COMBAT & CASUALTY CARE

Fall 2018

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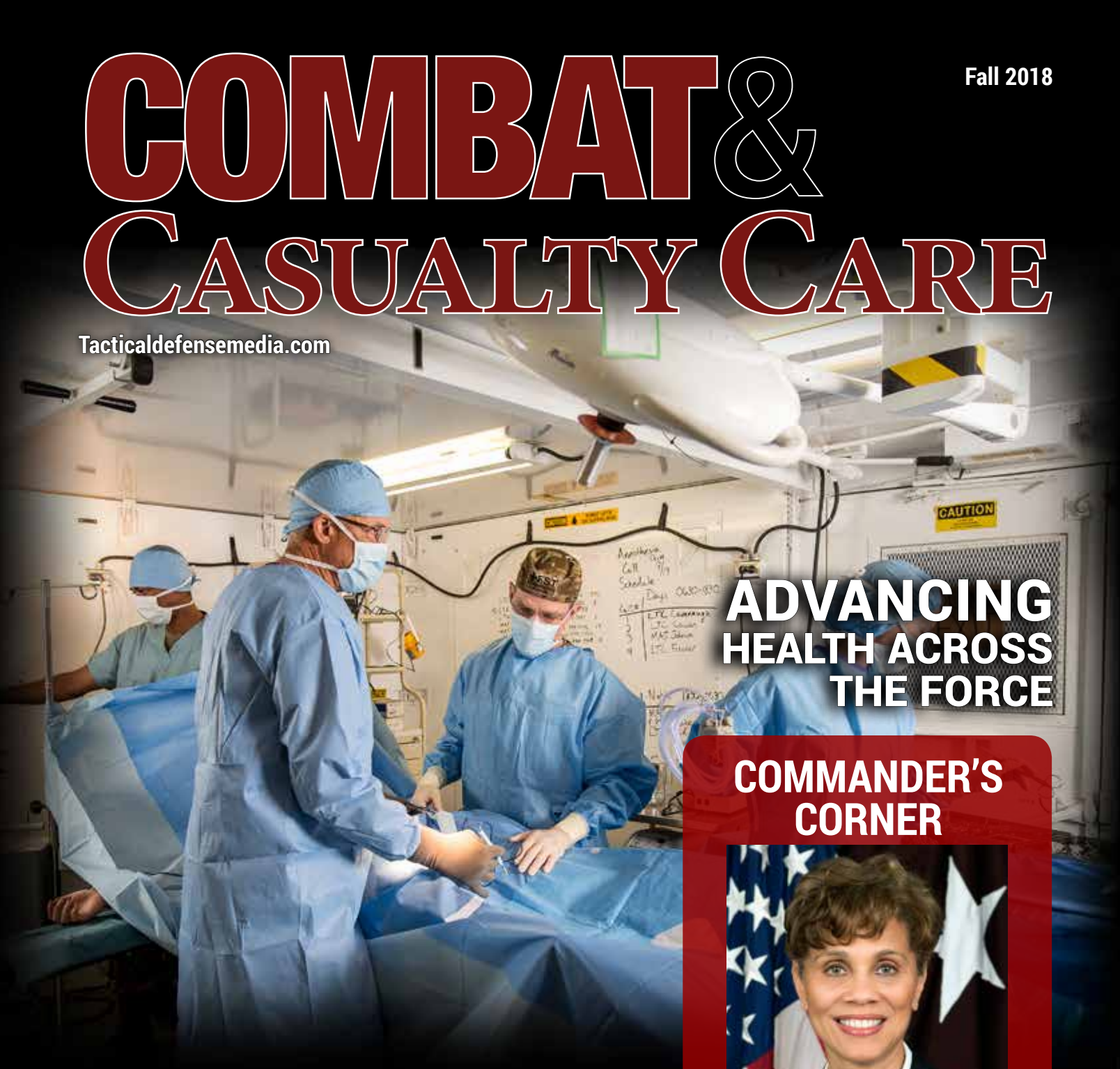

ADVANCING HEALTH ACROSS THE FORCE

COMMANDER'S CORNER

LTG Nadja Y. West
The Surgeon General
Commanding General
U.S. Army Medical Command

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[1]Lurie KG, et al. *J Med Soc Toho.* 2012;59(6):304-315.
[2]Convertino VA, et al. *Resp Care.* 2011;56(6):846-857.

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APPLYING BALANCED CARE ANY PLACE, ANY WHERE

As an overseer of the Military Health System (MHS), the Defense Health Agency (DHA) is tasked with ensuring the MHS extends to contingency and combat-theater operations.

By Dr. Paul Doan

Features

COMMANDER'S CORNER

LTG Nadja Y. West
The Surgeon General
Commanding General
U.S. Army Medical Command
Joint Base San Antonio, TX

Departments

Cover: Col. Paul Phillips, a U.S. Army Reserve orthopedic surgeon with the 228th Combat Support Hospital, San Antonio, TX, and Col. John Johannigman, a U.S. Army Reserve general surgeon, work together on a simulated surgery promotional photo shoot for Army Reserve marketing and recruiting in a field hospital at Ft. Hunter Liggett, CA. (U.S. Army Reserve photo by MSgt Michel Sauret)

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INSIGHTS

The Fall 2018 issue of Combat & Casualty Care sheds light on some challenges in sustaining current day DoD force health. It is with great pride that we present readers with an informative cover interview featuring perspective from the Office of the Army Surgeon General and Commanding General, U.S. Army Medical Command, LTG Nadja West. With many shared force health challenges and some unique to the most powerful land force in the world, LTG West speaks to initiatives for greater automation in surgical care, holistic combat trauma treatment, and more one-to-one doctor patient interaction.

Since its establishment in 2013, the Defense Health Agency (DHA) has been a major entity in establishing high level standardization and regulation across the Military Health System. With a greater emphasis on holistic care in clinical and long-term care, the DHA is ensuring coordination in healthcare distribution from contingency to combat theater operations worldwide. One of the more recent obstacles to quality of life in military healthcare has been in the area of pain management and the use of opioids to mitigate pain of many types. Womack Army Medical Center, Ft Bragg, NC, is at the forefront of DoD pain management practice, employing various opiate and non-opiate-based forms of relief, many of which are centered around psychological pain control and how they can aid the physical.

On burn care, the U.S. Army Institute of Surgical Research (USAISR) Burn Center, Ft. Detrick, MD, is leading Army/Joint DoD efforts to provide advanced care through Burn Flight Team intervention in combat and disaster zones. COL Jerome Buller, USAISR Commanding Officer, tells about lessons learned from many mass casualty situations where enhanced burn care response is needed most. With burn injury often resulting in scar tissue, MAJ Nathaniel Miletta, Chief, Laser Surgery and Scar Center, Brooke Army Medical Center, Joint Base San Antonio, TX, speaks to laser surgical technology being used to enable patient outcomes not long ago thought impossible.

From the field, the Fall issue takes a look at the latest in the use of freeze-dried blood plasma with U.S. Special Forces as well as novel vaccine development to treat rodent-born viral threats. As part of our organizational focus, we present a special interview with Dr. Joseph Caravalho, President and CEO of the Henry M. Jackson Foundation, Bethesda, MD, who discusses efforts to enhance military medicine and its application. Also, the Defense Medical Readiness Training Institute (DMRTI) gives us a look at some cutting-edge training techniques that DMRTI is using to help prepare the next generation of field medical personnel.

Your comments and suggestions are welcome. Thank you for the continued readership!

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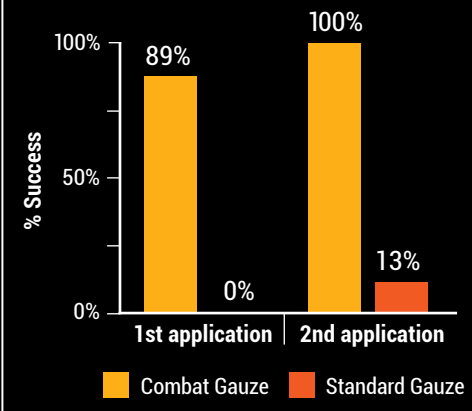

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The U.S. Military Health System (MHS) is one of America's largest and most complex health care institutions, with 54 military hospitals, 377 clinics, and 270 dental facilities across the nation and around the globe. As an MHS overseer, the Defense Health Agency is tasked with ensuring that it extends to contingency and combat-theater operations worldwide.

By Dr. Paul Doan, MD, MPH, Clinical Support Division, with other contributing DHA experts

A Naval Mobile Battalion takes patient information during a mass casualty drill for a field training exercise. (USN)

Every element of the U.S. Military Health System (MHS) comes together when medical professionals help ensure those in uniform are medically ready to deploy anywhere around the globe at a moment's notice. The MHS saves lives on the battlefield, helps combat infectious diseases around the world and manages a health budget of nearly $50 billion dollars. It includes an education and training system with an accredited medical school and graduate programs, and graduate medical education for enlisted and officer personnel.

The MHS includes uniformed, civilian and contract personnel, along with partners at all levels of the Department of Defense. This includes the military service components, the Defense Health Agency (DHA), other DoD entities and health care providers in nearly every community across the nation. Approximately 70 percent of our overall care is purchased from the civilian network.

MHS missions are complex and interrelated. We work daily to ensure:

- America's 1.4 million active duty and 331,000 reserve-component personnel are healthy so they can complete their national security missions
- All active and reserve medical personnel in uniform are trained and ready to provide medical care in support of operational forces around the world
- America provides a medical benefit commensurate with the service and sacrifice of more than 9.4 million active duty personnel, reserve component members, military retirees and their families.

DHA Created to Support the MHS

As a combat support agency created Oct. 1, 2013, the Defense Health Agency (DHA) currently leads the MHS in a major transformation to achieve a standardized and integrated health system. The goal was and remains to deliver changes according to the "Quadruple Aim" of increased readiness, better health and better care at a lower cost. DHA manages the TRICARE health plan and works to improve health care supporting the warfighter, provides quality care for patients, and takes good care of warfighters' families.

