Marines of Company E, 2nd Battalion, 9th Marines, carry a wounded marine to an H-34 helicopter while fighting North Vietnamese Army forces during Operation Hickory III in Vietnam. (Photo courtesy of the Department of Defense)

Reorganizing Around Combat Casualty Care

Can Army Medicine Negate the Peacetime Effect?

Col. Michael J. Tarpey, MD, U.S. Army

We are going to repeat the same mistakes we have made before. We are going to think our doctors are trained. They are not going to be trained. You have just got to pray that your son or daughter … is not the first casualty of the next war. Pray that they come in about the 5-year mark.

—Gen. Peter Chiarelli

Army medicine has long been torn between its two primary missions—care of 9.6 million beneficiaries in military treatment facilities (MTFs) and treating casualties on the battlefield. The beneficiary care mission has taken precedence for multiple reasons, including its enduring nature (unlike the episodic nature of combat casualty care), the daily bureaucratic demands associated with its size, and the attention to detail required to meet civilian accreditation standards.[1] The overwhelming amount of attention and resources devoted to beneficiary care has come at the expense of battlefield medicine. At one time, the Army medical force could move directly from caring for patients in stateside MTFs to treating casualties on the battlefield. However, this is no longer the case due to increased medical specialization and the absence of trauma patients in the majority of military hospitals.[2]

Revolutionary advances in combat casualty care over the last two decades in Iraq and Afghanistan have increased casualty survivability to record levels.[3] However, the gains from combat experience tend to erode during periods of relative peace. Combat casualty outcomes over the past eighty years demonstrate that casualty survival rates worsened at the beginning of each new conflict before improving as the conflict continued—a phenomenon known as the "peacetime effect."[4] Researchers estimate that up to 107,256 combat fatalities that occurred at the onset of World War II, the Korea War, the Vietnam War, Operation Iraqi Freedom, and Operation Enduring Freedom could have been prevented if trauma systems and skills had been maintained during the interwar periods.[5] Today, after two decades at war, multiple critical gaps exist in the Army medical force's ability to treat casualties in large-scale combat operations (LSCO). The Army Medical Department (AMEDD) has too few surgeons and an insufficient number of operative cases for them in Army MTFs. Moreover, it is inadequately prepared to provide prolonged field care and lacks standardized tactical combat casualty care (TCCC) training for medical personnel across the force.[6]

Congress and other key national leaders have been concerned about the military's lack of trauma preparation since the first Gulf War. The issue has persisted for decades because developing and sustaining enduring solutions is extremely difficult. Moreover, AMEDD leaders have primarily focused on health care delivery in MTFs. In order to increase efficiencies in beneficiary care and encourage the services to focus on their combat casualty care missions, Congress passed the National Defense Authorization Act (NDAA) for Fiscal Year 2017. The NDAA directs the transfer of responsibility for MTF administration and management from the services to the Defense Health Agency (DHA).[7] The Department of Defense (DOD) and the surgeons general have argued against this transformation for years, most recently citing the COVID-19 response as a reason to slow things down. Their arguments, however, have fallen on deaf ears as Congress remains adamant about the transition; DHA assumed control of all MTFs in September 2021.[8]

Contrary to popular arguments from the medical community, the transformation of military medicine presents a tremendous opportunity for the AMEDD generally, and the Army Medical Command (MEDCOM) in particular. Being relieved of the responsibility to provide beneficiary care allows MEDCOM to develop and sustain a medical force that can maximize combat casualty survival rates in a LSCO with a near-peer competitor. Transforming MEDCOM to create a medical force ready to perform its wartime mission has significant ramifications for Army medical personnel, the Office of the

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Surgeon General (OTSG), and the MEDCOM staff. The effort and resources involved in planning, organizing, coordinating, and improving trauma training and patient care experiences for 43,000 active-duty Army personnel (including 15,000 combat medics, 4,200 physicians, and over 3,000 nurses) based on data, metrics, and research are consistently underestimated.[9] Success, however, has the potential to negate the peacetime effect and prevent thousands of deaths in the next conflict.

