THE JOINT TRAUMA SYSTEM CHRONICLE

DEFENSE CENTER OF EXCELLENCE FOR TRAUMA, FALL 2021

Welcome to the inaugural issue of the Joint Trauma System (JTS) newsletter. Until recently, most people had not heard of the Joint Trauma System. JTS kept a low profile, working behind the scenes to improve combat casualty care through data analysis, readiness training, and the publication of evidence-based clinical practice guidelines (CPGs). JTS has served the Combatant Commands since its inception originating as an Army directorate responsible for the DoD Trauma Registry. JTS business has grown — boomed — since it transitioned to the Defense Health Agency (DHA) back in 2018. The organization has grown from a skeleton crew to over 125 and with this comes more responsibilities and clout. Recently, DHA informed JTS that as part of the DHA's restructuring the Joint Trauma System will transition under the Healthcare Administration directorate along with the Armed Service Blood Program. Come along and join us on our journey as we build a joint trauma system which will cater to the unique requirements of warfighters.

JTS SET TO LAUNCH MILITARY WORKING DOG REGISTRY

Man's best friend deserves the best care and JTS is helping the DHA Veterinary Service do just that with the development of a Military Working Dog (MWD) Registry fashioned after the DoD Trauma Registry. JTS is set to launch the MWD Registry developed to methodically track and capture canine patient information across all services to support DoD efforts to increase survival and decrease morbidity and mortality of MWDs.

At the direction of the Assistant Secretary of Defense for Health Affairs per DHA Procedural Instruction 6000.08, the MWD Registry was created to ensure documenting and archiving of canine combat casualty epidemiology, treatment, and outcome. The web-based registry provides Combatant Commands the vehicle to collect, store, and analyze battlefield casualty data, incorporating data through the entire continuum of care—from the point of injury through long-term rehabilitative care. The registry fills a void in veterinary services and provides data not always found in the MWD patient record.

MWDs remain a critically important asset. In 2010, a Pentagon task force concluded that "The best bomb detector is a dog." They reported that in Afghanistan and Iraq, the most sophisticated detectors available located only 50% of Improvised Explosive Devices (IEDs); soldiers assisted by bomb sniffing dogs found 89% of IEDs.

Injured working dogs are expected to receive the highest level of resuscitative care as far forward as possible, yet veterinary assets in theater are limited or absent. The handlers are usually the first responders for the MWDs. Most MWDs are initially treated at military medical treatment facilities by human healthcare providers. Because canine war wounds are unique, civilian veterinary research, even on police dogs, cannot always inform care f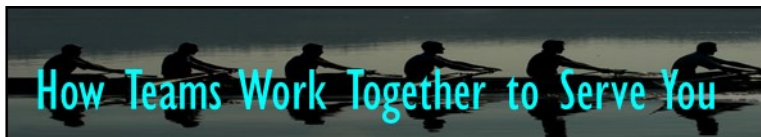or MWDs injured on the battlefield. Academic veterinary centers have historically looked to the MWD experience for guidance on canine trauma management. Thus, military-specific research on MWD combat casualty care is needed. The MWD registry will provide the data necessary to enhance veterinarian and technician training and update clinical practice guidelines (CPGs).

"By understanding how and where MWDs are injured, we can focus research and development projects to better protect MWDs, whether that is protective gear like booties or a vest or medical countermeasures," said LTC Sara Cooper, Chief, Animal Medicine, DHA Veterinary Service. "The MWD Trauma Registry will also provide the first collection of data to determine the effectiveness of interventions during MWD casualty care. This will ensure first responders are getting the right training to provide care to MWDs. This effort has been in development for a long time, and it is very exciting to see the MWD Trauma Registry being launched."

MWD Registry Goals
♦ Establish a central database to input and track the healthcare and treatment outcomes for Canine trauma, disease and non-battle injuries that occurs while the canine is deployed worldwide.
♦ Provide data to support updates to Canine Tactical Combat Casualty Care and the MWD CPG.
♦ Provide data to support research topics/area of emphasis to improve veterinary care.
♦ Increase survival and decrease morbidity and mortality of MWDs.

Source: Oates M. Pentagon: Dogs Better Than Technology at Bomb Detection. 2010. Available at http://www.homelandsecuritynewswire.com/pentagon-dogs-better-technology-bomb-detection.

How Teams Work Together to Serve You

Brain Fog COVID Fatigue Registry Captures Long-haul Conditions

COVID Dashboards Automate Reports

One Joint Casualty Care System for ALL

NEW CPGs →

War Wounds: Debridement and Irrigation, 27 Sep 2021

Use of TBI Plasma Biomarkers after Potentially Concussive Events, 16 Aug 2021

VA/DoD CPG for the Management and Rehabilitation of Post-Acute Mild Traumatic Brain Injury, Jun 2021

Eye Trauma: Initial Care, 01 Jun 2021

Tackling Future Military Health Threats through Registry Services and Performance Improvement: the Joint Casualty Care System

A few words from the Joint Trauma System Chief Col Stacy A Shackelford, USAF, MC, Trauma Surgeon

JTS colleagues, it has been a long pandemic to which JTS responded with remarkable resilience. Kudos to JTS teams!

The drawdown in U.S. Central Command (USCENTCOM) brings us closer than we have been in two decades to a peacetime interwar period. These two events leave many of you wondering what the JTS future holds and when we will get back to our primary trauma focus. Before I answer this question, let me first address JTS' multifaceted support of the pandemic.

Only one month after the first cases of COVID-19 were reported in the U.S., DHA tasked JTS with establishing the COVID-19 registry and performance improvement (PI) initiatives in partnership with Uniformed Services University Infectious Disease Department. Leveraging the experience of the JTS, the DHA was able to expand the DoD Trauma Registry (DoDTR) Infectious Disease module and assist in providing an initial pandemic registry capability to the DoD system. The development of a robust information technology infrastructure and onboarding of new registrars posed major challenges to providing immediate, sustainable PI capability at the onset of the public health crisis. The creation of a rapid deployment of the COVID registry, while successful, shed light on the need to expand our capabilities to prepare for future contingencies.

The pandemic fostered the realization that we need a more integrated holistic joint casualty care system. Many times I thought it would be nice to have a joint medical system similar to the Joint Trauma System, but I certainly did not see this as a JTS problem to solve. However, the pandemic made it clear to JTS leadership that the lack of a DoD joint medical system was a deficiency no other organization outside of JTS had the knowledge to build or infrastructure to support. It makes sense to have one system supporting all Services. In reality, there is only one system of casualty care using the same facilities, the same roles of care, the same providers, and the same evacuation platforms for medical, surgical, mental health and dental emergencies. Even our canine partners use this system. I believe the DoD and Service Members will benefit from a holistic, unified joint casualty care system, modeled after and led by the JTS.