Instead of three separate health systems run by the services, Congress determined a single agency would integrate the health systems. On Oct. 1, 2018, DHA began a phased transition to take on administration

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and management responsibilities of military hospitals and clinics, and health care services delivered by the MHS.

DHA leads the MHS on a transformational journey as a high reliability organization (HRO) by organizing continued efforts and helping to ensure quality, safe care for beneficiaries. Finding efficiencies across the MHS and improving access to care are part of DHA's focus as an HRO with five areas of change: leadership commitment, patient-centered focus, safety culture, teamwork and continuous process improvements.

While DHA executes business reforms and helps improve military readiness for building a more lethal force, we are working to strengthen alliances and attract new partners. DHA personnel take great care in standardizing health care delivery with best practices and improving health outcomes of our people, enhancing the patient experience, and gathering data for analysis and care improvement as a true learning organization.

Enhancing Clinical Care

To help improve care for Servicemembers, retirees and their families, we are forming communities of experts to advance the best clinical practices for various medical conditions. We call this initiative "Clinical Communities," and organize them with oversight responsibility for clinical care processes in the MHS focused on high-volume, high-risk, high-cost medical conditions involved with their specialty area. We think clinical communities will help empower our frontline clinicians to consistently provide excellent care.

For example, we have started driving MHS clinical improvements and spreading them across the MHS in the following clinical communities, or medical specialties: primary care, women and infant, neuromusculoskeletal, and behavioral health.

Other clinical support services, like pharmacy and laboratory, contribute to each clinical community. We plan to form additional clinical communities in the future, such as dental, cardiovascular, critical care and trauma.

Pain management is a key component of readiness and combat casualty care. In one 2014 study* of 2,957 Servicemembers returning from Afghanistan, 44 percent reported chronic pain, and 15 percent reported using a prescribed opioid. [*Robin I. Toblin, et al « Chronic Pain and Opioid Use in U.S. Soldiers After Combat Deployment," https://jamanetwork.com, (September 30, 2018)]. These pain prevalence rates are much higher than the general population, where 26 percent reported chronic pain and 4 percent used opioid medications.

To address comprehensive pain management and overuse of opioid medications, our primary care clinical community is preparing to implement MHS-wide a "stepped care model" that synchronizes and standardizes delivery of pain care to Servicemembers and beneficiaries. Following a structured approach to pain management throughout the continuum of care and when necessary, primary care managers will have additional clinical support and non-addictive treatments to offer when pain becomes difficult to manage.

Our goal of the stepped care model is to help patients manage their pain at the lowest care level necessary. Patients who need more specialized care will be connected to a pain management clinic, which may include a case manager, health psychologist, addiction specialist, physical therapist and other integrative medical providers. Additionally, all providers will use a single 0-10 pain scale, called the Defense and Veterans Pain Rating Scale (DVPRS). The DVPRS adds a functional assessment of activity, sleep, mood and stress to the traditional 0-10 pain scale. Framing pain with the functional assessment helps move patients and providers to a culture of patient-centered pain management for controlling pain and enhancing patients' quality of life.

Standardizing Care Delivery

We are implementing important MHS-wide clinical care best practices in a number of areas.

For example, to capture patient-reported behavioral health symptoms and assess outcomes across the enterprise, the behavioral health clinical community continues to implement and advance adoption of the Behavioral Health Data Portal (BHDP). The BHDP allows for real-time analysis in one clinician dashboard, with aggregate data for meaningful program evaluation.

In coordination with DHA's pharmacy group, the behavioral health clinical community has developed a provider registry to identify prescribing practices associated with treatment of Post-Traumatic Stress Disorder (PTSD). DHA will continue to develop structure and process for the enterprise to monitor treatment outcomes and standardize a common MHS approach to evaluating quality and value for behavioral health care.

Implementing care pathways to prevent postpartum hemorrhages is another major initiative taken on by the women and infant clinical community. This clinical community is also working on care pathways for obstetrical providers to improve maternal and newborn outcomes. We believe these and other guideline advances will significantly improve the health and welfare of expectant Servicemembers and their newborns.

Standardizing care of common conditions, such as low back pain and mild traumatic brain injury (mTBI) or concussion, is an area of focus for DHA's neuromusculoskeletal clinical community.

The Service TBI leads and the Defense and Veterans Brain Injury Center (DVBIC) worked to modernize a major screening test for detecting acute concussions with a tool called the Military Acute Concussion Evaluation 2 – or MACE2 – and Concussion Management Tool (CMT).

Early identification and treatment of concussion can prevent long term negative consequences to cognitive, psychological, and physical functions. The MACE2 incorporates state-of-the-science advances in concussion evaluation, with particular focus on vestibular and oculomotor areas. The CMT is a draft revision of the previous concussion management algorithm to further drive modernized concussion management.

We also recently piloted use of a musculoskeletal patient-reported data portal. The MDP seeks to establish an enterprise-wide system for reliable collection of validated musculoskeletal patient reported clinical outcomes. Using MDP is a step in evidenced-based medical care. And, analyzing patient-reported outcomes data will help define the best care pathways for different musculoskeletal health conditions.

Improving Combat Trauma Care

Under the 2017 National Defense Authorization Act, DHA now has oversight responsibility for the Joint Trauma System (JTS). JTS serves as the reference body for all trauma care since Congress mandated the JTS to improve trauma care across the MHS.

Using evidence-based process improvement of trauma and combat casualty care, the JTS works to drive morbidity and mortality to the lowest possible levels. They establish standards of care for trauma services provided at MTFs, translate research from DoD centers of excellence into clinical trauma care standards, and incorporate lessons learned from military-civilian trauma education and training partnerships into clinical practice.

Providing evidence-based recommendations on trauma care and systems across the DoD, the JTS also established a DoD Joint Trauma Registry. The secure registry collects combat casualty care epidemiology, treatments and outcomes from point of injury to recovery.

Additionally, the DHA monitors quality and safety of surgical procedures through peer review, and by participating in the American College of Surgeons' National Surgical Quality Improvement Program. NSQIP is a nationally validated quality improvement program created by the ACS that measures and scientifically evaluates patient outcome data and compares care among NSQIP participating hospitals.

NSQIP risk-adjusted data for the DoD MTFs during the year of 2017 showed the quality of surgical care provided in MTFs was equal or better than civilian counterparts across the majority of the quality indicators, such as mortality, morbidity, surgical site infection, post-surgical pneumonia, etc.

For rehabilitation care of extremity injuries and amputations, the MHS has been setting world-class standards of care for prosthetic care in the advanced rehabilitation centers for injured Servicemembers during military operations in Iraq and Afghanistan.

Rehabilitation is a comprehensive effort involving multidisciplinary teams of physical medicine and rehabilitation, surgery, physical therapy, occupational therapy, recreation therapy, nursing, behavioral health and prosthetics. The team follows the Servicemembers from their initial evaluations through their discharge from the hospital, course of outpatient rehabilitation and return to active duty or civilian life.

An Air Force squadron prepares patients for casualty evacuation during a simulated scenario to test tactical medical response. (USAF)

To advance care for patients with amputations, the MHS also collaborates with the Department of Veteran Affairs and other health systems on multiple aspects of medical care, graduate medical education, and research.

In summary, the MHS will continue rapid transformation over the coming years with focus on delivering quality care and optimal patient experiences for our beneficiaries. ▪

MANAGING THE INTRICACIES OF PAIN

Womack Army Medical Center, Fort Bragg, North Carolina, is at the forefront of a DoD-wide campaign to target and mitigate the effects of long-term opiate use — and in some cases abuse — among its ranks.

By Dr. (COL) Donald Algeo, WAMC Pain Management Specialist

Dr. (COL) Donald Algeo, Womack Army Medical Center's Physical Medication Rehabilitation Pain Specialist, treats for pain control by carefully placing an acupuncture needle in the lumbar spine of a patient's back. (Photo by Brenda Gutierrez, Womack Public Affairs)

The current utilization of opiates has been multifactorial for several years across the Army and DoD. The popular thought in predominant teaching was that health-care providers were undertreating pain. This has been reported and written about at length in other venues. The fact is that, because of the need to be physically and mentally ready to fight and win our nation's wars, overutilization and chronic use of opiates for chronic benign pain were recognized as problems several years ago. This was one reason why the Office of The Surgeon General developed the Army's Comprehensive Pain Management Campaign. One of the purposes of this campaign was to develop better education for primary care on treatment of pain. It was also to set up non-pharmaceutical treatment for pain.

In 2010, as part of the Army's Comprehensive Pain Management Campaign, the physicians in the Inter Disciplinary Pain Management Service recognized that many patients in today's Army and across the DoD were being treated with chronic opiate management. In many of these cases , polypharmacy was being utilized with two or more medications that could potentially become very dangerous. It was also discovered that treatment for more than 90 days was frequently happening without appropriate monitoring. Working with the Lazarus Project, NC, which was prescribing Noloxone nasal spray inhalers for heroin overdoses, Womack Army Medical Center (WAMC), Ft. Bragg, NC, first introduced the Noloxone Rescue Program for use in treating heavy opiate users. At the same time, WAMC developed a larger umbrella program called Operation Opiates Safe in 2011. The program was designed to identify and stratify risk, provide patients and families with education on the risks of chronic, high-dose opiate use, and communicate risk to the unit commanders. Under the program, the utilization and prescribing of Noloxone nasal spray was initiated. Also introduced was the concept of communicating with unit commander's through the utilization of the profiling system for controlled substances. These programs were specifically designed for people with chronic pain that had been identified as being chronic opiate users for the treatment of pain.

Around the same time, WAMC stood up The Integrated Pain Medicine Center (IPMC) — not as a replacement for the appropriate identification and treatment for addiction and substance abuse, but as a body focused on finding other modalities beyond pharmaceuticals to help people manage their pain and improve patient's abilities to perform physical functions. The overall result is improving long-term outcomes and quality of life. Utilizing the concepts of Operation Opiates Safe, the IPMC has brought about awareness that medication treatment is by no means the only method for addressing pain issues and, in many cases, a secondary or lower-level solution. Out of a cross-pollination of care methodologies between the DoD and the Department of Veterans Affairs (DVA), came the DVA's adoption of the Naloxone Rescue Program as a standard of care.