Historical Overview

Examples of the peacetime effect date back at least to the 1700s and should come as no surprise.[10] Part of the peace dividend includes dismantling wartime trauma systems, reducing the number of military medical personnel, capturing fewer innovations in the medical literature, and shifting focus away from trauma education and training toward beneficiary care.[11]

Carver Hospital, Washington, D.C., circa 1860–1865 during the U.S. Civil War. (Photo courtesy of the National Archives)

For example, in the aftermath of the first Gulf War, significant attention was directed to closing the readiness gaps of deployed military medical providers. Specifically, military doctors and nurses lacked critical trauma training and real-world trauma experience.[12] In 1998, the Government Accountability Office (GAO) cited examples of physicians and nurses who had never treated trauma patients prior to deployment. In fact, the GAO found that many medical professionals did not receive predeployment training in managing trauma patients.[13] Col. Donald Trunkey, a trauma surgeon and deployed military hospital commander at the time, pointed to the need to "train as we would fight."[14] He was an early advocate of sending military surgeons to civilian trauma centers to maintain currency in trauma care.

Following the Gulf War, Congress and the GAO directed the DOD to establish demonstration training programs in which military medical personnel practiced in civilian trauma centers since few trauma patients were seen in MTFs.[15] In response, the DOD established a joint military-civilian trauma training program in 1999 at the Ben Taub Memorial Hospital in Houston, where a small number of Army, Navy, and Air Force physicians and nurses worked alongside their civilian counterparts to treat trauma patients.[16]

In two short years, however, the program was terminated due to administrative and legal issues.[17] The program, while helpful in establishing the viability and usefulness of joint military-civilian trauma training programs, revealed many significant challenges associated with creating enduring collaborations between military and civilian medical facilities.[18] For example, variations in state regulations, local policies, and concerns about malpractice, billing, provider privileging, and continuing education were too significant to overcome.[19]

Although MEDCOM was involved in the Ben Taub military-civilian partnership, it was focused at that time on the "Gateway to Care" initiative to develop a more efficient, "business-like approach to health-care delivery."[20] Consequently, relatively few Army medical personnel received trauma training in civilian trauma centers. Unfortunately, the peacetime effect struck again, and Army medicine found itself in a familiar place on 11 September 2001, with only a small percentage of its medical force having extensive experience treating trauma patients.[21]

Combat Casualty Care over Three Decades (1990–Present)

The last three decades of military medicine included many revolutionary transformations in combat casualty care. The failure to prioritize battlefield medicine, however, led to preventable deaths.[22] A medic deploying to Desert Storm in 1990 would have used prehospital care techniques that were essentially unchanged since the Civil War.[23] Seemingly none of the lessons learned between World War II and Vietnam had been incorporated into prehospital trauma care doctrine or treatment guidelines by the first Gulf War. Although the tourniquets used in World War II were known to be ineffective, medics in the first Gulf War carried them in their aid bags with instructions to use them only as an absolute last resort when all other methods failed.[24]

Retired Navy Capt. Frank Butler, one of the modern visionaries in prehospital medicine, stated that "turning lessons learned in combat casualty care into lives saved in future conflicts requires definitive action and strong leadership."[25] Clearly, neither occurred by the first Gulf War, and medics went to war ill-equipped and lacking tactical trauma care guidelines explicitly designed for the battlefield.

In 1996, Butler and his colleagues published a seminal article that launched the TCCC revolution.[26] The TCCC guidelines were developed over the next several years and transformed prehospital trauma care, eventually saving thousands of lives during combat.[27] However, the Army did not initially appreciate the transformational nature of the new TCCC guidelines. It took over a decade for the conventional Army to adopt the guidelines as the standard for battlefield trauma care.[28] My own experiences as a medic with a Patriot missile battery in the first Gulf War and as a battalion surgeon in Operation Iraqi Freedom enabled me to witness the revolutionary transformation of combat casualty care.

Fresh out of civilian family medicine residency training, I deployed to Kuwait as a physician with 1st Battalion, 15th Infantry Regiment (1-15 IN), 3rd Infantry Division, in January 2003. Although I did not receive military trauma training prior to deployment, I was fortunate that my unit was colocated with the 3rd Battalion, 75th Ranger Regiment at Fort Benning, Georgia. Some of their medics introduced us to the new TCCC guidelines, the value of which our medical leadership immediately recognized and began teaching to our thirty-eight enlisted medics. While in Kuwait, our medics conducted rigorous medical training using the TCCC guidelines to address combat scenarios from the 1993 battle in Mogadishu, Somalia. The TCCC guidelines were based on the best evidence available and were superior to the Army Medical Department Center and School's curriculum at the time.

