

# ANNUAL REPORT

Traumatic Brain Injury Center of Excellence

2022

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# Letter from the Branch Chief

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TBICoE's work unifies a system of TBI health care, reliably advancing the science for the warfighter and ready to meet future brain health challenges.



Capt. Scott A. Cota, MC, USN Branch Chief

Dear Colleagues and Collaborators,

In 1992, when Congress established what is now the Traumatic Brain Injury Center of Excellence, few could have predicted that TBI would come to be known as the signature wound of war in the 21st century. Thirty years later, we are still counting the cost—and hundreds of thousands of service members are bearing it. Since 2000, more than 465,000 of them have been diagnosed with a first-time TBI.

As I look back on my first full year as branch chief of TBICoE, I am proud to be part of the solution. In the pages that follow, you'll see the many ways our outstanding team is leading, translating, and advancing brain health for the Defense Health Agency.

The Department of Defense has long understood that protecting, treating, and optimizing the brain health of America's warfighters is essential. That's why, years ago, department officials tapped TBICoE to create and maintain a military TBI surveillance database and chair the DOD's TBI Advisory Committee. In June, they directed implementation of the Warfighter Brain Health Initiative Strategy and Action Plan as a joint effort between the operational and medical communities.

Multiple agencies across the DHA—including TBICoE—are leading components of this critical work. Among many other actions, the plan includes conducting the longitudinal study of blast exposure first mandated by the 2018 National Defense Authorization Act Section 734. As program lead for the Section 734 Studies, I am confident that a cohesive strategy will vastly improve our ability to get warfighters what they need to recover from injury and conduct their mission.

TBICoE's work unifies a system of TBI health care, reliably advancing the science for the warfighter and ready to meet future brain health challenges. We support this mission at 15 military and veterans' hospitals and clinics, including several Intrepid Spirit Centers, and from our National Capital Region headquarters. Our research covers the TBI continuum of care from initial injury through rehabilitation to return to family, community, and work or continued duty. We develop, distribute, and teach clinical recommendations and screening tools, including the Military Acute Concussion Evaluation 2, which the DOD requires after a potential concussive event.

The Department of Defense has long understood that protecting, treating, and optimizing the brain health of America's warfighters is essential.

In 2022, I had the opportunity to see our dedicated, talented staff at work during visits to six of our network sites in California, Colorado, Florida, North Carolina, and Texas. These visits also fostered strategic relationships both inside and outside the DOD. For instance, at Fort Carson—the regional headquarters for all Army explosive ordnance disposal technicians west of the Mississippi— I met with EOD combat leadership about our studies on low-level blast exposure and TBI. At Fort Bragg, our subject matter expertise led to an expanded role in the prestigious Special Operations Medical Association (SOMA) conference for 2023. In California, I addressed the annual meeting of the American College of Sports Medicine in San Diego and discussed research possibilities with sports medicine fellows at Camp Pendleton. And in Tampa, Florida, I met with our research team at James A. Haley Veterans' Hospital as well as groups

from two combatant commands at MacDill Air Force Base. I appreciated the opportunity to meet with CENTCOM discussing support for their area of responsibility and developing performance metrics, and enjoyed briefing the USSOCOM Joint Medical Officer Orientation Course (JSOMOC) on warfighter brain health.

This time next year, I expect to be reporting on my visits to the rest of our sites, as well as several new products and exciting results from the Section 734 studies. Also ahead are significant changes in how—and how often—we measure the brain health of our warfighters. For now, though, I invite you take a few moments to see how far we've come this year.

Capt. Scott A. Cota, MC, USN
Branch Chief
Traumatic Brain Injury Center of Excellence
Research Portfolio Management Division
Research and Engineering Directorate
Defense Health Agency



# **Advancing the DHA Mission**

As part of the DHA's Research and Engineering directorate, TBICoE aligns priorities to the broader mission of improving health and building readiness. We join the unrelenting pursuit of excellence by lending subject matter expertise and leadership to agency-level efforts as well as to collaborations with partners both inside and outside the DOD.

