

COMBAT & CASUALTY CARE

WINTER 2022
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COL Brian Lanier, MD

Commander

U.S. Army Institute of Surgical Research



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U.S. Army
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COMMANDER'S CORNER

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COL Brian Lanier, MD

Commander

U.S. Army Institute of Surgical Research

Joint Base-San Antonio

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Mr. Matt Quinn

Science Director

U.S. Army Telemedicine

& Advanced Technology Research Center

U.S. Army Medical Research

and Development Command

Ft. Detrick, MD



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VIRTUAL-BASED TRAINING, REAL-WORLD READINESS

COL Maria Molina, MD

Deputy, Education & Training Directorate

Defense Health Agency

Chief, Medical Modernization

and Simulation Division

Chair, Army Central Simulation Committee

Falls Church, VA

Cover: Medical professionals from the 212th Combat Support Hospital, 30th Medical Brigade, 21st Theater Sustainment Command, conduct a live wisdom tooth extraction during a live exercise, or LIVEX, at the Miesau Army Depot. Patients volunteered to conduct their surgeries in the field so that Soldiers from the 212th CSH could practice performing medical procedures in a field environment. (U.S. Army Photo)

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By Mark Schauer

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INSIGHTS

As we close out 2022, we look back on another year of health challenges for many but of healthcare advances for all. With lessons learned from two years of pandemic, one of the biggest focal points in medical treatment conveyance has been the use of telemedicine and tele-instruction. Whether at home or on the battlefield, a push to enable remote communication of expertise from doctor to patient in real time has spawned new capabilities to connect wounded with time-critical care delivery.

The Winter 2022 issue of *Combat & Casualty Care* takes us into the world of surgical research and application. Leading off is a follow up story from 2021 on the use of "telementoring" as a means of transferring expertise to any operating room in the world. CAPT Gordon Wisbach MC, USN, Ret., Naval Medical Center-San Diego, CA assisted the command's Virtual Medical Operations Center (VMOC) in pioneering this voice and visual based capability enabling the dissemination of surgical expertise on a global scale. In a roundtable interview with fellow military surgeons, we get a look at how surgical telementoring is breaking new ground through continued application.

From telementoring to telemedicine, U.S. Army Telemedicine & Advanced Technology Research Center (TATRC), Medical Research and Development Command, Ft. Detrick, MD, and Science Director Matt Quinn are promoting the National Emergency Tele-Critical Care Network (NETCCN), a valuable communications tool for bridging the time-to-care gap when casualties face the lack of immediate response. C&CC's annual Association of Military Surgeons of the United States (AMSUS) edition also spotlights the U.S. Army Institute of Surgical Research (USAISR), San Antonio. Newly-minted USAISR Commander COL Jeffrey Lanier, is heading up an Institute conducting cutting edge studies in Combat Application Tourniquet (CAT), Cold Platelet Resuscitation, Burn Navigator System, and Continuous Renal Replacement Therapies (CRRT), just to name a few.

With training at the root of readiness, the Defense Health Agency (DHA) and its Medical Modernization and Simulation Division (MMSD), led by COL Maria Molina, MD, is leading DoD efforts to create even more effective training tools that prepare field medics for combat casualty scenarios before they even experience one.

Be sure and catch this issue's double feature from U.S. Army Yuma Proving Ground, AZ on the latest in vertical life casualty evacuation (CASEVAC) and modification of the Army's Armored Multi-Purpose Vehicle (AMPV) for medical evacuation (MEDEVAC). On the industry front, Laurel Ridge Treatment Center, San Antonio, TX, offers critical mental health outpatient services that are helping to change lives.

As always, feel free to contact us with any comments or suggestions. Thank you for your continued readership!

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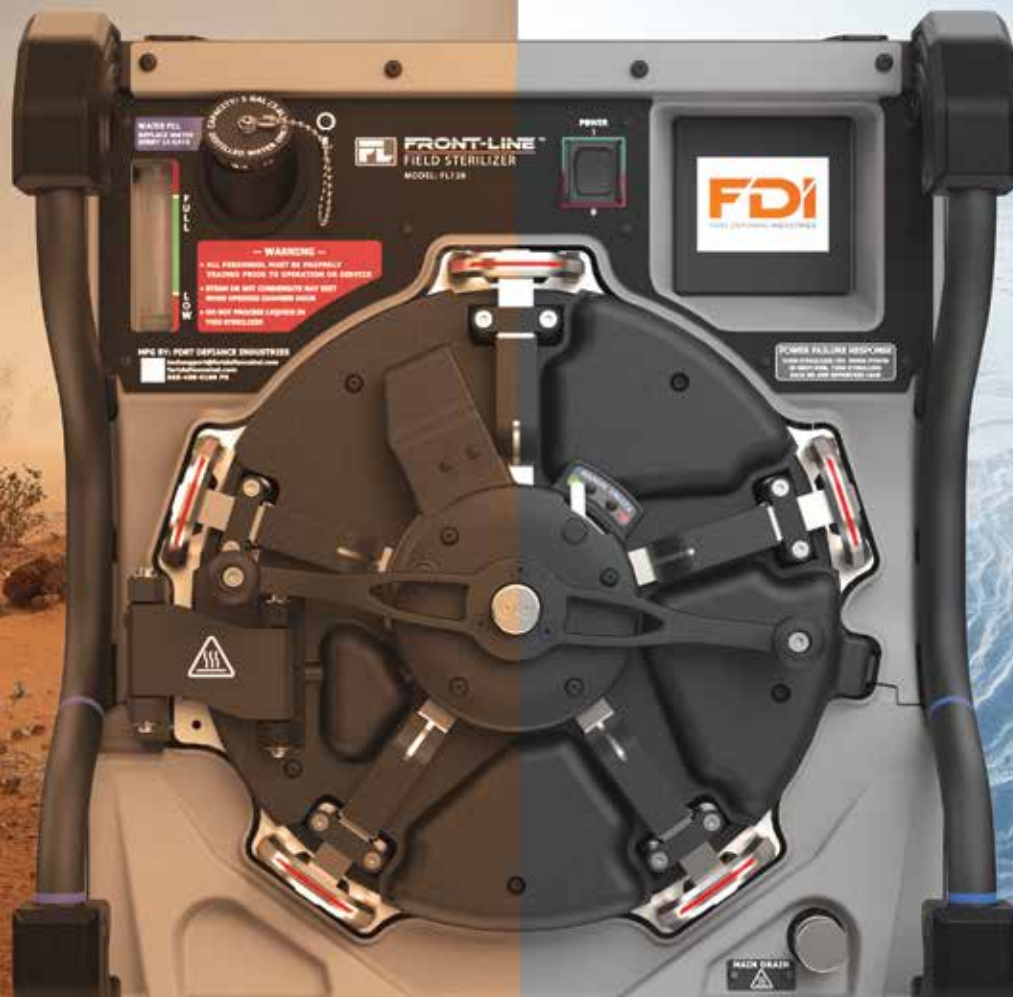
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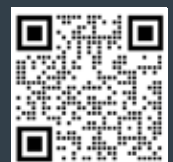


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SURGICAL TELEMENTORING: CONNECTING REMOTE EXPERTISE TO OPTIMIZE OPERATIONAL CARE DELIVERY

Championed by Naval Medical Center-San Diego's Virtual Medical Operations Center (VMOC), a relatively new, communications-based, autonomy-facilitative practice enabling remote telementoring to boost operational surgical capability.

By CAPT Gordon Wisbach, MC, USN, Ret.