In 2004, the JTS faced similar challenges when establishing the DoDTR to support the USCENTCOM. Although JTS has made much progress since then, the capability for registry-based clinical PI is far from institutionalized for the full spectrum of combat casualty care. The DoD lacks a framework for future registry-based clinical PI for health threats of military significance identified in the National Defense Strategy, in particular chemical, biologic, radiologic and nuclear weapons, directed energy weapons, and environmental threats. In addition, major causes of medical evacuation which impair the ability to sustain our deployed forces include dental, mental health, and non-battle musculoskeletal injuries.

The JTS organizational model could serve as a blueprint for an expanded joint casualty care system to address the full spectrum of future military health threats. The DHA has the capability and infrastructure to support such a casualty care system. The DHA clinical communities, especially the military medical community, are well-suited to support a joint casualty care system, but would require additional staff such as PI, data, epidemiology and registry teams.

Shared capabilities between JTS and the DHA clinical communities would help establish a reserve team of trained, flexible personnel who can accommodate different health threats, such as when the trauma system personnel transitioned to COVID-19 support. Ideally, the National Disaster Medical System would coordinate with the DoD to develop similar proficiency in civilian communities.

A valuable lesson learned during the pandemic was the use of MHS GENESIS greatly improved health data management capabilities. From a PI perspective, implementation should be expedited across the DoD to meet health threat and medical registry needs. The development of a public health/pandemic all hazards registry and PI team expanded the DHA's capability during the pandemic. This system could evolve into a joint casualty care system managed by a data-centric learning healthcare organization capable of analyzing data at the speed and scale to sustain the operational advantage and increased efficiency needed by the Department of Defense.
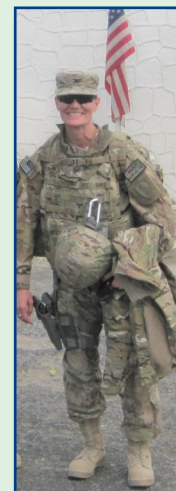
2021 Goals

❶ Deliver performance improvement products to improve buy-in of stakeholders. Implement Combat Casualty Care Quality Improvement Program.

❷ Establish joint medical interoperability standards.

❸ Expand Combatant Command trauma systems based on feedback from tabletop exercises and field exercises.

❹ Support future operations, National Defense Strategy and National Disaster Medical System. Lead Sustain Expeditionary Medical Skills strategic initiative.

❺ Improve data efficiency.

5-year Goals

❶ JTS coordinates an enterprise performance improvement capability (joint casualty care system) to enhance Commander's casualty response.

❷ CTS is integral to Combatant Command operations (performance improvement/12 core functions).

❸ Build framework to improve educational opportunities, system-based practices and research capabilities with National Association of Emergency Medical Technicians and other military-civilian partnerships.

❹ Create and employ a deliberate JTS recruitment, assessment, sustainment, training, development program to ensure long-term mission success.

CHAIN OF SURVIVAL & RECOVERY ACROSS THE GLOBAL CONTINUUM OF CARE

Point of Injury to Definitive Care →

CASEVAC — Intratheater EVAC — Intertheater EVAC — 72 hours plus — Post acute care

1 hour — 1-24 hours — 24-72 hours — 72 hours plus — Post acute care

| BAS Role 1 | Forward Surgical Teams, Role 2 | CSH, EMEDS, EMF Role 3 | Definitive Care Level 4, OCONUS | Level 4 CONUS | Recovery, Rehabilitation VA, CFI |

Surgical Capability →

HOW JTS TEAMS WORK TOGETHER TO DELIVER OPTIMAL TRAUMA CARE
Right Patient, Right Place, Right Care, Right Time

JTS is a collaborative organization in which each team is interdependent on each other. Remove one component of the life cycle and JTS fails in its mission to improve trauma readiness and provide the optimum chance for our warriors' survival and the maximum potential for functional recovery. To put this process into context, let's follow a patient from point of injury (POI) to a Role 4. This starts with a casualty. Role 1 to Role 2 casualties become patients at a Role 3.

After a base attack, medics responded to a casualty, rendered tactical combat casualty care and carried him to Role 1. A 9-Line medical evacuation request was dropped. A UH-60 arrived and transported the casualty to the closest Role 2 for damage control surgery (often using clinical practice guidelines [CPGs]). A Critical Care Air Transport Team then flew the post-surgical casualty to the theater Role 3.

The hospital (Role 3) received the patient and performed additional surgery. After 4 days in the ICU, the patient was ready for aeromedical evacuation to Walter Reed National Military Medical Center in the U.S. (Role 4). Once fully recovered, the patient is discharged and sent back to their home station.

The trauma care data, from point of injury to stateside hospital visit is captured and sent to JTS to be entered in the DoD Trauma Registry. The data is abstracted, cleaned and aggregated to create a complete picture of clinical care and recovery. The JTS Data Acquisition team scrutinizes every line of the patient records from the first Tactical Combat Casualty Care (TCCC) card to the discharge paperwork. The resulting "clean" data is then ready for data analysis.

The JTS Epidemiologists, Data Scientists and Statisticians play a key role in the analysis of the DoDTR data. They work with the JTS partners and internal staff to pull and analyze DoDTR data.

The Performance Improvement (PI) team takes this data to conduct PI activities to assess CPG adherence, identify lessons learned, trauma care delivery shortcomings, and produce recommendations to improve guideline adherence.

Performance gaps are identified and reported to the DHA/MHS and U.S. military leaders. This information is given to the Defense Committees on Trauma which include the Committee on TCCC, Committee on Surgical Combat Casualty Care and En Route Combat Casualty

Care. These committees, through studies and evidenced-based research, develop training objectives and CPGs.

The Joint Trauma Education and Training Branch incorporates the lessons learned and CPGs into deployment readiness curriculum and works with the Defense Medical Readiness Training Institute to implement instruction and maintain course material relevance. These teams ensure deployed personnel are adequately trained to provide combat casualty care and care under fire. They work with the JTS Continuing Education (CE) Program to deliver compelling content for the weekly Thursday Combat Casualty Care Conference.

The Combatant Command (CCMD) Trauma System (CTS) Operations advise and enable the establishment of scalable CTS. The CCMD is ultimately responsible for the trauma care delivered in the CCMD (i.e. CENTCOM). The CCMD Surgeon General coordinates with deployed medical assets, which includes trauma surgeons, to ensure that JTS treatment guidelines are being followed and the patients information is updated in the DoDTR.

