COMMANDER'S CORNER

MG Barbara R. Holcomb
Commander
U.S. Army Medical Research and Materiel Command

VADM Raquel C. Bono
Director
Defense Health Agency
Medical Corps
U.S. Navy

RA DM Brian S. Pecha
Command Surgeon
U.S. Pacific Command

PUSHING PROLONGED CARE TO THE FIELD

COMBAT & CASUALTY CARE

Fall 2017

tacticaldefensemedia.com
ZOLL continues its commitment to broadening its portfolio for the military. With the addition of new products via recent acquisitions, ZOLL has the most comprehensive solutions for military critical care. From monitoring and airway management to enhanced perfusion, ZOLL is focused on providing you with lifesaving technologies that are portable and effective throughout all echelons of care.

EMV⁺® 731 Series Ventilator
- A rugged, lightweight ventilator with real altitude compensation for all levels of care.

Propaq® M Monitor
- The standard in vital signs monitoring, with optional defibrillation, pacing, and Real CPR Help®

ResQPOD® ITD
- Noninvasive impedance threshold devices (ITDs) that improve blood flow and reduce intracranial pressure1,2

ResQGARD® ITD
- 

Learn more about ZOLL’s resuscitation solutions at www.zoll.com/military or call 1-800-804-4356.

TAILORING CASUALTY CARE TO A BURGEONING BATTLEFIELD
The U.S. Army's Combat Casualty Care Research Program (CCCRP), Ft. Detrick, MD, is bridging the gap between mission and health.
By Col. Michael R. Davis

Features

LEADERSHIP PERSPECTIVE
Maximizing Materiel Lifecycle for Advanced Care
MG Barbara R. Holcomb
Commanding General
U.S. Army Medical Research and Materiel Command (USAMRMC)
Chief, U.S. Army Nurse Corps

HEALTH FOCUS
Building a Seamless Healthcare Framework
VADM Raquel C. Bono
Director
Defense Health Agency (DHA)

Streamlining Prolonged Field Care
U.S. Army Institute of Surgical Research (USAISR) is providing combat medics with advanced blood product technology and technique for austere environmental trauma care.
By Dr. Anthony Pusateri

Addressing the Breadth of Traumatic Brain Injury
The National Intrepid Center of Excellence (NICOe), Walter Reed National Military Medical Center (WRNMMC), is shedding light on traumatic brain injury (TBI) and associated psychological health (PH) conditions to maximize wellness.
By Office of Command Communications, NICOe

Answering the Need for Realistic Bleed
C&C spoke recently with Dr. Joss Fernandez, cardiothoracic and vascular surgeon, and Col. “Boots” Hodge (USAF ret.) regarding a state-of-the-art technology providing a simulated real-world bleeding cadaver capability that mimics that of live casualties.
Interview by Christian Sheehy

Cover: Army Capt. Benjamin Stork cares for a patient on an HH-60 Blackhawk helicopter headed to the USNS Comfort, a hospital ship off the coast of Puerto Rico following Hurricane Maria. Stork is a flight surgeon assigned to the 101st Airborne Division's 6th Battalion, 101st Aviation Regiment, 101st Combat Aviation Brigade.
(Army photo by Capt. Tyson Friar)
Combat medics deploying in support of operations face increasingly difficult challenges in the field. These medics must address the urgency of casualty stabilization from point of trauma to trauma care center in progressively more austere environments. Their readiness and capability truly defines life and death for the casualties they treat. In the Fall 2017 issue of Combat & Casualty Care, we examine aspects of research critical to capabilities development, from extending the life of field-ready blood plasma to simulated “bleeding” cadavers.

Much of what the Army’s Medical Research and Materiel Command (MRMC), Ft. Detrick, MD, supports from a force-wide medical materiel perspective is shared from a Combat Casualty Care Research Program (CCCRP) perspective when it comes to advancing positive outcomes in post-trauma combat scenarios. In an update to C&CC, Col. Mike Davis, CCCRPMRDC Director, speaks to today’s unique challenges in protecting, preserving, and restoring the health and fighting readiness of Joint U.S. servicemembers. Davis notes that in an era of increasingly asymmetric conflict where the demand grows for a multi-domain strategy of battle, the ability of the combat medic to provide proactive response for prolonged field care will be critical to positive outcomes, particularly in austere conditions. This concept of prolonged field care is supported by work being done at the U.S. Army Institute of Surgical Research (USAISR), Ft. Sam Houston, TX, to advance critical blood replacement techniques and processes designed to extend the life of this life-saving liquid.

In an exclusive cover interview with C&CC, U.S. Pacific Command (PACOM) Command Surgeon Rear Admiral Brian Pecha, readers gain insight into challenges to ensuring PACOM’s standard of care for distributed operations over vast stretches of sea and the transfer of health data critical to Joint force readiness on a global scale. From lessons learned over more than a decade and a half of combat operations in the Middle East and Afghanistan, Army MRMC Commanding General Barbara Holcomb is leading a complex team leveraging new technology to advance medical modernization priorities for alignment and support of resources and processes essential to full lifecycle healthcare from initial trauma treatment to long-term health support.

Rounding out this issue is a special focus from the office of the Director, Defense Health Agency (DHA), as VADM Raquel Bono details specifics surrounding DHA’s efforts to create a more integrated system for promoting enhanced health readiness for active and transitioning servicemembers and their families.
Reduced Blood Loss

In a pre-clinical model, QuikClot Combat Gauze® had less blood loss when compared with standard packing.¹

Stronger Clots & Fewer Re-bleeds

In pre-clinical studies, Combat Gauze® has shown stronger clots versus standard gauze² and allows movement with significantly fewer re-bleeds.³,⁴,⁵ In one pre-clinical study, Combat Gauze showed zero percent re-bleed after initial hemostasis.⁶

Scientific Fact

The Efficacy of Combat Gauze in Extreme Physiologic Conditions

Imagine a Mobius strip.
That is to say, imagine a rectangular strip of paper, of cloth, of anything, joined together at point A and point B after being twisted a full half-turn. In essence, imagine a long, uneven surface with one continuous side.

Now, imagine a playing field like a Mobius strip – any game, any sport, any team-centric effort – and imagine the rules of that game on that playing field always twisting and turning like a Mobius strip does; a singular concept with a definite starting and ending point but also with stretches of variable, uneven surface in between.

This is life in the Combat Casualty Care Research Program.
We begin with the basics; the warfighter’s mission and the warfighter’s health - and then we try to bridge the gap between those two points. That’s what we do. But then everything changes: things like combat projections, personnel, funding, timelines, and sometimes even the rules themselves change on the way from where we begin to where we eventually find success.

Leadership into Uncertain Times

And so in keeping with our overall mission of protecting, preserving, and restoring the health and safety of the combat service member, the staff at the CCCRP now moves into a period where we must begin to harness this era’s rapid technological advancements while, at the same time, applying those advancements to what military leadership believes will be a far more unique and unstable battlefield in future conflicts. In short, we must prepare for something we’ve never seen before.

I believe this mission to be attainable despite the military’s own rather alarming projections for future combat scenarios. In a recently released United States Army-Marine Corps white paper entitled, “Multi-Domain Battle: Combined Arms for the 21st Century,” the authors paint a wide variety of scenarios for ground combat operations against sophisticated peer enemy threats in the 2025-2040 timeframe. These scenarios include a number of factors, but overall largely preclude the assumption of air superiority – a critical paradigm contributing to the creation of highly asymmetric battlefields in recent conflicts.

Indeed, it is critical to understand why the U.S. military now assumes a lack of air superiority in future conflicts and, further, how this assumption will affect our medical efforts moving forward. Specifically, and again according to the same aforementioned white paper, it is agreed that both current and potential adversaries have for years studied the manner by which the U.S. coordinates air power to enable ground freedom to allow forces the ability to out-maneuver and outmatch. Going further, it is known that highly-advanced potential adversaries are currently developing methods to both counter and...
degrade U.S. strengths in the air and maritime domains, as well to disrupt U.S. military access to land, space, cyberspace, and the EMS. As such, the combination of these methods is intended to turn long-presumed strengths into weaknesses, potentially greatly diminishing overall U.S. military advantage.

In turn, and as a direct result of these assumptions, the military medical research community must understand and prepare for the ways in which this paradigm shift will impact the pursuit of excellence in our mission. The difficulty in achieving air supremacy, or even localized air superiority, against sophisticated adversaries on the future battlefield will directly require medical efforts to be more proactive and empowered at the point of injury as opposed to efforts that were previously accomplished at a Role 2 medical treatment facility.

Smaller and more ruggedized medical equipment and technologies, including semi-autonomous or autonomous systems, will be needed to potentiate casualty care efforts that can-and-will conceivably stretch for days if required in the aforementioned denied environments. Immediate evacuations will not be available. Adherence to the traditional “Golden Hour” rule of care as currently constructed may not be possible. As such, the concept of bringing life sustaining assets to the point of injury while also supporting delayed evacuation and/or prolonged field care becomes critical from this point forward.