Capt. Gordon Wisbach, Navy Medicine Readiness and Training Command (NMRTC) San Diego's Virtual Medical Operations Center (VMOC) telesurgical director, prepares for a robotic-assisted gallbladder removal surgery at NMRTC San Diego May 16. During the surgery, Wisbach communicated with Naval Hospital Camp Pendleton staff members remotely, per approved protocol, for telementoring. NMRTC San Diego's mission is to prepare service members to deploy in support of operational forces, deliver high quality healthcare services and shape the future of military medicine through education, training and research. NMRTC San Diego employs more than 6,000 active duty military personnel, civilians and contractors in Southern California to provide patients with world-class care anytime, anywhere. (U.S. Navy photo by Mass Communication Specialist 3rd Class Mariterese Merrique)

Since the advent of minimally invasive surgery, remote surgical application has been discussed and tested. The facets practiced have grown from remote live surgical demonstrations to remote surgical mentoring to full surgical procedures performed remotely. Current experience is based primarily on animal experiments, simulation models, and a select few cases of remote laparoscopic surgery for patients. Barriers to commercial use of remote surgical technology include patient safety concerns, legal liability, surgical credentialing, economic reimbursement for services, a standard platform for adoption and integration, and connectivity and latency between components. Some of these barriers are less of a concern in the Military Health System (MHS) that is committed to expanding telemedicine by advancing technology through sustained collaboration with the goal of increasing readiness, access, quality, and patient safety to the service member. Finding trusted surgical technology that can achieve these goals has been challenging.

SURGICAL TELEMENTORING DEFINED

An application termed 'telementoring' where remote surgical mentoring is transmitted via video and/or audio data has been explored to improve remote surgical applications. The technology has the power to transmit specialized surgical sub-specialists remotely to locations geographically distant and/or hazardous. So far when tested, telementoring has shown similar results achieved when direct in-room mentoring occurs documenting its reliability and feasibility. Telementoring technology tested has been broad with various methods investigated but thus far no ideal platform has been identified. The more specialized field of robotic-assisted surgery has seen even fewer tested options but does utilize an almost exclusive platform with the da Vinci Surgical Systems created by Intuitive Surgical Inc. (Sunnyvale, CA, USA). This system has some of the best visualization capabilities of any laparoscopic technology used

today and already utilizes a mentoring console format that facilitates video and audio transfer across fiber optic cables with limited latency. Medical robotics was applied to surgery over half a century ago as a military project aimed at replacing the surgeon's physical presence giving soldiers surgical care in battlefield environments. Many advancements have been achieved where robotic systems have successfully completed tele-surgical operations and even established telerobotic remote surgical services for rural communities. Telehealth application of robotic-assisted platforms has tremendous potential however no platform today is engineered to complete remote surgical options. To overcome the obstacles faced in remote application of surgery, a sustainable collaboration between key stakeholders like medical professionals, innovative providers and industry must identify a platform that will undergo development and rigorous testing to achieve a sustainable means of tele-enable surgical options. Towards this end, we began the development of the first tele-enabled da Vinci Robotic Surgical System (Intuitive Surgical Inc., Sunnyvale, CA). The da Vinci system has been used in previous telesurgery enabled platforms to complete pyeloplasty and nephrectomies in animal models looking primarily at the connectivity and feasibility of these systems. In addition, the da Vinci system had been used in telementoring endeavors in human models with one study testing over a VPN network during robotic-assisted radical prostatectomies, while another used ConnectTM, a second-generation telementoring interface developed by Intuitive Surgical Inc, during robot-assisted prostatectomies and nephrectomies.



Army medic performing an ear exam on a soldier with the aid of Mobile Medic - a mobile and web tool that helps healthcare workers obtain remote expertise. (U.S. Army Photo)

CRITICAL REAL-TIME VOICE AND VISUAL COMMUNICATION

The video feed from the robot camera, visible to the training surgeon on the surgeon console, is also viewable in three-dimensions through a separate and remote da Vinci robotic surgical console in real time. The audio feed allowed the mentor to speak with the staff surgeon, in-room operating personnel, and residents. The in-room staff surgeon or resident could communicate with the mentor only through the in-room robotic console via the microphones in the console. Using the da Vinci

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surgical console, the mentor could manipulate the surgical controls broadcasting telestration to the surgical view of the in-room staff and/or resident sitting at the surgical console. With these features, the remote da Vinci surgical console allows the mentor to counsel the staff surgeon, residents, and in-room operating staff on surgical technique, anatomy, equipment set-up, patient positioning, and case oversight.

IN-HOSPITAL CLINICAL PROTOCOL

Unique from previous studies, our telementor used a novel means of connectivity enabling full immersion for the mentor through the da Vinci robotic console with three-dimensional binocular live surgical involvement and telestrative teaching capacity during multispecialty surgeries. This pilot study test connectivity and reliability of the network as well as evaluated the clinical safety and performance of the telementoring interface for all surgical team members of in the operating room. In 2021 a remote mentor joined robotic-assisted procedures in the specialties including General Surgery, Thoracic Surgery, Urology, and gynecology. After the staff surgeons established that they were comfortable with the operation and willing to participate, a mentor-mentee meeting was arranged pre-operatively. The remote mentor was positioned at a remote mentor stationed including a remote stand-alone da Vinci surgical console in the Virtual Medical Operations Center. The patient-bedside mentee was a credentialed and capable surgeon working in coordination with the anesthesia service provider, operating room nurse, and surgical technician. A tenant of this pilot study was to expose the surgical team to the technology for a proof of concept and focus on acceptance level of this capability.

ESTABLISHED SIGNAL DEMAND GUIDES THE FUTURE DIRECTION

Through this pilot study we established the foundation to develop future tele-surgery enabled da Vinci Surgical System. An evaluation of the current technology, protocols, and console designs was obtained and will guide future refinements, challenges and requirements. The primary focus is to assure the safety and efficacy for remote surgeon involvement in local surgical or invasive procedures. The secondary goal is to characterize the experience of both the Mentor and Mentee in terms of evaluating the current technology, as well as the existing procedures that guide the establishment and maintenance of interpersonal/professional communication required for effective interaction between the two roles, and ultimately the best possible surgical outcome.

We hypothesize that the addition of surgical tele-mentoring, tele-presence and, ultimately, tele- surgery will improve the performance of surgical or invasive procedures by staff surgeons with the remote involvement by an expert surgeon. Advances in technology will be leveraged in an effort to expand surgical expertise and improve surgical patient care within the Defense Health Agency. This research effort has tremendous potential to impact the quality and safety of surgical and invasive procedures in the future by delivering surgical or invasive procedure expertise remotely. In continuation of this promising journey, we have an approved protocol between two military medical institutions - NMRTC-SD and NHCP - to do the following: Validate image fidelity with anatomic structure identification; Improve quality of video telecommunication connectivity including video and audio; Work load effect on the surgical team confidence and stress level, and; Conduct an overall assessment of the system including ease, reliability, usability, and usefulness.

MAXIMIZING THE POWER OF TELEMENTORING THROUGH ADVANCED FIELD READINESS



LTC Gary Legault

Director, Virtual Medical Center (VMC)
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COL Tyson Becker

Trauma/ Critical Care Surgeon
Director, Strategic Trauma and Readiness
Center of San Antonio (STaRC), TX



CAPT Benjamin Walrath

Emergency Medicine physician and
Director, Navy Medicine West EMS
Naval Medical Center-San Diego, CA

Combat & Casualty Care was privy to a recent question and answer session performed as part of a webinar hosted by AMSUS entitled "Operational Telementoring for Prolonged Combat Casualty Care" with Moderators CAPT Gordon Wisbach, MC, USN (Ret) and LTC Gary Legault, MC, USA. Expert panelists were COL Tyson Becker, MC, USA, Trauma/ Critical Care Surgeon; Director Strategic Trauma Readiness Center of San Antonio (STaRC) and CAPT Benjamin Walrath, MC, USN, Emergency Medicine physician and Director at Navy Medicine West EMS. The two combat physicians discussed ways telementoring could become an even greater game changer on the global battlefield.