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When the 3rd Infantry Division attacked Iraq in March 2003, 1-15 IN conducted twenty-five days of continuous combat operations over eight hundred kilometers of open desert. We treated thirty-two wounded American soldiers during that time, many with life-threatening injuries, without losing a casualty. Many other units that had not trained their medics using the TCCC guidelines were not as fortunate. For example, early in the war, a soldier from 2nd Battalion, 69th Armored Regiment, a sister battalion from the 3rd Infantry Division's 3rd Brigade, bled out and died on the battlefield due to an ineffective tourniquet.

Approximately two years later, I returned to Iraq with 1-15 IN for a second tour. I was dismayed to discover that the TCCC guidelines had minimally infiltrated the conventional Army nine years after their introduction despite evidence showing proof that they save lives.[29] In January 2005, over three years into Operation Enduring Freedom and two years into Operation Iraqi Freedom, the TCCC guidelines were not considered doctrinal and were not taught at

Medical personnel tend to a simulated casualty during a drill aboard the hospital ship USNS *Comfort* (T-AH-20) in the Persian Gulf 1 January 1991 during Operation Desert Storm. (Photo by the Department of Defense via Wikimedia Commons)

AMEDD schools. Moreover, many units still arrived in Iraq without tourniquets, the cornerstone of the TCCC guidelines. Units had to go outside regular medical supply channels to acquire tourniquets and other medical equipment prescribed by the TCCC guidelines.

On 6 March 2005, the front page of the *Baltimore Sun* featured an article by Robert Little that exposed the Army for sending soldiers into combat without tourniquets two years after the Committee on Tactical Combat Casualty Care recommended that all soldiers be issued a tourniquet and be trained on its use.[30] Little discussed the number of deaths that could have been prevented if soldiers carried tourniquets while "the Army conducts tests to determine the best pouch to put it in, which could take several months."[31] He also quoted Maj. Gen. Joseph Webb, the Army's deputy surgeon general, who was surprised to learn that some soldiers in Iraq did not have tourniquets. Webb admitted that he was not familiar with the purchasing and logistical procedures necessary to make it happen.[32]

As a result, Sens. Richard Durbin and Carl Levin asked Secretary of Defense Donald Rumsfeld why soldiers were deploying to Iraq and Afghanistan without tourniquets.[33] Congressional hearings on the subject ensued, and senior military leaders quickly responded to equip all deploying soldiers with a tourniquet that they were trained to use. Once again, Congress intervened to improve Army medicine's performance on the battlefield. Soon after that, AMEDD finally adopted the TCCC guidelines as prehospital trauma treatment doctrine.

Army Medicine Priorities

Caring for 9.6 million beneficiaries is a huge and, at times, overwhelming mission. Nevertheless, Army medicine provides outstanding health care to its beneficiaries.[34] The quality of Army medicine has been driven by congressional interest that forced surgeons general from all the services to work to provide care

as efficiently as civilian hospitals.[35] Until very recently, Army MTF commanders faced similar pressure to meet dozens of hospital standards that included metrics on access to care, patient satisfaction, and various safety requirements, just to name a few. However, Army MTF commanders have never been evaluated on how well their personnel are prepared to perform their wartime missions. In fact, one could argue that MTF commanders are incentivized to prevent active-duty personnel from attending trauma training since time spent outside the clinic negatively affects the efficiency metrics used to evaluate MTF commanders.[36]

Similarly, Army providers are not credentialed to perform their wartime mission. Instead, they are credentialed on the procedures commonly performed in MTFs. Family physicians, for instance, may be required by TCCC guidelines to perform cricothyrotomies (inserting a tube into the cricothyroid membrane through an incision in the neck to establish an airway), insert chest tubes, and perform needle decompression of tension pneumothorax. The vast majority of Army family physicians are not credentialed to perform these wartime procedures. Instead, they are credentialed to deliver babies, treat ingrown toenails, and other procedures commonly performed in MTFs.

