatment of TBI. A complete list of DVBIC presentations at MHSRS is provided in the comprehensive table of DVBIC presentations below.

## Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury Summit

The annual Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury (DCoE) Summit was held September 19-21, 2017. This virtual conference offered 28 educational sessions, including 14 sessions in the TBI Track. The total number of attendees was 1,567, with 9,002 continuing education units awarded and 1,422 certificates of attendance. TBI topics and speakers included:

- Long-term impact of traumatic brain injury: The 15-year longitudinal TBI studies and IMAP study. (Risa Nakase-Richardson, Ph.D., FACRM, Polytrauma Rehabilitation Program, James A. Haley Veterans' Hospital; and Louis French, Psy.D., NICoE, WRNMMC)
- Evidence from the Warrior Strong longitudinal study: Post-concussive symptoms common in soldiers who have returned home. (Karen Schwab, Ph.D., DVBIC, and Donald Marion, M.D., DVBIC)
- Gender differences in TBI. (Anne Bunner, Ph.D., DVBIC, and Katherine Helmick, M.S., CRNP, ANP-BC, CNRN, DVBIC)
- Management of acute concussion from injury to return to duty: Using the Military Acute Concussion Evaluation (MACE), clinical management algorithm (CMA) & progressive return to activity (PRA) algorithms. (Keith Stuessi, M.D., and Clint Pearman, M.S., CBIS, Naval Hospital, Camp Pendleton)
- Bees in my helmet: Role of chronic traumatic encephalopathy in mild memory impairment: A practical guide to treatment. (George Charpiet, M.A., SLP-CC, Canandaigua Veterans Administration Medical Center)
- Filling the gaps: Capturing the 'whole story' following traumatic brain injury. (Col. Beverly Scott, M.D., Madigan Army Medical Center)
- Adding insult to injury: Traumatic brain injury and substance use. (Lars Hungerford, Ph.D., ABPP-CN, Naval Medical Center San Diego)
- Outcomes of training service members with a history of mTBI in assistive technology for cognition." (Carole Roth, Ph.D., CCC, BCANCDs, Naval Medical Center San Diego)
- Visual dysfunction in traumatic brain injury: An interdisciplinary approach to care. (Robin Winslow, O.D., and Abby Wicks, O.D., FAAO, NICoE)
- Investigation and treatment of military related traumatic brain injury. (Cmdr. Josh Duckworth, M.D., USUHS)

- Evaluation and treatment of behavioral health symptoms in TBI patients. (Jonathan P. Wolf, M.D., NICoE, WRNMMC)
- Unraveling the Gordian knot of TBI, polytrauma, and chronic pain. (Edison Wong, M.D., M.S., DVBIC)
- Interdisciplinary care: The trifecta for patient quality outcomes, medical readiness and return on investment. (Kendra Jorgensen-Wagers, Ph.D., LCMHC, CRC, and Juan Rivera, M.D., FACS, MBA, U.S. Army Landstuhl Regional Medical Center)



MACE training at Camp Lejeune. (DVBIC photo)