## Warfighter Brain Health Initiative

Identifying and treating TBI is a critical priority for the DOD. This commitment was reinforced in June with the release of the Warfighter Brain Health Initiative Strategy and Action Plan. The plan aims to synchronize, prioritize, and unify brain-health efforts across the department. Organizations from across the DHA are leading components of the plan, addressing multiple concerns such as blast exposures, repetitive head impacts, and long-term effects. TBICoE is the office of primary responsibility for the health and performance line of inquiry of the Section 734 Program, named for the 2018 NDAA section that mandated a longitudinal medical study on blast-pressure exposure of service members. The goals of the line of inquiry are to:

- Evaluate health and performance outcomes of blast overpressure exposure focused on warfighter brain health
- Leverage human performance optimization programs, and existing clinical and research data
- Recommend interim blast exposure criteria to inform operational decisions and reduce the effects of blast exposure
- Recommend future areas of research to fill knowledge gaps

### DOD TBI Advisory Committee

Since 2014, TBICoE has chaired the DOD's TBI Advisory Committee, the DOD's coordinating body chartered to promote and address enterprise-wide coordination of the TBI Pathway of Care for the warfighter. Members of the TAC represent key components of the DOD TBI community, including the DHA, Army, Navy, Air Force, Marine Corps, Special Operations Command, and the Defense Intrepid Network. Each member and service representative brings a unique skill set and collaborative approach to fulfill the charter's mission.

## Brain Injury Awareness Month

Every year, the DOD recognizes March as Brain Injury Awareness Month (BIAM). The annual DHA campaign, largely centered on the TBICoE BIAM Communications Plan, seeks to increase stakeholder understanding of the signs and symptoms of TBI. Using the theme Be TBI Ready, we emphasized our role as DOD's BIAM lead and manager of the TBI Pathway of Care with a full slate of activities and products publicizing TBI research, clinical support, and education efforts. For more information, see the Mission Support section.

## Collaborative Partnerships

In addition to the collaborative efforts of the TAC, TBICoE continued to build significant working relationships both inside and outside the DOD. We have longstanding partnerships with other DHA centers of excellence—including the Psychological Health Center of Excellence, the Vision Center of Excellence, the Hearing Center of Excellence, and the National Intrepid Center of Excellence—to jointly address TBI and its impact on mental health, hearing, and vision. Our subject matter experts are regularly invited to brief or join various TBI-related working groups, contributing knowledge to the shared goal of improving the lives of warfighters with TBI and their families and caregivers. Our research team has developed relationships with many outside organizations, and in 2022, more than 50 external partners engaged in active research studies in the TBICoE portfolio.

# Military Health System Research Symposium

The Military Health System Research Symposium is the DOD's premier scientific meeting, a joint event for military medical care providers, military scientists, and professionals in academia and industry. Attendees exchange information on research and health care advancements in such areas as combat casualty care, military operational medicine, and clinical and rehabilitative medicine—all of which dovetail with TBICOE efforts.

When MHSRS 2022 convened in September in Kissimmee, Florida, <u>TBICoE</u> was there in force. Branch Chief Capt. Cota gave one of 12 TBICoE oral presentations; in addition, TBICoE researchers contributed 17 poster presentations. The Clinical Affairs outcomes and assessments team contributed an additional two posters: one demonstrating the positive association between provider instruction and patient behavior in complying with the 72-hour follow-up requirement in the <u>DHA-PI 6490.04</u>, and the other reporting the results of an analysis of the *Tri-Service Work Flow Form* usage for acute concussion.



TBICOE Branch Chief Capt. Scott Cota briefs attendees on the Longitudinal Medical Study on Blast Overpressure Exposure of Members of the Armed Forces at MHSRS (TBICOE photo).

