

USAWC STRATEGY RESEARCH PROJECT

**ENSURING GOOD MEDICINE IN BAD PLACES: UTILIZATION OF FORWARD
SURGICAL TEAMS ON THE BATTLEFIELD**

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ABSTRACT

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Battlefield emergency surgery is saving lives in greater numbers than witnessed in previous wars. The evolution of U.S. Army Forward Surgical Teams (FST) and Combat Support Hospitals (CSH) has provided combat wounded soldiers with state-of-the-art trauma care. The FST, comprised of highly-skilled medical professionals, can be deployed to the leading edge of the battlefield thereby enhancing access to life-saving surgical treatment. These uniquely-qualified units have been developed to provide resuscitative, emergency surgery under specific combat conditions. As Operation Iraqi Freedom (OIF) enters a fourth year, FSTs remain deployed in significant numbers although major combat operations have concluded. Given the limited quantity of Army surgeons and these teams, appropriate allocation of valuable assets is essential to optimize medical care for wounded warriors. This research project examines current FST and CSH capabilities and provides recommendations for appropriate utilization of these vital surgical assets. Additionally, specialized training, equipment, and staffing enhancements for the future medical force are presented.

ENSURING GOOD MEDICINE IN BAD PLACES: UTILIZATION OF FORWARD SURGICAL TEAMS ON THE BATTLEFIELD

“He who wishes to be a surgeon should go to war”-Hippocrates¹

The mission of the Army Medical Department (AMEDD) is to conserve the fighting strength of our military forces.² This Health Service Support (HSS) mission is delivered across a continuum, from the leading edges of the battlefield to the large medical centers in the continental United States. Today's Army's healthcare system is an \$8 billion per year organization which employs over 145,000 people and manages the healthcare of 9 million beneficiaries.³ Ensuring medical treatment for soldiers, family members, and other beneficiaries, while delivering comprehensive care to the Force Projection Army is a daunting challenge.

As the modern AMEDD strives to meet these challenges, focus must be maintained on our primary mission: Conserve the Fighting Strength. Caring for the soldier is, after all, the principle reason for the existence of the Army Medical Department.

Today, there is much discussion about transforming military healthcare, merging medical assets between services, using market-based care whenever possible and applying co-payments for military personnel receiving healthcare. These steps may prove beneficial for the long term health business practices; but what about the military-unique mission of “go to war medicine?”

The AMEDD has unparalleled capabilities with which to accomplish its mission. No other nation has the ability to deliver state-of-the-art medicine across this spectrum. It has taken over 200 years for the AMEDD to evolve into the preeminent medical force in the world. Over the course of our nation's history, Americans have come to expect the best care for their wounded warriors. Success in this arena involves strict adherence to the Army medical battlefield rules listed in Table 1.⁴

- Be There (Maintain a Medical Presence with the Soldier)
- Maintain the Health of the Command
- Save Lives
- Clear the Battlefield of Casualties
- Provide State-of-the-Art Medical Care
- Ensure Early Return to Duty of the Soldier

TABLE 1. ARMY MEDICAL BATTLEFIELD RULES

To provide combat casualty care, medics must be on the battlefield with the fighting forces. Proximity to the soldier is the key to providing optimal medical care, both in peacetime

and combat. Maintaining Force health is a core principle of the AMEDD and involves a significant non-combat mission, as well. Advances in preventive medicine and trauma care within military medicine have helped to reduce combat deaths to all-time low numbers. Soldiers' lives are being saved; although modern weapons deliver increased firepower, lethality has decreased. For OIF, less than 10 percent of Americans wounded in combat have died.⁵ This trend for increased survivability has continued throughout American military history due, in large part, to the ability of the AMEDD to adapt to the challenges of modern warfare.

Protecting soldiers' health and welfare has been the responsibility of the Army Medical Department since the Revolutionary War. Force Health Protection under the direction of the Center for Health Promotion and Preventive Medicine (CHPPM) has led to new initiatives which ensure lower health-related hazards for soldiers. Emerging threats to military forces from biological and chemical warfare have been addressed by initiatives such as the Anthrax Vaccination Immunization Program (AVIP).⁶

Technological advancements have resulted in improved medical care on the battlefield and in the military hospitals around the world. Enhancements in the delivery of medical treatment and patient evacuation have been mainstays of meeting the AMEDD mission over the course of our nation's history.