LTC Legault: With increased focus on prolonged field care and casualties downrange longer than anticipated, how do we manage those longer care scenarios with surgical teams expected to performed care after initial combat surgery?

COL Becker: Traditionally surgery teams focused on damage control concepts of stabilize and ship out the patient to the next level of care. It is very possible that you are not going to have the ability to evacuate as quickly as we have in the past so you are going to be thinking of definitive vascular repairs and other more complex procedures. And so, I do think that's where telemetry is going to be more important. Somebody may understand the principles of vascular care or burr hole craniotomy but it would be nice to have the ability to phone a friend to re-assure themselves that they are doing the right thing, to refresh themselves if they haven't done a particular procedure in a while. Access to knowledge through telemetry could add a huge benefit especially with the current shortage of skilled

surgeons in specialties like vascular. With a vascular surgeon readily available everywhere in theater, having those skills pushed to the point of trauma could answer critical need.

LTC Legault: In order to utilize telemedicine and provide telementoring, how do we get people trained and through what platform? For example, when you are not available to teach or guide through an ultrasound FAST exam particularly in cases where it may only be combat medic available or non-medical personnel at the patient bedside?

CAPT Walrath: It is a no brainer that with a clinician at the point of injury who has a robust skillset, we can do more. The mentor is only as good as the mentee and there are several training platforms within the DoD. Back in 2013, Congress passed legislation stating that the Military Services, particularly the Army, needed to embrace National Registry certification, which is a civilian standard for scope of practice of pre-hospital providers. The DoD fails frequently in the pre-hospital setting, at least in the Navy, by not credentialing our pre-hospital providers. By reviewing someone's skillset through credentialing, you have made sure they have at least the baseline knowledge and expertise necessary to be mentored from afar. I think that is what we are missing in the DoD, credentialing in at least the Navy. We do not credential our pre-hospital providers. We just expect that the training they received in San Antonio, or Cook County training on the job training is enough assurance. There are schools that can train our medics to be ready to provide that level of care in the pre-hospital setting.

■ ROUNDTABLE DISCUSSION

Unfortunately, the military service branches have not all agreed as a single enterprise. The Army and Air Force require National Registry Certification, trusting external validation of any training. The Navy still has not embraced that completely, although we are, I think, finally, moving towards having our Corpsmen graduate school and take the National Registry Exam. With our medical technicians, we are looking at instruction and certification received by civilian paramedics. So, I would say that we can look to our civilian counterparts and use their infrastructure from an education and training perspective to help ensure that the medic at the point of injury has the appropriate skillset to be mentored.

LTC Legault: What do you think the benefit is of having telementoring for use as a pre-hospital reach back capability and what technologies do we need in place to support?





CAPT Walrath: The whole concept of the paramedic is to provide an extension of physician skills on scene. We cannot have Board Certified, emergency medicine physicians, trauma surgeons, or critical wartime specialists at every point of injury. And honestly, from a resource management perspective, it is just not fiscally responsible to expect that we would. We need to train our medics with the appropriate skill sets and tools to go into the field, understand their limitations and be able to call back for medical care direction. Having a set of protocols that assist our medics to identify when they feel like their patient needs something that


they are not trained to do, or they are not comfortable doing well is critical. Having a communication link to a higher level of training to assist our medics on the scene is force multiplying and ultimately saves lives.

I think the one final comment I have along those lines is the medic in the field who thinks, hey, I really want to save my brother in arms, my sister in arms, but I was not trained quite enough or this is outside my scope of practice. With the opportunity to call back and say, hey, what can I do, even if there is nothing they can do, just talking to a senior physician who says look you've done everything you can, and you did a great job, from a resiliency perspective, we can mitigate some emotional and psychological moral trauma that happens to our clinicians in the field. This is a tangential advantage or aspect to telementoring that we do not usually think about, but is very important particularly with modern concerns of occupational burnout or occupational exhaustion.

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STREAMLINING POINT-OF-INJURY TO SURGICAL CARE TRANSITION FOR OPTIMIZED OUTCOMES

Colonel (Dr.) Jeffrey Lanier presently serves as Commander, U.S. Army Institute of Surgical Research, Joint Base San Antonio, Texas. He received his Bachelor of Science in Biological Sciences cum laude from Northern Kentucky University and was commissioned as a 2nd Lt. through the Army Reserve Officer Training Corps program at Xavier University. COL Lanier attended medical school through the Army's Health Professions Scholarship Program and received his Doctor of Medicine with High Distinction from the University of Kentucky College of Medicine. COL Lanier completed his residency training in Family Medicine at Tripler Army Medical Center, Hawaii.

After completion of his residency training, COL Lanier served as a Staff Family Physician at Martin Army Community Hospital, Fort Benning, Georgia. From 2007-2008, he deployed in support of Operation Iraqi Freedom with the 3rd Squadron, 73rd Cavalry Regiment, 1st Brigade Combat Team, 82nd Airborne Division. He returned to Martin Army Community Hospital from 2008-2015, serving as Team Leader and then Assistant Program Director of the Family Residency Program, where he was a two-time recipient of the Teacher of the Year Award. In 2010, COL Lanier completed a Faculty Development program at the University of North Carolina.

Colonel Lanier's subsequent assignments include Physician Recruiter, U.S. Army Medical Recruiting Brigade, Fort Knox, Kentucky, 2015-16; Chief Medical Officer, Ireland Army Health Clinic, Fort Knox, Kentucky, 2016-17; Commander, California Medical Detachment, Presidio of Monterey, California, 2017-19; Division Surgeon, 1st Cavalry Division, Fort Hood, Texas, 2019-20.



Combat & Casualty Care had the opportunity to speak with COL Brian Lanier, USAISR Commander, regarding areas the DoD's premier laboratory for study of combat casualty care delivery and home of the Department's only burn center is presently focused on as we head into 2023.

C&CC: What is your primary role and mission within USAISR?

COL Lanier: I am the commander of the U.S. Army Institute of Surgical Research at Joint Base San Antonio-Fort Sam Houston, Texas. The USAISR, also known as the ISR, is one of seven research institutes under the U.S. Army Medical Research and Development Command at Fort Detrick, Maryland. The ISR is the Army's premiere research organization focused exclusively on the combat wounded and is the home of the only Burn Center in the Department of Defense. As the commander of this illustrious command, I am tasked with continuing our noble mission of, "Optimizing Combat Casualty Care." Our daily medical and medical

COL Jeffrey Lanier, MD

Commander
U.S. Army Institute of Surgical Research
Joint Base San Antonio-Ft. Sam Houston

research activities performed at this institute are focused on saving lives on the battlefield. Everything we do is for the combat wounded and I am fortunate to lead an exceptional team of professionals who excel in the areas of combat casualty research, burn research and compassionate patient care. I have set some priorities in different focus areas that I believe will assist in continuing our mission while I'm here as the ISR Commander.

People: People are my number one priority. The important work we do at the ISR isn't possible without the hard work and dedication of every member of this team. Everyone on this team either takes care of



U.S. Army Special Forces Soldiers assigned to 19th Special Forces Group (Airborne) perform TCCC (Tactical Combat Casualty Care) on a simulated casualty during a joint training exercise in Lithuania, Oct. 21, 2021. Special Operation Forces Soldiers from Lithuania, Latvia, Estonia and Poland provided life saving techniques and strategies for trauma care on the battlefield, this training is crucial because it teaches the procedures that must be administered when providing aid with NATO partners and allied forces. (U.S. Army photo by Sgt Stanford Toran)

patients, performs research to improve care delivery on the battlefield, or supports those who do. My primary responsibility as the ISR Commander is to ensure the Team has the necessary tools to do their work to the best of their ability, under any circumstances.