JTS leadership works with MHS leaders on operational planning and readiness through evidence-based PI reports, documented lessons learned, and recommendations on trauma education and research translation processes applicable to DoD trauma care delivery, which will serve as a key feedback loop across the translation lifecycle.

SPEAK UP, SAVE A LIFE

SIGN UP HERE

giselle.r.moody.ctr@mail.mil

Speakers wanted for Thurs Combat Casualty Care Conferences. Share your trauma care stories and lessons learned to improve battlefield care.

HOW JTS SUPPORTS CCMD TRAUMA SYSTEMS

It's been a busy time for the JTS Combatant Command (CCMD) Trauma Systems (CTS) Operations, starting with table top exercises (TTXs) with geographical CCMDs (GCCs). The TTXs are mission-critical drills to sustain readiness and support security cooperation objectives. Six GCCs (AFRICOM, EUCOM, CENTCOM, INDOPACOM, NORTHCOM, and SOUTHCOM) sat down with CTS Operations to review, discuss, and determine the way forward toward implementation of a casualty care system distinctive to the CCMD theater environments. The plan is to develop a standardized process which includes roundtable discussions between the CCMD Surgeon's office, the DHA Liaison Officers (LNOs) and JTS CTS Operations to gain insights and uncover key areas to address during the exercise.

A Trauma Management Team (TMT) will lead efforts within the CCMD to integrate trauma care systems and performance improvement into operational planning, training exercises, and real-world operations. TMT includes a trauma surgeon to lead the development and oversight of integrated CTS capabilities as the Trauma Director; a Trauma Program Manager and a registered nurse to monitor the casualty care review process, identify events, monitor outcomes and report on system related issues; and a Trauma Registrar, a patient administration subject matter expert, to ensure casualty care records from point of injury (POI) to evacuation through roles of care are completed and submitted to DoD systems of record.

CTS Operations identifies the joint knowledge, skills, and abilities essential to the CTS mission for curriculum design. CTS curriculum is geared for, but not limited to, the DHA LNOs, personnel assigned to the TMT, and JTS personnel assigned as LNOs to the CCMDs.

The CTS team will assist JTS leadership with its effort to lead the Patient Evacuation Coordination Cell (PECC), Joint Integration Process Action Team (JIPAT) to develop a concept of operation (CONOP). The PECC is responsible for the planning and execution of all MEDEVAC tasks. It also supports patient tracking and reporting. The CONOP will outline tactics, techniques, and procedures to guide the establishment and use of operational evacuation coordination bodies (e.g., PECC). The JIPAT will prepare recommendations to update DoD policy, joint doctrine, Service regulations, and theater entry training requirements. JIPAT will also coordinate with the Services and DHA, and the Assistant Director, Combat Support, to review knowledge, skills, and abilities required to support PECC operations.

CTS Operations is working with DHA's Joint Operational Medicine Information Systems office to deliver the first-ever automated reporting system with intelligent tasking capabilities specific to patient movement and casualty evacuation. The application will reside within the new Medical Common Operating Picture which incorporates capabilities such as medical situational awareness, synchronization, risk mitigation, planning, and intelligence into a single platform. The patient movement function will capture and track 9-Lines from POI and inter-facility transfer request between the roles of care. Bottom line, PECCs will integrate operational, clinical and regulating considerations to optimize patient movement activities within the joint operations area.

The team welcomes the new CTS Operations Chief COL Jay Baker, MC, USA. Baker served as a senior operational leader as the Special Operations Command, Europe Surgeon. We also welcome Bruce Tarpey, Patient Transport Data Lead (US Army MEDEVAC/US NAVY SAR).
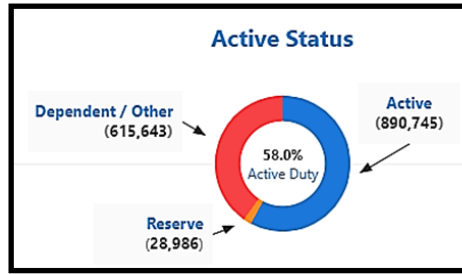

Reference: DHA-PI 6040.06/Combatant Command (CCMD) Trauma System (CTS)
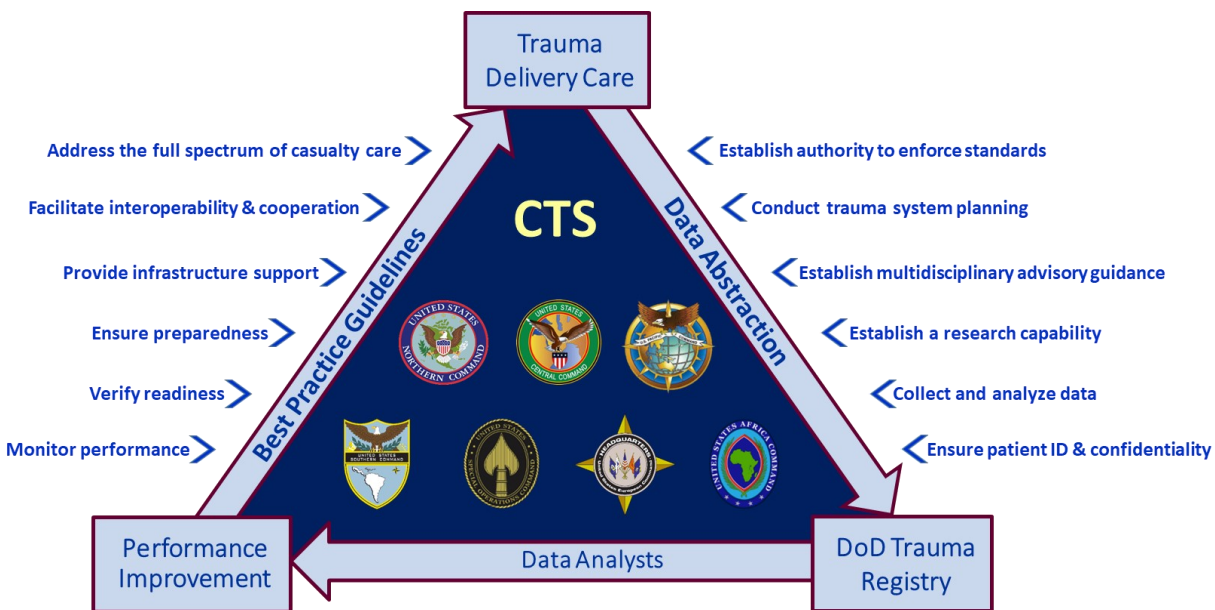
THE JTS OPERATIONAL PYRAMID EXPLAINED

▸ Trauma Care Delivery: Trauma care is documented as care is delivered.
▸ Data Abstraction: Trauma care data is abstracted in the DoD Trauma Registry (DoDTR).
▸ DoD Trauma Registry: Trauma care data is collected by JTS and aggregated in the DoDTR and injury specialty modules.
▸ Data Analysts: Analysis of data enables JTS to recommend clinical process improvements. The migration to DHA presented JTS with more opportunities to affect change and broaden its reach.
▸ Performance Improvement: JTS leverages data analyses to contribute to performance improvement through CPGs and resolving clinical care process gaps. There's a training component of performance improvement that comes before Trauma Care Delivery. JTS fulfills this requirement by contributing to readiness training programs.
▸ Best Practice Guidelines: Performance improvement culminates in the form of best practices, lessons learned reports, patient safety initiatives, and CCMD trauma system assessments.
▸ Trauma Care Delivery: The cycle of continuous performance improvement begins again, enhancing trauma and combat casualty care to save more lives and improve Wounded Warriors' chance of full recovery.