Finally, the Army's medical force structure mix prioritizes beneficiary care over combat casualty care. Although the Army has 4,200 active-duty physicians, fewer than 150 practicing general or trauma surgeons are in the inventory.[37] As a result, they are the most deployed physicians in the AMEDD, spending approximately 30–40 percent of their professional careers deployed.[38] Many general and trauma surgeons leave the Army soon after fulfilling their initial obligations. In contrast, there are over twice as many gastroenterologists, three times as many dermatologists, and over eight times as many pediatricians and obstetricians as there are trauma surgeons, all of whom are devoted to delivering health care in brick-and-mortar facilities.[39]

MTFs: Training Platforms to Sustain a Ready Medical Force

There is no doubt that MTFs play an essential role in training medical personnel to care for disease and nonbattle injuries, which are the leading cause of wartime casualties.[40] However, the lack of trauma patients seen in most MTFs combined with the increasing divergence between modern combat casualty care techniques and civilian trauma protocols leave military providers inadequately prepared for combat casualty care.

Combat casualty care has evolved into its own medical specialty with its own research, protocols, literature, and training requirements. Combat casualty care includes two separate but related components: prehospital trauma care and battlefield surgical care. Although MTFs play a role in preparing medical providers to perform both aspects of battlefield medicine, each requires training and patient care that can only take place outside the MTF.

Prehospital Trauma Care Training

Since their introduction in 1996, battlefield trauma protocols have diverged from civilian guidelines designed for high-technology hospitals. As one might expect, combat casualty care interventions are context-dependent based on the tactical situation. Training conducted in a tactical setting offers advantages over hospital-based training for medical personnel who provide care at the point of injury and in Role 1 (basic medical care) facilities.[41] Because medical personnel in MTFs lack realistic tactical training scenarios and see few trauma patients, their ability to provide combat casualty care may erode. Both issues could be addressed by conducting tactical casualty simulations in medical simulation training centers (MSTCs) and rotating nonsurgical Army medical personnel to civilian trauma centers.

Surgical Training for Combat Casualty Care

Between 2001 and 2010, surgeons gained valuable trauma experience while deployed in Iraq and Afghanistan. Fortunately, casualty rates decreased drastically over the following decade, providing surgeons fewer opportunities to operate while deployed. In contrast, the Brooke Army Medical Center (BAMC), the only military level I trauma center, treats approximately 4,500 trauma patients each year, accounting for 66 percent of all trauma patients seen in MTFs.[42] Unless stationed at BAMC, many surgeons deployed without recent trauma experience. Fortunately, a small number of Army general surgeons have rotated through civilian trauma centers as

part of military-civilian partnerships established as a result of the NDAA.[43] This promising development will allow Army surgeons to gain real-world trauma experience but needs to increase dramatically in scale to impact the problem significantly.

Revolutions in Military Medical Affairs

Combat casualty care has long driven medical innovation during wartime, resulting in revolutions in military medical affairs.[47] The last two decades of war in Iraq and Afghanistan are no exception and have resulted in an absolute explosion of medical innovations. Among these are the TCCC guidelines, the creation of the Joint Trauma System (JTS), tourniquets, hemostatic dressings, and damage control resuscitation/surgery.[48] Few of these innovations emerged from institutions designed to support combat casualty care. Instead, most of them resulted from informal, innovative, bottom-up efforts from military members of all ranks.[49] Unfortunately, most of these lifesaving methods were not institutionalized in protocols, doctrine, or training until many years after their development.

> The modern surgical techniques practiced in U.S. hospitals continue to diverge from the surgical methods used to control damage on the battlefield.

The nature of the surgical profession has changed over the last fifty years, further exacerbating the skills gap described above. Until recently, general surgery residents were exposed to a wide variety of surgical conditions, including trauma. Upon completing residency, most surgeons maintained generalist skills throughout their careers. Like many other medical specialties, however, surgery has become increasingly specialized over the last several decades. For example, cardiothoracic, vascular, and plastic surgeons used to complete a general surgery residency before specializing. The current trend in surgical training for these specialties does not include a full residency in general surgery.[44] Changes in surgical training coupled with the reduced number of trauma patients seen in most MTFs have created the Army's need to ensure these surgeons are "trauma competent" prior to deploying.

The modern surgical techniques practiced in U.S. hospitals continue to diverge from the surgical methods used to control damage on the battlefield. In the United States, surgical care frequently involves minimally invasive techniques, advanced imaging, and subspecialty consultation.[45] These trends also impact modern trauma surgery in the United States, though less than most other surgical subspecialties. Combat surgery—including damage control surgical techniques—generally features aggressive operative and staged interventions not commonly practiced in civilian hospitals.[46] As a result, Army surgeons of all types, but particularly specialists, are unlikely to gain regular experience with modern battlefield surgical techniques while practicing in MTFs. Civilian trauma centers (and BAMC) are the next best thing to the battlefield, though additional training in war surgery is also necessary.