# **Clinical Affairs**

The Clinical Affairs section has three main functions:

- Develops state-of-the-science TBI clinical recommendations and tools for military health care providers
- Provides TBI epidemiological and surveillance data support to military leaders and the DOD community
- Conducts analyses and reporting to support standardization of care and optimal brain health outcomes for our warfighters

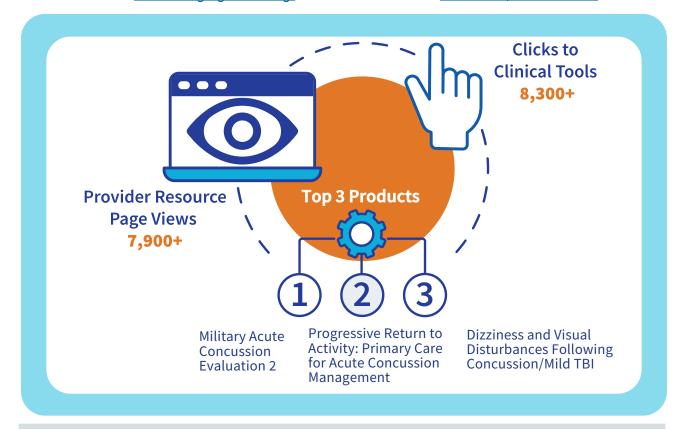


**Dr. Stephanie Maxfield Panker** Clinical Affairs Section Chief

## Clinical Practice and Clinical Recommendations

TBICoE's clinical practice and clinical recommendations team develops practical, easy-to-use clinical tools to support health care providers in assessing and treating service members and veterans who have sustained a TBI. Providers can access clinically relevant information and resources that address common symptoms associated with mild TBI, such as headache, sleep disturbances, and vision problems. In 2022, TBICoE released major revisions of two clinical tools: the *Neuroimaging Following* 

Concussion/Mild Traumatic Brain Injury:
Guidance for the Primary Care Manager clinical recommendation and the Neuroendocrine
Dysfunction (NED) Following Concussion/
Mild TBI fact sheet. In addition, the team is collaborating with TBICoE researchers and dissemination specialists to develop low-level blast fact sheets for providers and service members that will be published online in 2023. All TBICoE clinical recommendations and supporting resources are available for download at health.mil/TBIProviders.

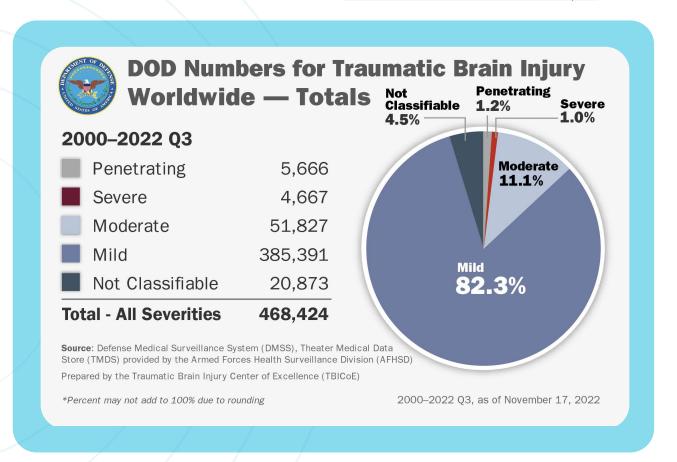


# **Clinical Affairs**

#### Surveillance

In 2022, the surveillance team contributed to the growing body of scientific literature with three new publications. Team members also responded to requests for assistance and TBI-related information from multiple DOD stakeholders throughout the year, including engagement with the Section 734 workgroup as they develop a plan to monitor service members exposed to low-level blasts.

In 2007, the DOD charged TBICoE with reporting the official tally of service members who have sustained TBIs. To accomplish this mission, TBICoE's surveillance office works with data from the Armed Forces Health Surveillance Division to update and publish the number of active-duty service members with a first-time TBI every quarter. As of November 2022, the total number of first-time TBIs sustained by service members since 2000 is 468,424.