Managing Multi-Faceted Care

The pain management capability at WAMC is one of DoD's best. Several of the concepts and practices that were developed are now being considered standard of care. This includes, but is not limited to, the Naloxone rescue, controlled substance profiles, and risk stratification. The latter, risk stratification, has been an evolving tool for identifying those individuals who are most likely to inadvertently overdose. Risk categories of high, medium, and low were developed and applied through the utilization of the electronic medical profile system. This aided in communication with unit commanders to allow them to see what level of risk their soldiers were in. Previous to the implementation of this risk stratification and substance profiling, unit commanders were most often unaware of any personnel at risk unless contacted by the soldier's physician or nurse. Recognizing this, WAMC's IPMC began implementing an electronic profile system enabling physicians to pass along risk factor information to unit commanders directly, labeling personnel on opiate regimens as high, medium, or low risk. This substance-profiling risk stratification has since become a standard of care practice across the Army for monitoring of many different types of pharmaceutical usage.

Determination of risk level for opiate use specifically starts with a good history and physical examination (H&P). The H&P is augmented with several different opiate risk questionnaires. Risk stratification also uses a morphine milli-equivalent dose per day to identify risk. Greater than 90 milligrams/day is considered high risk, less than 90 but greater than 50 milligrams/day as medium risk, and less than 50 milligrams/day as low risk. The combined review of the H&P, questionnaire results, and daily dose gives the final level of risk. In many cases of polypharmacy, patients are generally considered high risk based on the types of medication being taken. A similar high-risk assessment may also be made for patients on lower dosages if they have a background involving substance abuse. In cases where patients are taking opiates and other types of medications affecting the nervous system (such as sleep medications, seizure medications, depression medications, benzodiazepines and more), a high-risk assessment can be made based on the likelihood of combinational effects on the body. Patients failing to recognize significant side effects can also lead to a being high risk.

To support the regular implementation of risk stratification, WAMC was one of the first Army medical centers to establish the use of clinical pharmacists in the IPMC for monitoring changes to risk assessment levels due to altering dosages, other medication introduction, and even age-related risk factors. Perhaps the largest single benefit for the inclusion of clinical pharmaceutical support in determining risk assessment was the fact that before having the clinical pharmacist support the only risk assessment was done by individual treatment teams. There was no review from all sources for the patient's care. The treatment teams were "stove piped" and may only view the patient from the point of view of their care plan. With the introduction of clinical pharmacists who were tasked to monitor a patient's pharmacological intake regardless of source, a broader view of a patient's true risk could now be seen.

Addressing Acute vs. Chronic

Treating patients with a dual diagnosis of chronic pain and substance abuse is a very difficult situation. If a patient gets to the point where they need to be in a detoxification and recovery program for drug abuse, then the risk of continuing to use pharmaceuticals for pain management may be too high. The utilization of pharmaceuticals in this instance is made on a case-by-case basis and based off of risk versus benefit. There are many non-opiate pharmaceuticals that we can employ. In no way has the opiate epidemic in the United States affected our treatment of acute pain.

We have attempted to employ several different techniques in acute pain to decrease the use and dosage of opiates. One example of this is peripheral nerve blocks prior to surgery. From a health-care management standpoint, prevention of opiate abuse includes having a good history and physical, an appropriate diagnosis, risk assessment of the patient and the medications, and significant patient and family member education on the dangers of utilizing controlled substances. Health care providers must ensure there is an intentional goal to minimize polypharmacy, and a solid treatment program to include reevaluations and a timeline expectation for the utilization of controlled substances for chronic pain needs to be looked at on an individual and case-by-case basis. The utilization of these substances needs to be tied to functional improvement for the patient. These strategies are the main focus of our primary care outreach program.

Sustaining Continuity in Standard of Care

Perhaps one of the larger challenges in achieving long-term, high-standard care has been overcoming the changeover in highly qualified caregivers who are transferred from and to post particularly after solid patient-caregiver relationships have been established. Though there is no one modality for success in pain management, perhaps the biggest factor in positive outcomes is the value of human-to-human contact and understanding as to how and what pain is experienced. Especially since the relationship that medication has with a patient is generally only hand-to-mouth.

With this in mind, WAMC began utilizing an integrated pain management treatment team in 2010. Some of the care groupings that this team offers includes functional restoration with physical therapy, occupational therapy, movement therapy consisting of yoga and tai chi, aquatic therapy, health psychology, massage therapy, chiropractic care, and acupuncture in conjunction with a traditional comprehensive interventional pain clinic.

Another major WAMC focus in maintaining continuity of care was the development of a primary care outreach program. This outreach program employs the University of New Mexico's Extension of Community Healthcare Outcomes or ECHO program. The purpose of this program is to train primary care pain champions for each outlying primary care clinic. We accomplish and sustain this through the utilization of primary care pain consultants. The primary care pain consultants have weekly meetings for didactics and to discuss very difficult patient cases.

ECHO consultants meet with the primary care teams at the outlying clinics to co-manage high-risk and difficult patients. They also help coordinate and run the sole provider programs at all primary care clinics. In cases of acute opioid abuse/addiction, the pain clinic helps identify these individuals and then refers them to the appropriate treatment and recovery programs.

On a Combined Front

The goal of long-term pain management without the use of controlled substances will continue to evolve as we find modalities to help treat pain and improve function. We can treat the physical and the psychological aspects of pain, but unless both are addressed as the integral system of treatment, then we're likely to fail to improve on the patient's function and quality of life. Attacking pain from a combined body, mind, and spirit perspective is the ultimate goal in determining the optimal course of treatment to maximize function even when physical pain cannot be completely eliminated. ■

ENHANCING OPERATIONAL MEDICINE THROUGH SKILLS SUSTAINMENT

LTG Nadja Y. West

The Surgeon General
Commanding General
U.S. Army Medical Command

LTG Nadja Y. West is the 44th Surgeon General of the U.S. Army and Commanding General, U.S. Army Medical Command.

Her previous assignments include Chief, Dermatology Service at Heidelberg Army Hospital, Germany; Division Surgeon of the 1st Armored Division, Bad Kreuznach, Germany; Deputy Task Force Surgeon in the former Yugoslavian Republic of Macedonia and Kosovo; and Chief, Department of Medicine and the Dermatology Service at 121st General Hospital in Seoul, Republic of Korea. She also commanded McDonald Army Community Hospital, Ft. Eustis, Virginia, and served as the Deputy Commander for Integration at the National Naval Medical Center (NNMC), Bethesda, Maryland, where she became the first Army officer to join the leadership team at NNMC. She also served as the J-3, Director of Operations, for Joint Task Force National Capital Regional Medical; commanded Womack Army Medical Center, Ft. Bragg, North Carolina; and served as the Commanding General, Europe Regional Medical Command.

Following command in Europe, LTG West served as the Deputy Chief of Staff, G1/4/6, Office of the Surgeon General, Falls Church, Virginia. Following this assignment, she moved to her most recent assignment as the Joint Staff Surgeon at the Pentagon, Washington, DC. As the Joint Staff Surgeon, she served as the chief medical advisor to the Chairman of the Joint Chiefs of Staff and coordinated on health services issues.

LTG West is a graduate of the U.S. Military Academy with a Bachelor of Science degree in engineering. She attended the George Washington University School of Medicine in Washington, DC, earning a Doctorate of Medicine degree.

Combat & Casualty Care had the opportunity to speak with U.S. Army Surgeon General and Commanding General, U.S. Army Medical Command, LTG Nadja West, regarding MEDCOM efforts to continue increasing holistic preparedness in trauma care and enhanced capability in surgical care automation across a technology-driven medical force.

C&CC: As a globally positioned force, what are some of U.S. Army Medical Command's (MEDCOM) primary educational courses addressing the evolution of modern military surgical care for both trauma and routine need?

LTG West: As a globally positioned force, the U.S. Army must continue to promote and facilitate world-class training, along with sustainment training, to ensure surgical teams remain current with trends and data-driven best practices. We accomplish this task by building responsive medical capabilities within MEDCOM and through collaborative opportunities that enhance operational training and skills sustainment. Simulation training provided by medical simulation training centers (MSTCs) gives our medical and non-medical Soldiers in the active Army, Army Reserve, and Army National Guard hands-on instruction in the latest battlefield trauma and critical care techniques. The Combat Casualty Care Course is an eight-day, tri-service, continuing medical education program designed to enhance the operational medical readiness and predeployment trauma training skills of medical officers.

Medical collaboration with civilian trauma centers is critical to the enhancement of operational readiness and skill sustainment. Primary Army Medical Department (AMEDD) Military/Civilian Trauma Team Training (AMCT3) consists of a surgeon, nurse anesthetist, ER physician, ER nurse and critical care nurse. These personnel serve as an embedded team within a civilian trauma center for a period of one to three years. Soldiers taking Strategic Medical Asset Readiness

Training work with their civilian counterpart for 15-day rotations with interactive, hands-on training.

C&CC: From physical to psychological health, how is your office working to advance mental well-being across the force, particularly with such a great deal of combat trauma affecting the mind as much as the body?

LTG West: The Army has expanded and transformed behavioral health (BH) care. The Behavioral Health System of Care (BHSOC) is a comprehensive continuum of care with 11 standardized BH clinical programs replicated across the Army. The BHSOC operates as a single BH system that supports the readiness of the force by promoting health, identifying BH issues early in the course of the illness, delivering evidence-based treatment, fully leveraging other members of the Army community, and monitoring efficiency and effectiveness through transparent metrics. Programs such as Embedded Behavioral Health (EBH), BH in primary care clinics, and school BH reach Soldiers and families where they live and work, improving access and reducing stigma for seeking BH assistance and treatment.