Tourniquets, the "signature life-saving prehospital intervention of the wars in Iraq and Afghanistan," are an excellent example of bottom-up driven medical innovation.[50] The recommendation to use tourniquets as the primary option to stop arterial bleeding on the battlefield was made in 1996.[51] Over the next several years, special operations units began equipping their soldiers with tourniquets to carry into battle. In 2006, a decade later, all deployed soldiers were finally trained to use them and were required to carry them when deployed.[52] The death rate due to extremity hemorrhage in U.S. casualties decreased by 66 percent between 2006 and the end of 2010 and is attributed mainly to the use of tourniquets.[53]

Another revolutionary medical innovation that emerged in the last two decades is the JTS. At the start of the wars in Afghanistan and Iraq, no organized trauma system existed, and there were no plans to create one. In November 2004, the Joint Theater Trauma System was created by a group of Army and Air Force trauma surgeons who developed a plan to

coordinate medical care and evacuation in Iraq and Afghanistan.[54] The Joint Theater Trauma System evolved into the JTS and has been instrumental in developing clinical practice guidelines, coordinating care and evacuation in theater, and collecting data to promote research and development.

Both the JTS and the tourniquet exemplify the value of military medical innovations in saving lives on the battlefield. They also demonstrate the critical need to capture the revolution in military medical affairs and lessons learned in combat by institutionalizing them in protocols, doctrine, and training. As part of the Military Health System transformation, MEDCOM should reorganize itself in a way that allows the innovations and lessons learned on future battlefields to be institutionalized rapidly.

Current Medical Force Readiness Gaps to Execute its Wartime Mission

Military medicine has performed exceptionally over the last two decades of war, and as a result, case fatality and killed-in-action rates are the lowest in history.[55] Nevertheless, the threat of LSCO against near-peer competitors reveals critical medical readiness gaps in trauma skills and trauma systems. Each gap should be addressed to avoid the peacetime effect in the future. Six readiness gaps are particularly concerning:

- prehospital trauma care,
- battlefield surgical care,
- prolonged care,
- data collection and performance improvement,
- the AMEDD's ability to assess its readiness to perform wartime missions, and
- developing senior AMEDD leaders with significant combat casualty care experience.

Prehospital Trauma Care

Survival rates in Iraq and Afghanistan were as high as 98 percent for casualties who arrived at a combat hospital alive, but the vast majority of battlefield deaths occurred before casualties made it to the hospital.[56] In fact, 87.3 percent of the battlefield deaths in Iraq and Afghanistan from 2001 to 2011 occurred in the pre-MTF environment.[57] During that time, 976 soldiers died of injuries that were deemed potentially survivable.[58] This finding suggests that advancements in the prehospital arena are most likely to reduce combat deaths. Although the TCCC guidelines revolutionized prehospital trauma care on the battlefield, TCCC training across the Army is not well-standardized, varies in quality, and is not applied universally.[59] A recent survey of 601 U.S. Army physicians and physician assistants (PAs) revealed that over 40 percent had never completed a TCCC course.[60] Moreover, adherence to TCCC guidelines in Iraq and Afghanistan was generally poor.[61]

Measuring adherence to TCCC guidelines also remains an issue. The Army lacks a mechanism to ensure that medical personnel receive initial TCCC training, that the training meets published standards, and that providers maintain their proficiency. The Army's twenty-one MSTCs could easily fill this void and are ideal sites that provide tactical scenarios consistent with the TCCC guidelines. However, too many organizations, including MEDCOM, U.S. Army Installation Command, and U.S. Forces Command, are involved with MSTCs without clear lines of operational control. Under the current arrangement, MSTCs lack manning documents and baseline standards for the training they should provide. A reorganized MEDCOM could collaborate with stakeholders to transform MSTCs, allowing them to serve as the Army's executive agent for delivering and sustaining TCCC training.