Research: I want our research to be relevant to the warfighter and focused on bringing solutions to identified gaps in combat casualty care. ISR research has been a driving force behind the most important advances in combat casualty care since 1949. As the Army's premier combat casualty care research institute, we must continue to maintain our status by continuing to perform relevant research for our combat wounded. We also must be mindful and good stewards of the resources allotted to us and show that our work is necessary for today and on future battlefields.

Patient Care: The ISR Burn Center was established in 1949 as the first and only Department of Defense burn center and is the only military treatment facility co-located with a research laboratory which optimizes translational research. We have a reputation of providing world-class quality, and safe burn care and must continue doing so. We must also be ready for the next military conflict by training healthcare providers who will continue to provide the best burn care in the world and maintain that crucial skillset needed to accomplish the task. We also must be innovative in every aspect of burn care and research as we continue to lead fundamental advances in the multidisciplinary care of burn casualties which have become the standard for burn care throughout the world. A highlight of the global impact of our training activities is a recent mission to teach Advanced Burn Life Support (ABLS) in support of CENTCOM in the UAE.

Readiness: Along with providing the appropriate training for those outside of the ISR to meet the battlefield mission, our staff must be ready to support the mission as well. Readiness is applicable to all staff members, but our Burn Flight Team is at the forefront. This Team is uniquely qualified to perform critical-care aeromedical evacuation of severely burned casualties—for example, they recently conducted a strategically important mission to recover burned Sailors from Hawaii following a devastating shipboard fire in the Pacific Ocean.

Tell the ISR Story: The ISR plays a critical role in supporting the warfighter and must tell our story whether through news stories, social media posts, community outreach events, or VIP tours to our facilities. Meanwhile, our burn leadership carries out an active outreach program to the community and participates in regional disaster preparedness. We must let our stakeholders, our families, and the public about the crucial work we do here and the outstanding staff that is conducting the work.

C&CC: Can you provide us with the latest research on combat casualty care at the USAISR?

COL Lanier: As I mentioned before, the ISR is the Army's premier research organization focused exclusively on improving the delivery of combat casualty care and home of the only Department of Defense Burn Center. Our research has led to development of lifesaving, combat casualty care products provided to the Warfighters. Some include the Combat Application Tourniquet; Cold Platelet Resuscitation; Combat Gauze Dressing, the Burn Navigator System, and in-flight Extracorporeal Life Support (ECLS) and Continuous Renal Replacement Therapies (CRRT), to name a few.

Our primary focus has been on reducing complications associated with casualty management through research aimed at technology and treatments that can be used to manage casualties under austere conditions for prolonged periods prior to medical evacuation. The military medical system available during the wars in Iraq and Afghanistan achieved unprecedented survival rates. This was due to the ability to rapidly transport casualties from the point of injury to nearby, well-equipped, medical facilities staffed with trained clinical professionals. Casualties in Iraq and Afghanistan were routinely able to be evacuated to a surgical platform within 60 minutes. Future conflicts may require frontline providers to care for casualties for up to 72 hours or more before reaching definitive care. Our goal is to extend pre-hospital survival window from the "golden hour" to a "golden window" for as many as possible.

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C&CC: What is the USAISR doing to address the future challenges on the battlefield?

COL Lanier: The ISR is DoD's lead laboratory for prolonged field care of combat casualties. We are continuously looking at ways to enhance burn care as well as combat casualty care research. We have taken steps to optimize and streamline our efforts to maximize tangible results for our Warfighters. As we look to the future, the ISR is developing capabilities that will make it possible to maximize survival in Large Scale Combat Operations for our troops in the field and during transport. In order to achieve this, we have combined our research capabilities of our Research Directorate into five dynamic combat casualty care research teams or CRTs.

The five CRTs are: CRT1-Blood & Shock Resuscitation; CRT2-Hemorrhage & Vascular Dysfunction; CRT3-Organ Support & Automation Technology; CRT4-Combat Wound Care; and CRT5-Pain & Sensory Trauma. CRT1-Blood & Shock Resuscitation is focused on research projects that include an anti-shock drug; engineered dried whole blood alternatives; next generation extended shelf-life platelets and whole blood; and improved blood transport container system and support for drone delivery of blood products. CRT2-Hemorrhage & Vascular Dysfunction is working on non-compressible hemorrhage control and expanded REBOA capability; use of hemostatic foams; microvascular stabilization; and resuscitation with enteral fluids. CRT3-Organ Support & Automation Technology concentrates on clinical decision support system and compensatory reserve measurement for medics; next

generation smart tourniquets; heparin-free Extracorporeal Life Support (ECLS); ultrasound-guided and semi-automated vascular access to enable multi-organ support in forward-deployed environments; and robotic surgical assistance. CRT4-Combat Wound Care research is centered on non-surgical debridement of severe burn wounds; far-forward treatments to prevent burn progression; external fixation/traction for lower extremity injuries; and pathogen agnostic wound care. CRT5-Pain & Sensory Trauma is focused on assessing the efficacy of novel pain compounds for the management of acute pain; ultrasound-guided and semi-automated local/regional anesthesia; combination non-opioid therapy for acute pain; and temporary corneal repair.

The Burn Center has a vigorous Clinical Research Department that conducts combat-casualty-care research in tandem with the Research Directorate. Current clinical research includes oxygen conservation in burn patients; use of ultrasound to diagnose inhalation injury; plasma for burn shock resuscitation; enteral resuscitation; ketamine for pain control in critically ill patients; and standard versus protocolized rehabilitation in burns, to name just a few. Many of these studies are part of multicenter collaborations with civilian centers, which further enhances the impact of the work.

As you can see, our research and clinical activities are both tightly focused to ensure our combat wounded have the best chance of survival if injured on the battlefield. We will continue to provide the best care possible at the Burn Center and focus our research efforts for the Warfighters that we work for. For me, there is no greater honor than to care for those who serve our great Nation.

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SCAN ME

AMPV: MEDEVAC ANYWHERE, IN ANY WEATHER

The U.S. Army recently tested a medical evacuation (MEDEVAC) variant of its Armored Multi-Purpose Vehicle (AMPV) at Cold Regions Test Center (CRTC), Yuma Proving Ground, Arizona.

By Mark Schauer, Yuma Proving Ground



The U.S. Army's Armored Multi-Purpose Vehicle (AMPV) has five variants—a general purpose vehicle, mission command vehicle, mortar carrier, and medical evacuation and medical treatment vehicles. Each have nearly 80% more interior volume than the M113, and significantly more power, survivability, and maneuverability. (U.S. Army Photo)

Soldiers depend on armored vehicles for mobility in combat situations.

This past winter, a high impact, multi-month evaluation at U.S. Army Cold Regions Test Center helped ensure the Army's latest armored personnel carrier, the Armored Multi-Purpose Vehicle (AMPV), works even in the world's coldest environments. A portion of the test involved a Soldier touchpoint where active-duty service members used the vehicle in the extreme cold.

"The Soldiers that participated were from a Stryker brigade," said Hannah Henry, test coordinator. "The AMPV is fairly similar to it, so we wanted to get their feedback."

The touchpoint utilized the medical evacuation variant of the AMPV.

"Their main focus was the ability to get patients into and out of the vehicle," said Henry. "How slippery does the ramp get? Can you operate the medical equipment in the cold? They rode as patients in the vehicle and rated how they felt as the vehicle moved along."

