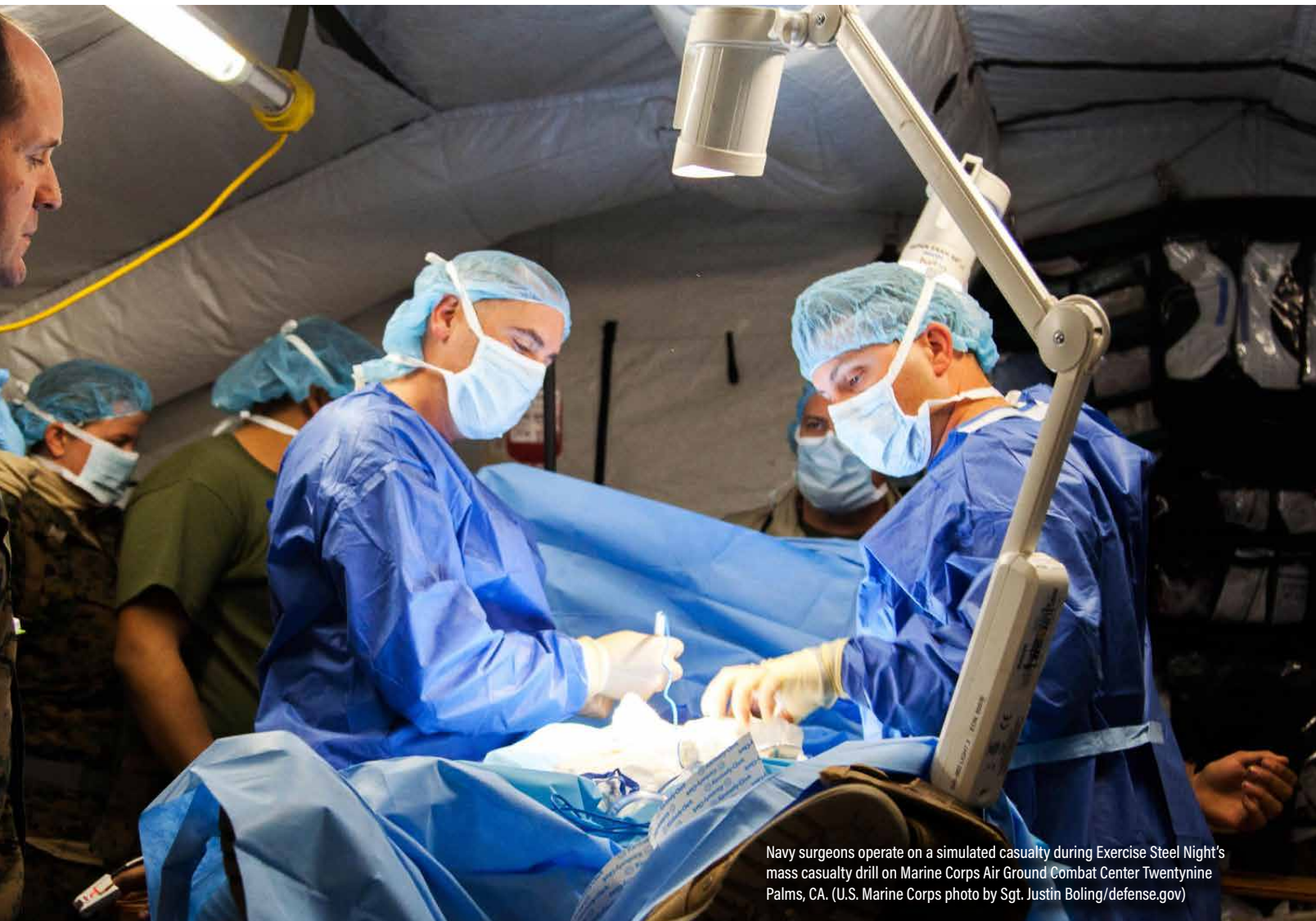


MAGNIFYING FOCUS ON RESTORATIVE CARE



Navy surgeons operate on a simulated casualty during Exercise Steel Night's mass casualty drill on Marine Corps Air Ground Combat Center Twentynine Palms, CA. (U.S. Marine Corps photo by Sgt. Justin Boling/defense.gov)



The U.S. Army Medical Research and Materiel Command's (USAMRMC) Combat Casualty Care Research Program (CCCRP), located at Fort Detrick in Maryland, works with both military and civilian investigators to develop the products and technologies required to aid wounded service members. Here, new CCCRP Director Col. Michael Davis guides our readers through the program's mission and vision in his first interview.

