

THOUSANDS DIE WHILE FUNDING LAGS

An Interview with Colonel Brian Eastridge

More than 1,100 of our service men and women killed on battlefields in the Middle East might be alive today if military medics and surgeons had better tools to mitigate hemorrhage and optimize airway management or if transport to a field hospital had been more expeditious.

Between October 2001 and June 2011, 4,596 American soldiers died on the battlefields in the Iraq and Afghanistan conflicts. Dr. Brian Eastridge wanted to know how many of them *could* have survived if the right training or equipment were available.

Eastridge is Professor of Surgery in the Division of Trauma and Emergency Surgery at the University of Texas Health Science Center at San Antonio and a colonel in the US Army with 27 years of service and six operational deployments. During his active duty service, he was the Trauma Consultant to the U.S. Army Surgeon General and co-developer and Director of the Joint Trauma System. His analysis, published in the *Journal of Trauma and Acute Care Surgery* in 2012 (Vol 73, Number 6, Supplement 5), determined that 25% of those casualties had injuries that were potentially survivable.

Why weren't the training and equipment available to save these soldiers?

"There are simply some huge gaps in our knowledge," Dr. Eastridge said. "And those gaps are directly related to a paucity of funding to do the research. Research is desperately needed to narrow those gaps and improve care and survival of our combat wounded."

Extrapolating Dr. Eastridge's findings to the home front, where more than 190,000 Americans died from traumatic injury in 2014, that would mean 47,500 deaths could have been prevented—deaths that occurred on the nation's roadways, in private homes and in remote areas of the country.

While that analysis has never been done, Dr. Eastridge noted that the percentage of survivors would likely be far greater.

"The most common mechanism of injury and death on the battlefield was explosion, which imparts a tremendous amount of destructive energy to the body and leads to instantaneously lethal injury," he said. "This mechanism occurs infrequently in the civilian environment. Since fewer patients are subjected to this amount of injurious energy, intuitively, it is likely that a larger percentage of our trauma patient mortality here at home have potentially survivable injury."

What is needed to close the gaps in knowledge and to start saving more lives, both on the battlefield and at home, is an investment in traumatic injury research that is commensurate with the toll of trauma on society.

Research Translation Works Both Ways

As with the wars of antiquity, these recent conflicts have afforded the development of new knowledge and, likewise, new perceptions of the gaps that remain. Military surgeons have had the unique opportunity to learn from exposure to large numbers of high acuity injuries, an experience that is unmatched in civilian emergency departments and trauma centers.

As Dr. Eastridge explained, if a problem can be identified, it can be studied and a mitigation strategy developed. For instance, early in the Iraq war, surgeons were seeing a lot of death from isolated extremity injury, which they believed to be preventable with the use of a time-tested tool—the tourniquet.

Tourniquets had been around for thousands of years, but had fallen out of favor due to concerns about losing limbs as a result of prolonged ischemia. But Tom Walters, a PhD investigator at the US Army's Institute for Surgical Research (ISR), took the problem to the research laboratory, and within less than a year, he had an answer. Walters tested all of the commercially available tourniquets on healthy volunteers to judge their ability to stop hemorrhage, to be tolerated by the patient and to be realistically deployed in a combat environment. His work led to the fielding of the Combat Application Tourniquet (CAT), now standard issue for every soldier deploying to the battlefield.

As the CAT made its way into the field in late 2005, attributable death from extremity injury began to fall from 23.3 deaths per year; to 17.5 by 2007, and to 3.5 after full implementation of the device, representing an 85% decrease in mortality. With the translation of military medical advances into the civilian establishment, first responders in the U.S. are now beginning to carry these life-saving devices, illustrating that research in trauma is bidirectional.

Now, the lessons we have learned on the battlefield and translated into civilian practice need to be refined through the controlled scientific studies that are the purview of the civilian medical system, using large datasets and clinical networks. In this way, the civilian injury research and care template can be utilized to subsequently advance injury care on the next battlefield. Our US military troops deserve no less.

Dr. Eastridge was instrumental in translating his work with the trauma system in Southwest Texas to the development of a formal military trauma system for the battlefield of Afghanistan and Iraq. The model of the Southwest Texas Regional Advisory Council was particularly fitting to the battlefield environment, which resembled the rural and sparsely populated 26,000-square-mile Texas region, which has few medical facilities available to manage the injured patient. Timing of evacuation and transport proved to be remarkably similar between the South Texas region and the Middle East battlefield.

Having recently returned from his sixth deployment, Dr. Eastridge is seeking to enhance the military trauma system model and validate the concepts of tactical pre-hospital care on the battlefield. His

current work is conducted through the DoD-funded Remote Trauma Outcomes Research Network, attempting to narrow some of the pertinent knowledge gaps brought to light during the war.

Pre-Hospital Research May Yield Best Results

“Our most important efforts will be to better understand and mitigate the suffering and loss of life that occurs on the streets and on the battlefield *before* a casualty can reach the hospital...I think that’s where we will get our biggest ‘bang for the research buck,’” suggested Dr. Eastridge. “Many potentially survivable injuries in remote areas become non-survivable only because of the time it takes to get to a properly equipped hospital.”

To this end, improved devices to monitor physiology and assist in the triage of patients, means to arrest torso and junction hemorrhage, and treatments to increase the window of survivability between the injury and the hospital are future targets for trauma research.

For both the Department of Defense and civilian trauma centers, the fact remains that the current level of research funding does not come close to matching the need. “The lack of money is a ubiquitous issue in research. We literally have hundreds of ideas to pursue and gaps to close,” said Dr. Eastridge. “If we had the resources, I can only imagine the progress we could make and the number of lives we could potentially save.”