A MULTI-VARIANT, MULTI-ENVIRONMENT CAPABLE WORKHORSE

The Armored Multi-Purpose Vehicle's (AMPV) five variants—a general purpose vehicle, mission command vehicle, mortar carrier, and medical evacuation and medical treatment vehicles—have nearly 80% more interior volume than the M113, and significantly more power, survivability, and maneuverability. The cooling and electrical systems are also more robust to accommodate both existing and future upgrades. It boasts the same powertrain and suspension system as the Bradley Fighting Vehicle and M109A7 self-propelled howitzer, which eases maintenance and logistics challenges for all three vehicles in the field.

Though the weather this past winter at CRTC did not reach the jaw-dropping temperatures of -60 degrees Fahrenheit or more below zero, the variation did not faze the testers.

"Extreme cold comes in windows, and it's normally a scramble to try to get things into those windows," said Stephan Krueger, test officer.

The coldest times the vehicle was operating on road courses saw the mercury plunge below -36 degrees Fahrenheit, and the crew had much to do. The AMPV accumulated hundreds of miles on CRTC's punishing road courses, and undertook braking and acceleration tests at CRTC's automotive test track.

Further, the engine was subjected to cold starts in temperatures well below zero, oftentimes after having cold air blown on its engine from tubular fans to ensure a maximum of frigidness. The testers drove the vehicle for more than 1,000 miles across primary and secondary roads and cross-country trails.

"Normally when it is extremely cold, we prioritize cold starts," said Krueger. "If it is extremely cold and we are not doing cold starts, I like to try to get a lot of durability miles in. Cross country is the slowest and takes the most time—much of our effort is getting those miles."

FULL ROUND OF TRIALS COMPLETE

The AMPV has already undergone extensive testing at all three of U.S. Army Yuma Proving Ground's natural environment test centers—Yuma Test Center outside Yuma, AZ.; Cold Regions Test Center at Fort Greely, AK; and, most recently, at Tropic Regions Test Center in the jungles of Panama.



MISSION RESILIENCY

LAUREL RIDGE TREATMENT CENTER

Laurel Ridge Treatment Center has faithfully served the children, adolescents and adults of San Antonio since 1987. Laurel Ridge's story began with the mission of Saving Lives, Healing Families and Creating Hope for individuals and families in South Texas and has done so with excellence and pride; growing and expanding to now have a compliment of over 600 employees.

In 2007, Laurel Ridge began to see the need for private treatment centers to learn more about the issues and challenges facing active duty service members, realizing that the sheer number of those in need of treatment would soon out-pace the then military system's behavioral health capabilities. Laurel Ridge began an effort to come alongside military command and meet the service member's treatment needs with the most cutting edge and evidence based treatment programs available.

2008 birthed Mission Resiliency, the Active Duty Treatment Program at Laurel Ridge. This dedicated Active Duty unit began with ten beds and all patients on the unit were on a military -specific milieu. Mission Resiliency's goal was to keep the military culture strong with this cohort and to provide the best treatment with the least amount of disruption possible while restoring resiliency to the service member. Ten beds soon became 20 beds and within a couple of years, Mission Resiliency's outcomes and evidence-based treatment resulted in a 60 bed dedicated Active Duty military treatment building on the main campus.

Since its inception, Laurel Ridge's Mission Resiliency program has successfully treated thousands of active duty service members struggling with Combat Trauma, PTSD, substance use/abuse issues, suicidal ideation, and other

behavioral health conditions.

Mission Resiliency is a multi-modal, multi-disciplinary approach to intervention that addresses the service member and his or her family as a whole. Laurel Ridge utilizes evidence-based treatment programs meeting or exceeding TRICARE standards of care. Furthermore, Mission Resiliency continues to monitor outcomes, ensure fidelity of treatment, and implement the most current treatments available.

Nearly 1 in 4 active duty service members showed signs of a mental health condition, according to a 2014 study in JAMA Psychiatry. Treatment modalities such as Prolonged Exposure and Cognitive Behavioral Therapy in co-occurring anxiety disorders and Substance Use Disorders has resulted in significant improvements with addressing alcohol and drug use.

Laurel Ridge also treats Active Duty Dependents, realizing deployment related symptoms and issues are not limited to the service member who has been deployed. " says Laurel Ridge CEO, Jacob Cuellar, MD. "When one member of the family is deployed, there is a ripple effect of anxiety, shift in responsibility, and a family dynamic that also needs to be addressed."

Laurel Ridge is perfectly positioned to treat both the service member and the family - many of Laurel Ridge's clinical staff and treatment teams are made up of retired military or military spouses. ***"We not only treat these families, we have been these families;"*** says Director of Military Services, Rodney Norman Army (RET). "Many of us know the struggles, know the pain, have come

BETWEEN A ROCK & A BREAKTHROUGH

through to the other side, and are perfectly positioned point these wonderful service members and their families to hope."

BIG MOVES...

Building on its successful outcomes in treating active duty service members, Laurel Ridge celebrated the opening of the Mission Resiliency Active Duty Outpatient Treatment Program in Killeen, Texas in the Spring of 2014. "Laurel Ridge has always responded to the needs of the Community and we are proud to serve whenever and wherever needed," says CEO Cuellar, MD.

In August of 2020, at the height of the Pandemic, Laurel Riddge celebrated another milestone as they expanded their footprint (across from the original campus) with a

perform daily PT, stay Deployment Resilient and Mission Ready.

"Our goal is not only to treat the combat trauma, the PTSD, the substance use but to actually build a better skill-set for each ADMS so that they are as proficient in processing trauma, stress, and other deployment or active duty related stressors while also maintaining a state of Mission Readiness," says Mission Resiliency Clinical Director, Angela Chavez.

Since its inception, Mission Resiliency's tag line has been: Sometimes You're Between A Rock & A Breakthrough. "That turned out to be almost prophetic," says CEO Jacob Cuellar, MD. ***"Because here, Hope is alive and breakthroughs happen every day. Every. Single. Day...and you know what,"*** he smiles. ***"We are just getting started."***



brand new, dedicated state-of-the-art Mission Resiliency Active Duty Military Treatment Center. This 60-bed Mission Resiliency campus boasts a beautiful gym, dining hall, kitchen and plenty of space for service members to

For more information about Mission Resiliency at Laurel Ridge go to laurelridgetc.com or call 210-491-3591.

FORGING THE FUTURE OF TELE-CRITICAL CARE

Matt Quinn is the Science Director for the Army's Telemedicine & Advanced Technology Research Center (TATRC) and leads efforts by TATRC's research & development teams to forge the future by fusing data, humans, and machines into solutions that optimize Warfighter performance and casualty care. Matt has over 20 years of experience in health technology across federal agencies including the Agency for Healthcare Research and Quality (AHRQ), the National Institute of Standards and Technology (NIST), the Federal Communications Commission (FCC), the Health Resources and Services Administration (HRSA), the U.S. Army as an Engineer Officer and in the private sector at Intel Corporation, where he was Managing Director of Healthcare and Life Sciences and at Teradata, where he was Healthcare Industry Manager. Mr. Quinn has been deeply involved in advancing health innovation and, while Director of Healthcare Initiatives at the FCC co-authored the FDASIA report for Congress on the regulatory framework for health technology and at AHRQ and NIST co-authored key guidance which led to "safety-enhanced design" EHR certification requirements. Matt has testified before the Senate and the House of Representatives, been recognized multiple times with the FedHealthIT100 award for driving change and advancement in the Federal Health IT ecosystem, received the HHS Distinguished Service Award, the highest honor granted by the department, the Army Meritorious Civilian Service Medal for his work in launching the National Emergency Tele-Critical Care Network (NETCCN) and the first ever National Health IT Collaborative for the Underserved "Champion of Diversity" award. He earned an engineering degree from the United States Military Academy at West Point and an MBA from Colorado State University.