# DVBIC 2017 Presentations, Posters and Abstracts

Name of Conference	Site Lead	Title	Type
1. DCoE PH/TBI Summit 2. Minneapolis VA Research Day	Minneapolis VA	Transcranial direct current stimulation (TDCS) paired with a cognitive task reduces impulsivity in a clinical population of veterans	1. Poster 2. Poster
2017 National Capital Area (NCA) TBI Research Symposium	Richmond VA	Olfactory and taste disturbances among Iraq and Afghanistan U.S. military veterans with a history of mild traumatic brain injury	Presentation
2nd International Brain Stimulation Conference	Minneapolis VA	Combining TDCS with a task to reduce impulsivity in a clinical population	Poster
31st Annual Meeting of the Associated Professional Sleep Societies	Tampa VA	Sleep apnea severity is associated with motor recovery and processing speed in acute TBI rehabilitation admissions: A VA TBI model system study	Presentation
31st Annual Meeting of the Associated Professional Sleep Societies	Tampa VA	Sleep stages, total sleep time, and arousals in acquired brain injury rehabilitation patients with and without sleep apnea	Poster
32nd Annual Academic Research Competition in San Diego, CA	NMCS D	Retrospective analysis: Using lumosity in the treatment of mild traumatic brain injury	Abstract
45th Annual Meeting of the International Neuropsychological Society	NMCS D	Neurocognitive eye tracking in moderate-to-severe traumatic brain injury: evidence for enhanced sensitivity to impairment	Poster
7th Naval Hospital Camp Lejeune Regional Research Symposium	Camp Lejeune	Blast gauges, firecrackers and a high school mentally: using simple tools to foster scientific curiosity	Presentation
7th Naval Hospital Camp Lejeune Regional Research Symposium	Camp Lejeune	Enhancing data analysis with software	Poster
7th Naval Hospital Camp Lejeune Regional Research Symposium	Camp Lejeune	In the rear with the gear: Insight into repetitive low level blast exposure	Poster
7th Naval Hospital Camp Lejeune Regional Research Symposium	Camp Lejeune	Mitigating confounding factors in gear efficacy; Mapping overpressure at a blast plagued range: operation significance	Poster
American Academy of Clinical Neuropsychology	Camp Pendleton	Classification of alcohol use and misuse among active duty service members referred for traumatic brain injury evaluation	Poster
American Academy of Clinical Neuropsychology	Fort Bragg	Cognitive test scores as a function of word memory test performance	Abstract

Name of Conference	Site Lead	Title	Type
American Academy of Clinical Neuropsychology	Fort Bragg	Examination of MMPI-2-RF validity scales in disability evaluations: Comparison between orthopedic and behavioral health conditions	Abstract
American Academy of Neurology Sports Concussion	HQ	Clinical Recommendations for Progressive Return to Activity Following Acute Concussion	Poster
American Academy of Neurology Sports Concussion	HQ	Differentiating Concussion from Intracranial Pathology in Athletes: A Critically Appraised Topic	Poster
American Academy of Physical and Medicine Rehabilitation	Tampa VA	Improving care for persons with disorders of consciousness (DOC): An introduction to minimal competency recommendations for doc programs	Presentation
American Academy of Physical and Medicine Rehabilitation	Richmond VA	Predicting long-term global outcome after traumatic brain injury (five year data): Development of a practical prognostic tool using the TBI Model Systems National Database	Poster and presentation
American Congress of Rehabilitation Medicine	Palo Alto	Functional network dysfunction in chronic symptom traumatic brain injury	Poster
American Congress of Rehabilitation Medicine	WRNMMC	"I can't sleep": quality of sleep in caregivers of service members and veterans with traumatic brain injury	Abstract and poster
American Congress of Rehabilitation Medicine	Fort Bragg	Improving recognition and treatment of sleep apnea in the rehabilitation setting to improve outcome	Instructional course abstract
American Congress of Rehabilitation Medicine	Palo Alto	Reliability of telephonic neuropsychological assessment post traumatic brain injury	Poster
American Physical Therapy Association Combined Sections Meeting	NMCS D	Primary care provider practices and perceptions of care for service members with concussion: Pre-intervention qualitative analysis of interview data	Poster
American Psychological Association	Fort Bragg	Primary care practices and perceptions in care for service members with acute concussion: Does reflection in a mixed-method study modify practice?	Poster
American Speech-Language Hearing Association	SAMMC	Completion of multidisciplinary treatment for persistent postconcussive symptoms is associated with reduced symptom burden	Presentation
American Speech-Language Hearing Association	HQ	Practical applications of cognitive rehabilitation principles: motivational interviewing and goal attainment scaling.	Presentation
Association of Military Surgeons of the United States (AMSUS)	Camp Lejeune	Effectiveness of a mindfulness-based group therapy (mbgt) integrative restoration (iREST) for active duty personnel with mild traumatic brain injury	Poster