### TBI Outcomes

The office of outcomes and assessment evaluates clinical documentation and provides feedback to the TBI clinical communities across the MHS. One example is the *Acute Concussion Care Quadruple Aim Performance Plan Data Analysis Report*, which documents rates of initial diagnosis of mild TBI, the use of the Progressive Return to Activity guidelines, and notes the use of the Neurobehavioral Symptom Inventory in accordance with the <u>Defense Health Agency-Procedural Instruction (DHA-PI) 6490.04</u>.

The Mission Support Office provides administrative and operational support to advance TBI mission priorities across the organization and throughout our network of 16 sites. Much of this work is done behind the scenes, including regulatory compliance, process improvements, and business operations. MSO's public-facing work streams disseminate, communicate, and educate the public about our research findings, surveillance data, products, and tools to improve the care of service members with TBI.

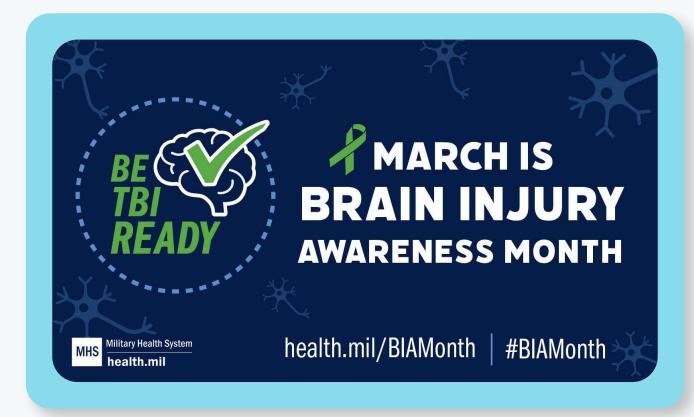
In 2022, the Dissemination section merged into MSO in a major organizational shift. The move streamlines efficiencies and cultivates a more collaborative work environment between the educational arm and communications assets of TBICOE.



CAPT James Blankenship Mission Support Office Section Chief

# Brain Injury Awareness Month

TBICOE takes the lead in shaping and amplifying the DHA's annual Brain Injury Awareness Month (BIAM) campaign every March. The MSO coordinated activities to publicize TBI research, clinical support, and education efforts throughout the center's network of 16 sites. TBICOE continued to use virtual formats for DHA-wide BIAM events; provided in-person events in local markets; and used various digital platforms (social media, podcasts, Health.mil, and govDelivery) to promote the Be TBI Ready theme.



#### **During BIAM:**

- Regional education coordinators (RECs) hosted 282 training and outreach events attended by 9,204 stakeholders. This was a 36% increase in training attendance from 2021 BIAM.
- The CUBIST and Picking Your Brain podcasts generated 975 plays—a 101% increase over 2021.
  - "Collaborating on Dizziness and Vision": This Picking Your Brain episode introduces the revised Dizziness and Vision Clinical Recommendation and discusses how it helps medical providers treat overlapping symptoms associated with TBI. TBICOE subject matter experts spoke with guests from both the <u>Hearing</u> and <u>Vision</u> centers of excellence and then Deputy Assistant Director of Research & Engineering, Brig. Gen. Katherine Simonson.
  - "USSOCOM and TBI": Another Picking Your Brain episode for BIAM features TBICOE Branch Chief Capt. Scott Cota, Command Chief Master Sgt. Greg Smith, and Sgt. Maj. Matt Parrish. Capt. Cota speaks with these two hosts of SOFcast, the official podcast of U.S. Special Operations Command, about the health impacts of TBI and blast-related concussion stemming from the demands of special operations combat and training.
  - "Gender Differences in TBI Treatment and Outcomes": In CUBIST's most popular episode of the year, Col. Jennifer Gurney, a surgeon who chairs the Defense Committees on Trauma, discussed a study published in the *Journal of Neurotrauma*, October 2020.
- TBICoE supported the National Museum of Health and Medicine with two virtual events—the <u>February Science Café</u> on acute concussion updates with subject matter experts from TBICoE and a Brain Awareness Day educational video the REC team developed.