Mr. Matt Quinn

Science Director
U.S. Army Telemedicine & Advanced
Technology Research Center
U.S. Army Medical Research & Development Command

Combat & Casualty Care spoke with Matt Quinn, Science Director at the Army's Telemedicine & Advanced Technology Center (TATRC) regarding the evolution of the National Emergency Tele-Critical Care Network (NETCCN) and ways the NETCCN is bridging the care gap in lack of immediate care response when casualties occur remotely and ready access to hands-on treatment is not an option.

C&CC: Provide some brief background on NETCCN's growth to the present and its reach.

Mr. Quinn: NETCCN was born in March 2020 when the U.S. Army Medical Research and Development Command's Commanding General, BG Michael Talley, asked TATRC's Commander, COL Jeremy Pamplin, "What can TATRC do to combat the COVID-19 pandemic?" One-hundred and eighty-three days after that call and less than three months after award, NETCCN initiated its first mission in the real world: tele-critical care in support of the INDOPACOM mission to

Guam Memorial Hospital. During the pandemic, NETCCN has delivered "anywhere to anywhere" tele-critical care – and a wide variety of other services – in support of more than 60 healthcare organizations, 1,000 patients and nearly 5,500 patient days of care across the United States and its territories. Since, NETCCN has been incorporated into several military exercises and experimentation activities, including Project Convergence 22, which has resulted in "soldier touchpoints" with more than 300 military clinicians and more than 900 simulated patient encounters. One of the NETCCN platforms now has an ATO (Authority to Operate) on military networks and TATRC is currently working with the Defense Health Agency's (DHA's) Virtual Medical Center to initiate a pilot program to use NETCCN to extend scarce expertise on Monkeypox from wherever the infectious disease specialists are to wherever the DoD needs that expertise to evaluate potential cases of this disease. In addition, NETCCN is supporting the President's "Test to Treat" program at 13 community COVID-19 testing sites in Michigan through a mission assignment from the Department of

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Health and Human Services Administration for Strategic Preparedness and Response (HHS/ASPR). While this might seem far from combat casualty care, expanding COVID-19 testing sites staffed by community health workers – often in poorly-connected churches, strip malls and community colleges – to support on-demand evaluation and prescription of anti-viral drugs truly demonstrates the ability of NETCCN to reach “from anywhere to anywhere.”

C&CC: As a network-reliant type of healthcare, talk about ways telemedical capabilities are evolving to better meet patient needs.

Mr. Quinn: Traditionally “telemedicine” evokes images of bandwidth-heavy “real time video” applications in which clinicians in healthcare organizations communicate with patients, whether at home or in another clinician’s office using specialized telemedicine equipment and peripherals. NETCCN – both to support new models of care during COVID-19 and for Multi-Domain Operations – has broken this mold in several ways. First, NETCCN operates on personal or organization-supplied smart-phones and tablets instead of specialized or proprietary hardware that would need to be shipped and installed prior to use. This allowed TATRC to initiate a NETCCN mission to a hospital in Missouri in less than three hours, saving two patients’ lives. Next, while NETCCN can and has supported direct-to-patient care delivery, the vast majority of NETCCN use has been in support of other clinicians: an intensivist assisting a primary care doctor at a rural critical access hospital care for a severely ill patient, an intensive care nurse helping a medical surgical nurse, and even palliative care expertise for small hospitals that usually send their sickest elsewhere but, because of circumstances, cannot. Another key difference is bandwidth requirements. NETCCN applications all must run on 4G cellular networks versus broadband. Something that we have learned through extensive use of NETCCN by healthcare providers in the military health system and across the globe is that, especially after an initial communication, most clinicians communicate through messaging and other low-bandwidth synchronous and asynchronous communications. During the pandemic, one of the hospitals that NETCCN was supporting lost power and network. Because NETCCN runs on 4G and phones, it was the continuity of care for a period of time. Instead of featuring a wide array of features and functions – as is the case among technologies competing for the traditional hospital telehealth market – NETCCN applications have a few features that are exceedingly simple to use (as determined by extensive usability testing): basic communication, documentation and onboarding patients. Finally, there are multiple NETCCN applications – intentionally. While each must meet certain minimum characteristics, like the ones described above, they are all different. But must all be able to connect to a cross-platform application module that accepts and normalizes data across the applications. This reflects the reality of the future of telemedicine and digital health tools, whether in the civilian world or in military health, across levels of care, specialties, services and the like.

C&CC: From a primary challenges perspective, speak to the specters of Prolonged and Mass Casualty Care. How are the hurdles for each shared and different?

Mr. Quinn: Prolonged care, mass casualty care or both are characterized by resource limitations: Equipment, medications, medical devices, and especially expertise. Our experimentation in support of mass

casualty care and prolonged care should focus on expanding the capability and capacity of those on the front lines and of the system as a whole. Our NETCCN experience in COVID-19 provided excellent learning in this regard and motivated our application of tele-critical care. As Barbash and others noted in the New England Journal Catalyst early in the pandemic, “Locations without ICU beds do not have clinicians who know how to use ventilators – even if they become available. Necessary is a simple, consistent means to reliably and effectively support people who deliver critical care. As long as network resources are available, Tele-Critical Care is a solution.” Throughout the pandemic, we encountered and assisted clinicians mostly at small hospitals who would ordinarily send their sickest patients to a larger hospital. But, because of surges and other factors, they could not. We have countless examples of how primary care doctors, physician assistants and medical surgical nurses in some of our Nation’s most underserved, austere and rural communities successfully cared for ventilated patients, sometimes for days. The key was establishing that trusted relationship between distance and local caregiver. And helping them in their time of need. NETCCN had several hospitals as repeat customers and this is a testament both to the challenges of a depleted workforce during surge after surge but to the value of the service to the caregivers at these organizations.

From the start, and in an effort to apply experience from the pandemic to mass casualty events in the context of MDO, NETCCN has been envisioned as something that would scale nationally – or even internationally. This requires not just technical scalability – the cloud – but a framework to field requests, assign teams to missions and collect data across multiple NETCCN teams. By organizing NETCCN as a digital health ecosystem consisting of multiple clinical/technical teams connected by an operations cell and a cross-platform application platform, NETCCN has supported as many as 26 healthcare organizations simultaneously, while on-boarding and off-boarding new missions. Incorporation of NETCCN into real-world hurricanes, tornadoes and other large-scale casualty events as well as experimentation exercises like PC22 will further this learning.

C&CC: With continued evolution of the National Emergency Tele-Critical Care Network (NETCCN), what are some key TATRC objectives for streamlining more services to fit within NETCCN’s scope, particularly in support of future Multi-Domain Operations?

Mr. Quinn: During the whirlwind of the past two and one-half years, TATRC and its partners have done our best to gather rigorous qualitative and quantitative feedback from users of all types, both to iteratively improve NETCCN platforms and operations on a continuous basis, but also to gather lessons learned to apply to the challenges of MDO. Through direct use and refinement by medics in TATRC’s NEXUS human-performance lab, TATRC and our NETCCN teams can gather empirical data from combat medics performing complex and iterative combat casualty care tasks, including procedures, with the assistance of distance tele-critical care experts, which combat medics typically do not perform. This allows TATRC and its teams to get closer to optimize human-technology teams and to refine both technologies and concepts for how technology can expand capability and capacity of response.