Name of Conference	Site Lead	Title	Type
AMSUS	Camp Lejune	Illustration of ISCRC recovery process at naval hospital camp lejeune using the neuroplasticity model	Presentation
AMSUS	HQ, NICOE	Military Health System Consensus Statement on the Prevention, Diagnosis and Treatment of Traumatic Brain Injury	Presentation
AMSUS	Camp Lejune	Operation return to force for special operators with mild traumatic brain injury (mTBI)	Presentation
Annual Meeting of the National Academy of Neuropsychology	Camp Pendleton	Accuracy of self-reported questions for assessment of tbi history	
Annual Meeting of the North American Neuro-Ophthalmology Society	Minneapolis VA	Evaluating Multiple Sclerosis and Traumatic Brain Injury using OCT-based quantification of visual fixation	Poster
Annual Meeting of the Society for Biological Psychiatry	Minneapolis VA	Reducing impulsivity with transcranial direct current stimulation (tDCS) and a cognitive task	Poster
Annual Meeting of the Society for Biological Psychiatry	Minneapolis VA	Engagement in a visual task increases postural stability in veterans with mild traumatic brain injury	Poster
Association of Military Osteopathic Physicians & Surgeons	HQ	Traumatic Brain Injury and Clinical Tools and Recommendations; Defense and Veterans Brain Injury Center Progressive Return to Activity (PRA) Following Acute Concussion/Mild Traumatic Brain Injury Clinical Recommendation	Presentation
Biennial Meeting of the Society for Research in Child Development	Fort Bragg	The relationship between maternal obesity and neurodevelopmental disorders: A meta-analysis	Poster
BrainBox Initiative Conference	Palo Alto	Improvement of functional connectivity with rTMS in Veterans with brain injury	Presentation and poster
Chronic Effects of Neurotrauma Consortium (CENC) Annual Meeting	Richmond VA	CENC multicenter observational study: Characteristics of early participants and future directions	Presentation
Clinical Transcranial Magnetic Stimulation (TMS) Society	Minneapolis VA	Identifying predictors of clinical response of medication refractory depression with comorbid mild TBI to deep TMS	Poster
Current Concepts in Sleep	Tampa VA	Traumatic brain injury and sleep	Presentation
DCoE Webinar Series	NMCSO	Emerging technologies for assessment and rehabilitation of traumatic brain injury	Webinar
DCoE Webinar Series	Fort Carson	Mild TBI in soldiers returning from Iraq or Afghanistan	Webinar
Faculty Research Meeting (Neurosurgery, Stanford Medicine)	Palo Alto	Advanced diagnostics and non-invasive treatments for brain injury	Presentation

Name of Conference	Site Lead	Title	Type
Health Measures User Conference	WRNMMC	"Real-time" short form development: Applying item information to obtain "live" score-level reliability estimates for evaluating expected short form performance	Poster
Health Measures User Conference	WRNMMC	The reliability and validity of PROMIS in caregivers of individuals with civilian- or military-related traumatic brain injury	Poster
International Brain Injury Association	Fort Carson	Lifetime history of TBI among soldiers returning from OEF/OIF Deployments	Presentation
International Brain Injury Association	Fort Carson	Effects on mTBI and PTSD on ANAM performance in OEF/OIF active duty soldiers	Presentation
International Brain Injury Association	NMCSO	Self-reported alcohol use among active duty service members referred traumatic brain injury screening	Poster
International Brain Injury Association	WRNMMC	Factors affecting burden in family caregivers of military service members with traumatic brain injury	Poster
International Brain Injury Association	WRNMMC	Health-related quality of life following severe and penetrating traumatic brain injury in U.S. military service members	Poster
International Brain Injury Association	WRNMMC	Mild neurocognitive disorder and diffusion tensor imaging in military service members following mild traumatic brain injury	Poster
International Brain Injury Association	WRNMMC	The influence of caregiver burden on health status and perceived role efficacy in caregivers of U.S. military service members with traumatic brain injury	Poster
International Brain Injury Association	WRNMMC	The influence of traumatic brain injury severity on health-related quality of life in caregivers of a service member or veteran with traumatic brain injury	Poster
International Brain Injury Association	WRNMMC	The relationship between perceived burden and health-related quality of life in caregivers of military service members with traumatic brain injury	Poster
International Brain Injury Association	WRNMMC	The relationship between plasma amyloid and neurocognition following mild traumatic brain injury	Abstract
International Brain Injury Association	WRNMMC	The relationship between PTSD symptoms and tau and amyloid levels in U.S. military service members with and without mild-moderate traumatic brain injury	Abstract and poster
International Brain Injury Association	WRNMMC	Family caregiver proxy report of the impact of deployment and traumatic brain injury on the health and behavior of children of U.S. military service members	Poster