Improvements in how the Army has organized the BHSOC has been manifested in multiple efforts to advance BH care, readiness and well-being. Overall utilization of BH care increased from about 900,000 patient encounters in fiscal year 2007 to more than 2.25 million in fiscal year 2017. Screening and initial management of BH conditions occur routinely at standardized time points and during primary care visits; 61 Embedded Behavioral Health Teams support all operational units, including 31 brigade combat teams and 156 battalion and brigade-sized units. The Army also integrated Substance Use Disorder Clinical Care providers into BH clinics at all Army medical facilities as of Oct. 1, 2016, enabling better access to and delivery of evidence-based care for Soldiers with substance use and other BH disorders. Army Virtual Health (VH) has grown, driven largely by Virtual Behavioral Health (VBH). As of June 2018, VBH accounts for about 60 percent of total VH encounters across MEDCOM. VBH enhances access to care and readiness by surging providers virtually to geographic areas with a shortage of resources.

With more robust outpatient access to BH care, Soldiers required over 65,000 fewer inpatient bed days for all types of BH conditions in 2017, as compared to 2012 (an approximate 41 percent decrease), due in part to improvements in outpatient services, Intensive Outpatient Programs and case management. Army direct BH inpatient care quality outperforms purchased BH inpatient care. From August 2016 to July 2017, the purchased inpatient care average length of stay was approximately three times longer than the direct care average length of stay, and, historically, purchased care re-admission rates have been approximately twice the direct care re-admission rate.

Without peer in the purchased care setting and validated in external and internal evaluations, direct BH outpatient care delivered by Army Medicine EBH teams and providers is culturally competent, patient-centered, and responsive in command consultation and enables Soldier readiness before, during and after deployment. Recognized as the DoD standard in BH outcomes monitoring, the Army's Behavioral Health Data Portal (BHDP) enables precision medicine, enhances quality and continuity of care, and embeds systems for providing individualized feedback and action at the point of care. As of August 2018, the Army used BHDP in over 78,000 encounters monthly with a total of 3,705,536 completed surveys collected to date. Army Medicine continues to lead from bench research to health care delivery efforts to achieve standardization of evidence-based BH care in support of readiness and recovery.

C&CC: From the perspective of robotics in medicine, can you speak to ways the Army is promoting greater intervention of automation in field triage to surgical practices?

LTG West: With the increase of automation, robotics and telemedicine, wounded Soldiers will have access to more and increased specialty care on the battlefield. Our task is to sustain processes and develop technologies and devices that advance medical capabilities of combat medical personnel for triage, diagnosis and decision-making to improve the management of combat casualties in the field.

For example, Army Medicine is positioning advances in technology to assist medics on the battlefield. An example of such technology is Mobile Medic. The Mobile Medic team consists of the Army's Combat Medic (68Ws) dedicated to providing mobile virtual health support at the point of need. Mobile Medic utilizes portable virtual health equipment such as GlobalMed's Transportable Exam Station and "Telehealth in a Bag" to allow medics on the battlefield to consult with higher-level medical assets regarding treatment.

C&CC: As the Defense Health Activity begins transition to command of all U.S. military medical facilities this October, how is your office helping to streamline this changeover while working to ensure personal doctor/patient care remains a priority?

LTG West: Army Medicine is working closely with the Defense Health Agency (DHA) to ensure a smooth and seamless transition of MTFs with minimal disruption for our patients. At every step, we have worked side by side with the DHA to develop a comprehensive transition plan for patient-centered care.

Some key features of the transition plan involve the following:

- A phased transition of MTFs to the DHA between now and Sept. 30, 2021. This gives both DHA and the Army time and space to transition capabilities and personnel from Army Medicine into the DHA to help DHA establish necessary health care administration and management capabilities supporting the MTFs. Army Medicine's regional health commands and HQ will continue to manage MTFs until transition to DHA.
- Army Medicine subject-matter experts collaborate in DHA working groups across the spectrum of health care functions to convey Army patient and provider needs to the DHA. These planning efforts help inform how DHA designs and implements its management concept for the MTFs and write new DHA policies and procedures for the MTFs. Our collaboration helps ensure best practices are incorporated in the DHA's transition plan as well as mitigate potential disruption to patients and providers as transition occurs.
- Army Medicine and DHA have conducted and will continue into the future to test transition plans through rehearsal of concept drills and exercises to identify potential friction points or issues that could impact patient care and provider support. As these issues or concerns are identified, we will work together with DHA to mitigate any risks.
- The DoD's transition plan includes providing a dual-hat authority for the MTF leader as a DHA MTF director and service

commander. In his or her role as a service commander, the MTF leader reports to the senior commanders on an Army installation to identify and integrate their medical readiness needs. This commander-to-commander relationship also ensures MTFs maintain effective communic Soldiers and other beneficiaries. The MTF leader is held accountable by the DHA director to deliver efficient, safe, quality care to all beneficiaries and to improve access and experience of care for beneficiaries.

C&CC: With the DoD's ongoing mission to eliminate preventable deaths on the battlefield, how is your team leading the Army and Joint Services to enable field medics to extend lives from critical Golden Hour to 72-hour evacuation and treatment?

LTG West: Organizations within the U.S. Army Medical Department Center and School Health Readiness Center of Excellence are leading the Army and Joint Services in pushing technology forward to enable field medics to extend lives from critical Golden Hour to 72-hour evacuation and treatment. Working with the joint and allied forces on patient movement throughout the continuum of care, doctrine is continually updated at the NATO Standardization agreement level and below through the Transportation Command Global Patient Movement Joint Advisory Board. This improves patient care by improving the communications process, standardizing procedures, and improving training of all personnel involved in the process.

The creation of multiple Force Design Updates (FDUs) for medical evacuation units gives our air ambulance greater treatment capabilities, such as pushing blood far forward by adding Golden Hour Containers and improving communication capabilities for the Critical Care Flight Paramedic (CCFP) by adding improved individual radios. Improving CCFP sustainment opportunities by partnering with the Army Trauma Training Detachment for rotations in a level 1 trauma center at Ryder Trauma Center is a key initiative. This training is generally reserved for forward resuscitative teams and special operations due to the high level of provider skill necessary and the intensity of the program, which assists in preparing participants for deployment and contingency operations.

The Expeditionary Combat Medic (ECM) course will provide the combat medic the knowledge and skills to provide prolonged care in an austere environment. The ECM course is a force multiplier. The medic becomes certified to provide more advanced medical services to treat common conditions, prevent disease, treat combat trauma casualties, and, if needed, hold injured or diseased Soldiers for extended periods in units forward of medical care under the direct or indirect supervision of a medical provider. Our ECMs are being trained to perform e-FAST exams with portable ultrasound to support evacuation decisions in austere, resource-constrained environments. They are also trained to monitor end-tidal carbon dioxide with battery-operated portable capnography and provide ventilatory support with the Simplified Automated Ventilator 2. Proper performance of whole blood transfusions at the point of injury is also being taught as the recommended resuscitation fluid of choice in accordance with the Committee on Tactical Combat Casualty Care Guidelines and the Joint Trauma System Whole Blood Transfusion Clinical Practice Guideline.

The U.S. Army Medical Department Center and School is today providing curriculum support to the Program Executive Office for Simulation, Training and Instrumentation for the Tactical Combat Casualty Care Exportable (TC3X) system. Each TC3X system provides two high-fidelity, ruggedized mannequins with associated consumables. The TC3X mannequins provide real-time, objective feedback to the trainee and operator. This capability, supported by the installation training support centers, will will allow medics to train their fellow unit members to manage preventable causes of death on the battlefield and support unit and multi-echelon collective training. Initial fielding began in July 2018 and is projected to field 77 kits across 42 Army installations.

On the gaming front, the Product Manager for Medical Simulation is developing TC3Sim, a program developed to teach and reinforce the concepts of tactical combat casualty care. TC3Sim uses story-driven scenarios to teach and evaluate a student's knowledge of the essential medical tactics, techniques and procedures required of the Army. Each scenario in TC3Sim is a short, goal-oriented training exercise that provides the context to train a group of key tasks within a specific mission. These key tasks include the ability to assess casualties, perform triage, provide initial treatment, and prepare a casualty for evacuation under battlefield conditions.

C&CC: From aviation medic and deployed medicine perspectives, how is MEDCOM preparing personnel for the complexities of prolonged field care?

LTG West: Deployed Medicine is a platform used by the Defense Health Agency (DHA) to trial new innovative learning models aimed at improving readiness and performance of deployed military medical

personnel. The intent is to deliver personalized, dynamic learning using the most current and accessible technology, enabling a self-directed and continuous study of medical best practices and lessons learned. The U.S. Army Emergency Medical System and the Center for Pre-Hospital Medicine have collectively produced a training support package for the Critical Care Flight Paramedic (CCFP) sustainment training. The CCFP course allows combat medics to become nationally registered paramedics with an emphasis on critical care medicine, including pharmacology, pathophysiology and key elements of en route critical care, such as day and night operations, high-performance hoist rescue operations, air ambulance operations, and air ambulance operations.

For prolonged field care, the Delayed Evacuation Casualty Management course provides in-depth discussion and training on casualty monitoring, supportive care, fresh whole blood administration, airway and ventilator management, hypovolemic shock and its associated resuscitation, blast, burns, and daily non-battle illnesses.

C&CC: Please feel free to speak to other goals/challenges moving forward.

LTG West: It is critical that we continue innovation to enable readiness and conserve the fighting strength of the total force while caring for our Soldiers and families. Army Medicine will always place great emphasis on research and development to project and sustain a healthy and medically protected force.

To achieve this, we are continuing integration with the Advanced Development Division of the U.S. Army Medical Materiel Development Activity (USAMMDA) to identify solutions for prolonged and en route care such as SKED litter update, litter straps, integrated product team for new technology, and hemorrhage detection devices. We coordinate with the Joint Program Committee-6/Combat Casualty Care Research Program to help identify research and material to address gaps and enhance combat casualty care. On the R&D front, ensuring that researchers have access to studies such as Task Saturation Study, Aeromedical Space Study and Ground Ambulance Space Study to identify gaps related to the 68W's combat medic ability to treat patients is of ongoing importance.