Innovation is certainly not a new concept to Army medicine. Specialties such as Emergency Medicine and Trauma Surgery have specifically evolved in response to combat experiences and wartime wounding patterns over the past several hundred years. As will be discussed in more detail later in this paper, the military has been responsible for numerous advances in medical science with resultant benefits for medical and surgical patient care. To fulfill the AMEDD mission of providing medical care to the warrior, especially far-forward, lifesaving treatment, the Medical Department must continue to develop unique deployable medical and surgical capabilities.

Evolution of medical science has been driven by necessity. As warfare tactics and weaponry have modernized, military medicine has developed new capabilities to treat combat casualties. Among these measures, trauma surgical techniques, and the ability to deliver this care to the battlefield, represent perhaps the most significant advances in saving lives in combat. In managing these trauma victims, time is the real enemy. Providing advanced medical care to an injured person within the first hour after trauma increases the chances for survival exponentially. This concept, delivering patients to treatment within the "Golden Hour," has become a major tenet for modern combat casualty care.⁷ (Figure 1).

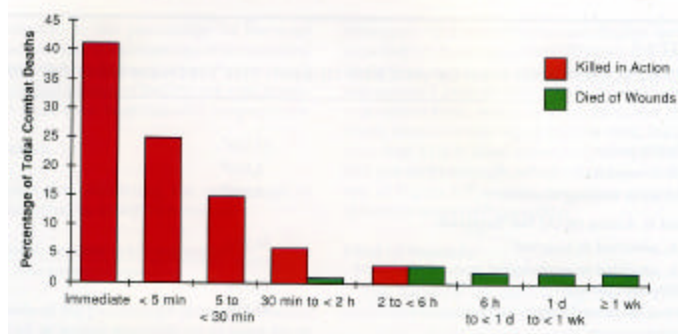


FIGURE 1. GOLDEN HOUR FOR TRAUMA TREATMENT.

The Army Forward Surgical Team (FST) was developed to address this specific window of treatment time for severely wounded soldiers. Historically, approximately 10-15 percent of those injured in combat require life-saving surgical intervention to control hemorrhage and provide emergency stabilization before evacuation.⁸ The FST concept has proven its value in saving lives and limbs during multiple deployments since its initial development in the early 1990's. Employment of this vital surgical capability has been instrumental in the resultant record low mortality rates among American and Coalition Forces seen in the current war in Iraq.⁹

FSTs are 20-man teams uniquely qualified to provide far forward surgical intervention to trauma patients. Surgery performed by the FST is resuscitative surgery, focusing on saving lives and salvaging limbs. These teams are rapidly deployable and capable of quickly establishing operations at the leading edge of the battle space. This close proximity to the warfighter is achieved by a surgical element that is 100 percent mobile. An on-going challenge for the AMEDD is enhancing mobility without a reduction in combat medical capability.¹⁰

FSTs serve a critical purpose, but have definite limitations. Patients must be quickly evacuated to a higher level of care as the team has minimal capability to hold and care for casualties postoperatively. Medical evacuation assets are essential as additional surgical intervention may be necessary for these patients. As soon as practical following initial resuscitation at the FST, wounded are evacuated to a larger, more robust Combat Support Hospital (CSH) farther back within the area of operations.¹¹

Requirements for combat healthcare and medical support for American military forces continue to change. Since the fall of the Berlin Wall in 1989, the number of military deployments involving American Forces has increased dramatically. In response to geopolitical changes and increased operational tempo for the U.S. military, then-Chief of Staff of the U.S. Army, General Eric Shinseki promoted transformation of the Army. General Shinseki was motivated by

lessons learned from post-Cold War conflicts and Operation Desert Shield/Storm (DS/DS) in 1991. He recognized a need for a lighter force with increased agility and more strategic deployability.¹²

The AMEDD realized its need to change to meet the challenges of the Army transformation. The medical department is currently modifying HSS doctrine and re-organizing units through force modularization and the employment of new technologies to increase mobility, deployability, and to enable the delivery of high-quality combat casualty care.