REGISTRY CAPTURES LONG-HAUL CONDITIONS, BREAKTHROUGH CASES

The JTS manages the first COVID-19 registry to serve the Department of Defense (DoD) and Military Health System. Working with infectious disease experts from Uniformed Services University of Health Sciences (USU), JTS initiated the COVID-19 Registry at an unprecedented speed – within two months. The registry, launched 01 June 2021, collects and aggregates pandemic response data in the Military Treatment Facilities (MTFs) in enduring actionable information. JTS was a natural candidate for the job given its established reputation as the leader in trauma data collection, analysis and process improvement.

Active Status

Dependent / Other (615,643)
Active (890,745)
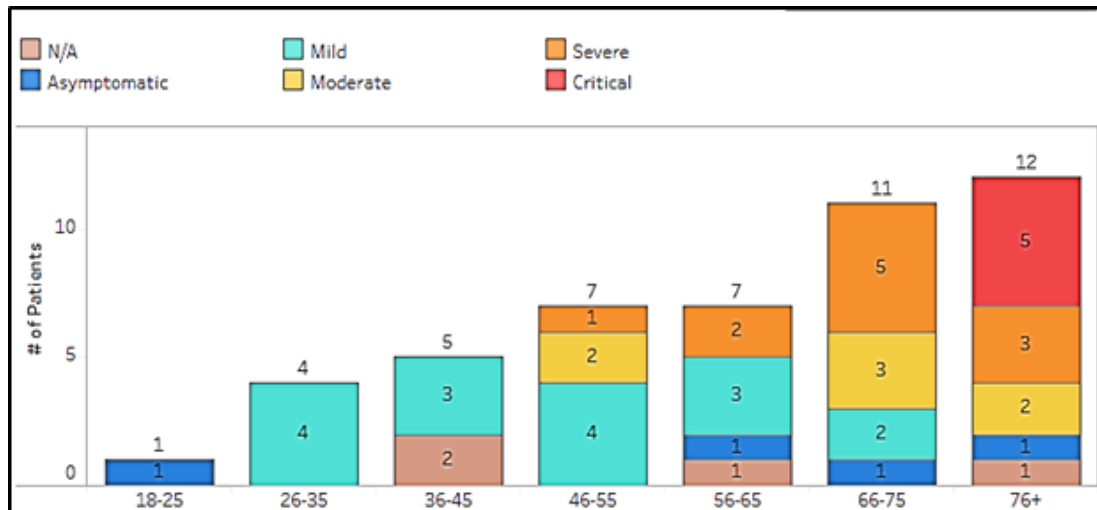58.0% Active Duty
Reserve (28,986)

The COVID-19 registry is unique in that it establishes the first in-person encounter for the COVID-19 event and tracks the event until 30 days post final discharge (from MTF) after it has been determined that the patient has tested negative, or if the patient dies. Every medical encounter related to a patient's COVID-19 illness episode is captured in both inpatient and outpatient events. The registry also captures initial and ongoing assessment data, diagnostic testing/imaging, interventions and outcome data.

With the recent rise of the Delta variant and breakthrough cases and the discovery of long-haul COVID-19, JTS has expanded the registry

data collection criteria to include vaccine numbers and cases related to vaccines. JTS staffing has proven highly capable in pivoting to accommodate the changing nature of the virus to ensure data is collected on the variants and their symptoms and outcomes. Data is scrubbed and validated during the quality assurance process.

Data collection criteria is founded on the Center for Disease Control and Prevention's data collection form and the new COVID-19 History and Physical Form developed by JTS, U.S. Central Command and USU. Clinicians will use the JTS COVID-19 form to submit COVID data.

As of Oct 2021, the DHA has incorporated over 367,000 COVID positive patients in the registry and manual data abstraction has been completed on 11,537 patients, with data automation being applied to improve ability to rapidly track trends for all patients.

JTS has delivered 110 COVID reports in CY2021. JTS also developed dashboards designed to automate reports and make data readily available to leaderships. See next page for dashboards. Efforts are underway to migrate the COVID-19 Registry as a module within the DoDTR to a functional registry within the DHA Enterprise Intelligence and Data Solutions Military Health System Information Platform.

Small number of breakthrough cases by age and severity.

COVID 19 Registry Summary
2 Feb 2020   Oct 2021

▸ Total patients with detailed review chart: 11,537
▸ Hospitalized: 4,819 (42%)
▸ Severe/Critical: 3,970 (34%)
▸ Recovered: 10,974 (96%)
▸ Deaths: 381 (3.3%)

Priorities for detailed chart reviews:

▸ All Inpatients
▸ Vaccine breakthrough cases
▸ Monoclonal antibody recipients
▸ Persistent viremia and possible second infection
▸ Multisystem inflammatory syndrome in children
▸ Burn Pit exposed patients
▸ Outpatients

Active duty Service Members with long-haul conditions– post-COVID-19 and post-vaccination

Diagnosis	Post-COVID, N=111,767	Post-Vaccination, N=732,602
Fatigue	1,896 (1.7%)	4,607 (0.63))
Brain Fog	1,411 (1.3%)	4,327 (0.59%)
Headache	2,540 (2.3%)	6,965 (1.0%)
Loss of Taste	435 (0.4%)	245 (0.03%)
Dizzy Standing	1,048 (0.9%)	3,063 (0.4%)
Palpitations	1,485 (1.3%)	3,219 (0.4%)
Chest pain/Cough	7,887 (7.1%)	13,245 (1.81%)
Joint, Muscle Pain	15,614 (14.0%)	60,742 (8.3%)
Depression, Anxiety	4,836 (4.3%)	16,542 (2.3%)
Fever	586 (0.5%)	1,015 (0.14%)

Dashboards — COVID-19 Registry

COVID-19 Registry Dashboards. *View the COVID-19 Registry population with filters (specific MTF, Service, Beneficiary category, inpatient, gender, BMI, recovered, burn pit registry patients, MIS-C patients, Monoclonal antibody patients, breakthrough cases, persistent viremia) to allow for detailed drill down of patient aspects.*

Dashboards were developed by the JTS Epidemiologists/Statisticians team in collaboration with the Data Release Branch.