The Golden Hour: A Ticking Clock

With predicted loss of air superiority becoming a major staple of the projected battlefield of the future, we must again in turn begin the necessary paradigm shift away from the traditional understanding of the “golden hour” standard of combat care and move towards a more mobile application of that concept. Given the likely inability in more urban and denied settings to transport casualties to a damage control facility, we must begin to bring “golden hour” medical assets and intervention capabilities directly to the point of injury.

Of particular interest to me here is the concept, application, and implications of unmanned casualty evacuation. While much work still needs to be done in refining the technical capabilities of both ground and vertical lift platforms, it is here specifically where we can begin the actual and outright harnessing of modern-day technological innovation. Cutting-edge advances in automated systems, airway management, and the establishment of early Extracorporeal Life Support, as well as the continued refinement of damage control resuscitation will be key to success in this field. Further, seeing as how battlefield hemorrhage is responsible for potentially preventable pre-hospital mortality in more than 90% of cases, whole blood transfusion and early wound and extremity management will be of significant importance moving forward in this lane.

Given those facts, it is perhaps in this area more than any other that we can begin to see the need to harness the vast technological advancements and capabilities that I mentioned previously. With regard to technologies directly applicable to this field, there is specific
interest within the CCCRP in automated vascular access, which would sharply potentiate the use of more efficient and advanced resuscitation measures. In addition to providing an ideal route for closed loop resuscitation and administration of whole blood, automated vascular access provides access for potential future use of Extra Corporeal Life Support systems and lifesaving medical devices deployed in blood vessels (endovascular) as below.

ECLS systems have the potential to rescue severely injured casualties who go into organ failure as they may have the ability to replace kidney, liver, and lung function. Further, they can be ruggedized and used in the forward environment to supplement the pumping action of the heart also in addition to organ substitute in combat casualties. Early utilization of ECLS near the point of injury could likely increase the probability of survival among severely injured casualties. These technologies also have the potential to greatly reduce the medical footprint required in theater and can ideally be used on the future battlefield in an automated, closed-loop fashion in delayed evacuation and unmanned casualty evacuation scenarios.

Endovascular devices such as (Resuscitative Endovascular Balloon Occlusion of the Aorta) emerged from treating wartime casualties in Iraq and Afghanistan. REBOA is an evolving, effective intervention that stops life threatening, non-compressible torso hemorrhage while preserving blood flow to the heart, brain, and other vital organs and could potentially be deployed in an automated fashion in the future battlefield.

The Always Fight: Prolonged Field Care

The U.S. Army leadership’s recent declaration that prolonged field care is now the number one priority of the Army at-large is a boon to the mission of the CCCRP, but also a sizable challenge as well. While all the various and ongoing efforts of this program have contributed to the current state of military medical readiness, it will clearly be the steps we take now that will ensure that same level of readiness is in place for the 2025-2040 timeframe. In short, the interwar period is a precious commodity, and in the wake of this new declaration, robust support from Army leadership will be required to ensure this period is used with utmost efficiency.

That being said, it is to be expected that the Army’s declaration on behalf of prolonged field care will overlap across many of the current portfolios within the CCCRP. The forward application of decision support, automated systems, and even artificial intelligence will be lynchpin concepts moving forward, and will clearly have the support from our entire staff regardless of portfolio division. It is here also where we bring TBI into the fold, as early diagnosis of traumatic brain injury continues to be a top priority for both the Army and the larger DoD. With more than 160,000 members of the Army suffering a TBI since 2000 according to the Defense and Veterans Brain Injury Center – a reaffirmation of the importance of prolonged field care requires both the development and delivery of easily-translatable technologies and knowledge products to the warfighter, especially in ground-level combat environments.

Zero Preventable Deaths: The Constant Goal

This, of course, is our always and constant goal: zero preventable deaths. And much like success in the more clearly-focused area of prolonged field care, success here will depend on re-doubled efforts from staff across the military biomedical research enterprise. Indeed, it seems so simple to say that one wants to provide the infrastructure necessary to prevent combat-related mortality, yet I firmly believe that we can make this reality truly possible if we bring to bear nearly all we do within the JPC family and the wider MRMC family. The multi-domain battlefield will no doubt be the most demanding environment the warfighter has ever faced, and so we must plan and act accordingly.

And yet there always challenges. There are always obstacles. There is always uneven ground. Much like traversing the aforementioned Mobius strip, our program must and will employ a combination of short term tactics and long-term strategies designed to build successes that will benefit the warfighter in the current, future, and the continuous fight. These are the places where innovation is needed- along those vast and arduous tracts of shifting ground where teamwork is required to navigate the terrain between point A and point B.
EVOLVING THREATS DEMAND ADVANCED PROTECTIVE GARMENTS

Chemical warfare agents, toxic industrial chemicals, and emerging pharmaceuticals such as Fentanyl can create a dangerous situation for first responders.

- **MULTI-THREAT GARMENTS**
  - NFPA 1994, CLASS 2 & NFPA 1992

- **XRT GARMENTS**
  - NFPA 1994, CLASS 3

- **BPS GARMENTS**
  - NFPA 1994, CLASS 4 & NFPA 1999

Our products provide exceptional protection without compromising your mobility or ability to get the job done.

- NFPA certified
- Lightweight yet extremely durable
- Enhanced functionality for mission effectiveness
- Easy to put on and take off — does not require chemical taping
- Effective heat stress management allowing you to remain on scene longer

©2017 W. L. Gore & Associates, Inc. CHEMPAK, GORE, and designs are trademarks of W. L. Gore & Associates
Everything the U.S. Army Institute of Surgical Research (USAISR) does is about optimizing combat casualty care. We have two significant missions. One is that we are the home of the DoD’s only burn center. So, we are the U.S. Department of Defense (DoD) burn center. We provide patient care for military personnel, dependents, beneficiaries and also civilian patients with burn trauma. That is a very significant portion of our mission. The other portion is to conduct a comprehensive program in combat casualty care research, aimed at providing solutions to improve combat casualty care, and at the same time, improve civilian trauma care. We are focused on all aspects of combat casualty care, from point of injury through initial treatment, initial surgery, and all the way through long-term rehabilitative care.

**Wide Reach**

The scope of our research program includes virtually all aspects of trauma care. We conduct comprehensive research programs that include preclinical and clinical research in the areas of Coagulation and Blood, Damage Control Resuscitation, Tactical Combat Casualty Care, Extremity Trauma and Regenerative Medicine, Maxillofacial Trauma, Multi-organ Preservation and Support, Combat Trauma and Burn Injury, Medical Decision Support and Automation, Systems of Care, Sensory Trauma, and others.

**Prolonged Field Care**

A significant new effort for us is in the area of Prolonged Field Care. In current and recent conflicts over the last 16 years, the U.S. military has been able to get casualties to surgical care within about 45 to 90 minutes, with very good success. What we’re preparing for now is future situations where we may need to stabilize casualties for up to a day, two days, or even 3 days in austere environments, because of different types of expected warfare scenarios. So, we have a very significant program in this area. Early research efforts include studying treatments that we have for shorter-term use to see how applicable they’ll be for longer-term use. We have to understand the limits of...
what can really be done in those environments. New problems will be identified and we will work to develop new technologies to fill identified capability gaps. One of our challenges is to move stabilizing and potentially complex treatments farther forward to where the casualties are, instead of relying on rapid transport to a combat support hospital, which may not be as feasible in future conflicts. Treatment and stabilization may need to occur near the point of injury, at a battalion aid station, at a forward surgical team, or during transport.

Advancing Blood Products

We believe that safer, more effective, and more logistically supportable blood products will be key factors in prolonged field care. Products that we expect to deliver to the battlefield and civilian medicine in the next few years include dried plasma, cold stored-extended life platelets, pathogen reduced whole blood, and advanced methods for whole blood storage and transfusion.

Hemorrhage Mitigation

In the past 10 years, the USAISR has played a critical role in the development of advanced hemostatic dressings, advanced tourniquets, devices to control junctional hemorrhage (hemorrhage in the axillary or groin regions that is not amenable to tourniquet or topical dressings), a decision support system for burn resuscitation, and a large amount of information that has informed many clinical practice guidelines that are currently in use by the U.S. military, as well as in civilian trauma centers. Recently, the USAISR has been involved in research that has led to the development and FDA approval of the REBOA (Remote Endovascular Balloon Occlusion of the Aorta) device for the control of non-compressible truncal hemorrhage. This device is now commercially available and has been credited with a number of successes in both military and civilian use. Other recent products include a small intrathoracic pressure regulation device designed to improve cardiac output in hemorrhagic shock, and the Compensatory Reserve Index (CRI). The CRI is an algorithm designed to detect when a patient is going into hemorrhagic shock. It is incorporated into a small device that is the first medical monitoring technology capable of providing early detection of impending circulatory shock in trauma patients.