ENABLING HEALTH OPTIMIZATION THROUGH DATA MOBILITY

By COL Michael W. Greenly, PM, Joint Operational Medicine Information Systems, PEO DHMS

The Joint Operational Medicine Information Systems (JOMIS) Office observes en route care during an Air Force field training exercise. (PEO DHMS)

The Joint Operational Medicine Information Systems (JOMIS) Program Management Office, under the Program Executive Office for Defense Healthcare Management Systems (PEO DHMS), manages the deployment and sustainment of current and future operational medicine information systems to deployed forces across the range of military operations. Currently, JOMIS is planning for the integration and deployment of the MHS GENESIS electronic health record (EHR) to the theater community. JOMIS is equally focused on sustaining and modernizing the Theater Medical Information Program-Joint (TMIP-J) suite of software applications currently in use at over 900 worldwide locations, including forward resuscitative sites, ships and submarines, and aircraft. JOMIS also acquires and integrates new requirements for patient movement, medical situational awareness, medical command and control, and medical logistics.

COL Michael W. Greenly
JOMIS Program Manager

Theater blood and operational medicine mobile computing are primary focal areas for near-term delivery of new capabilities. In 2019, we will release a new version of the Mobile Computing Capability (MCC) which includes several new capabilities, such as the ability to send patient encounters from one MCC device to another using the military tactical network. This allows a first responder to send a patient encounter documented at the point of injury to a forward care and/or transport team so caregivers at the next stage can properly treat the patient. MCC allows users to rapidly document patient care on Defense Information Systems Agency-approved commercially available mobile devices. Tactical Combat Casualty Care (TCCC) card and sick call inputs are primary use situations. MCC is compatible with TMIP-J systems and with MHS GENESIS.

JOMIS is working with vendors to incorporate new and emerging mobile technologies to expand MCC and other operational medicine mobile applications at and beyond point of injury (Role 1) use. Since mobile use throughout society will increase, we're giving users additional mobile capabilities. JOMIS also plans to deliver a mobile theater blood capability in the near term. Eventually, the MCC platform will host this capability.

Advancing Electronic Health Records

The Department of Veterans Affairs (DVA) acquisition of MHS GENESIS will lead to new levels of interoperability and data sharing with the DVA and DoD on the same system.

The Joint Legacy Viewer already allows clinicians to view patient records across EHRs and nearly 60 health information exchange partners outside the DoD/DVA. Electronic documentation is essential to interoperability. Electronically capturing patient records ensures our active duty service men and women and veterans receive the best care possible and all of the benefits they deserve. Electronic documentation of health records is often a bigger challenge in theater environments than in garrison facilities, so we increased our train-the-trainer efforts at all levels in the last 12 months to expand use of our TMIP-J systems.

Specifically, training efforts focus on our Medical Situational Awareness in the Theater (MSAT) tool and the Theater Medical Data Store (TMDS), training current users at combatant command posts and implementing new courses at the schoolhouse level. MSAT combines data from multiple sources to provide a common operating picture and decision support for combatant command surgeons and staff. TMDS

is the Theater Medical Data Repository – the central hub – that allows clinicians and caregivers the ability to view inpatient and outpatient records. Deployed forces need to understand how to leverage these systems to document encounters and place search-able data into the EHR.

In the last 12 months, we trained MSAT and TMDS to over 430 users at 15 command locations across U.S. Southern Command, U.S. Pacific Command, U.S. European Command, and U.S. Africa Command. The training provided commanders the same military medical capabilities – such as management of blood supplies and commander visibility into unit disease and non-battle injury reporting – that U.S. Central Command successfully used in the Middle East over the last decade. Usage on our MSAT training tier increased 700 percent. This training will continue across the combatant commands.

We also collaborate with schoolhouse partners on a number of training courses and curriculums to increase user awareness and proficiency of our software before deployment. We recently worked with the Medical Education and Training Campus in San Antonio and Defense Medical Readiness Training Institute to integrate MSAT/TMDS training and practical scenario-based medical readiness exercises into their regular courses. We expect this to be completed in January. Other training courses and curriculums are in various stages of development, including a new MSAT/TMDS course set on Joint Knowledge Online and TMDS/MSAT computer-based trainings. All of these will steer users toward using the EHR and TMIP-J and away from the paper forms still used in many places today.

A Focus on Mobile Communications

Advancements in operational medicine mobile computing and other new technologies will increasingly drive military medicine and healthcare documentation. Soldiers currently deployed grew up using their mobile devices for all types of applications, and most are more comfortable using mobile phones than any other devices. With their portability and constantly improving connectivity, mobile devices are the ideal device for the Servicemember.

Hands-free technology, voice-to-text dictation, multiple patient monitoring, training applications, and the ability to securely connect to any available network are some of the key mobile capabilities that JOMIS is working to provide our deployed Servicemembers. Providing our medics easy-to-use mobile solutions to capture and document all theater treatment encounters remains our primary goal. Looking further into the future, we plan to use emerging technology to provide our field medics with live video feeds that provide instruction for performing surgeries and other medical techniques.

Meeting Challenges Ahead

Ensuring theater medical providers document their medical encounters electronically instead of on paper is our greatest current challenge and remains our top priority. Paper is a problem, not a solution. Paper records require management and unfortunately do not always make it into the patient's health record. Even paper records scanned into TMDS do not always produce computable data, providing only snapshots that are difficult to map, sometimes unreadable, and require more people to manage. We need less paper managers. EHRs provide doctors and caregivers necessary information for optimal patient treatment, and allow active duty personnel and veterans to receive the benefits they deserve. Ensuring providers not only can treat patients, but understand how to accurately document care, is essential as we move healthcare beyond paper records and optimize electronic documentation.

This is a challenge, particularly in a theater/battlefield setting where treating injured or sick Servicemembers is – and should be – the number one priority. Hence, up-to-date user training and new schoolhouse courses are essential. We commit to making users proficient with our software as early as possible so electronic documentation becomes the easiest way to document patient data. Advancements on the mobile platform, particularly with hands-free technology, will also help in this regard. We will continue to prioritize user readiness and just-in-time training and collaborate with the functional healthcare community to field advanced software to improve electronic healthcare documentation for our Servicemembers. JOMIS is committed to educating the services, commanders, and leaders on the importance of documenting encounters into the EHR. ▪

OPTIMIZING MASS CASUALTY BURN CARE

The U.S. Army Institute of Surgical Research (USAISR), Joint Base San Antonio-Fort Sam Houston, Texas, is the Army's premier research organization focused exclusively on the combat wounded and home to the only Burn Center in the U.S. Department of Defense.

By COL Jerome Buller, Commander, USAISR

CPT Argelia Felix-Camacho, a critical care nurse at the USAISR Burn Center, comforts a patient in Guatemala before a flight to the Shriners Hospital for Children in Galveston, TX. (Photo by Master Sgt. Corenthia Fennell, USAF)

The atomic detonations at Hiroshima and Nagasaki at the end of World War II instantly generated over 100,000 burn casualties. Because of this event, the Army was made keenly aware that burn injuries would be a major problem in future conflicts. Consequently, the U.S. Army Surgical Research Unit, later the U.S. Army Institute of Surgical Research (USAISR) at Fort Sam Houston, Texas, has had a major focus on burn injury since 1949.

COL Jerome Buller

Born in the Skies

The USAISR Burn Center has cared for major burns from all military conflicts beginning with the Korean War, including almost 1,000 patients from Iraq and Afghanistan. The creation of the U.S. Army Burn Flight Team (BFT) in 1951 gave the DoD the ability to care for burn and polytrauma patients world-wide. Military and civilian members of the BFT are employed at the Burn Center's Intensive Care Unit (BICU) and can deploy worldwide within two hours for both military and civilian patients to provide specialty care while in flight. Since its inception, the BFT has been called upon for assistance with a number of high-visibility, high-profile military and civilian emergencies around the world. The Institute's research in combat casualty care and the advancements in technology have given the BFT the ability to transport patients more rapidly to the Burn Center while providing specialized care to patients who may have not survived decades ago.

For instance, in 2012 the BFT set a new record for the longest continuous flight by flying for 19 hours on a non-stop flight from Singapore to San Antonio and traveling more than 9,850 miles, surpassing its previous longest flight by more than 3,000 miles. In 2013, the BFT teamed up with the San Antonio Military Medical Center Extracorporeal Membrane Oxygenation (ECMO) Team and the Air Force 59th Medical Wing's Critical Care Air Transport Team to perform the first in-flight ECMO mission. ECMO is a heart-lung bypass system that provides lifesaving support for patients who cannot survive on a ventilator alone. In 2015, the Team added a new capability to its arsenal of critical care equipment by providing the first in-flight continuous renal replacement therapy (CRRT), a kidney dialysis machine. CRRT is routinely used in the BICU to purify the blood of toxins through a filtration system and to assist in fluid removal. In February 2017, the BFT set another record when it once again teamed up with the ECMO Team and the Air Force CCATT to provide the first in-flight ECMO and CRRT.

The BFT continues to standby for any mission, anytime, as history shows that it can be called upon to deploy and provide critical care for any incident. During the 1970s and 1980s the BFT conducted hundreds of missions. In 1979, the BFT was deployed to Camp Fuji, Japan, after a U.S. Marine Corps barracks caught fire from a gasoline leak caused by a powerful typhoon. Thirty-nine of the most severely burned Marines were transported to the USAISR Burn Center for care.

In the 1980s, the BFT was deployed to places like Beirut, Lebanon, the Persian Gulf, and to Bashkirian, Republic of the Soviet Union. There, two passenger trains were destroyed when a leaking natural gas pipeline exploded, killing over 400 and injuring another 800. The ISR deployed a 17-man burn care team to assist in that disaster. That was the first U.S. and Soviet Union joint effort since World War II. The Team was deployed in 1994 to the "Green Ramp" disaster at Pope Air Force Base, North Carolina, when 24 members of the Army's 82nd Airborne Division were killed after a mid-air collision of a fighter jet (F-16D) and a C-130. Forty-three badly burned Soldiers were transported to the Burn Center.