Demographics: View severity, location, length of hospital stay, ICU days, and vent days by demographic information.
https://bitab.health.mil/#/views/COVIDRegistryDashboard/Demographics?:iid=2

Treatments: View treatments of interest (glucocorticoids, remdesivir, CCP, etc.) over time to see percent of patients receiving the treatments, average days to treatment, and outcomes.
https://bitab.health.mil/#/views/COVIDRegistryDashboard/Treatments?:iid=3

Complications/Comorbidities: View patients by their specific comorbidities or complications by severity.
https://bitab.health.mil/#/views/COVIDRegistryDashboard/ComplicationsComorbidities?:iid=3

COVID DHA Dashboard: View results of COVID tests found in the MIP. View weekly and cumulative trends of test results. View demographics by test result as well as comorbidities, and a map of places with the highest number of infections.
https://bitab.health.mil/#/views/CovidWeekly/COVIDRegistryDashwide?:iid=1

Vaccine Dashboards. *View vaccination counts by maker and vaccination status.*

Vaccine Metrics: View cumulative number of those vaccinated by number of doses, and number of breakthrough cases since second dose
https://bitab.health.mil/#/views/VaccinesandAdverseEvents/VaccineMetrics?:iid=2

Breakthrough Metrics: View the number of fully vaccinated break through cases by selected demographics. Cumulative breakthrough cases by month, and days since final dose to breakthrough case by maker.
https://bitab.health.mil/#/views/VaccinesandAdverseEvents/BreakthroughMetrics?:iid=2

Breakthrough Maps: View the breakthrough cases over time by location (state or MTF), in graph form or heat map.
https://bitab.health.mil/#/views/VaccinesandAdverseEvents/BreakthroughMaps?:iid=2

Combat Casualty Care Quality Improvement Program Flags Potential Problems Builds Mitigation Strategies

Combat Casualty Care Quality Improvement Program (C3QIP) is gaining momentum in its effort to provide DoD leadership with valuable feedback to improve combat casualty care. C3QIP monitors clinical care processes for performance improvement gaps and trends. The team looks at adherence to CPGs and compares the different Role of Care facilities to develop benchmarks and mitigations. JTS pulls C3QIP-related metrics from the DoD Trauma Registry (DoDTR) and flags records with potential PI issues.

JTS reports the metrics with mitigation recommendations to Combatant Command Surgeon Generals and Trauma Management Teams. To date, the C3QIP team has delivered reports on resuscitative endovascular balloon occlusion of the aorta, en route/transport, damage control resuscitation, and the use of ketamine.

C3QIP fulfills the requirement set by DHA Procedural Instruction 6040.05-5, 26 June 2020 which states, "JTS will employ the DoDTR, the Joint Lessons Learned Information System, and other data sources to assess and evaluate guideline adherence and document lessons learned from trauma care delivery, which will serve as a key feedback loop across the translation lifecycle."

Legend:
- 🟦 Damage Control Surgery
- 🟪 Pain Management
- 🟧 Pre-Hospital Indicators
- 🟨 Blood Transfusion
- 🟩 Burns
- 🟨 Infection Prevention
- ⬜ Neurosurgery
- 🟪 Systems Issues
- 🟥 Complications
- ⬛ All Deaths

Damage Control Surgery
→ REBOA
→ Exploratory Laparotomy
→ Emergent Thoracotomy
→ Vascular Repair @ R2
→ Ex Fix @ R2
→ Traumatic Amputation
→ Blast w/ complex injury
→ Withdrawal of life support*
→ Lowest SBP*

Pain Management
→ Ketamine Administration
→ Pain Assessment Completed
→ Treatment Completed

Pre-Hospital Indicators
→ Receipt of 1380
→ Golden Hour times
→ Inadequate Airway
→ IO
→ NDC
→ Fluids: Crystalloid/Colloid
→ Opioid/Benzo Administration

Infection Prevention
→ Invasive Fungal Infection
→ ABX administration

Blood Transfusion
→ Transfusion, massive >3unit/hr
→ WB Transfusion*
→ Prehospital transfusion*
→ TXA
→ PE/DVT*
→ Calcium administration

Burns
→ Burns > 20% (2 & 3 degree)

Neurosurgery
→ Cerebral monitor*
→ Neurosurgery R2
→ TBI w/neuro intervention @ R3
→ GCS (highest/lowest)*
→ Initial pupillary response*
→ Lowest SBP

Systems Issues
→ Equipment
→ Personnel
→ Communication
→ Documentation
→ Transport/Evacuation
→ Logistics

Complications

Deaths

Defense Medical Readiness Training Institute (DMRTI): Time-honored Dedication to Readiness Training

DMRTI Chief CAPT James Quick shares the story of DMRTI, its long history in the military healthcare system and its relationship with the Joint Trauma System

Tell us about DMRTI and its mission.

The Defense Medical Readiness Training Institute (DMRTI) was established in 1996 to meet the growing need for medical training that replicated combat scenarios in order to better prepare health care providers for the challenges of field medicine. DMRTI was preceded by the Joint Medical Readiness Training Center (JMRTC) charged with implementing the Combat Casualty Care Course in 1986. DMRTI joined DHA in 2014. In 2019, DMRTI transitioned from the Education and Training Directorate to the DHA Combat Support Directorate under the JTS.

The DMRTI mission is to enhance operations and sustainment capabilities through joint, interagency, intergovernmental, and multination medical training. DMRTI utilizes a tri-service staff of professionals to coordinate and conduct 32 courses which focus on trauma care, burn care, joint medical operations, disaster preparedness, humanitarian assistance, and chemical, biological, radiological and nuclear preparation and response for approximately 4,000 students each year.

Why was DMRTI integrated with JTS?

The purpose of the realignment was to enhance the synchronization of resources; to support readiness training programs; to ensure students receive training appropriate to joint demands; and to ensure course content and execution is optimized for efficiency and effectiveness.

What was the rationale of integrating DMRTI into JTS? How does

DMRTI fit into the overall JTS organization?