To complicate this problem, Department of Defense Instruction (DODI) 1322.4, *Medical Readiness Training*, made TCCC the standard of care for all military first responders. According to the DODI, all service members should receive TCCC training based on their skill level every three years and within twelve months of deployment.[62] The Army lacks a well-formulated plan to operationalize this requirement across the force. Although the Medical Center of Excellence (MEDCoE), now aligned under the U.S. Army Training and Doctrine Command (TRADOC), provides effective training to combat medics in Advanced Individual Training and as part of predeployment trauma training courses, other commands do not have an effective plan to provide TCCC sustainment training for soldiers across the Army. To make matters worse, no one is tracking the current status of TCCC training across the Army.

Battlefield Surgical Care

The Army is facing a genuine crisis concerning its ability to recruit and retain surgeons.[63] Most military

general surgery residents deploy within sixty days of graduation.[64] They typically spend five to nine months deployed in environments where they have few opportunities to operate. For example, 60 percent of Army general surgeons deployed from June 2014 to June 2015 reported performing less than one operative case per month during their deployment.[65] Military surgeons typically return to low-acuity, low-volume practices in stateside MTFs for ten to twelve months before deploying again.[66] This operational tempo and low caseload is not sustainable and accounts for the growing exodus of surgeons after their initial obligation.

From 2012 to 2016, general surgeons across Army MTFs averaged only 108 cases per year compared to civilian general surgeons, who averaged 398–533 cases per year. It is easy to conclude that "obtaining mastery of general surgery is a nearly impossible proposition given the current care models at Army MTFs."[67] Only 15 percent of Army surgeons currently meet the knowledge, skills, and abilities standards.[68]

It is particularly challenging for general and specialty surgeons who are not trauma specialists to remain current in trauma care if they are not stationed at BAMC, where they can routinely operate on trauma patients. The MEDCOM began to address this issue in the year 2000 by sending individuals and forward surgical teams to the Army Trauma Training Center, part of the Ryder Trauma Center in Miami, for two weeks of trauma training before they deployed. The RAND Corporation reviewed this program in 2020 and found that only about 40–50 percent of Army surgeons attended the course prior to deployment.[69] Of those who did attend, reviews were mixed. Surgeons stated that they had little opportunity to provide hands-on care to patients during the two-week rotation.[70]

Nevertheless, military-civilian partnerships wherein Army surgical teams practice in civilian trauma centers provides them the best opportunity to gain experience caring for sufficient numbers of trauma patients.[71] MEDCOM created the Army Medical Department Military-Civilian Trauma Team Training (AMCT3) program in 2018. Under AMCT3, Army surgical personnel are practicing in seven civilian trauma centers.[72] The level of effort required to develop agreements and administer partnership programs to allow hundreds of active-duty Army surgeons and thousands of surgical team members to maintain their operative trauma skills is enormous. In reorganizing, MEDCOM should ensure that it builds a staff sufficiently large and knowledgeable about building and maintaining these essential partnerships.

Prolonged Care

Combat casualty care during a LSCO with a near-peer competitor will differ substantially from the care provided during the Iraq and Afghanistan conflicts, where the United States maintained air superiority. According to a TRADOC capability needs assessment, "Army units currently lack the capability to provide prolonged care (greater than sixty minutes) at the point of need when evacuation is delayed."[73] Without air superiority in a LSCO with a near peer, Army medical personnel will need to provide prolonged care at Role 1, 2, and 3 facilities. The MEDCoE will begin addressing this gap by including prolonged care training as part of Advanced Individual Training for combat medics. Unfortunately, no programs currently exist to train and sustain medical personnel in the prolonged care of casualties across the remainder of the Army.

Data Collection and Performance Improvement

A learning health system uses data to drive process improvement.[74] Many of the military innovations developed during the last two decades of war benefited from a process that included data collection, interpretation of the results, and a willingness to adopt policies and procedures associated with improved outcomes.[75] Refinements in blood product resuscitation and the development of the JTS are just two examples of many.

However, much of the learning and the programs developed in response over the last two decades of conflict occurred informally, outside established institutional channels. Moreover, as with delays in the institutionalization of tourniquets and TCCC training, the lack of a formal learning system model embedded into Army medicine organizations contributed to preventable deaths. As conflicts draw down and casualty rates decrease, the learning health system model needs to be formally embedded into reorganized Army medicine institutions so that in future conflicts data-based process improvements begin at the outset.