Name of Conference	Site Lead	Title	Type
International Brain Injury Association	WRNMMC	The relationship between white matter hyperintensities, neurocognitive performance, and white matter integrity following mild traumatic brain injury	Poster
International Brain Injury Association	Fort Bragg	Cognitive test performance and evaluation context in U.S. military service members with a history of mild TBI	Poster
International Brain Injury Association	Fort Bragg	Performance and symptom validity testing as a function of medical board evaluations in U.S. military service members with a history of mild tbi	Poster
International Brain Injury Association	NMCSD	A 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	Poster
International Brain Injury Association	Tampa VA	Competitive employment outcomes in veterans with traumatic brain injury: A VA traumatic brain injury model system study	Presentation
International Brain Injury Association	Tampa VA	Employment stability in veterans and service members with traumatic brain injury: A VA traumatic brain injury model system study	Presentation
International Brain Injury Association	Tampa VA	Extending our knowledge of the long-term outcomes of disorders of consciousness	Invited Symposium
International Brain Injury Association	Tampa VA	Implications of key differences in military and civilian TBI cohorts admitted for inpatient rehabilitation: A VA and NIDILRR TBI Model System study	Presentation
International Brain Injury Association	Tampa VA	Incidence and trajectory of obesity in veterans and service members with TBI: A VA TBI Model System study	Presentation
International Brain Injury Association	Tampa VA	Minimal competency recommendations for disorder of consciousness rehabilitation	Instructional course
International Brain Injury Association	Tampa VA	Relationship of mental healthcare utilization and suicidal behaviors and ideation at 1-year post traumatic brain injury (TBI): A VA TBI Model Systems study (VA TBIMS)	Poster
International Brain Injury Association	Tampa VA	Sleep architecture in acquired brain injury rehabilitation patients with mild, moderate and severe sleep apnea. brain injury	Poster
International Brain Injury Association	Tampa VA	The influence of traumatic brain injury severity on health-related quality of life in caregivers of a service member or veteran with traumatic brain injury	Poster
International Brain Injury Association	SAMMC	Diffusion imaging findings in U.S. service members with mild traumatic brain injury and post-traumatic stress disorder	Poster

Name of Conference	Site Lead	Title	Type
International Brain Injury Association	SAMMC	Local diffusion imaging connectometry in United States service members with mild TBI and PTSD	Abstract
International Neuropsychological Society	WRNMMC	A Cross-sectional perspective of neurocognitive outcome from military-related mild-moderate TBI in the sub-acute recovery period and 1-year post-injury	Poster
International Neuropsychological Society	WRNMMC	Case series analysis of the natural history of neurocognitive performance following moderate, severe, and penetrating traumatic brain injury in U.S. military service members	Poster
International Neuropsychological Society	WRNMMC	Comparing neuropsychological outcome in active duty soldiers following complicated, uncomplicated, and equivocal mild traumatic brain injury	Poster
International Neuropsychological Society	WRNMMC	Neuropsychological outcome following moderate, severe, and penetrating traumatic brain injury in U.S. military service members	Poster
International Neuropsychological Society	WRNMMC	Predictors of neurobehavioral outcome 2 years following mild-moderate traumatic brain injury	Poster
International Neuropsychological Society	WRNMMC	The natural history of psychological symptoms following moderate, severe, and penetrating traumatic brain injury in military service members: A case series analysis	Poster
International Neuropsychological Society	WRNMMC	The relationship between self-reported postconcussion symptoms with tau and amyloid-beta 42 levels following military-related mild-moderate traumatic brain injury	Poster
International Neuropsychological Society	Fort Bragg	Percentage of low neurocognitive scores as a useful embedded performance validity measure	Poster
Kaiserslautern High School Resiliency Forum	LRMC	BIAM presentation on thinking ahead to build a better brain presentation	Presentation
Military Health System Research Symposium (MHSRS)	Camp Pendleton	Acute, sub-acute, and chronic effects on neuromotor performance after repeated low-level blast exposure	Poster
MHSRS	Camp Lejeune	Analyze predict overcome: Using analytics to improve outcomes	Poster
MHSRS	Minneapolis VA	Assessment of neural dynamics in severe traumatic brain injured patients with disorders of consciousness	Presentation
MHSRS	Camp Pendleton	Assessment of neurological changes and monitoring of blast exposure in combat training environments	Poster
MHSRS	Minneapolis VA	Assessment of progressive neuron loss in veterans with mild TBI by optical coherence tomography (OCT) of inner retinal layer thickness over time	Poster