The two organizations share the DoD readiness education and training mission. Each plays a key role in trauma training. 1) JTS formulates clinical practice guidelines (CPGs) by using statistical analysis of DoD Trauma Registry data, after actions reports, and health data abstracted from patient records. 2) Joint Trauma Education and Training Branch (JTET) extrapolates training requirements from the CPGs. JTET develops and deploys standardized Tactical Combat Casualty Care (TCCC) curricula. In collaboration with Uniformed Services University, JTET also develops EWSC modules for Combat Critical Care Team providers 3) DMRTI generates curricula for C4 (Combat Casualty Care Course) and the Medical Planner courses based off of the JTS' recommendations and coordinates and executes those courses as well as analyzes the effectiveness of required training.

### What is in the future for DMRTI and its relationship with JTS?

With DHA restructuring, DMRTI will move to J-7 while JTS moves to Health Care Operations. Although the organizations will no longer be joined, DMRTI will continue to strengthen its relationship with JTS, DHA, and Services in order to improve survivability from combat and non-combat related injuries. DMRTI will focus its efforts on improving the relationship with geographical and functional CCMDs in order to better mold timely and relevant training to their unit- and mission-specific needs. The DMRTI command is also developing plans to participate in joint exercises conducted by the CCMDs providing observer/trainers to provide vital, real-time feedback to CCMDs, medical units and assigned personnel.

JTS Helps USCENTCOM Test Portable X-ray Devices to Close Imaging Gap in Austere Environments

JTS PI Branch is helping U.S. Central Command identify and test a viable portable x-ray device which can be used for prolonged field care in austere locations. What is needed is a scaled-down lighter hand-held version of the older wheeled "bumblebee" portable X-ray fielded at Role 3 and hardened Role 2 facilities. Imaging experts performed the first field tests of imaging devices at Camp Bullis (San Antonio, TX) to ensure product suitability.

The ideal device will be small, light, and rapidly set up. Durability, versatility, and image portability are required features. The device must be rugged to withstand "abuse" and provide sufficient power to endure lengthy operations and to image large humans. It must also be versatile enough to be moved and detached for hand-held use. Teams wanted the digital image format (i.e. JPEG,

PNG) capable of being burned to CD or sent over external WiFi network via email directly from the viewer (imaging) software—anonymized but unencrypted.

The goal is to try to match as closely as possible the imaging capabilities found in Continental U.S. facilities: Quick viewable images soon after exposure and the easy-to-use portable viewing software for image manipulation. Easy maintenance and updates were taken into account given the austere environments in which the device will be used. Radiation exposure remains a safety concern when using x-ray wireless handheld since it can expose the operator to scattered (yet limited) radiation. Personal protection equipment will address this concern.
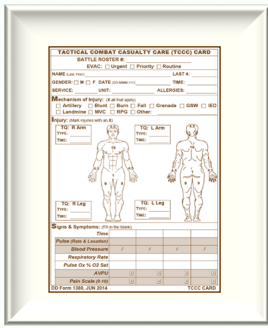
COMPLETE PATIENT CARE RECORDS AND AFTER ACTION REPORTS HELP ENSURE MISSION READINESS AND SAVE MORE LIVES

"Commanders will ensure that all first responders carry and use DD Form 1380 to document pre-medical treatment facility care at the point of injury. Such care relates to both battle and non-battle injuries."
~ DHA-PI 6040.1. Implementation Guidance for the Utilization of DD Form 1380, TCCC Card, 20 Jan 2017

Documentation and data collection for combat casualty care is a top battlefield issue cited by Combatant Command (CCMD) Surgeon General teams and Defense Committees on Trauma (DCoT) members. Casualty data enables MHS officials to make sound policies and supports the development of trauma curriculum, best practices, and evidence-based clinical practices guidelines to improve battlefield trauma care.

A completed DD 1380, otherwise known as the Tactical Combat Casualty Care (TCCC) Card, and associated After Action Report (AAR) is the foundational requirement for prehospital documentation. Unfortunately, injury documentation on the battlefield and during transport is plagued with challenges. Often TCCC cards do not arrive with the patient. At times, the casualty card may be lost, indecipherable or destroyed. Multiple variables contribute to the loss or destruction of cards.

DoD and DHA policy supports the collection and submission of prehospital trauma care data. DHA Procedural Instruction (DHA-PI) 6040.1. Implementation Guidance for the Utilization of DD Form 1380, Tactical Combat Casualty Care (TCCC) Card, 20 Jan 2017, is the primary mandate and one of about seven policies which underscore the need to capture this information. However, enforcing the policy requirements remains a challenge.

In order to ensure the DD 1380/TCCC cards are submitted reliably, JTS and its partners must figure out how to best encourage personnel to complete required forms and After Action Reports (AARs) (even if after the event) and submit the information.

Accountability appears to be key to successful submission. At this point in time, no one is taking responsibility to check if TCCC cards and AARs are thoroughly completed and submitted. As prescribed in the DHA-PI, every deployed medical director is tasked with ensuring a 1380 is completed and turned in to JTS for every trauma casualty. Once completed, the DD Form 1380, TCCC card must be visibly attached to the patient. Upon arrival at a Role 2 or Role 3 MTF, the DD Form 1380 must be included with paper medical record, then scanned and entered into both the patient's electronic health record and the DoD trauma registry. Commanders of each casualty's unit must enforce completion and submission of prehospital documentation. Role 2 and 3 MTFs commanders must ensure the casualty cards are not discarded. Enforcement is problematic.

A post-mission AAR within 72 hours of returning from the mission was added to overcome the problem of lost cards or information not captured in the casualty card. JTS identified during trauma system assessments that many deployed locations do not have the appropriate scanners to submit hand-written documentation. Alternate methods would be to electronically complete and send forms to JTS or transport handwritten forms to higher levels of care where patient administration can take responsibility for scanning and submission.

The JTS team plans to take advantage of the decrease in casualty flow to reflect on how to make casualty documentation easier to complete in the heat of a crisis. Digital formats and handheld devices are preferred, but technological solutions may not be feasible in some austere environments or where internet connectivity can be scarce or non-existent at times. The option of submitting a scanned casualty care completed from memory after the mission allows documentation to occur at a later time with minimal technological support, but it does not support ongoing patient care and handoff.

Documentation of treatment on the DD 1380 is part of the all Service Member TCCC tier 1 curriculum while the TCCC AAR is covered in the combat medic TCCC tier 3 and 4 training. However, the requirement remains poorly enforced. A lack of awareness could be blamed on the fact that different Services have obtained different versions of prehospital forms or developed their own AAR. This inconsistency makes a strong case for a single joint process.

Ensuring vital information is handed off to the en route care and surgical teams is another challenge. JTS and CCMD SGs want to know from medics how to make it easier to overcome inconsistent reporting in terms of missing information such as time of injury, time of tourniquet, missing demographic, lack of antibiotic or other meds, date/time – sometimes it is hard for the receiving team to determine if the document references one patient or two.