### GovDelivery Activity for BIAM 10 emails to 5,176 subscribers



 188% increase in unique open rate from 2021

#### Facebook Activity for BIAM Reached 51,107 Facebook users—a 55% increase over 2021



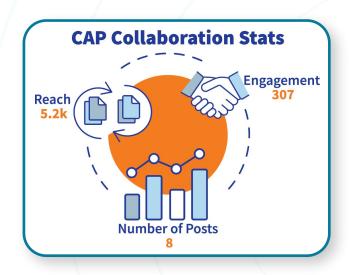
- Promoted BIAM activities
- Launched two researcher spotlight videos
- Garnered 2,518 reactions, clicks, and shares for the month—a 5.5% increase over 2021

### Communications

The communications team provides expertise in strategic planning, content development, and consistent messaging in various platforms about TBICoE and its research activities; clinical recommendations and supporting provider trainings; and educational information about TBI for all stakeholders. The team coordinates with all TBICoE sections, DHA communications, DHA partners, and other DOD organizations to grow engagement of current communications channels and identify and develop other venues to expand TBICoE's messaging footprint.

#### **Social Media**

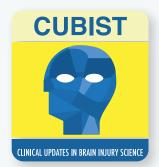
This year, collaboration drove TBICoE's Facebook strategy. Perhaps our most effective team-up in 2022 was with Computer/ Electronics Accommodations Program (CAP), a government organization which provides free assistive technology to service members and the DOD's civilian staff. During the fall National Disability Employment Awareness Month and Family Caregiver Month Facebook campaign, both organizations worked together to create content highlighting the TBICoE products and available CAP assistive technologies that could benefit service members living with TBI. Our most popular content featured photos from our communications team's visit to the Pentagon where CAP staff demonstrated devices that make office work more accessible to those with vision, cognitive, hearing, and other TBI-related disabilities.





#### **Podcasts**

TBICoE's foray into <u>podcasting</u> began in 2016 with a series called *The TBI Family*, which ran for 15 episodes and was geared toward TBI caregivers and their loved ones. Now, we produce two podcasts, *Clinical Updates in Brain Injury Science Today* (or *CUBIST*) and *Picking Your Brain*, which are aimed at providers and patients respectively. In 2022, we began using DVIDS as a hosting service for all episodes; you can find them there or wherever you listen to podcasts.

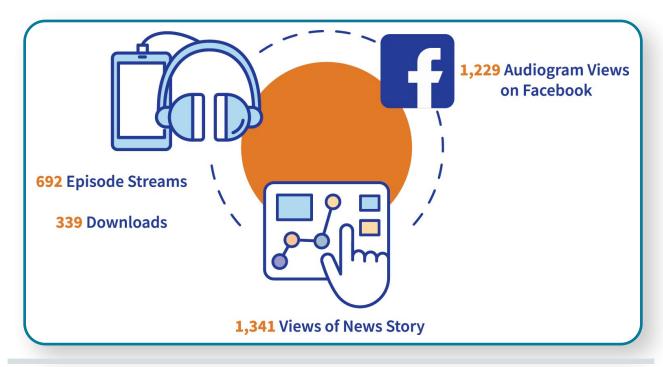


The <u>CUBIST</u> podcast, driven by the Research section and produced by the communications team, serves health care providers. Each episode discusses the latest TBI research relating to patient care. The podcast hosts, who have clinical backgrounds in TBI, select episode topics based on current and trending research most relevant to patient care. Guests often include the principal investigators and other subject matter experts. In 2022, TBICoE released 11 <u>CUBIST</u> episodes, generating over 2,500 streams.

The <u>Picking Your Brain podcast</u>, which premiered during BIAM 2020, focuses on the care and recovery of service members and veterans with TBI. In addition to those who collaborated on BIAM episodes, notable 2022 guests included the Senior Enlisted Advisor to the Chairman of the Joint Chiefs of Staff (SEAC), Ramón Colón-López, and Dr. Nancy Skopp, a clinical psychologist from the Psychological Health Center of Excellence. In 2022, TBICoE published four episodes of the podcast, which received over 1,400 streams.