Looking Ahead

Products that are in earlier stages of development include advanced treatments for eye injury, the application of miniaturized extracorporeal life support for critical casualties, improved skin regeneration and healing, and a “smart” system to facilitate intubation in the field. The USAISR also conducts trauma outcomes research based on retrospective studies of data from both combat and civilian trauma. More basic areas of research include studying the mechanisms underlying the coagulopathy of trauma, regenerative medicine approaches to restoring volumetric muscle loss after extremity injury, mitigation of biofilms in wound care, and the use of mesenchymal stems cells in trauma care, among others.
TDM publications are FREE to all members of the U.S. military, employees of the U.S. government, non-U.S. foreign service based in the U.S. and defense contractors.

International readers may access TDM publications electronically.

Our publications’ far-reaching distribution and stellar reputation can help propel your company to the forefront of the industry!

To spotlight your company and request a media kit, contact us at contact@tacticaldefensemedia.com
Overcoming the challenges the Military Health System (MHS) currently faces with Traumatic Brain Injury (TBI) incidence and the resulting costs requires an all-hands-on-deck approach to treatment.

Since its establishment in 2010, the National Intrepid Center of Excellence (NICoE) has played a leading role in advancing the understanding of TBI and is a key component within the MHS TBI pathway of care and provides a point of entry for patients referred to the care system.

At the NICoE, we serve a broad range of patients through our Intensive Outpatient Program (IOP) and outpatient services—including active-duty, National Guard and Reserve service members, and adult beneficiaries. An interdisciplinary team of providers assesses and treats each patient as a whole being—physically, psychologically, and spiritually. We believe that our patients’ identities are larger than their TBI, and we assist them on their journey to enhance meaningful participation in their lives.

A central component of the NICoE’s mission is to improve diagnostic determination, evaluate novel treatment modalities, and explore the long-term consequences of TBI exposure on patients and their families. The NICoE model of integrating clinical care and research helps drive rapid advancement of clinical delivery and continuous evolution of the research strategy. Through collaborations with federal, academic, and private organizations, the research team uses the most advanced technical and clinical resources to evaluate and treat the effects of TBI and associated PH conditions.

More info: wrnmmc.capmed.mil

A patient receives magnetoencephalography therapy including brain mapping neuroimaging techniques at Walter Reed National Military Medical Center’s National Intrepid Center of Excellence. (WRNMMC)
RADM Brian S. Pecha received his Bachelor’s degree in 1983 from the University of San Francisco and a medical degree from Stanford University School of Medicine in 1988. He completed residency training in Internal Medicine at Naval Hospital San Diego, where he served as Chief of Residents. In 1991, he was assigned to Naval Hospital, Naples Italy as a staff Internist and Department Head, and for the final year of his tour was Director of Medical Services.

He entered civilian practice in 1994 and re-affiliated with the Navy Reserve the following year. Since then his assignments have included Naval Reserve Hospital Oakland; Fleet Hospital Nine; Naval Reserve Hospital Bremerton; Operational Health Support Unit Camp Pendleton; 1st Battalion 14th Marines; 4th Marine Division; and Headquarters Marine Forces Reserve. He has served as a training officer, administrative officer, assistant officer-in-charge, officer-in-charge, Battalion Surgeon, Division Surgeon, and Force Surgeon. From Jan 2011 to Dec 2012 he commanded 4th Medical Battalion, 4th Marine Logistics Group, with headquarters in San Diego.

In 2002, he was recalled to active duty and assigned as senior medical officer for the Branch Medical Clinic at Marine Corps Air Station Yuma. In 2006, he was recalled with 1st Battalion 14th Marines, deploying to Anbar Province in Iraq as the Surgeon for Task Force Military Police, a major subordinate command of the 1st Marine Expeditionary Force. In March 2013 he was brought to active duty as the Force Surgeon for Marine Forces Reserve in New Orleans, and upon promotion in October 2013 was recalled again for a year as The Medical Officer of the Marine Corps. Upon demobilization he resumed his role as Reserve Deputy Medical Officer of the Marine Corps and as Reserve Deputy Chief of the Navy Medical Corps. In March 2016, RADM Pecha was recalled to active duty as command surgeon, U.S. Pacific Command, Camp H.M. Smith, Hawaii. On 1 October 2016 he was promoted to his current rank of Rear Admiral.

RADM Pecha graduated in 2004 “with distinction” from the Naval War College distance education program. He earned the Fleet Marine Force Officer Warfare Qualification in 2006. In 2010, he completed Phase II of Joint Professional Military Education at the Joint Forces Staff College in Norfolk.

His personal decorations include the Meritorious Service Medal (2 awards), Navy and Marine Corps Commendation Medal (3 awards), Navy and Marine Corps Achievement Medal (2 awards), Navy Unit Commendation Medal, Meritorious Unit Citation, and various campaign and service medals.

In civilian practice, RADM Pecha works as a physician at a California State Hospital for persons with intellectual disabilities. He has been certified and recertified by the American Board of Internal Medicine since 1991, and was elected to fellowship in the American College of Physicians in 1998.

RADM Brian S. Pecha
Command Surgeon
U.S. Pacific Command

C&CC: Please speak to your primary focus as Command Surgeon, U.S. Pacific Command.

RADM Pecha: U.S. Pacific command covers over 50% of the globe, with oversight of nearly half of all U.S. Forces. We have some of the largest and smallest countries by population, economic activity, and military capabilities. In addition, PACOM includes the “ring of fire” which means that natural disasters are a part of our daily life.

The number of possibilities for Humanitarian and Disaster Relief efforts, for emerging infectious diseases, and for actual combat operations means that the office of Command Surgeon here at PACOM is constantly busy. We provide support to the warfighter, work heavily in the area of global health, and attempt to coordinate the efforts of the medical departments for our component commands – U.S. Army Pacific, Pacific Fleet, Air Forces Pacific, and Marine Forces Pacific.

Global Health Engagement efforts are a particular focus of our work. Health is inextricably linked to security. The complex borders in this part of the world pose severe challenges as populations move back and forth, complicating the provision of ongoing care and posing risks in spreading disease. Our efforts to help coordinate with our partner nations, and the
WE FOCUS ON YOU, SO YOU CAN FOCUS ON YOUR PATIENT

Proud to be supporting
US Armed Forces

Tempus Pro is the Vital Signs Monitor of choice for a large percentage of NATO Forces including: US, UK, Norway, Spain, Australia & others

Manufactured in the USA

RDT LLC
Suite 201, 1428 Weatherly Rd SE, Huntsville, AL 35803, USA
Tel: 1-256-684-8838
Toll Free: 1-888-255-2115
improvements that ensue when we bring multiple countries together to practice, are a key to staying on top of these challenges. The friendships and partnerships we try to create with and among nations are what I see as perhaps our biggest contribution to ADM Harris’s Theater Security efforts. I think it’s so important that I’ve often said Global Health Engagement is one of the best preventive health measures we have for dealing with the disease known as warfare.

C&CC: From a PACOM Area of Operations perspective, can you talk about some focal efforts that you see as primary hurdles to force health and readiness?

RADM Pecha: PACOM is large, and it includes some of the best natural incubators for disease in the world. Our ability to harness the laboratory surveillance efforts of our partner nations to get the earliest sign of novel viruses and the challenges inherent in providing preventive care in this complicated environment are constant issues for force protection. From new strains of influenza, to leptospirosis, to Marburg virus, to multi-drug resistant tuberculosis there’s no end to our need to be vigilant and to find ways to keep our forces safe.

C&CC: With the vastness of PACOM’s AOR and the need to ensure standardized surgical practices are continually implemented regardless of location, can you speak to some current/ongoing challenges/efforts your office may be overseeing?

RADM Pecha: I feel that we’ve taken the lead in promoting the work of the Joint Trauma System, led by a team in San Antonio and through our local Theater Trauma System, headed by COL Dwight Kellicut at Tripler Army Medical Center.

As part of the effort to standardize trauma care we hold a monthly JTS call, open to all military physicians and nurses in the PACOM AOR. We discuss recent trauma cases in depth for ways to highlight the successes and challenges of specific aspects of care and in particular the difficulties with patient transport and handoffs in care.

We’re working on ways to leverage our expertise in trauma care and the lessons learned over the past 16 years of war for our partner nations, and at the same time to find ways to enhance our skills as trauma providers. We think this could be a big win-win for both the U.S. military trauma system and for our allies and partners. So while these efforts are in their infancy I think there’s great potential here.

C&CC: With many lessons learned from the recent decade plus of combat operations, can you speak to some factors that PACOM leadership sees as essential to improving positive casualty outcomes?

RADM Pecha: With the vastness of PACOM’s AOR and the need to ensure standardized surgical practices are continually implemented regardless of location, can you speak to some current/ongoing challenges/efforts your office may be overseeing?

RADM Pecha: We face a number of challenges here in PACOM that are different from those encountered in CENTCOM where the bulk of DODs trauma care has been provided over the past 16 years. In particular, the tyranny of distance is a constant challenge that stresses our abilities.