Some forms have recently been recouped through the use of old fashioned office routing envelopes to facilitate transfer of handwritten documentation to Role 3 patient administration. The JTS PI team recently distributed red envelopes - labeled Medical Documentation - intended for the MEDEVAC teams to ensure paper documents from Point of injury/Role 1 and Role 2s to transport to the Role 3 PAD. The routing envelope provides a "low-tech" option for submitting patient documentation.

JTS continues to research and explore opportunities to better serve our warrior community and capture critical trauma documentation to support individual casualties with a complete medical record and to support performance improvement through data collection and analysis. Implementing new business practices may be one step toward that goal. Leadership enforcement of this basic medical requirement is essential. JTS will provide updates on the progress of prehospital data collection.

Case-control Analysis of Prehospital Death and Prolonged Field Care Survival during recent U.S. Military Combat Operations

Shackelford SA, del Junco DJ, Riesberg JC, Powell D, Mazuchowski EL, Kotwal RS, Loos PE, Montgomery HR, Remley MA, Gurney JM, Keenan S.

Background: Prolonged Field Care (PFC) is prehospital medical care applied beyond doctrinal planning timelines, describing the military operational scenario for management of serious and critical casualties in austere environments, including by nonspecialist and nonphysician providers. While conditions of military PFC have a long history in military medicine, the contemporary context of PFC more specifically frames a remote environment where a higher level of care is not feasible for hours to days. The term has been used when considering the challenge of future battlefield operating environments in comparison to the conditions established during conflicts in Afghanistan and Iraq.

Objectives: The objectives were to quantify medical interventions administered to survivors and nonsurvivors, identify PFC resources, and determine if prehospital care administered to nonsurvivors differed from that given to survivors to inform PFC clinical practice, training, and resource allocation.

Method: Retrospective cohort study of DoDTR casualties with Maximum Abbreviated Injury Scale (MAIS) score of 2 or greater and prehospital records during combat operations 2007 to 2015; U.S. military nonsurvivors were linked to Armed Forces Medical Examiner System data. Medical interventions administered to survivors of 4-72 hours of PFC and nonsurvivors who died prehospital were compared by frequency-matching on mechanism (explosive, firearm), injury type (penetrating, blunt) and injured body regions with MAIS score of 3 or greater.

Conclusion: Tourniquets, blood transfusion, airway, and ventilatory support are frequently required interventions for the seriously injured. PFC should direct resources, technology, and training to field technology for sustained resuscitation, airway, and breathing support in the austere environment.

Read about the study here: Case-control analysis of prehospital death and prolonged field care survival during recent U.S. military combat operations

Clinical Utilization of Deployed Military Surgeons

Hall AB, Qureshi I, Gurney JM, Shackelford SA, Taylor J, Mahoney C, Trask S, Walker A, Wilson RL.

Background: Combat casualty care has been shaped by the prolonged conflicts in Southwest Asia, namely Afghanistan, Iraq, and Syria. The utilization of surgeons in austere locations outside of Southwest Asia and its implication on skill retention and value have not been examined. This study hypothesizes that surgeon utilization is low in the African theater. This lack of activity is potentially damaging to surgical skill retention and patient care. The utilization of surgeons in austere locations outside of Southwest Asia and its implication on skill retention and value have not been examined.

Objectives: This study aims to determine the caseloads of small surgical teams deployed in Africa to inform surgeon utilization and reduce potential risks to skill retention.

Methods: Military case logs of surgeons deployed to Africa under command of Special Operations Command Africa between January 1, 2016, and January 1, 2020, were examined. Cases were organized based on population served, general type of procedure, current procedural terminology codes, and location.

Conclusion: Surgical cases for military surgeons were uncommon in Africa. The low volumes have implications for skill retention, morale, and sustainability of military surgical end strength. Reduction in deployment lengths, deployment location adjustments, and/or skill retention strategies are required to ensure clinical peak performance and operational readiness. Failure to implement changes to current practices to optimize surgeon experience will likely decrease surgical readiness and could contribute to decreased retention of deployable military surgeons to support global operations.

Read about the study here: Clinical utilization of deployed military surgeons

How to Request DoDTR Data

The requestor must be U.S. Military, U.S Government or sponsored by a U.S. Military or Government entity who will accept responsibility for safeguarding the data set and ensure all applicable DoD and Federal requirements are met by the non-Federal requestor.
JTS does not help non-Federal requestors find DoD sponsors. DHA requires the end user of the data to be identified.

Issuance of identifiable data for research purposes is subject to oversight by the Institutional Review Board (IRB). If the protocol was reviewed by a non-DOD primary IRB, the DHA Human Research Protections Program must review research documentation.

1. Complete the Request for Information Worksheet to request counts of patients and determine if the DoDTR offers enough information for a particular research or performance improvement project.
2. Complete the DoDTR Data Request Form to specify the data elements as listed in the approved protocol.
3. Complete a Data Sharing Agreement Application (DSAA) and submit it to the DHA Privacy Office with the above forms. DHA may determine a MOU/MOA. If one is needed, it must be signed prior to release of data. More requirements are listed in the DSAA.
4. DHA Privacy Office approves the DSAA. Once JTS is notified of DSAA approval, data will be queried/reviewed and released.
5. For more information, email the Data Release Branch at: mailto:dha.jbsa.j-3.list.jts-data-release@mail.mil

DEFENSE COMMITTEE ON TRAUMA (DCoT) NEWS

The Defense Committee on Trauma (DCoT) is busy ensuring the guidelines include the latest best practices and innovative techniques as well as supporting performance improvement efforts. There are too many initiatives to cover here, so we will highlight current priorities.

Committee on Tactical Combat Casualty Care Works in Progress

The committee has completed a comprehensive review of guidelines for airway management and TBI and eviscerations. The USMC and Army FORSCOM provided updates on their actions to guarantee far forward blood options for medics and corpsman on any battlefield.

A new CoTCCC initiative is examining interventions in extreme cold weather. While hypothermia prevention has been an original anchor point in TCCC, historically CoTCCC has not evaluated TCCC in the arctic. The group will address what TCCC procedures should be done or not done, or modified when treating a casualty in extreme cold conditions.

The new Prolonged Casualty Care (PCC) Working Group has delivered the first draft of the PCC Guidelines. The guidelines pick up where the TCCC Guidelines leave off if a medic IS unable to evacuate a casualty and must continue management for hours to days. One critical aspect of the PCC guidelines is they hone the skill levels of a basic medic or corpsman operating in an austere Role 1 environment with limited equipment. The second aspect is the focus on casualty care in any austere environment so they can assist a medic in Africa or a corpsman in the Pacific. The third aspect is use of minimum, better, best format to ensure a standard of care and to scope expectations.