By Col. Michael Davis, Director, Combat Casualty Care Research Program

When we treat service members, we know that they're making the ultimate sacrifice. I consider myself lucky that I'm taking care of these heroes; that I'm taking care of the service members who deserve to be credited with those kinds of things. To have that kind of relationship and that kind of point of view creates a very unique physician-patient relationship. Whether we're taking care of patients directly or engaging in combat casualty care research, we're really in it for a very unique cause. We're taking care of these service members that are defending our nation and way of life. To be honest with you, it can be hard to put

into words sometimes because it is such a unique relationship from other clinical work.

We've developed a relationship through treating casualties at the point of injury all the way through definitive reconstruction. That's what I really try to get across to the other military and civilian investigators who have not had the honor of a deployed experience. I find the passion for combat casualty care to be quite contagious. Once people outside our DoD programs see the passion we have for taking care of these service members –whether it's driving research that's



Members of the Critical Care Air Transit team, 149th Medical Group, Texas Air National Guard, practice on a simulated critical-care patient onboard the C-130H2 aircraft from the 136th Airlift Wing during Air-X 2015, the largest joint force domestic operations exercise at College Station, Texas. (Air National Guard photo by Master Sgt. Charles Hatton/released)

ultimately going to improve service members' lives or through direct patient care— it's just contagious. I find that those we work closely with in collaboration really start to feel that passion when they see it in action.

Broad Spectrum of Care

The Combat Casualty Care Research Program spreads its interests across four distinct portfolios: Neurotrauma and Traumatic Brain Injury, Hemorrhage Control and Resuscitation, Forward Surgical-En Route Care, and Photonics and Light-Based Innovation for Severe Injury. As program director, my prime responsibility will be to create both the mid-term and the long-term plan for developing materiel and knowledge products designed to close capability caps in military trauma care. Indeed, while trauma is the leading cause of death for U.S. civilians under the age of 46 years old, there is very little federal investment in trauma research outside the DoD; so I will also serve, in essence, as the de-facto director of the overall U.S. investment in trauma research. On the military side, the primary focus of the CCCRP is the care delivered to warfighters on the battlefield; from the point-of-injury to the use of field hospitals and combat support hospitals. From a research and development standpoint, the CCCRP is currently focused on improving care on future battlefields, including a specific focus on the "Multi-Domain Battle," a concept which encompasses early-entry operations, near-peer battle situations, and operations which are not dependent on large logistic bases and air superiority.

Current Key Efforts at the CCCRP

Naturally, the CCCRP lends a substantial amount of its overall effort towards the early detection and combatting of traumatic brain injuries; with a specific goal of finding a solution for increased morbidity and mortality from TBI. Since 2000, more than 360,000 service members have been diagnosed with a TBI according to federal data. These numbers, coupled with the rising cultural visibility of head

injuries, means a tightly-focused, continuous effort from CCCRP officials.

"One of the things we have to balance is walking the line between moving the program forward and also letting our senior leaders and the public know what we're doing with the money they've entrusted us," says Dr. Tammy Crowder, manager of the CCCRP's Neurotrauma and Traumatic Brain Injury Portfolio. "Regardless, the end result is always the same – to do what we can to make sure that potentially survivable injuries are not limited by lack of knowledge, capabilities, or technology."

According to Crowder, one of the leading technologies in the portfolio is the I-Portal PAS tool developed by Pennsylvania-based Neuro-Kinetics, Inc. The device, which is designed to diagnose concussions both early and accurately, uses a virtual-reality headset to assess possible brain injury by measuring a specific series of oculo-motor pathways. The I-Portal PAS has received financial support from both the DoD and the National Football League, and is currently being tested at a number of military medical facilities.