Medical personnel from Fort Belvoir Community Hospital operate on a cut suit, a human-worn medical training device, during the 78th Training Division's Warrior Exercise 78-15-01 "Arctic Lightning," 21 January 2015. "Changes in surgical training coupled with the reduced number of trauma patients seen in most military treatment facilities have created the Army's need to ensure these surgeons are 'trauma competent' prior to deploying." (Photo by Phillip Scaringi, 78th Training Division)

Assessing the Army Medical Force's Readiness to Execute its Wartime Mission

Until recently, Army medicine had never specified the skills based on areas of concentration (AOCs) and enlisted military occupational specialty (MOS) that are required to certify medical personnel as ready to deploy. In the past, physicians and other medical providers were considered ready to deploy if they were credentialed by the MTF. The divergence of battlefield medicine and hospital-based medicine makes this assumption questionable. In fact, the NDAA directed the DOD to implement ways for military health care providers to maintain critical wartime medical readiness skills.[76] MEDCOM responded by identifying Individual Critical Task Lists (ICTLs) for all 103 AOCs and twenty-four MOSs containing tasks that must be completed to be considered ready to perform their wartime mission. The scale of this initiative is vast, and progress in the MTFs has been very slow. Although the MSTCs could be a part of the solution, they are not resourced for ICTL accomplishment. In addition, the ICTLs are not aligned with the ever-evolving TCCC guidelines.

Development of Senior AMEDD Leaders with Combat Casualty Care Experience

General officers in the AMEDD oversee all aspects of the Army Health System to include everything from commanding medical regions to leading MEDCOM staff directorates. Most flag officers developed professionally in the MTF system, and naturally, that is where their expertise and experiences lie. Remarkably, MEDCOM never established a directorate focused exclusively on battlefield care or identified a general officer whose primary mission is combat casualty care.[77] This oversight created a lack of leadership and accountability at the highest levels of Army medicine,

often resulting in hospital-based care's primacy over battlefield medicine. Transitioning all Army MTFs to DHA control provides the perfect opportunity for MEDCOM to establish a directorate headed by a general officer dedicated exclusively to battlefield casualty care. Establishing a directorate of this type would empower a general officer and his or her staff to spearhead efforts to address the current critical gaps in combat casualty care afflicting Army medicine.

Training, Organizing, and Equipping for Combat Casualty Care

The MEDCOM, OTSG, and Regional Health Command (RHC) staffs combined include over one thousand military and civilian personnel who almost exclusively focus on the quality of care provided in MTFs.[78] With the DHA's assumption of responsibility to run the MTFs, these staff members can be refocused on building and sustaining a medical force ready to perform its wartime mission. The staff should prioritize maintaining a learning Army Health System that is operationally focused. Data should drive research, training, performance improvement, and assessments of medical force readiness.

MEDCOM should focus initially on prehospital care because most preventable deaths occur before casualties reach combat hospitals. Yet, MEDCOM and the RHCs have little involvement in providing prehospital trauma training—the very foundation of combat casualty care—to the forty-three thousand active-duty Army medical personnel and the rest of the Army. Although TRADOC provides TCCC training to basic trainees and at the MEDCoE, the Army does not have a plan to deliver TCCC sustainment training across the force. Upon reorganization, MEDCOM should play a prominent role alongside involved Army Commands in implementing a plan to meet the requirements of DODI 1322.24, *Medical Readiness Training*.[79]

MEDCOM does not need to look far for a good model to push across the force. The U.S. Army Rangers set the gold standard for maintaining a prehospital casualty response system.[80] The Ranger model eliminated preventable deaths by implementing a command-directed casualty response system. All Rangers are trained on TCCC guidelines according to their skill level, and prehospital trauma registry data are used to facilitate performance improvements centered on clinical outcomes.[81]

Although currently focused on combat medics (68Ws), MSTCs should be the foundation for Army TCCC sustainment training across all AOCs and MOSs. Moreover, MEDCOM should play an essential role in transforming MSTCs into standardized platforms used to train TCCC guidelines and ICTLs.[82] Most importantly, the TCCC training conducted in the MSTCs should be updated regularly to keep up with evolving TCCC guidelines.

Additionally, MEDCOM should lead the effort to implement prolonged care training across the medical force in MSTCs, MTFs, or at the unit level. Prolonged care training should address a longstanding capability gap by providing Army combat medics with opportunities to practice their trauma and prolonged care skill sets. For combat medics, caring for patients alongside physicians and nurses in emergency rooms, inpatient wards, and intensive care units is an excellent way to practice providing prolonged care in battle.