The Burn Flight Team continues to assist when called upon. Most recently, the Team was deployed to Guatemala to transport six critically injured pediatric patients to the Shriners Hospital for Children in Galveston, Texas. Patients were severely burned after the Fuego volcano erupted in the early summer of 2018. So whether civilian burn patients need to be transported to the U.S. for specialized treatment or a service member needs to be treated at the ISR Burn Center, the BFT is ready to deploy worldwide to assist in the assessment, evaluation and treatment of casualties sustaining burn injuries related to both combat and non-combat events.

Number, Cause, and Location

The ISR's involvement in a mass casualty burn injury would depend on the number of people injured, the cause of the incident, and the location. If the incident occurs overseas, then we would more than likely deploy the Burn Flight Team as we've done in the past. The BFT would assist in assessing, evaluating and treating the injured, and if needed, transporting casualties to the Burn Center.

It would be a different scenario if it happened in our backyard. The first thing that we would do is to alert all Burn Center personnel and the leadership at Brooke Army Medical Center (BAMC), since we are collocated with them. We would next set up an operations center in the Burn Center to coordinate all aspects of incident response. Next, work schedules for the staff members would be rearranged, but not all personnel would be on duty at the same time so that we could operate 24/7 with rest cycles.

Once that has been established, we begin to triage patients. For a large number of patients, this may be done outside of the hospital, so that we don't admit a patient who doesn't require inpatient care. Burn Center beds are limited. Every burn center has what is known as "surge capacity," which means that it should be able to expand by 50 percent of its bed capacity in an emergency. At the ISR Burn Center, our bed capacity is 30 beds based on staffing. That's 12 beds in the BICU and 18 in the Progressive Care Unit. Our physical capacity is 40 beds—16 BICU and 24 PCU.

So in our case, we would have to determine the most severely burned patients to admit while at the same time assess the need to admit patients with a lower acuity level to other wards at BAMC on a temporary basis. That doesn't mean that the Burn Center staff wouldn't treat those patients. Our staff would provide subject matter-expert support such as mentorship and supervision to the staff of those wards.

Prioritizing for Transport

An important step would be to alert the American Burn Association, the leading national civilian organization for burn providers. During a major emergency, U.S. burn centers let the ABA know how many beds are available within their respective centers, in case we cannot support an overwhelming number of patients. Then we would do what is called "secondary triage." We would reevaluate patients who were admitted to the Burn Center and identify those who can be transferred elsewhere. These patients would include inpatients who were admitted pre-disaster and some lesser injured patients from the disaster. Our last step would be to coordinate with local and regional burn centers to redirect new patients there, and/or admit patients in transfer after the secondary triage. It is a very coordinated effort here as well as with the ABA. The ABA disaster plan envisions a three-tiered response to a major burn disaster: 1) state and local response systems; 2) the National Disaster Medical System, which, for example, oversees the Disaster Medical Assistance Teams; and 3) Defense Support to Civil Authorities, which includes a whole host of capabilities to include the BFT.

The Burn Center also serves as the regional burn center for 22 counties in South Texas for civilian patients. Annually, we admit approximately 625 burn patients and 75 non-burn necrotizing problems such as soft tissue infections, desquamative skin diseases and soft tissue trauma from accidents. Those numbers include military, DoD beneficiaries and civilians. This peacetime mission provides a unique service to the local community, while ensuring the Burn Center's readiness to respond in wartime and in civilian disasters alike. ▪

Additional insight in this article provided by Dr. Leopoldo "Lee" Cancio, Burn Center Director, and Dr. Steven Galvan, Public Affairs Officer

LIFTING THE LIMITATIONS OF SCARRING WOUND TRAUMA

MAJ (Dr.) Nathanial R. Miletta is the Chief of the Laser Surgery and Scar Center at San Antonio Military Health System. He has extensive experience in laser surgery, completing his dermatology residency at Walter Reed National Military Medical Center, where he first began treating wounded warriors. Following his residency, he then spent a year completing a Dermatologic Surgery Fellowship at the Massachusetts General Hospital, where he also treated burn patients at the Shriners Hospitals for Children. He has also been involved in numerous clinical research studies, publications and book chapters in the areas of laser surgery and long-term casualty care.

MAJ Miletta deployed to Afghanistan as a field surgeon and participated in acute trauma care such as amputations and burns. At his home station, his research and clinical care focus on conditions of the skin that affect wounded warriors. Examples include utilizing CO2 laser for burn and trauma scars, using microwave energy devices to permanently stop sweating on residual limbs, and laser hair removal to eliminate folliculitis and ingrown hairs.

MAJ (Dr.) Nathaniel Miletta
Chief
Laser Surgery and Scar Center
San Antonio Military Health System

Combat & Casualty Care had the opportunity to speak with MAJ Nathaniel Miletta (Dr.), Chief of the Laser Surgery and Scar Center (LSSC), Brooke Army Medical Center (BAMC), Joint Base San Antonio-Ft. Sam Houston, Texas, regarding some latest techniques and efforts to bring advanced quality of life to patients suffering from burn and other scar-causing wound trauma.

C&CC: What is the primary mission of the Laser Surgery and Scar Center at the San Antonio Military Health System?

MAJ Miletta: The Laser Surgery and Scar Center (LSSC) represents a joint service effort of both the Brooke Army Medical Center and the 59th Medical Wing Department of Dermatology at the Wilford Hall Ambulatory Surgical Center. The effort is a commitment to providing wounded warriors access to the most advanced dermatologic technologies and conducting cutting-edge research in order to optimize long-term trauma outcomes. With 23 energy-based treatment platforms and several advanced surgical devices, the Laser Surgery and Scar Center is the largest center of its type in the U.S. Department of Defense and among the largest in the country. Our center is committed to treating the entire wounded warrior, including the functional, symptomatic, and aesthetic impairments of the skin that impact health-related quality of life.

C&CC: How does the Laser Surgery and Scar Center intend to achieve its mission?

MAJ Miletta: The LSSC developed in response to the disorders of the skin in our wounded warrior population. Since skin is the largest organ system of the body, skin injury or disease can significantly impact our patients. From the time of its inception through today, our focus has been on long-term burn and trauma patients with functionally limiting and disfiguring scars as well as, addressing residual limb skin issues in the traumatic amputee population. We've done this by using energy-based technology platforms and dermatologic surgery procedures in novel ways to benefit our unique patient population. Moving forward, the center is also implementing or conducting clinical research with a focus on tissue regeneration and normalization to include: platelet rich plasma containing growth factors, harvesting of stem cells from fatty tissue, melanocyte transplantation, micro-needling, microwave destruction of sweat glands, hair transplant for burns, and laser-assisted drug delivery.

In order to strive toward these goals, we are proud to maintain collaborative clinical and research relationships with the Center for the Intrepid – Brooke Army Medical Center, Institute for Surgical Research Burn Center – Medical Research and Materiel Command, Massachusetts General Hospital – Harvard Medical School, and the Shriners Burn Hospital for Children – Boston.

C&CC: Can you provide an example of how the Laser Surgery and Scar Center benefits our patients suffering from long-term burn and trauma scarring?

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MAJ Miletta: Absolutely. The current evidence suggests that 32 to 72 percent of burn survivors will go on to develop hypertrophic, or thickened, scars that are often symptomatically, aesthetically, and functionally debilitating. My mentor, Colonel Chad Hivnor MD, pioneered the use of carbon dioxide laser in the treatment of burn and trauma scars in wounded warriors using a technique called fractional photothermolysis. Fractional photothermolysis creates a pixelated pattern of heat-related injury to the treated scar. Through the destruction of microscopic columns of tissue up to four millimeters deep, stem cells and fibroblasts within the skin replace the scarred tissue with normal, uninjured collagen.

Although only a fraction of the target is treated, collagen remodeling and improvements in skin architecture are seen throughout the scar. Through research conducted at the San Antonio Military Health System, we have demonstrated that these microscopic regenerative changes translate to a 54 percent increase in scar extensibility and 34 percent increase in elasticity with only three laser treatments. The innovative use of this technology has resulted in a paradigm shift in the way physicians treat scars in both the military and civilian medical systems, allowed numerous wounded warriors to return to active duty, and optimized quality of life for many military and civilian burn and trauma scar patients.

C&CC: Similarly, in what ways has the Laser Surgery and Scar Center benefitted the traumatic amputee population?

MAJ Miletta: Traumatic lower extremity amputees utilizing prostheses often report dermatologic issues at the residual limb-prosthetic interface. In 2010, a survey of 481 wounded warriors with lower extremity amputations from the Vietnam, Operation Iraqi Freedom, and Operation Enduring Freedom conflicts found that one of the largest detractors from overall prosthetic satisfaction was excessive hair and sweating at the residual limb. With approximately 1,800 wounded warriors with lower limb amputations since 2001, military physicians have been performing permanent laser hair reduction for years to alleviate issues related to the hair follicle such as infections, ingrown hairs and discomfort. However, excessive sweating often has a greater impact resulting in impaired fit and function of the prosthetic limb, skin irritation, and chronic wounds.

For years, physicians extensively injected the residual limbs with high doses of botulinum toxin that would reduce sweating for three-month intervals, before returning to baseline. With hopes of finding a permanent solution, the Laser Surgery and Scar Center is currently conducting an Institutional Review Board-approved trial investigating a novel, non-invasive microwave technology that permanently reduces sweating in the underarms. With slight treatment modification, this same technology is being evaluated as a permanent solution for sweating at the residual limb-prosthetic interface. Early results have been incredibly promising with lower limb amputees reporting a 40 to 80 percent reduction in sweat reduction with one treatment. Of our first eight patients treated, two have the intent of returning to active duty status and the others to improve their baseline quality of life. We hope the lessons we learn from these studies can be generalized to the civilian population in order to benefit the much larger population of civilian amputees.

MAXIMIZING MEDICAL RESEARCH THROUGH A SINGLE MHS ENTERPRISE

Joseph Caravalho Jr., MD, is the president and chief executive officer of the Henry M. Jackson Foundation for the Advancement of Military Medicine, a Congressionally authorized, not-for-profit organization of 2,800 employees who advance military medicine at locations throughout the U.S. and around the world.