Improving casualty outcomes will require us to overcome the inability to achieve a “golden hour” by providing top-notch en-route care.
In addition, there are new issues we need to address in what is primarily a maritime environment. Specifically, our Navy’s increasing move to distributed operations means we have to find ways to leverage limited physician expertise available at sea. While we’re well-practiced in providing top-notch care during phase zero, we will need to be creative with our assets if we should transition to phases 1 or 2. In addition, a shift to combat means we will have the possibility of evacuating individuals from the water. We will have to deal with a different set of injuries than what we have been faced with in Iraq and Afghanistan. That’s going to require an integrated effort on the part of Navy Medicine, Air Force evacuation folks, and a shift in training for dealing with these potential injuries. It’s also going to require we empower our Sailors and other military forces to provide great buddy aid for longer periods of time.

C&CC: From an industry partnering perspective, how is your office working to maximize outcomes from business relationships critical to force capabilities?

RADM Pecha: Our Component Surgeons are the front line with respect to working with our industry partners. From a PACOM perspective, we’ve had the chance to see some of the newest developing technologies at our major meeting, the Asia-Pacific Military Health Exchange. This premier meeting annually brings together the top military medical leaders from nearly thirty countries for a week-long exchange. Last year’s meeting in Singapore was a perfect example, with a number of presenters having access to these movers. In addition, the International Congress of Military Medicine, which just concluded in New Delhi last week was another chance to see and hear the latest developments in ways to improve field and trauma care.

C&CC: Feel free to speak to other forward-looking goals/challenges.

RADM Pecha: Finding ways to continue engaging with our partner nations is a key goal to dealing with the challenges of disaster relief and in staying on top of the issues that impact force health protection. We’ll continue to work with individual partners like Japan and South Korea and Australia and the Philippines, but we’ll push hard to extend these efforts into the multilateral realm.

Diseases don’t respect borders, and natural disasters require coordinated responses. I’d like to see continued efforts to have our military medical departments contribute to the Global Health Security Agenda goals of their respective nations. I’d like to see increased ability to interoperate in disaster response scenarios, and I’d like to see military health care be a bridge for peace and security in the Indo-Asia-Pacific region.
ANSWERING THE NEED FOR REALISTIC BLEED

Combat & Casualty Care (C&CC) spoke recently with Dr. Joss Fernandez, MD, cardiothoracic and vascular surgeon, and creator of EnvivoPC™, a state-of-the-art simulated human cadaver technology of Maximum Fidelity Surgical Simulations, providing simulated real-world bleed capability to mimic that of live casualties. With a large percentage of preventable military and civilian casualty deaths attributed to hemorrhage and bleed-out scenarios, this “bleeding cadaver” technology is enabling real-time training for active bleed situations with hands-on training not possible through virtual simulation. C&CC also spoke with Col. “Boots” Hodge, Air Force (Ret.), Associate Director, Operational & Disaster Medicine, Wright State University and National Center for Medical Readiness (NCMR), regarding advances in medic readiness that EnvivoPC™ is helping perpetuate.

C&CC: Why use a human cadaver?

Dr. Fernandez: Though the removal and examination of human organs was performed by Egyptians around 3000 B.C. the use of cadavers for the purposes of education and study were not performed regularly until 1200 A.D. A. Benivieni, A. Vesalius, G. Morgagni (15th and 16th century) are credited for the development of what is now recognized as gross anatomy and pathology. Until then anatomists such as Galen (2nd century) who performed vivisections on only animals were the only default authority on the correlated human anatomy. Subsequently, with the formalization of medical training and development of medical curriculum the study of human anatomy flourished in the 17th and 18th centuries. Modern day embalming and preservation techniques date from that era.

Unfortunately, to this day most practitioners experience with cadavers has been limited formaldehyde fixed tissue that is difficult to handle with indistinguishable tissue plains. This has led to the wide use of living animals as a substitute in surgical training. The turn of the century...
Get Troops Back in the Field in 3 Minutes!

Zanfel® – a safer, faster and more effective option than steroids or antihistamines for relieving poison ivy, oak or sumac.

Zanfel gets at the cause of the problem by removing the poison ivy, oak or sumac toxin (urushiol) from the skin ANYTIME after outbreak of the rash while relieving the itching within 30 seconds. Zanfel is also effective for Mosquito and Chigger Bites, Sand Flea and Sand Fly Bites and Other Insect Bites and Stings.

Benefits and Savings to the Medical Command and the Warfighter.
- The use of Zanfel improves READINESS and allows the poison ivy, oak or sumac affected warfighter to return to duty within a matter of minutes, (versus a week or more), in an itch-free and healing state.
- Significant and immediate cost savings to the unit and medical command.

Packet = Single dose. Great for IFAK kitting.

Call 800-401-4002 or visit www.zanfel.com.
Zanfel is a product of Zanfel Laboratories, Inc. ©2016 All rights reserved.
has brought a renewed interest in human anatomy for surgical training. Much like the early anatomist found, animal models do not sufficiently approximate the human anatomy. This is especially true in trauma and forward operations training. It is here where the most preventable deaths are the result of extremity exsanguination, and respiratory failure. The airway and limbs of porcine and other animal models fail to produce the experience needed. The solution we believe lies in the use of perfused (bleeding) fresh (not embalmed) human cadavers.

On the one hand, cadavers that do not bleed or fail to react to injury fail to give the operator a visceral experience, while, live animals fail to give operators the anatomic experience. Bleeding, breathing human cadavers address both these issues.

Col. Hodge: Having worked on the preventable death issues for years, I have been driven to find improved solutions to trauma training. I believe there are two primary issues, lack of familiarity of emergency equipment and poorly thought out training models. The key to success in training outcome is competence in procedures, intimate knowledge of the equipment required to perform the procedure and the muscle memory or memory glue that you retain and can use in difficult situations. The sad fact is that most models and simulations, do not represent the kind of trauma you see in disaster or combat. You train and build confidence on the wrong model. Secondly, the feel and tissue response you get, i.e. haptic feedback on plastics is non-existent. That is why high-end medics rely on live animal tissue. I have spent several years working on cadaveric tissue alternatives and developed numerous extremity bleeding models. I also discovered that fresh cadaveric tissue retains a fairly normal pulmonary or lung functions. Besides all the normal airway procedures which everyone is familiar with you can also ventilate, create chest excursion, breath sounds, pneumo and hemo thorax which responds to treatment.

C&CC: How was EnvivoPC™ developed?

Dr. Fernandez: The concept of flushing fluid into a cadaver’s arteries was first developed by American cardiovascular surgeon H. Edward Garrett, Jr in 1999. Others have followed with different combinations of fluids. Unfortunately, wide spread use of perfusion of cadavers was hampered by loss of the fluid into the tissues, to clinicians this is known as third spacing of fluid. The bloating and edema made the experience unacceptable except for very limited procedures. As a trainee of Dr. Garrett in 2012 I decided to devote myself to solving this problem. Following over 100 iterations and countless experiments I finally settled on a solution to the problem. The finalized formula developed with the help of a chemical engineer stays within the vasculature. The vessels will retain the fluid and the tissue, including the bowel will not become bloated and edematous. This allows for the introduction of increase blood pressure in the cadaver. Prior to this increasing the pressure in the vessel led only to faster swelling of the cadaver. With the ability to raise the pressure of the cadaver a pulsatile pump was introduced. This produced a pulse that could be felt throughout the cadaver.

C&CC: What is your experience with Bleeding cadavers?

Dr. Fernandez: Traveling the country we have been witness to the use of EnvivoPC™ in diverse theaters. This includes fully capable operating rooms with robotics to the most austere environments. We have seen
plastic surgeons raise delicate pedicle flaps and combat medic apply tourniquets. What is universally true of a successful lab is that the conversation is never about the pump and tube providing for the bleeding cadaver. Instead, the focus is on the surgical technique and curriculum. That is what makes for a realistic experience.

Yet, there are strengths and weaknesses to this system. A major strength is unlike live animals, blood loss, is not an issue as it can be replenished. The one major weakness is that the incisions and tissue manipulations made by one operator will remain for the next. For example, applying a tourniquet to a femoral artery injury can be done an endless number of times, but a surgical airway on a virgin neck may be only done once on any given cadaver. Multiple chest tubes at different sites on the chest may be performed. Also the chest may be filled with blood to simulate a hemothorax multiple times, but extremity amputations may only be done once on each side for obvious reasons.

We work with the educators teaching content to stage each use of the cadaver so that you can maximize the anatomic gift without the expenditure of having to have multiple cadavers. Despite this limitation the model still prevails over an animal model. Even the largest of living porcine model will expire after 1-2 liters of blood loss. This means limits on time and number of procedures per animal necessitating multiple living animals. This is not the case in EnvivoPCTM where the blood is synthetic and virtually limitless.

The ideal cadaver will have a postmortem period of no more than 1-2 months. The cadaver may be frozen during that period. Following thawing of the cadaver and flushing using a preservative the cadaver may be used for a period of 2 weeks if kept in cold storage (10°C) between uses.

C&CC: What procedures are performed on Bleeding Cadavers?