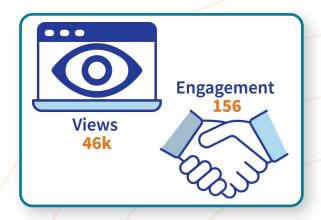


Our most popular podcast episode of the year was the *Picking Your Brain*'s <u>SEAC</u> episode, which included a moving account of the leader's personal experience with TBI and was covered on <u>Health.mil</u>. We are planning to continue the conversation in 2023 with a series featuring senior enlisted leaders from various service branches.



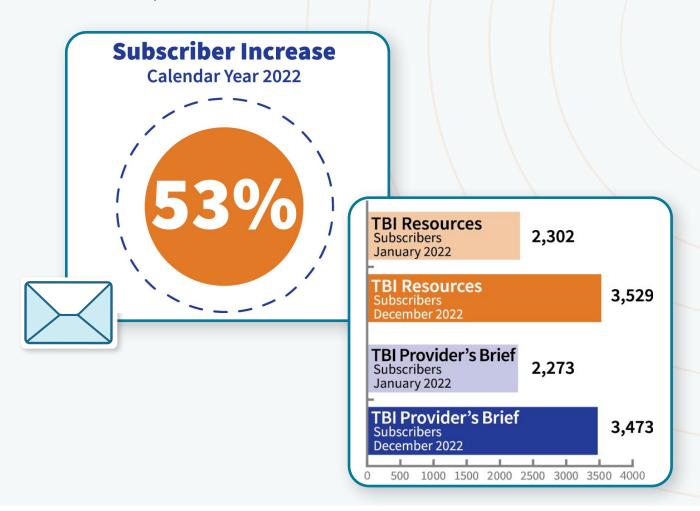
#### **Online Publications**

For National Concussion Awareness Day, observed the third Friday of September, we published a <u>Health.mil story</u> on concussion myths that went on to become viral on outside channels. It appeared as a blog post titled "<u>What You Should Know About Concussions</u>" on RallyPoint, a social media platform for active duty service members and veterans, and was later promoted in a weekly VA newsletter with an audience of 12 million.



#### **GovDelivery**

GovDelivery is a web-based email subscription management system that allows the public to subscribe to news and information from government entities. In June 2020, TBICoE began using govDelivery to send two monthly newsletters: TBI Providers' Brief, targeted to MHS providers, researchers, and leaders, and TBI Resources, aimed at patients, families, and other general audiences. In 2022, both newsletters saw a 53% increase in subscribers.



#### Dissemination

The dissemination team oversees developing TBI educational products and training for providers, patients, and caregivers. Among these are training products for the clinical tools identified in the DHA-PI 6490.04 Required Clinical Tools and Procedures for Assessment and Clinical Management of Mild Brain Injury (mTBI)/Concussion in Non-Deployed Setting: the MACE 2 and the PRA for the assessment, management, and rehabilitation of all service members with mild TBI/concussion.

Regional educational coordinators cover the entire MHS Market Structure and are embedded at 12 military hospitals and clinics in the U.S. and Germany, where they offer multiple in-person and virtual training and education opportunities throughout the year. This education is key: TBICoE researchers have found that patients of health care providers with intensive training on the PRA clinical recommendation had an overall reduction in symptoms after one week, one month, and three months when compared to patients of providers without this training.

#### **Educational Products**

Working closely with the Research and Clinical Affairs sections, the dissemination team updates existing products and create new ones based on identified knowledge gaps. In 2022, the dissemination team revised some of our commonly used products. The <a href="What You Should Know">What You Should Know</a> About Concussion patient fact sheet and Progressive Return to Activity: Primary Care for Acute Concussion Management provider trainings were revised to come in line with current efforts.

In 2021, TBICoE revised and released <u>Traumatic Brain Injury: A Guide for Caregivers of Service</u> <u>Members and Veterans</u>. This year, TBICoE released an accompanying suite of five standalone fact sheets focused on common challenges faced by caregivers of a service member or veteran with a TBI.