Another key thing that we’ve learned is that NETCCN is applicable to far more than critical care. Effective extension of an array of expertise far forward – to the point of need – can keep more Soldiers in the fight, but also keep more clinicians, medics and others available



TATRC's NEXUS Lab brings together combat medics, scientists, human factors experts, technologists and concept developers to gather "soldier touchpoints" and rigorously measure and improve the usability, network usage and other aspects of NETCCN and other combat casualty care technologies. (U.S. Army Photo)

to serve.

Finally, a key extension of NETCCN has been what we call "virtual hospital" capabilities – extending the NETCCN "anywhere to anywhere" care model to deliver "hospital-like" services to further increase capability and capacity. Early in the NETCCN project, TATRC – virtually - brought together military and civilian leaders, clinicians, technologists, combat medics and other stakeholders to identify and prioritize "virtual hospital" capabilities. The ability for distance clinicians to extend NETCCN services by remotely controlling mechanical ventilators and infusion pumps – via smart-phones and tablets - both has value for virtual care of COVID-19 patients and for future combat casualty care concepts. For example, instead of a distance intensivist instructing a nurse via voice, video or messaging on how to adjust a ventilator, remote control – with a local caregiver in the loop – would allow the distant clinician to directly control the medical devices "from anywhere to anywhere." In December 2021, after just seven months of work, three teams conducted a live demonstration of remote control of ventilators from three different manufacturers in key COVID and combat casualty care scenarios. Ventilator remote control was included in NETCCN support of a hospital in Vermont during the Omicron surge. In November 2022, the same teams will demonstrate remote control of ventilators and infusion pumps and incorporation of data across devices and sites of care in a dynamic, situational awareness dashboard.

C&CC: Feel free to speak to other areas of focus and any R&D outlook.

Mr. Quinn: In the recently published Army Medical Modernization Strategy, LTG James M. Richardson lamented that "The AHS' current acquisition and modernization processes are antiquated and unable

to keep pace with the current threat environment." The COVID-19 pandemic for all of its horror, death and suffering, presented a unique opportunity to work differently – to work faster, to be radically inclusive by bringing together technologists, clinicians and regulators, to work in (interoperable) ecosystems, to continuously improve through fielding, rigorously gathering feedback, iterating, improving, fielding and gathering feedback again.

To have an impact on the pandemic, as MRDC's CG challenged us, TATRC needed to assemble a team of teams to deliver an actual service. And do it quickly, securely and safely. Normally a research lab is responsible for prototyping a technology piece of a larger solution that, maybe, will transition to advanced development for later integration to "close a validated gap." This simply was not a tenable approach. So TATRC worked differently and made a significant impact.

In its letter to the 2022 NDAA, the Senate Armed Services Committee commended "TATRC... for the rapid development and deployment of... NETCCN... and... encourages the Defense Health Agency to fully leverage this...to accelerate current and future digital health and telehealth applications throughout the military health system." TATRC and its NETCCN teams have won multiple awards for "Disruptive Innovation," impact and government innovation but as the pandemic winds down, there is an opportunity to apply lessons learned not only from the technologies and care models that we used to expand capability and capacity during COVID-19 to combat casualty care and military medicine more broadly, but to how we work moving forward. Reverting to legacy processes, roles and functions will not deliver the trusted, usable, interoperable, secure solutions that our combat medics, frontline caregivers and leaders at echelon will need to address the myriad of known and unknown challenges of combat casualty care in MDO.

ADVANCING MEDICAL MODERNIZATION AND SIMULATION

Dr. Maria M. Molina is currently the Division Chief for Medical Modernization and Simulation within J-7, the Education and Training Directorate of the Defense Health Agency. She is also an Assistant Professor of Obstetrics and Gynecology at the Uniformed Services University of the Health Sciences and serves as Chair of the Army Central Simulation Committee. She is board certified in obstetrics and gynecology, a fellow in the American College of Obstetricians and Gynecologists and a fellow in the American College of Surgeons. She has previously served as the Chief of the Simulation Center at Brooke Army Medical Center, Ob/Gyn Department Chief and Chief of Surgical Services for Weed Army Community Hospital and the Gynecology Surgery Division Chief for Brooke Army Medical Center. Within these positions she has integrated simulation into the training of multiple students, residents, nurses, and medics. Dr. Molina provides the full scope of general obstetrics and gynecology practice including outpatient obstetrics and gynecology clinic, labor and delivery and operative care. She is also a Certified Simulation Healthcare expert and completed the Medical, Modeling, and Simulation Healthcare Certificate Program at the Naval Postgraduate School.

Dr. Molina's current efforts include: identifying opportunities for centralization of initiatives, programs, and resources within J-7; executing the Interoperable Network for Training, Readiness, and Education in Medicine (INTREMED), providing more meaningful performance metrics and analysis to the MHS; and integrating the Virtual Education Center (VEC) into J-7, in order to create a collective effort to improve quality of care and advance patient education.



COL Maria Molina, MD

Deputy, J-7 Education & Training Directorate
Defense Health Agency
Chief, Medical Modernization and Simulation Division
Chair, Army Central Simulation Committee

C&CC: What is the Medical Modernization and Simulation Division (MMSD) and where does it fall within the Defense Health Agency (DHA)?

COL Molina: The MMSD falls within the DHA Education and Training Directorate (J-7). In addition to the responsibilities of its branch offices, MMSD is the gatekeeper for all medical education and training requests that are submitted for J-7's review. The mission of the MMSD is to champion centralized, innovative educational tools and systems that span the breadth of the Military Health System (MHS), improving knowledge and wellness among students, providers, beneficiaries, and their families. MMSD's vision is a Military Health System composed of centralized, modernized educational resources and technologies.

MMSD's two current branches include the Defense Medical Modeling and Simulation Office (DMMSO) and the Virtual Education Center (VEC).

C&CC: What is the Defense Medical Modeling and Simulation Office (DMMSO) branch within MMSD and how is it shaping policy on simulation?

COL Molina: DMMSO is the lead organization for the centralized management of shared service Medical Modeling and Simulation (MM&S) capabilities and solutions to support medical education and training. The management of MM&S by this Office will support the development, management, and integration of requirements, capabilities, and systems for health care operations; promote the use of MM&S across the Department; and improve medical readiness, survivability, quality of care, patient safety, and efficiency.

DMMSO was mandated to centralize, consolidate, and standardize Military Treatment Facility (MTF) medical simulation processes. To fulfill this task, the Office worked closely with Service simulation organizations to co-locate at Fort Sam Houston, Texas in 2019. As a coordinating office, DMMSO partners with the Services and various organizations, universities, and Agencies, including Navy Medical Modeling and Simulation Training (NMMAST), Air Force Medical Modeling and Simulation Training (AFMMAST), Army Central Simulation Committee (CSC), Army Directorate of Simulation (DoS),



Soldiers execute a field training exercise at Joint Base Elmendorf-Richardson. (JBER)

and the Uniformed Services University of the Health Sciences (USUHS).

In addition to forging partnerships to increase collaboration, since the Office's staffing in 2018, DMMSO has aimed to further clarify and outline the role of simulation across the MHS. DMMSO has published both Department of Defense Instruction (DoDI) 6000.18, "Medical Modeling and Simulation Requirements Management" and DHA-Administrative Instruction (AI) 6000.01, "Medical Modeling and Simulation Requirements and Implementation Guidance for Training" to guide and mold the use of simulation.