Dr. Fernandez: There is no limit to the procedures performed on a bleeding cadaver. Whatever injury you would like to mimic may be duplicated in the cadaver. Here is a brief list of procedures that may be performed using the EnvivoPCTM system. It is by no means exhaustive. The cadaver may be positioned anywhere. The pump runs off a battery if no power is available.

Airway: Intubation, Difficult intubation (bleeding tongue, jaw fracture, face trauma), cricothyroidotomy, tracheostomy
Vascular Access: Central lines, venous and arterial cutdowns, Interosseous cannula
Thoracic: Needle Decompression, Chest tube placement, Treatment of Hemothorax
Orthopedic: Fracture care, hemostasis of amputation, amputations, pelvis stabilization, degloving injuries
Abdominal: Exploratory laparotomy, Care of evisceration
Vascular trauma: tourniquet application, hemostatic techniques, shunt placement.

Col. Hodge: Not only can you perform all these procedures but control the settings for specific training. An example is teaching hemorrhage control. You can present the trainee with major hemorrhage and have them treat it, but you can just as easily shut off the pump, bleeding stops and you can discuss, train, or re-train and then turn the pump on again and you have the major hemorrhage again.

C&CC: How do all the simulation options fit together?

Dr. Fernandez: There are thousands of simulation options available. Each one has a role but certainly some thought should be had before spending valuable resources. Using a bleeding cadaver to teach the basics of how to apply a tourniquet is not likely the best use of the anatomic gift. Cadavers may range from $1200 to $5000 each. Therefore in the early stages of education low fidelity simulators or even using fellow trainees is likely the most cost effective method. Once the trainee understands the mechanics and anatomy associated with a procedure they may progress to higher fidelity simulators. An intermediate step may be the use of a cut suit. This adds to the acuity of the simulation and ups the stakes. Finally, the highest fidelity simulator would be the definitive experience. A bleeding, breathing cadaver may be used for confirmation of acquired skills and refinement of technique. This also allows the most realistic haptics available.

Bleeding cadavers closely approximate the costs of living tissue. At this point the only benefit of using live animal is to practice the use of hemostatic agents. Even then on the porcine model it is somewhat unrealistic since the pig blood clots so readily.

C&CC: What is the future of EnvivoPCTM?

Dr. Fernandez: We are working on validation of the experience. We would like to confirm that metrics like operator cortisol blood levels, heart rate, blood pressure and sweat response mimics a real combat experience. When you encounter a breathing bleeding cadaver that is actively exsanguinating your autonomic response should be similar to that of a living human, especially if you are blinded to the fact that it is a post-mortem patient.
Major General Barbara R. Holcomb, Commanding General, U.S. Army Medical Research and Materiel Command and Fort Detrick, MD; Chief, U.S. Army Nurse Corps. Major General Barbara R. Holcomb is a 1987 Distinguished Military Graduate of Seattle University Army ROTC where she earned a Bachelor of Science degree in Nursing. She earned a Master’s degree in Nursing Administration from the University of Kansas, a Master’s level Certification in Emergency and Disaster Management from American Military University and a Master’s in Military Strategic Studies from the U.S. Army War College, Carlisle, Pennsylvania. Major General Holcomb’s military education includes the AMEDD Officer Basic Course, AMEDD Officer Advanced Course, Faculty Development Course, Combined Arms Services and Staff School, resident Command and General Staff College, AMEDD Executive Skills Course, Interagency Institute for Federal Health Care Executives, Medical Strategic Leadership Program, Army War College, Army Strategic Leader Basic, Intermediate, and Advanced Courses, and CAPSTONE. Her previous assignments include Clinical Staff Nurse, Post Anesthesia Care Unit and Department of Emergency Medicine, Madigan Army Medical Center; EMT Section, 47th Combat Support Hospital, Fort Lewis, Washington and deployment to Desert Shield/Desert Storm; Staff Nurse and Clinical Head Nurse, Mixed Med/Surg Ward and Head Nurse, Troop Medical Clinic and 111th MI Brigade Family Clinic, Fort Huachucha, Arizona; Officer Basic Course Nurse Advisor, Department of Nursing Science and Commander, A/187th Medical Battalion, Fort Sam Houston, Texas; Chief Nurse, Department of Outlying Health Clinics, 67th CSH/Wuerzburg MEDDAC, Germany; Medical Detachment Commander (Provisional), Camp Able Sentry, Macedonia; Chief Nurse/CO, 14th CSH, Fort Benning, Georgia; Commander, Special Troops Battalion; Chief, Base Transformation Office, U. S. Army Garrison, Fort Sam Houston, Texas; Chief, Ambulatory Nursing, Brooke Army Medical Center; Chief, Nursing Administration, Carl R. Darnall Army Medical Center and Commander, 21st CSH, Fort Hood, Texas; Commander, Medical Task Force 21, Operations Iraqi Freedom and New Dawn; Chief, Army Nurse Corps Branch at Human Resources Command, Fort Knox, Kentucky; Commander, Landstuhl Regional Medical Center, Landstuhl, Germany; Command Surgeon, FORSCOM HOs, Fort Bragg, North Carolina; Army Action Officer for the Military Health System Review; Commanding General, Regional Health Command – Central (Provisional), Fort Sam Houston, Texas and prior to becoming Commanding General, Medical Research Materiel Command and Fort Detrick, she served as the Deputy Commanding General for Operations, U.S. Army Medical Command. She was designated as Chief, Army Nurse Corps on 2 November 2015. Major General Holcomb’s awards and decorations include the Distinguished Service Medal (1OLC), Legion of Merit (2OLC), Bronze Star, Meritorious Service Medal (5OLC), Army Commendation Medal (3OLC), Army Achievement Medal (1OLC), National Defense Service Ribbon, Iraq Campaign Medal (2 campaign stars), Kosovo Campaign Medal, NATO Service Ribbon (Kosovo), Southwest Asia Service Medal (3 campaign stars), Kuwait Liberation Medal (Saudi Arabia and Kuwait), the Meritorious Unit Commendation Ribbon (10LC), and the Expert Field Medical Badge. She is a member of the Order of Military Medical Merit.

MG Barbara R. Holcomb
Commanding General
U.S. Army Medical Research and Materiel Command (USAMRMC)
Chief, U.S. Army Nurse Corps

Legion of Merit (2OLC), Bronze Star, Meritorious Service Medal (5OLC), Army Commendation Medal (3OLC), Army Achievement Medal (1OLC), National Defense Service Ribbon, Iraq Campaign Medal (2 campaign stars), Kosovo Campaign Medal, NATO Service Ribbon (Kosovo), Southwest Asia Service Medal (3 campaign stars), Kuwait Liberation Medal (Saudi Arabia and Kuwait), the Meritorious Unit Commendation Ribbon (10LC), and the Expert Field Medical Badge. She is a member of the Order of Military Medical Merit.

C&CC: Please speak to your focus as MRMC Commander heading into late 2017.

MG Holcomb: My primary focus is ensuring the readiness of the Force, followed by supporting The Army Surgeon General’s (TSG’s) additional priorities of healthcare, force development, and the care of the Army family (Soldiers, their families, DA civilians, and veterans). The United States Army’s Medical Research and Materiel Command (MRMC) is a lifecycle command for medical solutions, meaning we Discover materiel and knowledge products to solve medical gaps; Develop those solutions through meeting U.S. Food and Drug Administration requirements and finding partners for manufacturing (materiel solutions)
Lessons learned from a decade plus of combat, can you talk about some focal efforts that MRMC sees as primary to health and readiness from R&D to materiel availability?

MG Holcomb: With the changing operational environment, prolonged field care becomes the predominant challenge that our medical forces may face in the future. This issue is also acknowledged as one of the top medical gaps for the Army. Fundamental changes in how we provide care on the battlefield are necessary, which requires solutions across the doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy spectrum. MRMC’s role is to develop materiel solutions and capabilities that enhance performance and resilience as Soldiers endure multiple operational and environmental stressors and enable prolonged field care when Soldiers are injured. These challenges shape our science and technology investments to ensure we build a pipeline of capabilities that meet the near and far term needs, which often requires risk taking in favor of top priorities. Change is not easy but it is necessary. We are working hard to facilitate a cultural change that is accepting of and empowered by the varying environment and enables an accelerated rate of modernization.

MRMC laboratories are exploring ways to improve Soldier readiness through tools that assist in faster decision making; for example, how to tell if a wounded Soldier has internal bleeding, the extent of that bleeding and how best to treat it. MRMC Advanced Development teams are working with the Army’s Future Vertical Lift teams on the next generation aeromedical evacuation platforms and MRMC logistics teams are providing new medical grade oxygen capabilities for the battlefield ranging in size from ambulance–carried cylinders to generators large enough to support a Forward Resuscitation Support Team.

C&CC: With many lessons learned from a decade plus of combat, can you speak to some factors that MRMC is addressing in terms of point of trauma to evacuation to facility care that are driving what Army leadership see as essential to improve positive outcomes?