OIF represents the first long term commitment to combat operations for the U.S. since the Vietnam War. Our commitment in Southwest Asia offers unique opportunities for the AMEDD to optimize battlefield medical capabilities for the 21st Century. Much has changed in AMEDD (and Army) doctrine since DS/DS and as we enter a fourth year of OIF, a strategic-capabilities mismatch threatens to undermine the ability to effectively deliver essential medical support.

This paper examines the development of AMEDD doctrine for HSS in combat operations and identifies potential pitfalls in current utilization of surgical assets on the battlefield. Additionally, opportunities to modernize and enhance the future combat medical and trauma treatment capabilities are evaluated. Recommendations for future AMEDD transformation to ensure the capability to provide good medicine in bad places are discussed.

The Beginning of Army Medicine: A Chance to Cut is a Chance to Cure

To more completely understand and appreciate current AMEDD doctrine, it is necessary to examine historical developments in combat casualty care. The contributions of medical support to the morale and well-being of military forces has been documented from ancient times.¹³ Indeed, the link between morale, soldiers' health, and combat effectiveness of the military force have been recognized by commanders for centuries. As Dwight D. Eisenhower stated, "Morale is the greatest single factor in successful wars."¹⁴

The existence of a medical force capable of providing for the morale, health, and well-being of soldiers is a key component to military success. Clausewitz defined a "center of gravity" as "the hub of all power from which everything depends."¹⁵ Adhering to this theory, military strategists have advocated attack against an enemy's identified center of gravity. Likewise, protecting one's center of gravity is vital for success in war and continued survival of the nation. Arguably, the ability to protect or "conserve the fighting strength" represents a center of gravity of a military force.¹⁶

This concept proved true for Napoleon during his campaigns to conquer the European continent. His chief surgeon, Baron Dominique Jean Larrey, relocated French surgeons closer

to the fighting forces, thereby shortening the distance required to transport the wounded for care. Surgeons at the front were capable of evaluating, or sorting casualties for precedence of treatment. Today, this system of triage remains a fundamental concept in both military and civilian emergency medical management.

In addition to innovations in surgical techniques and the delivery of timely wound care, an organized ambulance system to more efficiently evacuate wounded French soldiers was established by Larrey. These modifications improved medical care and morale among the French fighting forces. Changes also enhanced logistical support and maneuver of forces by diminishing the congestion of road systems which had previously plagued armies following battle.¹⁷ Napoleon's enemies recognized potential benefits of these medical innovations and many adopted similar practices, with varying degrees of success. These concepts revolutionized battlefield medicine and set the groundwork for modern military medical doctrine.

The initiation of hostilities between the American Colonial militias and British forces near Boston, Massachusetts in April 1775 marked the beginning of the American Revolutionary War. Following the establishment of a Continental Army (14 June 1775), fighting intensified with resultant numerous casualties. General George Washington appealed to the Continental Congress and on 27 July 1775, a "Hospital for the Army" was created.¹⁸ This fledgling medical service, the predecessor to today's U.S. Army Medical Department (AMEDD) was established before American independence was declared.

American surgeons understood that the lives of soldiers depended on the speed of treatment. Unlike Napoleon's military, the Continental Army failed to establish a dedicated "ambulance volante" to transport wounded soldiers for medical treatment. Time was the enemy. Delays in providing medical care resulted in elevated mortality for those wounded in combat.

However, important lessons were learned and significant developments were made in American military medicine as a result of the Revolutionary War. The genius of Army physicians such as Benjamin Rush, James Tilton, Joseph Lovell, and others, enhanced preventive medicine, improved hospital sanitation, organization, and capabilities. Their contributions increased understanding of disease pathophysiology, enabling doctors to better fight diseases.

Surgical techniques and practices remained primitive in the early years of the Medical Department. Improvements in hospitalization and later, evacuation of the wounded, led to increased survival rates injured soldiers. However, an appreciation for the surgeon's age-old enemy remained painfully acute among military doctors. The time delay in providing treatment

to the seriously wounded was costing many lives. It would take more wars, and more lives to further advance battlefield medicine.