Before joining HJF, then MG (Dr.) Caravalho culminated his 38-year military career as the Joint Staff Surgeon, where he was the senior medical adviser to the Chairman of the Joint Chiefs of Staff. Immediately prior, he was the Army Deputy Surgeon General.

He is a graduate of Gonzaga University and the Uniformed Services University of the Health Sciences. Clinically, he served as a staff internist, nuclear medicine physician and cardiologist. Operationally, he served as the senior medical officer for a number of Army and Joint special operations units, including the 75th Ranger Regiment and 1st Special Forces Group. He also served in two combat deployments in support of Operation Iraqi Freedom.

Dr. Joseph Caravalho Jr.
President and Chief Executive Officer
Henry M. Jackson Foundation

C&CC: What role does the Henry M. Jackson Foundation (HJF) play in medical research?

Dr. Caravalho: HJF is a global organization dedicated to advancing military medicine for our nation's Warfighters. We partner with military, medical, academic and government clients by administering, managing and supporting preeminent scientific programs that benefit members of the armed forces and civilians alike. The not-for-profit foundation is authorized by Congress to support research and education projects at the Uniformed Services University of the Health Sciences and throughout military medicine. Since its founding in 1983, HJF has served as the connective tissue between the military medical community and its federal and private partners. HJF's support and administrative capabilities allow military medical researchers and clinicians to maintain their scientific focus and to accomplish their research goals effectively and efficiently.

C&CC: As the Military Health System (MHS) transforms under the Defense Health Agency, how do you see the changes affecting military medicine?

Dr. Caravalho: The last three National Defense Authorization Acts (for fiscal years 2017 through 2019) place much of the DoD medical mission under the Defense Health Agency's (DHA) direct control. With this centralized authority, DHA has primary responsibility for the health benefit, overseeing the direct and purchased health care for all military health beneficiaries. It also remains answerable to the combatant commands in doing their part to ensure the deployed joint force is medically ready and responsive to the readiness training requirements mandated by the Services through their respective Surgeons General. Finally, DHA bears ultimate responsibility for Defense Health Program-funded clinical research and requirements-driven research and development.

C&CC: Since the DHA has been granted centralized authority for military medical research, what steps can be taken to fulfill this mandate?

Dr. Caravalho: From my vantage point, I envision a relatively straightforward way for military medicine to consolidate forces, exercise unity of effort and gain immediate relevance of its medical research programs with the DoD senior leadership, senior uniformed Warfighters and Congress. The "secret sauce" is in creating a single MHS research enterprise.

I believe an effective system requires these three elements:

- A single Institutional Review Board (IRB) system that allows each of the IRBs to have enterprise-wide approval authority.
  This specific process is addressed under recent revisions to the Department of Health and Human Services' Common Rule governing human subjects research.

- DHA-approved duty time for medical staff to conduct clinical research. Heretofore, clinicians were generally only allowed to conduct research on non-duty time or if other patient throughput productivity measures were met.
- Centrally funded research support teams at each military treatment facility (MTF), scaled to meet the research capacity of each site. This removes the onus from the local clinicians and administrative staff to identify, recruit, train and sustain research assistants, research nurses and clinical research coordinators. These teams would be able to support any of the on-site researchers, regardless of specialty or clinical practice.

C&CC: How would these three elements establish the conditions for success?

Dr. Caravalho: Functioning as a single enterprise, every IRB-approved study could be potentially executed as a multi-site study. Clinician researchers at each MTF would be free to conduct meaningful military medical research with minimal time away from patient care. Multi-site research support teams would implement work across the enterprise without unnecessary variance.

In his role as the DoD's senior medical adviser, the Assistant Secretary of Defense for Health Affairs would be able to direct high-priority, requirements-driven clinical research that would best address pressing DoD readiness issues each year. Well-powered multi-site studies would be completed in a timely fashion, which would then lead to relevant knowledge products, clinical practice guidelines or DoD policies. Additionally, results of these well-designed and well-executed studies would potentially drive generalizable civilian health practices and policies.

The MHS comprises approximately 9.4 million military beneficiaries, whose demographics reflect America. In addition to the readiness questions that can be answered only by military medical research, I believe both academia and industry will avail themselves of the MHS to partner on other clinical research protocols. These private-military partnerships will not only help offset the burdensome costs of research but also have the advantage of demonstrating to the civilian community that military medicine is world-class.

C&CC: What would a single research enterprise mean for research personnel?

Dr. Caravalho: There are very smart physicians, dentists, nurses and other clinicians assigned at MTFs throughout the DoD. Lack of research support personnel—not the lack of readiness issues to address or the lack of eligible human subjects—currently hinders research initiatives at the smaller, more remote camps, posts and stations. Making use of a single MHS research enterprise, with appropriately assigned research support teams at each MTF, would allow these clinician researchers to study pressing DoD-wide readiness issues.

C&CC: How would military personnel benefit from this single research enterprise approach?

Dr. Caravalho: The Services' respective basic training sites are located at Fort Benning, Georgia; Fort Jackson, South Carolina; Fort Leonard Wood, Missouri; Marine Corps Recruit Depot Parris Island, South Carolina; Marine Corps Recruit Depot San Diego, California; Naval Station Great Lakes, Illinois; and Lackland Air Force Base, Texas. Collectively, these locations do not generate much by way of medical research, let alone coordinated medical research.

A research assistant with the Surgical Critical Care Initiative (SC2i), a research center within the Uniformed Services University (USU), is preparing specimens collected from study participants treated at the Walter Reed National Military Medical Center (WRNMMC), Bethesda, MD for molecular analysis. Through its investigation of patients' biological responses to trauma, the SC2i develops and deploys sophisticated predictive algorithms to enhance complex surgical decision making. (WRNMMC)

As an example of how Servicemembers could benefit from this model, multi-site research could assess the impact of various basic training interventions on pass rate among the services. Whether it involves measuring feet for appropriate running shoes and boots or assessing the use of athletic trainers during physical training, rigorously designed studies are needed for senior leaders to make informed decisions.

C&CC: What is HJF's role in advancing military and civilian medicine in the United States and around the world?

Dr. Caravalho: HJF's original mission was to support military medical research and education projects because that was what the Uniformed Services University of the Health Sciences (USU) needed to remain competitive as a top-notch medical school. We partnered with military medical researchers across the DoD by managing and staffing research programs around the world, enabling true breakthroughs in myriad research areas to improve not just the Warfighters' health and well-being but also the health and well-being of civilians.

As the needs of military medicine have grown, we have widened our aperture to expand through partnerships with new DoD organizations, such as the Defense POW/MIA Accounting Agency, along with more U.S. government agencies, academic centers and private industry. Internationally, we have also expanded our portfolio with the U.S. government, foreign governments and nongovernmental agencies. All told, we currently have 2,800 employees located across the globe to achieve our mission of advancing military medicine.We have built our expertise over the past 35 years, since Congress first authorized us to partner specifically with USU in this role. Our experience, connections and knowledge of the research process make us a high-value partner for any organization—public or private—wishing to work with DoD and civilian medicine. ■

MEETING THE BLEED HEAD ON

U.S. Special Operations Command (USSOCOM) has been implementing the latest in freeze-dried blood plasma product, pending full FDA approval for use, with operators in support of field casualty hemorrhage response.

By USSOCOM Communications

Hemorrhage is the leading cause of preventable death in combat casualties. U.S. Special Operations Command (USSOCOM) has benefitted from the use of French Freeze-Dried Plasma (FDP) since its first use of the product in 2012. The purpose of FDP, to help treat blood volume loss and coagulopathy from catastrophic injuries, would be the same regardless of the mission and/or force that administered the treatment.

In 2010, an urgent need request from USSOCOM was made for the approval and use of French FDP which at the time was being used successfully by U.S. allied forces in Iraq and Afghanistan. An expanded-access treatment protocol was established through the Food and Drug Administration (FDA) and is currently being managed by the Force Health Protection Division, U.S. Army Medical Materiel Development Activity (USAMMDA). The purpose of this blood product is in the resuscitation of severe hemorrhage of wounded Special Operations Forces (SOF) in remote, austere locations, where the access to traditional blood products is prohibitive. The objective is to maintain viability of the patient until transportation to surgical or a higher level of care can be achieved.

SOF Origins

The use of FDP originated within the United States Army Special Operations Command. Over the past few years (2016-2017) product usage has expanded to the other three Service Components of USSOCOM (Marine Corps Forces Special Operations Command, Air Force Special Operations Command, and Naval Special Warfare Command).

The primary advantage of using Freeze-Dried Plasma is that it is a stable, dry product that remains effective at room temperature for extended periods of time, until it is reconstituted with sterile water when ready to be used by medical personnel. Unlike fresh, frozen plasma, which requires refrigeration at all times, FDP can be stored practically anywhere, and transported in aid bags to treat wounded SOF operators in the field.

Since its approval for use in 2011, French FDP has been used to treat 26 patients for life-threatening injuries in austere environments, and 18 have survived to transfer of care. In addition to the logistical benefits of FDP, one of the major advantages of using FDP is that you can reconstitute it in less than 5 minutes. Frozen plasma must be stored frozen, and can take upwards of 40 minutes to thaw out prior to use. With far-forward care, time is critical and often the difference between life and death.

A critical skills operator with U.S. Marine Corps Forces Special Operations Command reconstitutes freeze-dried plasma during a Raven exercise at Camp Shelby Joint Forces Training Center, Mississippi. (U.S. Marine Corps photo by Sgt. Salvador R. Moreno)

"Our Special Amphibious Reconnaissance Corpsmen began deploying with freeze-dried plasma in December 2016 and we began looking at ways to increase our familiarity with the product," said Maj. Nick Mannweiler, communication strategy officer for the U.S. Marine Corps Special Operations Command (MARSOC). "By October 2017, every SARC forward-deployed with MARSOC units had received training in and an appropriate supply of freeze-dried plasma."