Questions? dha.jbsa.j 3.list.jts tc3@mail.mil

Committee on Surgical Combat Casualty Care Works in Progress

CoSCCC is supporting the Role 2 Readiness Report/Assessment and Standardization of Order Set performance improvement efforts. The R2RA consists of surveying Trauma Medical Directors evaluate Role 2 capabilities to identify problems and requirements for preserving the highly perishable, mission essential medical skills of deployed medical personnel involved in patient treatment in support of the Joint Force.

Single Surgeon White Paper is a consensus statement using interoperability language to outline pros and cons of a single surgeon team, define sustainability and the overall mission. The paper examines the need for single surgeon team, timing and realistic expectations. It also outlines the risks for the commander and risks for the patient.

Role 3 Neurosurgeon Vision Statement is a set of recommendations for when a role 3 needs a neurosurgeon and the neurosurgeon s length of tour. It offers considerations for expanding the medical rules of engagement to include host nation and civilian casualties with in terms of timely capability and skill sustainment.

CoSCCC has set its sights on publishing these two papers by the end of the year.

Questions? dha.jbsa.j 3.list.jts cosccc@mail.mil

Committee on En Route Combat Casualty Care Works in Progress

The replacement form for the DA 4700, Tactical Evacuation (TACEVAC) AAR and Patient Care Record, is now an official DoD form. The DD 3104 Evacuation Patient Care Record better captures critical patient information during the en route care transfer phase in an easier to use format. DD 3104 was carefully vetted with en route care experts.

The second mile stone was the transition of the TACEVAC guidelines from CoTCCC to the CoERCCC. The move better aligns the items during the patient movement block of combat casualty care. As the new stewards of this block of care, CoERCCC will have a focused working group to help move this task forward.

The last item to touch on is the Joint Requirements Oversight Council tasking to develop Multi Modal Patient Movement (MM PM) Joint Competency Model for En Route Care. The model will establish the common tasks for en route care providers, medical planners and medical regulators. CoERCCC received inputs from the Army, Navy, Air Force, DHA, and Office of the Joint Staff Surgeon representatives. The final produce has been submitted for staffing to meet the requirements of JRCOM 049 19 (28 MAY 2019).

TOP 10 RDT&E for En Route Care

1. Medical documentation
2. Clinical decision support
3. Patient monitoring
4. Transport physiology
5. Transfer of care
6. Maintaining normothermia
7. Transport timing following damage control resuscitation or surgery
8. Intelligent tasking
9. Commander s risk assessment
10. Unmanned transport

Read about the Top 10 Research Priorities for U.S. Military En Route Combat Casualty Care.

Questions? dha.jbsa.j 3.list.jts coercc@mail.mil

K9 COMBAT CASUALTY CARE (K9CCC) JOINS DCoT AS AFFILIATE COMMITTEE ON MILITARY WORKING DOG (CoMWD)

The recently formed CoMWD is reviewing the canine tactical combat casualty care (K9TCCC) guidelines and CPGs for military working dogs to identify gaps and recommend modifications based on data analysis from the DoD Military Working Dog Trauma Registry, best practices, lessons learned, policy proposals, and guidance related to K9CCC for the DoD. The K9CCC has partnered with veterinarians from all of AOC. At least 50% of the membership is emergency, clinical care specialists and surgeons. The K9CCC will include at least two Enlisted/NCO members at all times. The K9CCC will also publish a list of Top 10 research priorities for the CoMWD, and will oversee the dissemination of this list to the research community. Tier 1-3 K9TCCC training products will be incorporated into TCCC.

TBI Registry Data Adds Valuable Insights to Improve Survivability and Outcomes

With conflicts around the globe, evaluating Traumatic Brain Injury (TBI) is more relevant than ever. Since 2000, over 361,000 military service members have been diagnosed with TBIs, an estimated 48,600 of which obtained brain injuries while deployed.

Stateside, TBI affects over 200,000 a year. To address the need to identify TBI incidents, the Department of Defense (DoD) authorized the Joint Trauma System (JTS) to capture outcomes for patients with theater-sustained TBI from point of exposure to potentially concussive events as per Department of Defense Instruction (DoDI) 6490.13 Comprehensive Policy on Traumatic Brain Injury-Related Neurocognitive Assessments by the Military Services, through end of follow-up, defined as end of recorded care.

The Neuro-TBI Registry is the only DoD registry to collect data related to patients with TBI injuries, ranging from mild concussions to severe penetrating head trauma. The Neuro-TBI Registry team has conducted initial reviews for abstraction inclusion on 16,733 patients. Robust abstraction has been completed on 2,398 patient records containing 11,169 independent patient evaluations to date. The registry captures episodic cases from injury through 12 months and includes demographics, incident details, diagnoses, treatments, and outcomes. It contains identified information from medical records, both inpatient and outpatient, throughout the continuum of care. Data is analyzed by researchers to improve TBI care, survivability, and outcomes for injured service members as well as performance improvement initiatives including development of clinical practice guidelines.

Researchers leverage registry data to better understand potentially concussive events and identify actionable insights. Studies in populations document known exposures to potentially concussive events. Tactical studies of combat-related TBI include demographics of patients, mechanism of injury, initial clinical examination findings, and laboratory results during initial management of injuries so that modifiable factors associated with in-theatre mortality and poor outcomes can be identified and targeted to improve care.

The Neurotrauma Steering Committee which works with JTS is focusing studies in populations with known exposures to potentially concussive events. The Blast Exposure and Concussion Incident Reporting studies analyze the relationships between exposure events, health records, outcomes, and clinical guidelines. These efforts will help build the foundation for future TBI analysis for the garrison environment.

TBI data captured by JTS has helped providers prioritize TBI patients and determine the best courses of clinical intervention. For instance, the study, "*Influence of Time to Transport to a Higher Level Facility on the Clinical Outcomes of US Combat Casualties with TBI: A Multicenter 7-Year Study,*" found blast was the most common mechanism of injury (70%) and most patients (65%) sustained penetrating injuries. Over half (59%) of the TBI patients had polytrauma, and 39% had severe TBI. Those who were transported in three days or more had higher ISS scores, were more likely to be polytrauma patients, and were more likely to have additional flights in theater. The study also revealed that in patients with moderate to severe TBI, a delay in aeromedical evacuation after brain injury out of the theater via pressurized cabin fixed wing aircraft was associated with improved mortality rates. Longer time to transport was associated with a higher odds of being discharged home and returned to duty.

Studies such as this illustrate the wealth of knowledge gleaned from the TBI registry data and the need for such information.

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