Name of Conference	Site Lead	Title	Type
MHSRS	Richmond VA	Characterizing improvement profiles in the prospective clinical tracking form study at one and two years post-injury	Abstract and presentation
MHSRS	Camp Pendleton	Comparison of health outcome measures in service members at the national intrepid center of excellence (NICoE) and concussion care clinic (CCC), Naval Hospital Camp Pendleton (NHCP)	Poster
MHSRS	SAMMC	Depression among military service members with a history of mild TBI	Poster
MHSRS	Tampa VA	Do civilian epidemiologic studies inform military TBI epidemiology? A comparison of the VA and NIDILRR TBI Model System cohorts	Presentation
MHSRS	Camp Lejeune	Effectiveness of a mindfulness-based group therapy (MBGT) integrative restoration (iRest) for active duty personnel with mild traumatic brain injury	Poster
MHSRS	Camp Pendleton	Effectiveness of cognitive behavioral therapy for insomnia (CBT-I) in mTBI	Poster
MHSRS	Tampa VA	Employment stability in veterans and service members with TBI	Poster
MHSRS	Camp Lejeune	Environmental monitoring in training settings: Readings from blast sensors data from multiple SMAW training sessions	Poster
MHSRS	Fort Carson	Epidemiology and prognosis of mild traumatic brain injury in returning soldiers: A cohort study	Poster
MHSRS	Fort Bragg	Examining new composite scores for the ANAM4 TBI-MIL battery	Poster
MHSRS	Minneapolis VA	Executive functioning is associated with levels of symptom reporting in veterans with mild traumatic brain injury	Poster
MHSRS	Camp Lejeune	Getting away from it: The use of blast sensors to monitor overpressure in breaching range training	Poster
MHSRS	Camp Lejeune	Healing traumatic memories of war through art therapy	Poster
MHSRS	SAMMC	Impact of pre- and post-injury socioeconomic and psychosocial adversity on symptoms and symptom severity following mild traumatic brain injury	Poster
MHSRS	SAMMC	Impact of resilience and pre- and post-injury socioeconomic and psychosocial adversity on symptoms and symptom severity following mild traumatic brain injury	Poster

Name of Conference	Site Lead	Title	Type
MHSRS	Fort Bragg	Impact of sleepiness on visuomotor processing speed in service members with and without a mild traumatic brain injury	Poster
MHSRS	Tampa VA	Incidence, trajectory, and predictors of obesity in Veterans and Service Members with TBI: A VA TBI Model Systems study	Poster
MHSRS	Camp Pendleton	Intercorrelation between sleep quality, neurobehavioral symptoms, and PTSD in a clinical sample of traumatic brain injury patients	Poster
MHSRS	Tampa VA	Interim analysis of volumetric and diffusion imaging findings from 287 Veterans participating in the Chronic Effects of Neurotrauma Consortium (CENC) study	Poster
MHSRS	WRNMMC and Camp Pendleton	Intracranial abnormalities are associated with reduced reporting of neurobehavioral symptoms among active duty service members with moderate-to-severe traumatic brain injury	Presentation
MHSRS	NMCS D	Primary care practices and perceptions in care for service members with acute concussion: Does reflection in a mixed-method study modify practice?	Poster
MHSRS	NMCS D	Progressive return to activity after concussion: The evolution of training to primary care providers in a mixed method study	Presentation
MHSRS	NMCS D	Recovery trajectory in acute concussion: importance of adherence to progressive return to activity guidelines for activity	Presentation
MHSRS	Tampa VA	Relationship stability after traumatic brain injury among Veterans and Service Members: A VA TBI Model Systems study	Poster
MHSRS	NMCS D	Retrospective analysis: Using lumosity in the treatment of mild traumatic brain injury	Poster
MHSRS	Camp Pendleton	Self-Reported Alcohol Use Among Active Duty Service Members Referred Traumatic Brain Injury Screening	Poster
MHSRS	Tampa VA	Suicide-related ideation and attempts at 1-year post traumatic brain injury (TBI): A VA TBI Model Systems study	Poster
MHSRS	Tampa VA	Supervision needs following Veteran and Service Member moderate to severe traumatic brain injury: A VA TBI Model Systems study	Poster
MHSRS	LRMC	TBI - rehab management of concussion/mTBI - Pediatric Concussion Evaluation in Europe: Military Medical Providers Leading The Way	Abstract