MG Holcomb: Lessons learned in past conflicts are valuable and have resulted in research that has not only closed gaps but has saved more lives in combat that ever before. At the beginning of both Operation Enduring Freedom and Operation Iraqi Freedom, the combat fatality rate was approximately 18 percent. Currently, that number stands at five percent – a remarkable achievement directly related to advances in all aspects of military medicine to avoid preventable deaths on the battlefield. We have made incredible strides with respect to positive combat casualty care outcomes in the current fight. Many of those improvements are a result of gaining a better understanding of trauma management, improving devices to stop bleeding, blood replacement products, and rapid evacuation. However, senior leaders across the DOD are rightly pivoting to support the future multi-domain fight that will be very different than the current fight. At MRMC, we are capitalizing upon our past successes and investments to prepare for the future fight with forward-leaning scientific vigor.

One of the notable investments we’re making is redefining the concept of evacuation with regard to the multi-domain battlefield. Specifically, and given the confines of the future battlefield – most notably within burgeoning cityscapes – we will likely be forced to redefine the concept of the “Golden Hour” standard of care, which will mean, in turn, that we will need to explore options to move care to the Warfighter as far forward as possible.

C&CC: Speaking of the future fight, how will military medical research at MRMC address Secretary Mattis’ emphasis at the recent AUSA meeting for the Multi-Domain Battlefield or the CSA’s Modernization Priorities for the Army?

MG Holcomb: While we often consider military medicine as integral to and inseparable from the concept of readiness — and this remains vitally true — the direct relationship to Warfighter Lethality cannot be overstated. Consider an expeditionary fire team operating in dispersed operations. When any Warfighter goes down in that environment, the entire lethality of the team drops—not only the Warfighter who is injured, but also his or her “battle-buddies” who are providing immediate first aid.
numerous clinical practice guidelines. Moving forward, we are planning advanced technologies to stop hard-to-control truncal and extremity care to the casualty at the point of injury. We have recently developed combat casualties, we are beginning efforts to move more advanced indications and in support of U.S. Army Research, Development and Engineer-Staff of the Army and U.S. Army Training and Doctrine Command directed megacities and dense urban environments in response to the Chief of war-gaming for future scenarios. For example, we recently hosted a worldwide, we are also heavily engaged with requirement planning and capabilities? MG Holcomb: MHS GENESIS integrates inpatient and outpatient solutions that will connect medical and dental information across the continuum of care, from point of injury to the military treatment facility. This includes garrison, operational, and en route care, increasing efficiencies for beneficiaries and healthcare professionals. When fully deployed, MHS GENESIS will provide a single health record for Service Members, veterans, and their families.

The Department of Defense is implementing the MHS GENESIS electronic health record at our Military Treatment Facilities. As we move to using a commercial off-the-shelf (COTS) product, we need to identify new strategies for transitioning research. MRMC is collaborating with an industry partner on a process to transition research efforts to MHS GENESIS. We are developing a new paradigm for implementing research products through MHS GENESIS, a COTS product for use by the MHS and potentially other healthcare organizations. Some products may only be applicable to the MHS; however, many will have public use. MRMC is implementing a cooperative research and development agreement to support this effort. We are conducting a joint review of the Defense Health Agency/MRMC research products to identify efforts for potential transition. The exact path to implementation will vary depending on the maturity and relevance of the products.

C&CC: From an industry partnering perspective, how is MRMC working to maximize outcomes from business relationships critical to force capabilities?

MG Holcomb: Industry partners are a critical part of the MRMC’s capability development process, both from an innovation and production perspective. MRMC is constantly looking for industry partners to meet the needs of our research, development and acquisition readiness for that Warfighter. To the extent we prepare, protect, and optimize our Warfighters to deal with the operational stressors in each future combat scenario, we will have Enhanced Lethality. To the extent we intervene quickly with life-saving technologies at the point of injury during the battle, we will have Sustained Lethality. To the extent we can recover the Warfighter’s capabilities during the battle and as soon as possible after the battle, we will have Resilient Lethality. When our Warfighters know that they and their fellow Service Members have advanced capabilities across this spectrum of lethality—that we, in essence, have their back—then it becomes a force multiplier in actual capability by emboldening the Warfighter. So before, during, and after the battle, MRMC is focused on providing game-changing technologies as a primary combat multiplier for DOD forces in their over-arching responsibility to fight and win.

Even while my MRMC team is supporting current contingencies worldwide, we are also heavily engaged with requirement planning and war-gaming for future scenarios. For example, we recently hosted a medical workshop to assess the capability gaps and requirements in megacities and dense urban environments in response to the Chief of Staff of the Army and U.S. Army Training and Doctrine Command directives and in support of U.S. Army Research, Development and Engineer-Command efforts.

As previously stated, and from a technology perspective regarding combat casualties, we are beginning efforts to move more advanced care to the casualty at the point of injury. We have recently developed advanced technologies to stop hard-to-control truncal and extremity bleeding, devices for traumatic brain injury and, also, crafted or updated numerous clinical practice guidelines. Moving forward, we are planning to miniaturize and ruggedize the most advanced life-saving technology in critical care for our forces in order to further align ourselves with projections for the future battlefield; one that likely precludes U.S. air dominance and, in turn, the ability to evacuate personnel and move injured warfighters between echelons of care quickly and easily. One such technology for this environment is the Extra-Corporeal Life Support device that can act as a lung, kidney, or other vital organ for a wounded Warfighter on the battlefield.

More broadly, the movement of combat casualties around and from the battlefield will take into consideration developments in exoskeletons, and will also integrate with the future vertical lift and medical variants of the next generation of combat vehicles. This will necessarily involve a collaborative push-and-pull between casualty requirements and platform requirements. At the same time, sensors, medical device electronics, and communications will adapt low-signature, low-power, and interoperability requirements and integrate with the future network security needs. The future will also entail a continued push to develop higher levels of autonomy and robotics—complete with manned/unmanned teaming requirements—for medical devices, medical intervention, medical evacuation, and prolonged field care, all designed around the needs of expeditionary forces and their operational environment. We are in the midst of a formative period for our next major DOD investments, and I strongly believe that military medical research is ready to meet the challenge.

C&CC: With the implementation of Military Health System (MHS) GENESIS electronic records keeping for advancing streamlined healthcare beyond active service, how are MRMC efforts touching this evolution to better care?

MG Holcomb: MHS GENESIS integrates inpatient and outpatient health Agency/MRMC research products to identify efforts for potential transition. The exact path to implementation will vary depending on the maturity and relevance of the products.
requirements. We participate in meetings and are involved in panels to determine if a solution is something in which we need to invest. MRMC works to balance the military specific capability needs and industry partner business case requirements.

The Medical Technology Enterprise Consortium (MTEC) provides a forum for conducting emerging technology discussions among member organizations and reports the results back to the government in order to help shape requirements. MRMC established the MTEC operating under a prototype Other Transaction Agreement. The MTEC promotes collaborative research, development, and testing, leading to technology demonstrations advancing the state-of-the-art of technology, transitions new materiel technologies and improves medical practice. The MTEC currently has more than 85 members and in 2016 made awards for the Regenerative Medicine program, including approximately $19 million in government funding and approximately $11 million in nongovernment cost share.

C&CC: Feel free to speak to other forward-looking goals/challenges.

MG Holcomb: One recent endeavor worth mentioning is that we are developing applications and sensors; for example, wearable devices sensing exposure to environmental hazards or physiological status, which help the Warfighter maintain peak performance or avoid prolonged recovery periods. These capabilities, where possible, should add no additional weight or power requirements, have a very low electronic signature (can’t be easily ‘seen’ on the battlefield) and be networkable to provide improved situational awareness across the squad and higher organizations. We are also exploring semiautonomous vehicles (ground or air) for transport of both medical supplies and even wounded Warfighters to include how to augment medical care providers with sensors/monitors in austere environments.

The biggest challenge we face is the ability to integrate the latest technologies into medical devices while maintaining cyber security, decreasing cube and weight, and meeting all FDA requirements in a rapid, cost-effective manner. Our Warfighters and their families deserve no less than the best and we are committed to giving them our very best.
Army SOF and Holistic Tactical Combat Casualty Care

New standards are being set by the U.S. Army's Red Lion Battalion in the 17th Field Artillery Brigade, 308th Brigade Support Battalion, by implementing tactical combat casualty care (TC3) into their overall training. TC3 became a standard in the special operations units when these units realized that the medical instructions they were learning didn’t come second nature because it was practice separate from primary training.

“TC3 is an important evolution in Battlefield Medicine that ensures every Soldier has the knowledge and ability to help prevent the loss of lives,” said Sgt. 1st Class Morgen Bickler, the non-commissioned officer-in-charge at the Madigan Medical Simulation Training Center (MSTC). Special Operations Units have been incorporating it at every level for years and now it is starting to be implemented into conventional force. The key will be to integrate Point of Injury medicine into unit mission essential tasks and battle drill training instead of keeping them separated.”