With the DHA assumption of responsibility to run MTFs, MEDCOM should refine its effort to recruit and retain Army surgeons. MEDCOM has already taken some positive steps by centrally managing several critical wartime specialties and increasing incentive pay for surgeons. It is also essential for MEDCOM to work with civilian partners, the U.S. Department of Veterans Affairs, and MTFs to ensure that all Army surgeons see enough patients annually to maintain their trauma competence and that all surgeons can increase their operative caseload and complexity within their surgical specialty.

In addition, MEDCOM should focus on increasing trauma exposure for surgeons and their surgical teams through military-civilian partnerships involving civilian trauma centers. Once again, MEDCOM has taken some important steps by targeting individuals in forward surgical teams with the AMCT3 program.[83] The AMCT3 program will need to grow exponentially to provide trauma experiences for the hundreds of Army surgeons and thousands of surgical nurses and technicians in uniform. Navigating the challenges associated with malpractice, billing, and provider privileging, which led to the demise of the military-civilian partnerships established in the 1990s, will be essential.

Finally, MEDCOM should focus on implementing ICTLs, which would serve as the vehicle for commanders to certify that their medical personnel

can perform their wartime mission. Army medicine has not made nearly enough progress on this front since Congress directed it to do so in the NDAA. Simulation is an integral part of the solution and as with MSTCs, a lack of synchronization among the multiple organizations that provide simulated medical training contributes to the problem. Currently, DHA, Army Futures Command, OTSG, and the MEDCoE all have subordinate units that provide simulated medical training, but there is little synchronization or standardization. MEDCOM should work to bring these disparate and unsynchronized organizations together in support of ICTL implementation.

Recommendations

A transformed MEDCOM should focus initially on ten key areas:

1. Prioritize TCCC training. MEDCOM should work closely with Army commands to develop a plan for all soldiers to receive recurrent TCCC training at the appropriate skill level. The MSTCs should serve as the preferred method for TCCC training delivery.
2. Transform the MEDCOM and RHC staffs. Over one thousand military and civilian staff members currently focused on health care delivery in MTFs should now concentrate on the significant task of sustaining a medical force that is prepared to execute its wartime mission.
3. Establish a directorate within the MEDCOM dedicated exclusively to battlefield medicine that is headed by a flag officer. Doing so would ensure that the AMEDD negates the peacetime effect.
4. Build a learning health system focused on battlefield medicine that uses data to drive performance improvement. Initial efforts should focus on improving prehospital data collection and analysis methods.
5. Implement a plan that uses MSTCs, MTFs, and battalion aid stations to provide prolonged care training to Army medical personnel.
6. Identify the AOCs and MOSs essential for providing medical care in LSCO and prioritize recruiting and retention efforts for these personnel. Critical wartime specialties, particularly general and trauma surgeons, currently represent the most significant gap, and efforts to increase their numbers should be prioritized.
7. Improve opportunities for combat medics to advance their trauma skills and clinical acumen. Advocate for combat medics to be able to perform their wartime skill sets while working in home station MTFs.
8. Urgently begin implementing ICTLs and embed this in AMEDD culture by evaluating MTF commanders on their personnel's readiness to perform their wartime mission. Develop an operational credential for providers that includes the ICTL procedures needed to perform on the battlefield.
9. Build and sustain military-civilian partnerships with civilian trauma centers. These partnerships are essential to expose Army medical personnel to trauma patients prior to conflict.
10. Develop AMEDD leaders with extensive operational and combat casualty care experience. The MEDCOM needs leaders with expertise in both areas to lead an organization focused on expeditionary medicine. Surgeons, in particular, should have career pathways that encourage clinical expertise and leadership experience.

Conclusion

An enormous transformation is underway as the DHA assumes administration and management of all MTFs, forcing Army medicine to transition away from what has been its primary focus for many decades. To remain relevant, MEDCOM also needs to reorganize and refocus on establishing and sustaining a medical force that is completely prepared to treat casualties from a LSCO with a near-peer on the first day of the next war. By doing so, Army medicine can negate the peacetime effect that led to thousands of preventable deaths at the outset of major conflicts over the past eight decades. ■

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