Name of Conference	Site Lead	Title	Type
MHSRS	LRMC	Telehealth/virtual health/remote monitoring in the MHS: Pilot for TBI telehealth management	Abstract
MHSRS	Palo Alto	Telomere length is an indicator of complex mental health symptoms in Veterans	Poster
MHSRS	Richmond VA	The Chronic Effects of Neurotrauma Consortium (CENC) multi-center observational study: Interim, cross-sectional analysis comparing participants with and without historical mTBI	Presentation
MHSRS	Camp Pendleton	The effect of repetitive low level blast exposure on executive functioning	Presentation
MHSRS	NMCS	The fusion project: Multi-modal neurocognitive assessment of traumatic brain injury	Presentation
MHSRS	Camp Pendleton	The impact of lifetime traumatic brain injury and lifetime blast exposure history on neurobehavioral symptoms and neuropsychological functioning of special operation military personnel	Poster
MHSRS	SAMMC	The influence of medical evaluation board status on symptom reporting among service members with traumatic brain injury	Poster
MHSRS	Fort Bragg	The relationship between low scores on ANAM-4 TBI-MIL and the total score from the neurobehavioral symptom inventory (NSI)	Poster
MHSRS	Fort Carson	To exclude or not to exclude: The conundrum of effort measures in mTBI populations	Poster
Minneapolis VA Research Day	Minneapolis VA	Identifying predictors of clinical response to deep transcranial magnetic stimulation in medication refractory depression with co-morbid traumatic brain injury	Poster
National Academy of Neuropsychology	Fort Bragg	Challenges associated with TBI research and clinical practice in the DoD and VA: Diagnostics, pathology, and ethics	Presentation
National Academy of Neuropsychology	Fort Bragg	Results from the Defense and Veterans Brain Injury Center's Head to Head Study comparing four computerized neurocognitive assessment tools (NCATs): ANAM4, CNS-VS, CogState, and ImPACT	Presentation
National Academy of Neuropsychology	WRNMMC	The Relationship between plasma tau and neurocognition following mild traumatic brain injury: A longitudinal Analysis	Poster
National Academy of Neuropsychology	WRNMMC	The relationship between self-reported cognitive recovery following injury and neuropsychological test results	Poster