The first phase of training saw about 30 Red Lion soldiers going through a combat lifesaver course (CLS) course. This gives the soldiers a basic understanding of front-line or first-line response medical care. “CLS is a roll of TC3,” said Sgt. Bryan Barger, a medical non-commissioned officer with 17th FA Brigade Medical team. “We teach the skills to provide immediate lifesaving intervention and evaluate them both to ensure that they understood and could perform those skills. This is the first phase of their training.”

The second phase of the training consisted of the soldiers working in small teams and moving through seven different scenarios. The different members of the team had to explain to an evaluator how to conduct each skill, while performing the skill on a mannequin. While one team member was being evaluated the others held 360-degree security.

“I think this was different for most people,” said Spc. Jonathan Carter, a maintenance soldier from Headquarters Support Company, 308th BSB, 17th FA Brigade. “It was the actual application of those skill for a real-life event like a gunshot wound or an Improvised Explosive Device blast. In the classroom, we preformed these things on each other and in doing that you are not going to tighten a tourniquet to cut of the circulation for safety reasons more than anything else. Whereas when you’re working with the mannequins and they have that fake blood running through them, you can see there is still blood leaking and this tourniquet needs to be tighter.”

The final piece of the training was to evaluate the soldier while they executed their new skills under duress. They were placed into situation that they would actually encounter as a support battalion executing sustainment missions.

“This type of realistic scenario training does two things,” explained Barger. “First, it will put the soldiers under simulated battle stress and makes them have to quickly recall the knowledge that they learned earlier in the week. Second, it helps give them a sense of where they fit in into the bigger picture. And when people know where they fit in, they can understand the importance of their situation.”

MHS GENESIS Transition Underway

In October, Madigan Army Medical Center became the first large military hospital to transition to the Department of Defense (DoD) unified electronic health record, MHS GENESIS. The $4.3 billion system will, for the first time ever, enable all military branches to use one electronic health record. By the time that MHS GENESIS is fully implemented throughout all of the DoD, patients’ records will be accessible at any MTF regardless of branch.

Madigan is a part of the first wave of MTFs to begin using this new system, joining Fairchild Air Force Base, Naval Hospital Oak Harbor and Naval Hospital Bremerton, all in Washington state, as the pilot sites for MHS GENESIS. With MHS GENESIS, patient safety is expected to improve as records are more easily shared between providers. Through the Joint Legacy Viewer, a program compatible with MHS GENESIS, providers at the Department of Veterans Affairs and some community providers will be able to view patients’ records.

While many of the changes of MHS GENESIS will be behind the scenes, patients will notice the new Patient Portal, which replaces the secure messaging found in RelayHealth and many of the functions found on Tricare Online such as accessing test results and setting up medical appointments. Madigan patients can also view provider notes and request prescription renewals online as well.

Patients are also able to see and verify their patient contact information in the Patient Portal. The contact information found there, and used throughout MHS GENESIS, is automatically pulled from DEERS; if patients need to update their patient contact information, they can visit the DEERS website at www.tricare.mil/deers.

Madigan patients are today using the Patient Portal, found at patientportal.mhsgenesis.health.mil. They can sign in through either their common access cards, their MyPay passwords or their DS Logon passwords. If patients don’t have CACs or MyPay passwords, they can create DS Logon accounts to use the Patient Portal.
New Pain Management for Burn Injuries

Doctors at the U.S. Army Institute of Surgical Research (USAISR) Burn Center, Joint Base San Antonio-Fort Sam Houston, are utilizing a novel method of administering pain medication to burn patients in the burn intensive care unit in hopes to mitigate opioid addiction and other complications associated with burn care.

“It's something different,” said Dr. Clayne Benson, assigned to Brooke Army Medical Center, collocated with the USAISR Burn Center. “But the promise and benefits are huge.”

The pain medication is managed with the placement of an intrathecal catheter and infusion of preservative-free morphine. The concept is similar to epidural anesthesia used during labor for pain relief, except the catheter resides in the intrathecal space where the cerebrospinal fluid resides instead of the epidural space. The catheter used is exactly like an epidural catheter used for laboring women.

“It's an FDA-cleared device for a procedure that a lot of anesthesiologists have done for other reasons,” Benson said. “It had never been done on burn patients and we presented the idea of the study to the burn center leadership [Drs. Booker King, Lee Cancio, Jennifer Gurney, Kevin Chung and Craig Ainsworth] and they agreed to try this initiative.”

Benson, an Air Force Reserve lieutenant colonel, got the idea of using this technique in the intensive care unit while taking care of polytrauma soldiers at Landstuhl Regional Medical Center in Germany from 2009-2012. Benson said he is excited about the potential of this new pain management for burn patients.

“The results are amazing,” he said. “The best thing about it is that it only uses one-one hundredth of the amount of pain medication used with the traditional [intravenous] method.”

Full-Body Dispersal

Intrathecal medication is delivered straight to where it is effective, the spinal cord, thereby minimizing systemic complications of IV medications. Intravenous medication disperses pain medication throughout the entire body and only a tiny percentage of it gets to where it is needed. This is especially beneficial for burn patients who require numerous painful operations and traditionally require being placed on a ventilator, with one of the reasons being pain control. Longer ventilator times lead to complications like deconditioning, delirium and pneumonia, which all impact quality of life and time in the Burn Intensive Care Unit.

“Also, the majority of patients who are mechanically ventilated are diagnosed with delirium and are likely to have increased length of hospitalization, increased ventilator days and higher rates of long-term cognitive dysfunction,” Benson said.

Delirium is another complication burn patients experience with exposure to sedatives and pain medications.

“Delirium is when a patient’s awareness changes and they become confused, agitated, or they completely shut down,” said Sarah Shingleton, chief wound care nurse and clinical nurse specialist at the USAISR Burn Center Intensive Care Unit. “It can come and go, and is caused by a number of things to include different pain medications, pain, infections, a disturbed sleep cycle or an unfamiliar environment.”

Data Presentation

Members of the USAISR Burn Center Intensive Care Unit will present the data of the initiative at the 2018 American Burn Association meeting in April 2018. The presentation will describe a patient who sustained 45 percent burns to her body and had her pain and sedation managed with the placement of the intrathecal catheter.

The abstract prepared for the ABA meeting states, “During intrathecal administration of morphine, IV infusions of ketamine, propofol and dexmedetomidine were discontinued. The patient was awake and responsive, reporting adequate pain control without systemic opioid administration. Following removal of the intrathecal morphine infusion, the patient’s opioid requirement remained lower than prior to catheter placement despite repeated surgical interventions.”

“This novel way of achieving pain control helped us get our patients off mechanical ventilation faster and shorten the time they needed to be in the [intensive care unit],” said Maj. (Dr.) Craig Ainsworth, Burn Intensive Care Unit medical director. “We are excited to share this treatment option with other members of the burn care community so that we can better care for our patients.”

Benson’s goal is to someday apply this type of pain management to patients with polytrauma to reduce pain and the amount of pain medication which could potentially lessen addictions to pain medication.

“It’s a new approach and I hope that eventually it becomes the main mode of pain control for burn and polytrauma patients,” Benson said. “It has been a good team effort with the burn staff and their ‘can do’ attitude. I’m looking forward to where this leads. I believe it will change pain management as well as help to prevent opioid addiction in patients who have suffered from polytrauma and burns.”

More info: usaisr.army.mil
The Military Health System is an indispensable asset to U.S. national security, with a diverse offering of health care services, logistics, public health, research and training supporting our armed forces, our allies and others in need.

At the center of the MHS’ strategy sits our core responsibility of readiness. For decades, military medicine has performed its mission exceptionally well. Our leaders, our beneficiaries and the American public continue to ask us to raise our level of performance, and rightly so. Both on the battlefield and here at home, we have found that improvement comes from integration – integration among the military services, integration at the interagency level, and integration between military and civilian care.

The coming year represents a watershed moment in our ability to achieve this goal of integration, and I want to share some the strategic levers the Department and the Defense Health Agency are using to drive this effort.

**Integrated Combat Casualty and Trauma Care**

During the last 16 years of conflict, principally in Iraq and Afghanistan, but also extending to other areas around the globe, the MHS has achieved the highest survival rates witnessed in the history of warfare. An important contributor to this success is the collaborative work of Army, Navy and Air Force professionals, particularly in the areas of trauma care and surgery. The data they collected and shared has allowed us to track outcomes, assess and improve clinical practices, and organize resources to improve our ability to save lives.

Their collaborative work evolved into what we know as the Joint Trauma System, which provides world-class, evidence-based process improvement of trauma and combat casualty care to drive morbidity and mortality to the lowest possible levels.

In 2016, Congress directed the DHA to establish the JTS with several vital responsibilities:

- Serve as the reference body for all trauma care provided across the MHS
- Establish standards of care for trauma services both in the deployed environment and at home station
- Coordinate knowledge translation from our research programs to the delivery of care; and
- Coordinate lessons learned from our military-civilian educational partnerships (where military surgeons work in civilian trauma centers)

The JTS is an exemplary model for our integrated future. Although it was initially established on an informal basis, driven by our surgeons’ desire for improved outcomes on the battlefield, it will serve as a permanent part of our approach in the DHA for creating a common framework for health care improvement in all settings.