The primary difference with respect to special operations missions is the when and where these missions occur, and their distance to more definitive health care. SOF operates globally, often far forward of conventional forces and associated support. The impact of this in terms of medical treatment is that SOF medical personnel can carry relatively limited supplies, in some cases, literally what they can carry in a medic's aid bag alongside all other mission essential equipment and supplies. The shelf-stable, non-refrigeration requirements associated with FDP allows access to what is normally a logistical nightmare for such operations. (i.e., conventional blood products such as fresh whole blood or fresh frozen plasma). What once would take refrigeration to transport, can now easily be carried in a SOF Medic's aid bag.

Hospital Corpsman 2nd Class Alexander Schulte and Hull Maintenance Technician Fireman Apprentice Kristen Whitman donate blood to the Armed Services Blood Program aboard the submarine tender USS Frank Cable (AS 40). Frank Cable, forward deployed to Guam, repairs, rearms and reprovisions deployed U.S. Naval Forces in the Indo-Pacific region.
(U.S. Navy photo by Mass Communication Specialist 1st Class Richard Doolin/Released)

Use Evolution and Authorization

Clinical practice guidelines are continuously being updated as new and emerging technologies bring additional capabilities to the medical providers on the battlefield. The application of medical treatment is not inherently unique to SOF, but the locations and conditions of where treatment applied is. As such, USSOCOM seeks and where applicable, supports projects that research novel strategies to increase the ease, efficacy, and safety of fresh whole blood transfusion (i.e., person-to-person, pre-hospital blood banking, and blood substitutes) forward of normal logistics support. Special operations training centers such as the Joint Special Operations Mission Training Center (JSOMTC) and the USSOCOM Component medical training centers all incorporate specific training associated with the use of FDP, blood components, and fresh whole blood transfusions as outlined in the Committee on Tactical Combat Casualty Care (CoTCCC) tactical field care guidelines.

"MARSOC conducts realistic field training using freeze-dried plasma stocks specifically designated for training purposes," noted Mannweiler. "Each deploying Marine Special Operations Company receives in-depth, hands-on field medical training during their unit's pre-deployment cycle and use of freeze-dried plasma was seamlessly integrated into the scenarios."

As the recent FDA Emergency Use Authorization (EUA) of French Freeze-Dried Plasma expands approval for its use in Department of Defense (DoD) units outside USSOCOM, close coordination with the Joint Staff and the Assistant Secretary of Defense for Health Affairs will be critical to ensure prioritization for ongoing operations. While the EUA authorizes the use of the French FDP product, procurement of a foreign manufactured product still proves a challenge that only USSOCOM has experience navigating. In time, the management of the product will most likely transfer to the Armed Services Blood Program to allow DoD Enterprise Management of the limited resource. Close coordination of all users will be critical to ensure the product is available where it is needed most.

Looking Ahead

Where the product is carried and by whom are the most likely changes in the future. As FDP becomes more widely available, larger quantities could mean the ability to stockpile for larger casualty numbers and greater access, the standardization of allocations by mission needs versus the current mission, and anything that could help place units at a higher state of readiness for the multitude of battlefield scenarios. ▪

ENCOMPASSING FULL MEDICAL MISSION PREPAREDNESS

The Defense Medical Readiness Training Institute (DMRTI), Joint Base San Antonio, Ft. Sam Houston, TX, became part of the Defense Health Agency in 2014. Today, the tri-service organization offers resident, nonresident, and distance learning joint medical readiness courses.

By DMRTI Leadership Team

Nurse educator Leroy Cantrell from DMRTI, Joint Base San Antonio, shows participants of the Trauma Nursing Core Course (TNCC) at Blanchfield Army Community Hospital how to use a pelvic sling. The training improves participants' ability to rapidly identify life-threatening injuries, conduct comprehensive patient assessment, and perform intervention for better patient outcomes. (U.S. Army photo by Maria Yager (Army Medicine))

The legacy of organized medical readiness training in a joint environment goes back nearly 40 years. In 1980, the Combat Casualty Care Course (C4) Task Force was stood up to teach a military-unique curriculum for DoD Graduate Medical Education programs. This was followed six years later by the Joint Medical Readiness Training Center, formed to continue operational training. Meanwhile, C4 continued and C4A evolved for senior leaders. This transitioned into the Joint Operations Medical Managers Course (JOMMC).

Ten years later, in 1996, the Defense Medical Readiness Training Institute (DMRTI) was stood up. Initially the Uniformed Services University of the Health Sciences acted as executive agent, followed by the Army. DMRTI featured an expansion over previous efforts, including joint exercise support (combatant command support), reserve component support, distributive learning (online training) and an expansion on operational emphasis.

DMRTI is a tri-service organization staffed by professionals from the U.S. Army, Navy, Air Force, Department of Defense civilians, and contractors that offers resident, nonresident, and distance learning joint medical readiness courses. It provides support to a range of "customers" including the Department of State, the armed services, combatant commands, the Center for Global Health Engagement, and reserve components by working directly with the Services to meet their medical readiness and training requirements. The Institute's fundamental mission is to improve the coordination of readiness training efforts between military and

civilian organizations. DMRTI became part of the Defense Health Agency in 2014, under the Education and Training (J7) Directorate.

A Multi-Scope Training Regimen

DMRTI utilizes several combat and trauma medicine course selections. These include:

1. Combat Casualty Care Course (C4): Provides an orientation to the first and second echelons of care under simulated combat conditions. This postgraduate course is designed to enhance medical readiness by providing training in leadership, knowledge and skills necessary for direct medical support of tactical units under combat operations.
2. Emergency War Surgery Course (EWSC): A three-day course for surgeons and non-surgeon physicians deploying to a position where they will be treating battlefield trauma. Training focuses on guides referenced in the Emergency War Surgery Handbook with an emphasis on live tissue and cadaver lab.
3. Professional Medical Certification Courses:
   - Tactical Combat Casualty Care Course (TC3): A two-day course that provides skills to assess and manage a combat casualty from point of injury to a higher level of care. The target audience is deploying medical personnel assigned to line units.
   - Advanced Trauma Life Support® (ATLS®): In-resident course and mobile training teams; the ATLS course provides essential information and skills doctors may apply to treat life-threatening or potentially life-threatening injuries in extreme conditions.
   - Trauma Nurse Core Course (TNCC): In-resident course and mobile training teams; the course enhances the nurse's ability to assess patients that have sustained trauma. The target audience is military Nurse Corps officers and U.S. government-employed registered nurses. TNCC is not a stand-alone exportable course; it is conducted in conjunction with the combat casualty care course.
   - Pre-Hospital Trauma Life Support (PHTLS): In-resident course and mobile training teams; PHTLS is a two-and-a-half-day course sponsored by the American College of Surgeons and the National Association of Emergency Medical Technicians. The PHTLS course increases the participant's pre-hospital trauma management skills. The target audience is DoD medical personnel. PHTLS is not a stand-alone exportable course; it is conducted in conjunction with the combat casualty care course.

In addition, DMRTI instructs the professional medical certification course Advanced Burn Life Support (ABLS), which is a one-day course sponsored by the American Burn Association. It focuses on the assessment and management of burn patients during the first 24 hours post injury. The target audience is military and U.S. government-employed medical personnel.

DMRTI embraces the Joint Concept for Health Services while building on the mandate of the 2017 National Defense Authorization Act. The Joint Trauma System has partnered with DMRTI to implement the Joint Trauma Readiness Training Platform (JTRTP). The pilot course was delivered in 2018 to a multi-disciplinary class of U.S. Army medical professionals. The central goal of JTRTP is to increase standardization of shared capabilities and decrease variance across the services.

Students practice evacuating casualties from a simulated battlefield during an exercise at the Defense Medical Readiness Training Institute. (HM1(FMF) Carrissa Dookeran)

Concept-Based Preparation

The Combat Casualty Care Course and associated professional courses utilize a variety of presentation techniques to ensure the material facilitates a learning atmosphere in which students assimilate appropriate knowledge, skills and attitudes. Medical simulation and modeling are key to enabling skills-based assessment and ensuring that the learning is relevancy-oriented to mission accomplishment in austere environments.

The providers, nurses and medics who attend our courses utilize intrinsic knowledge and life experiences to skillfully integrate the new material into their work/field experience, helping the lessons become an active part of their thought process. The courses at DMRTI have to see measurable learning objectives and have a clear system of gauging the attendee's progress.

Prolonged field care and patient holding are concepts that are emphasized in our Combat Casualty Care Course, as the joint force prepares for more and more austere environments of care while simultaneously preparing for cases in which our forces do not enjoy complete air superiority.

Looking Forward

Over the past two years, DMRTI has been tasked to conduct new medical training as requirements across the joint forces have been refined. DMRTI has partnered with the U.S. Agency for International Development to offer the Joint Humanitarian Operations Course in San Antonio twice a year. Additionally, in direct support of combatant command requirements for joint medical planning and public health emergency management, the Joint Medical Operations Course and Public Health and Medical Services in Defense Support of Civil Authorities Course were implemented. ■

CALENDAR OF EVENTS

NOV 14 – 15
ISC East
New York, NY
Isceast.com

NOV 26 – 30
AMSUS
National Harbor, MD
Amsus.org

NOV 28 – 30
PEX VA
Alexandria, VA
Pexva.com

DEC 5 – 7
Border Management Summit
San Antonio, TX
Bordermanagementsummit.iqpc.com

JAN 15 – 17
SNA Nat'l Symposium
Arlington, VA
Navysna.org

JAN 22 – 25
SHOT Show
Las Vegas, NV
Shotshow.org/AM

JAN 28 – 30
Military Network Modernization
Washington, DC
Militarynetworkmodernization.iqpc.com

JAN 30 – FEB 1
Air Force Contracting Summit
Destin-Miramar Beach, FL
Defenseleadershipforum.org

FEB 5 – 7
SO/LIC
Arlington, VA
Ndia.org

FEB 6 – 7
Border Security Expo
San Antonio, TX
Bordersecurityexpo.com

FEB 7 – 8
Marine Corps West Expo
Camp Pendleton, CA
Marinemilitaryexpos.com

MAR 26 – 28
Global Force Symposium
Huntsville, AL
Globalsofsymposium.org

APR 14
Medical Disaster Response
Las Vegas, NV
Trauma-criticalcare.com

APR 15 – 17
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