Name of Conference	Site Lead	Title	Type
National Academy of Neuropsychology	WRNMMC	The relationship between white matter hyperintensities, neurocognitive performance, and white matter integrity following mild traumatic brain injury	Poster
National Capital Area TBI Research Symposium	Richmond VA	Blast versus non-blast traumatic brain injury: Comparison of following inpatient rehabilitation functional outcomes	Poster
National Capital Area TBI Research Symposium	Richmond VA	Motor impulsivity predicts worsening depression and PTSD symptomatology at 1-year follow-up in blast-exposed service members	Poster
National Capital Area TBI Research Symposium	Fort Bragg & Fort Carson	Predictors of post-concussion symptoms (PCS) 12-months post-deployment in soldiers with and without mild traumatic brain injury (mTBI): A prospective cohort study	Presentation
National Capital Area TBI Research Symposium	Camp Lejeune	Software enhanced data analysis	Poster
Rehabilitation Psychology Annual Conference	Tampa VA	Relationship of sleep apnea severity and Outcome: A VA TBI Model System study	Poster
Special Operations Medical Association Scientific Assembly	NMCS	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	Poster
TBI Research Forum: Detection and Treatment of Sensory Deficits	Palo Alto	Peripheral neurotrophic factor Signaling with chronic mild traumatic brain injury	Poster
The American College of Rehabilitation Medicine Annual Meeting	Camp Pendleton	The effect of repetitive low level blast exposure on memory	Presentation
The Annual Meeting of the American Academy of Clinical Neuropsychology	Minneapolis VA	Symptom validity screening measures in non-treatment seeking veteran samples	Poster
The Annual Minneapolis VA Research Symposium	Minneapolis VA	The VA traumatic brain injury Model Systems: 2017 update	Poster
The National Academy of Neuropsychology	Fort Bragg	Examining a new ANAM4 TBI-MIL composite score in soldiers with and without mTBI	Abstract
The National Academy of Neuropsychology	Fort Bragg	Using postconcussive symptoms as a grouping variable to compare performance on one of four computerized neurocognitive assessment tools (NCAT) in soldiers with and without mild traumatic brain injury (mTBI)	Abstract
Uniformed Services Academy of Family Physicians	HQ	Brain Injury - The Visible 'Invisible' Wound	Presentation

Name of Conference	Site Lead	Title	Type
University of Minnesota Clinical and Translational Science Institute (CTSI)	Minneapolis VA	Non-invasive brain stimulation modifies a brain network that supports abstinence during alcohol use disorder recovery	Poster
University of Minnesota Institute for Engineering in Medicine (IEM) Neuromodulation Symposium	Minneapolis VA	Reducing impulsivity with transcranial direct current stimulation (tDCS) and a cognitive task	Poster
University of Minnesota Neuromodulation Symposium	Minneapolis VA	Identifying predictors of clinical response of medication refractory depression with comorbid mild TBI to deep TMS	Poster
USUHS Research Day	Fort Carson	Predictors of post-concussion symptoms (PCS) 12-months post-deployment in soldiers with and without mild traumatic brain injury (mTBI): A prospective cohort study	Poster
VA Center for Innovation Demo Day	Tampa VA	VA SmartHome app	Presentation
VA Health Services Research and Development	Tampa VA	Advances in TBI care resulting from VA and TBI Model Systems collaboration	Cyberseminar
VA SLP	HQ	Development of the clinical recommendation update for rehabilitation of cognitive dysfunction in service members and veterans with mild to moderate TBI	Virtual presentation
VISN 21	Palo Alto	Accurate diagnostics and innovative treatments for TBI	Presentation
Womack Army Medical Center Research Symposium	Fort Bragg	A comparison of ANAM4 performance between soldiers with and without post-concussive symptoms	Poster
Womack Army Medical Center Research Symposium	Fort Bragg	Agreement between methods of calculating "impairment" on the ANAM4	Poster
Womack Army Medical Center Research Symposium	Fort Bragg	Does it matter? The relationship between subjective test-taking experiences and overall performance on neurocognitive assessment tools in service members with mild traumatic brain injury	Poster
Womack Army Medical Center Research Symposium	Fort Bragg	Primary outcomes from Fort Bragg's Head to Head Study of four computerized neurocognitive assessment tools (NCATS) in service members with and without mild traumatic brain injury	Presentation
Womack Army Medical Center Research Symposium	Fort Bragg	Which test do you prefer? Differential satisfaction measures of testing experience across computerized neurocognitive assessments in service members with mild traumatic brain injury	Poster
Womack Army Medical Center Research Symposium	Fort Bragg	Does the type of computer used affect reaction time measurement error on the ANAM4? A comparison of three computer platforms	Poster

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Back cover photo: U.S. Marines with Weapons Company, 3<sup>rd</sup> Battalion, 3<sup>rd</sup> Marine Regiment, and Afghan Border Police rush off a CH-53D Sea Stallion helicopter during Operation Shahem Tofan (Eagle Storm) on February 10, 2012. (U.S. Marine Corps photo by Cpl. Reece Lodder)



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