The team also worked on several products to be released in early 2023, including a fact sheet on low-level blast impacts for service members, an online training course for providers on the PRA, and a back-to-school guide for service members and veterans who want to continue their education.



#### **Regional Training**

TBICOE has 12 regional education coordinators (RECs) geographically dispersed across DHA markets to provide education, training, outreach, and dissemination of TBI-related materials across MHS and DOD Operational Forces. RECs promote TBI awareness to leaders in the U.S. armed services and Department of Veterans Affairs, as well as to service members, their families, and caregivers. Notable accomplishments in 2022 included:

- Conducted 2,156 in-person and virtual training sessions to 64,827 attendees
- Provided 6 virtual MHS-wide trainings on the <u>MACE 2</u> and <u>PRA</u>, clinical tools of the Acute Concussion Care Pathway
- Continued the popular TBI Quarterly Education Training series, with topics such as:
  - Updates From the Field
  - TBI Hot Topics and Clinical Applications
  - TBI and Social Determinants of Health
  - Global Impacts of Traumatic Brain Injury Care
- Supported MHS by sending monthly metrics of provider-focused TBI trainings (clinical recommendations, MACE 2, and PRA)
- Fostered collaboration through outreach to the Special Operations community, Army National Guard, and the U.S. Coast Guard, among other stakeholders.
- Conducted 10 TBI Grand Rounds for the VA Polytrauma Rehabilitation Center staff, covering topics from dizziness and vision to optimized sleep following a TBI. Across the 10 events, there was a total of 427 attendees.

#### **Regional Training by the Numbers**





Chris Lewandowski, TBICoE regional education coordinator, delivers an in-processing brief to newly arrived soldiers on Fort Carson, Colo.,
Aug 16, 2022 (TBICOE Photo).

The TBICoE Research section generates hypothesis-driven, clinically focused studies; identifies knowledge gaps in the scientific literature; responds to congressional mandates for TBI-related; and evaluates TBICoE-produced clinical tools.



Dr. Katharine Stout Research Section Chief

## Research Gaps and Priorities

The Research portfolio aligns with DOD TBI clinical research needs by regularly reviewing and analyzing TBI knowledge gaps. This leads to reprioritizing and updating a TBI research gaps list every two years. A working group with members from TBICoE's headquarters and research site network develops this data-driven, actionable list. This year, we released a list of 10 Research Gaps and Priorities for 2022–2024.

# Congressionally Mandated Studies

A significant priority for TBICoE researchers is fulfilling congressionally mandated longitudinal studies and reporting on the effects of TBI and blast overpressure exposure on service members.

#### **Blast Research**

Sections of National Defense Authorization Acts FY18–20 guide DOD research for mitigating risk of blast overpressure effects. As the office of primary responsibility for the health and performance line of inquiry, TBICoE tracks 26 research studies across the DOD that investigate the effects of overpressure from heavy weapons on service members. These studies aim to understand effects of this exposure on brain health and performance, which will assist in determining if future illnesses or injuries may be service-connected. One recent finding is that blast pressures as low as four pounds per square inch (PSI) could affect the mental functioning of service members, resulting in mild reported symptoms such as headache. In November, the DOD issued interim guidance with several steps to manage risk of exposures above that threshold during training.

#### NDAA FY07 Section 721: 15-Year Longitudinal Studies of TBI

The Longitudinal Study on Traumatic Brain Injury Incurred by Members of the Armed Forces in OIF/OEF, based at Walter Reed National Military Medical Center, and the Improved Understanding of Medical and Psychological (IMAP) Needs in Service Members and Veterans with Chronic Traumatic Brain Injury Study, based at the James A. Haley Veterans Hospital, have greatly contributed to the scientific literature. Findings from these studies are relevant to long-term patient outcomes following TBI, long-term rehabilitation needs and rehabilitation services across the MHS and VA, and the impact on family members, all with implications for optimized standard of care. A final 15-Year Study report to Congress will be issued in 2025.