This central repository for evidence-based practices and research lessons serves the broader American public’s interests too. As incidents in Las Vegas, Orlando and San Antonio have shown, mass casualty events are not confined to the battlefield. We need a means to better share lessons between military and civilian health systems. There is widespread desire in medicine, as exemplified in 2016 National Academies report, for much greater sharing of expertise between military and civilian trauma care systems – and the DHA is now ready to serve in that vital role too.

**An Integrated Health Record**

In February 2017, the Department began a multi-year project to deploy the next generation electronic health record, known as MHS GENESIS, beginning with the 92nd Medical Group at Fairchild Air Force Base, Washington. As I write this, the Department has deployed MHS GENESIS at three additional military hospitals in the Pacific Northwest: Naval Hospital Oak Harbor, Naval Hospital Bremerton, and Madigan Army Medical Center.

This initiative is much more than an IT project. MHS GENESIS represents the foundation upon which we will monitor the health and readiness of our service members, and will eventually serve as an integrated health information system from the point of care on the battlefield to our medical centers here at home. MHS GENESIS is a unique step forward for DoD and the MHS, representing the first time we have used commercial software for our core military health record. We have learned a great deal in these first eight months of implementation and are using early lessons to streamline deployment, training and clinical workflows at future sites.

The strategic value of this acquisition was bolstered in 2017 with the decision by the Department of Veterans Affairs to acquire the same commercial health information system that forms
the backbone of MHS GENESIS. This action represents an historic opportunity to provide a truly seamless health record between our two Departments. Congress and the American people expect – and our service members and veterans deserve – a seamless transition between DoD and VA health care. MHS GENESIS and its VA counterpart will be enormously valuable in reducing the "friction" that exists today between our two systems.

Integrating Care Delivery for All

On the home front, the Defense Health Agency is also focused on better integrating health care delivery among our military hospitals and clinics and the private sector providers with whom we interact daily.

Our TRICARE health plan provides the essential link between military and civilian care. To improve access to care and to simplify the benefit, TRICARE is changing for our 9.4 million beneficiaries.

Beginning in January 2018, TRICARE will offer two plans: TRICARE Prime and TRICARE Select. Our TRICARE Prime plan is the same plan we have offered our beneficiaries for more than 20 years. Care provided at military treatment facilities is the foundation of TRICARE Prime. Modeled on civilian HMO plans, TRICARE Prime offers a dedicated primary care provider, access standards the Department is obligated to meet (or to arrange care with another provider when we can't), a comprehensive civilian network customized to the population around military installations, and standards for quality and outcomes to which we hold ourselves accountable. We're proud of our performance in providing an integrated system of health for all who elect to use military health care, and we encourage our patients to choose Prime if its available to them.

In large military communities like the National Capital Region, San Antonio, Honolulu and San Diego, we operate a number of military medical facilities. We are integrating care processes in these markets so the patient's experience is the same – regardless of whether they use Army, Navy or Air Force medical facilities.

There are some beneficiaries who either live far from a military installation, or elect to principally receive their care from civilian providers. The new TRICARE Select program offers our beneficiaries this option. In the coming year, TRICARE will ask beneficiaries to make a decision annually about which plan they prefer to use, and actively enroll in it.

Regardless of whether our beneficiaries get most or just a little of their care in military hospitals and clinics, we are also taking steps to better integrate the visibility of the care delivered, regardless of setting. The MHS is partnering with civilian health information exchanges around the country so we can share – with the patient's permission – important health information such as consults, lab results, radiology exams and immunizations among our health systems.

Ahead to 2018

These and other changes to TRICARE – including the beginning of health care delivery from new civilian network providers on Jan. 1, 2018 – are a tremendous opportunity to better integrate our health care system, organized around the goal of putting patients at the center of our work, and making them active participants in their care. Ultimately, our effort to build a more integrated system of readiness and health is all about our patients. They will benefit from more consistent clinical and administrative practices, and from better interaction with our federal and civilian partners. By focusing intensely on outcomes and holding ourselves to a high standard, we will create a more efficient system that reduces administrative overhead so we can focus our resources on patient care.

We will be busy in 2018. With all our integration efforts – whether in education, clinical practices, health information or health care delivery – we will keep the care of our patients at the center of all we do. Our calling is to improve the readiness of the force and the health of those we serve, and we are committed to this vital mission.
Why should you join SOMA?

Professional development. SOMA is dedicated to advancing the practice of SOF and tactical medicine. You will be on the forefront of cutting edge developments in medical care in tactical, austere, disaster and deployed environments.

Sound economics. The benefits of SOMA membership exceed the costs.

Your career. SOMA membership presents great opportunities to network and develop your leadership skills.

Stay connected. You will be able to draw on a large network of SOF and tactical practitioners and leaders through SOMA’s social media networks.

Keeps you up-to-date. SOMA membership includes the Journal of Special Operations Medicine, the only indexed, peer review journal in the world dedicated to SOF medicine.

Perspective. Connecting with other medics and physicians gives you new insight and helps you maintain a balanced perspective about your profession.

www.specialoperationsmedicine.org

JOIN NOW >>

---

ADVERTISERS INDEX

Aerospace Medical Association... 28 Skedco................................. 15
Asma.org

Border Security Expo ............ 9 SOMA ....................................... 28
Bordersecurityexpo.com

H&H Medical Corporation ..........23 Techline Technologies. ........... C3
Buyhandh.com

Masimo ..................................C4 W.L. Gore and Associates ........... 7
Masimoprofessionalhealth.com Goreprotectivefabrics.com

Medical Disaster Response ....... 14 Zanfel .............................. 17
Trauma-criticalcare.com

RDT, Ltd .............................. 13 Z-Medica. ......................... 3
Rdtltd.com

SKILCRAFT® (National Industries 5 Zoll .................................... C2
for the Blind) ....................... 5 Zoll.com/military
Nib.org/products

---

CALENDAR OF EVENTS

NOV 27 – DEC 1
AMUSUS
National Harbor, MD
Amsus.org

NOV 29 – DEC 1
Future Ground Combat Vehicles
Detroit, MI
Groundcombatvehicles.iqpc.com

DEC 7 – 8
Emergency Prep Leadership Forum
Nashville, TN
Emergencypreparednessleadershipforums.com

JAN 9 – 11
Surface Navy Symposium
Crystal City, VA
Sna.org

JAN 23 – 26
SHOT Show
Las Vegas, NV
Shotshow.org

JAN 31 – FEB 2
Border Security Expo
San Antonio, TX
Bordersecurityexpo.com

FEB 6 - 8
AUVSI USDPS
National Harbor, MD
Thedefenseshow.org

MAR 5 – 9
HIMSS 2018
Las Vegas, NV
Himssconference.org

MAR 26 – 28
Military Healthcare
Washington, D.C.
Militaryhealthcare.iqpc.com

MAR 26 – 28
AUSA Global Force Symposium
Huntsville, AL
Asumeetings.org/globalforce2018

APR 8
Medical Disaster Response
Las Vegas, NV
Trauma-criticalcare.com

APR 9 – 11
Trauma Critical Care Acute Care Surgery
Las Vegas, NV
Trauma-criticalcare.com

---

Aerospace Medical Association
320 S. Henry St.
Alexandria, VA 22314-3579
(703) 739-2240, ext. 106
FAX: (703) 739-9652
www.asma.org

AsMA is dedicated to uniting the world’s professionals in aerospace medicine and human performance; advancing the frontiers of aerospace medicine by dissemination of knowledge throughout industry, the general public, and governmental agencies worldwide; and ensuring the highest level of safety, health, and performance of those involved in aerospace and related activities. If you wish to be among those individuals who are challenging the boundaries of our world’s frontiers—Join AsMA Today!

AsMA 89th Annual Scientific Meeting
Hilton Aatole Hotel, Dallas, TX
May 6 - 10, 2018
MightySat™ Rx
Fingertip Pulse Oximeter

Featuring Masimo SET® Measure-through Motion and Low Perfusion™ Pulse Oximetry

Measurements

- SpO2: Oxygen Saturation
- PR: Pulse Rate
- PI: Perfusion Index
- PVi®: Pleth Variability Index

Designed for Performance

> High-resolution display
> Plethysmographic waveform
> Durable and lightweight
> Enhanced comfort

www.masimoprofessionalhealth.com

Caution: Federal (USA) law restricts this device to sale by or on the order of a physician. See instructions for use for full prescribing information, including indications, contraindications, warnings, and precautions.

© 2017 Masimo. All rights reserved.

Apple is a registered trademark of Apple Inc. registered in the U.S. and other countries.

*The Masimo Professional Health app is downloadable from the App store™ for iOS devices or Google Play™ store for select Android devices. For an up-to-date list of compatible smart devices, see: www.masimoprofessionalhealth.com. Only available for Bluetooth® LE enabled models.