"We're excited about it," says Crowder, "but in many ways it's just one part of the whole."

To that end, Crowder says the CCCRP will look to a more of "Frankenstein's monster" approach to early detection of possible brain injury; meaning that while she's confident an oculo-motor assessment device may be able to diagnose a concussion in a large majority of people, the possibility exists that similar injuries to the brain may manifest themselves in different people in different ways. As such, the program is currently in the midst of launching a search for a technologically-mature device that will allow first responders to measure brain function that's associated with morbidity and mortality at the point-of-injury.

"We're hoping that one of these devices will enable first responders to better adhere to the clinical practice guidelines, which we know are better associated with reduced morbidity and mortality," Crowder noted.

As severe bleeding remains the number one cause of death on the battlefield, the topic of hemorrhage continues to play a key role in the CCCRP's investment efforts as well. While the main thrust of the program's Hemorrhage and Resuscitation Portfolio is to provide improved methods and technologies to control bleeding, more specific and long-term goals are baked into the portfolio's day-to-day efforts.

"We're looking for ways to reduce mortality by at least 25 percent," says Hemorrhage and Resuscitation Portfolio Manager Crystal Hill-Pryor. "At the same time we're also trying to develop blood products that can be used wherever needed on the battlefield, instead of only where freezers and specialized laboratories are available – all of which will make the earlier use of blood products possible."

Here too we see the incremental shift towards the battlefield of the future –as envisioned in the "Multi-Domain Battle" concept– with the use of a number of established technologies augmented by the development of a number of emerging products. For instance, while the use of abdominal tourniquets, junctional tourniquets, and the REBOA tool are now commonplace in the military medical world, there continue to be a number of other avenues to explore.



U.S. Army Sgt. Megan Smith, a medic with the 159th Combat Aviation Brigade, reviews a patient's medical records during a patient transfer over Afghanistan. (DoD photo by Senior Airman Sandra Welch, U.S. Air Force/Released)

“Developing an FDA approved dried plasma product is a top priority for us,” says Hill-Pryor. “Future products will need to aim to enable survivability for six-to-twelve hours and also as far out as 72 hours in prolonged field care scenarios. To achieve these goals, there is a need for significant and sustained investment to understand the challenges.”

The CCCRP’s collective dedication to understanding future battlefield scenarios also manifests itself within the Forward Surgical-En Route Care portfolio, where a commitment to reliable communication flow is key to prolonged sustainability.

“We constantly have an ear to the ground to hear what the current needs are,” says FSERC Portfolio Manager Col. Antoinette Shinn, “and the feedback we get in return helps us shape research priorities and

clinical practice guidelines, as well as helping us to know where the priorities remain.”

Chief among those priorities is the advancement of telemedicine capabilities in far forward areas in the most efficient ways possible. Says Shinn, “We’re looking for ways to maximize tele-mentoring and tele-monitoring in ways that will assist a medic, a combat medic, or even no medic in a far-forward environment to provide life-sustaining care in situations for up to 72 hours.”

The use of autonomous systems for transport of medical equipment and supplies is similarly gaining traction in the portfolio as well. But for Shinn and her team, palpable excitement lies in the burgeoning world of non-invasive hemorrhage detection, an obvious need on the battlefield of the future.

“We need to be able to identify when someone has, say, a blunt injury with internal injuries but they’re not overtly bleeding and they’re not symptomatic yet,” says Shinn. “If we can identify those people, that’s going to help with planning and logistical support, with determining who needs blood, who needs to be transported first.”

Says Shinn of the availability of such a device, “I think we’re closer to getting there – and when we do, it will help save lives.”

Continuing the Mission

In the end, all those separate strands of research ultimately intersect at the very core of the CCCRP’s overall goal to deliver medical innovation to the warfighter. The all-encompassing nature of such care is the most exciting aspect of my new position.

Ultimately, I just want to make sure that we get the best outcomes that truly translate to the battlefield and to the servicemembers back home. We don’t do research for research sake here, we have a very clear target, and that’s to make a difference to service members.

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