Additionally, DMMSO completed the "MHS Simulation-Based Training Delivery Capabilities-Based Assessment (CBA)" in March 2020. The CBA represents the work of a broad coalition of MHS stakeholders and subject matter experts from all three Services, the DHA, Special Operations Command, and USUHS. Systematic risk assessment identified 49 gaps distributed across eight overarching shortfalls during this high-level CBA. DMMSO is leveraging this report in collaboration with Stakeholders to map current and future MHS initiatives to promote efficient and prioritized gap closure, while reducing redundant efforts.

C&CC: What does the Virtual Education Center (VEC) strive to accomplish as it is being stood up? What benefits will it provide the MHS in the future?

COL Molina: The VEC is an online web platform that will give the MHS an easily accessible, secure, and multifaceted collaborative learning environment for beneficiaries, clinicians, and staff.

It will enable closer provider-beneficiary collaboration, promote wellness, unify patient education across the DHA, and allow for progress measurement. If DHA's goals of better health and lower cost are to be achieved, methodologies to provide patients with the knowledge and skills to positively participate in their health care is a must.

The VEC will have many capabilities, including providing management of consolidated education material for patient education to include, but not limited to, written, audio, video, visual, and supportive interactive capability. It will promote wellness, increase access to patient education, and guide patients to events, MTF resources, and vital information. In doing this, it will enable providers, patients, and family members across the MHS access to a virtual environment for provider and beneficiary collaboration in a secure setting. Finally, the VEC will consolidate and standardize all patient and clinical education across the DHA, leading to increased access with validated content for all military branches.

For providers and patients, the benefits of a VEC are clear. Healthier, educated patients make fewer appointments and need fewer medical procedures, allowing more treatment times for ill and injured patients. Providing patients with the information they need to improve their health within a single resource will improve the quality of life of our beneficiaries while reducing cost at military hospitals and clinics throughout the MHS. Healthy service members requiring fewer medical appointments and treatments will have a positive impact on unit readiness. Commitment to a culture of safety and to continuous process improvement enables the system-wide spread of leading clinical practices and improved administrative and business processes. Together, these improvements drive Great Outcomes.

C&CC: How has MMSD interacted with industry and the MHS to increase communication and stay aware of the latest technologies and initiatives?

COL Molina: To increase visibility of medical simulation and training, MMSD hosts annual medical simulation expos in the San Antonio, Texas and Falls Church, Virginia areas. The Expo highlights the DHA mission as a Combat Support Agency, to lead the MHS integration



William Beaumont Army Medical Center (WBAMC) trainees working in a field hospital during HealthCare Simulation Week 2022. (DHA)



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of readiness and health to deliver improved readiness, better health, and better care at lower cost. The Expo provides an opportunity for leadership and personnel to explore the latest emerging medical simulation technologies and solutions to support the mission and collaborate with numerous participating industry partners.

The DHA is responsible for improving the provision of health care to some 9.6 million beneficiaries. To speed lifesaving technology being developed by industry experts to the field, DHA's MMSD invites vendors to display their latest inventions and ideas to DHA's decision makers.

These events showcase modeling and simulation capabilities across the MHS, where DHA's success relies on partnerships with industry in creating what is needed to meet the requirements of the warfighter. Those requirements include ensuring medical professionals are prepared for the scenarios they will face in the field, whether in an MTF or on the battlefield. MM&S harnesses new technology to help train medical professional by simulating and replicating realistic events in a training environment. Recreating realistic scenarios using MM&S technology allows doctors, nurses, first-responders, and other healthcare professionals to practice medical interventions.

In addition to hosting this event, MMSD ensures attendance at conferences such as the Interservice/Industry Training, Simulation and Education Conference (I/ITSEC) and International Meeting on Simulation in Healthcare (IMSH) to view the latest innovations in medical simulation and training as well as keep open communication with other industry and Government groups.

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UNMANNED CASEVAC AIRLIFT CLOSER TO REALITY

U.S. Army Yuma Proving Ground, Arizona, tests autonomous vertical lift casualty evacuation (CASEVAC) as part of the Army's Project Convergence Technology Gateway.

By Mark Schauer, Yuma Proving Ground



Among the remarkable firsts achieved at Yuma Proving Ground during Project Convergence 21 was the autonomous flight of a legacy UH-60 Blackhawk helicopter, albeit with a human pilot aboard as a precaution. This year during Project Convergence Technology Gateway, a fully autonomous UH-60 dubbed Alias engaged in complex simulated missions across YPG's vast ranges without a safety pilot onboard, utilizing low level maneuvers that traditional pilots use in combat areas. (U.S. Army Photo)

Yuma Proving Ground (YPG), Yuma County, Arizona, was the epicenter of the Army's Future Force in Project Convergence 20 and 21, and continues to support the Army Futures Command's campaign of learning this year. The first Project Convergence Technology Gateway was held at YPG by the U.S. Army Combat Capabilities Development Command (DEVCOM) over the course of five weeks in September and October.

YPG's vast size includes nearly 2,000 square miles of restricted airspace. The proving ground's clear, stable air and extremely dry climate combined with an ability to control a large swath of the radio frequency spectrum makes it a desired location for the type of testing Tech Gateway was interested in: counter-unmanned aircraft solutions, extending network access, and flying autonomous and semi-autonomous aircraft. YPG's vast institutional UAS and counter-UAS testing knowledge and the presence of a wealth of other infrastructure meant for other sectors of YPG's broad test mission were utilized to support the aviation

evaluations: YPG is home to things like technical and tactical targets, as well as generator and combined maintenance shops.

AUTONOMOUS AIR MED EVAC TESTING

Among the remarkable firsts achieved at YPG during Project Convergence 21 was the autonomous flight of a legacy UH-60 Blackhawk helicopter, albeit with a human pilot aboard as a precaution. This year, a fully autonomous UH-60 dubbed Alias engaged in complex simulated missions across YPG's vast ranges without a safety pilot onboard, utilizing low level maneuvers that traditional pilots use in combat areas.

"The last time an autonomous vehicle similar to this flew at several thousand feet high because the safety aspect was not as mature as this," said Scott Crane, systems engineering and technical assessment contractor with the Defense Advanced Research Projects Agency. "We wanted to show that we could do the same survivability that real pilots do."

In one scenario, the aircraft carried a sling load of a heavy bundle to one location prior to being loaded with supplies needed at a different location miles away. While en route, the autonomous Blackhawk's destination came under notional enemy attack that prevented a safe landing.

"They re-tasked it with just one little click to go further out and wait until the area was clear," said Crane.

Finally landing, the scenario further imagined that a critically-wounded Soldier from the recent attack had to be evacuated to a hospital immediately, and no other aircraft were available. The testers re-tasked the autonomous Blackhawk to fly a realistic casualty mannequin to a simulated field hospital. The size of the payloads and complexity of the missions were both unprecedented for a fully autonomous UH-60.

ADVANCING TECHNOLOGY THROUGH PARTNERING

"Tech Gateway is a portal for non-traditional partners and any novel innovations they have for Army needs," said Rick Deoliveira, Technology Gateway chief of operation. "We saw about 260 different industry solutions that were technically reviewed by our DEVCOM engineers. The industry partners here are the cream of the crop."

Project Convergence 22 was interested primarily in utilizing the successful experiments of Project Convergence 20 and 21 in an operational environment with international partners. YPG's infrastructure is intended to support developmental testing of equipment: thus, perfectly suited for Technology Gateway's ambitions while the Army's National Training Center at Fort Irwin and the Marine Corps' Camp Pendleton hosted the operational aspects of this year's campaign of learning.

"This is early technology we would like to bring out of the lab and get it into the dirt to see how it works," said Lt. Gen. Thomas Todd, Chief Innovation Officer of Army Futures Command. "The beauty of that is we really iterate in the prototyping stage and demonstration stage at the same time we are writing what could be a future requirements document."



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