- 5 manuscripts completed and under co-author or public affairs review
- 10 manuscripts submitted and under peer review with journal
- 20 published manuscripts (including in press)

## TBICoE Research by the Numbers

#### **Collaborations**

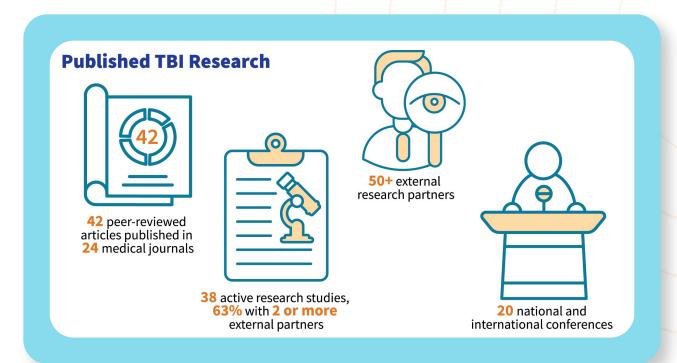
TBICoE works with internal and external collaborators in applying for grants and for collecting, analyzing, and publishing data. A full list of <u>publications</u> is available on the TBICoE website.











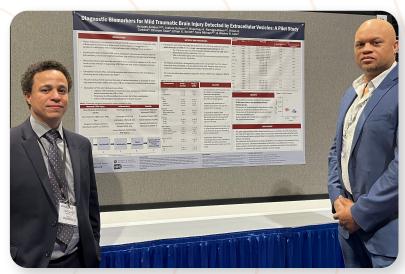
# Research is central to the TBICoE mission.



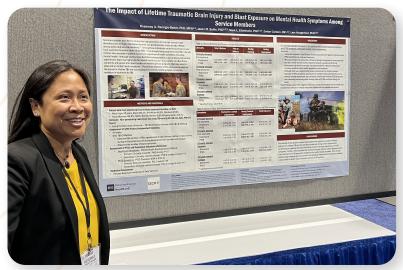
## Conferences

At home and abroad, our researchers presented at more than 20 conferences. At the Military Health System Research Symposium alone, they gave 12 oral presentations and 17 poster presentations.

Our team at Naval Medical Center San Diego won an honorable mention for their poster "Feasibility of a Head-Mounted Virtual Reality System (Fusion mVR) for Neurocognitive Eye Tracking within Military Medical Settings."



Jacques Arrieux (left), a TBICoE research scientist at Fort Bragg, NC, and Dr. Joshua Gatson, deputy program manager of the research network at TBICoE headquarters, present their research poster, Diagnostic Biomarkers for Mild Traumatic Brain Injury Detected by Extracellular Vesicles: A Pilot Study, at MHSRS (TBICoE photo).



Epidemiologist Rosemay Remigio-Baker stands by her MHSRS poster, The Impact of Lifetime Traumatic Brian Injury and Blast Exposure on Mental Health Symptoms
Among Service Members (TBICOE photo).

#### **Senior Clinical Research Director Conference**

Research is central to the TBICoE mission. As the principal DHA organization leading, translating, and advancing brain health, we support TBI research initiatives at military hospitals and clinics throughout the U.S. (including several Intrepid Spirit Centers). In December, TBICoE senior clinical research directors and other scientists gathered at the Maryland headquarters for a two-day conference. Capt. Cota briefed the group on next steps in the Warfighter Brain Health Initiative Strategy and Action Plan as well as the many ways we are supporting it. Later, attendees discussed site-specific priorities, strengths, and challenges, and emphasized the need for continued collaboration and coordination in order to advance the field and improve outcomes for TBI patients.



Dr. Stephanie Sloley, research support cell chief, speaks to researchers at the annual two-day senior clinical research directors' conference in Silver Spring, Md., Dec. 14, 2022 (TBICOE photo).



Senior clinical research directors (SCRD) and other scientists with the Traumatic Brain Injury Center of Excellence (TBICoE) pose for a group photo in Silver Spring, Md., Dec. 14, 2022 (TBICoE photo).



# Traumatic Brain Injury Center of Excellence Network Sites