Warfare has served as a catalyst for modernizing the healthcare system and has promoted advancements in medical science. This trend has continued throughout the history of our nation. Military vaccination programs serve as an example of this evolution. The smallpox vaccination program initiated for U.S. military forces prior to Operation Iraqi Freedom, is descended from Army inoculations given during the War of 1812.¹⁹

The American Civil War was an important period for development of the Army medical Department. With the outbreak of hostilities in 1861, only “114 doctors cared for the 16,000 men” serving in the U.S. Army.²⁰ What is usually not mentioned is that approximately 27 of these physicians later left to serve the Confederate cause. The U. S. Army Medical Department was exceptionally unprepared for the war facing the nation.

Eventually, more than 12,000 doctors would serve in the Army Medical Department, either in uniform or as contract surgeons. One such physician was Jonathan Letterman. Appointed Medical Director for the Army of the Potomac, Letterman called upon lessons learned from Larrey and his own ingenuity to organize and manage the military hospitalization and evacuation systems. (Figure 2).

When the hour of need comes, imperious exigencies allow little opportunity for reflection and experiment in the means best adapted to meet the requirements...and, unless provisions for their succor have been matured beforehand, the comfort of the disabled must be sacrificed to inexorable military necessities.

—Assistant Surgeon George Otis, 1861.²¹



FIGURE 2. JONATHAN LETTERMAN

Letterman's innovations were responsible for saving many lives. Still, the combination of more lethal weapons, Napoleonic tactics, and an ill-prepared medical service made for a “strategic/capabilities” mismatch generating horrific numbers of casualties.²² More than 600,000 American soldiers died during the Civil War.

In addition to the development of an organized hospital and medical evacuation system, this period heralded the delivery of echeloned care on the battlefield. Apportioning medical assets and treatment according to defined levels of need is a concept still utilized by today's combat medics and trauma surgeons.²³

These advances increased combat power through increased morale and well-being of soldiers, enabling greater numbers to return to duty sooner. The experience gained by surgeons in treating wounded soldiers during this period contributed greatly to the development of medical and surgical care for all Americans in the years following the war. Streamlined evacuation, positioning surgeons on the battlefield, and organizing medical units served to shorten the distance between the "point of injury" and available treatment. These concepts remain the focus and goals for modern trauma care.²⁴

World War I (WWI) saw the mobilization of nearly five million U.S. military men and women. This would be the first large-scale deployment of American soldiers overseas and the Army Medical Department effort was impressive. Although modern weapons delivered increased lethality, battlefield deaths dropped to nearly half (8 per 100) of those seen in the civil war.²⁵ Echeloned care system utilized for medical evacuation of the wounded proved effective, however, soldiers requiring lifesaving surgery still traveled to hospitals in rear areas. This prompted surgeons to call for a decrease in the time between wounding and surgical intervention. By positioning surgical units closer to the front, more lives could be saved.

World War II (WWII) brought dramatic changes to the Army Medical Department and to American medicine. The "Died of Wounds" (DOW) rate dropped from a WWI level of 8 percent to approximately 3.5 percent in WWII.²⁶ These advances were attributable to improvements in surgical care, antibiotic use (penicillin, sulfa drugs), enhanced evacuation of wounded, and increased emphasis on preventive medicine practices.²⁷ WWII saw the first uses of plasma and whole blood product on the battlefield, further contributing to increased survival rates.

In addition to saving lives, another major benefit of improved battlefield medicine was appreciated during the Second World War. Dr. Michael DeBakey conducted an analysis of casualty figures demonstrating the affect provided American forces by an efficient medical system.²⁸ The return to duty made possible by early access to medical care. As the war continued, this resulted in enhanced combat effectiveness.²⁹

Army transformation in WWII was dramatic as new levels of battlefield mobility were achieved through mechanization of combat forces. This increased demand on the medical force to restructure down to the battalion levels. It also forced changes to increase mobility for the hospital units. Large, immobile hospitals were ineffective in the fast-moving battlefields of

Europe and the Pacific. Smaller hospitals were designed to meet the demands of mechanized and amphibious warfare.³⁰

The Surgical Consultants Division of the Office of the Army Surgeon General developed a concept for Auxiliary Surgical Groups (ASG) in 1942. Six ASG eventually saw service in WWII and these specialized surgical teams proved highly valuable as a “portable” surgical capability closer to the front lines.³¹ By utilizing these “surgical teams” in military operations where medical evacuation was challenged, seriously wounded soldiers could receive emergency surgical intervention.

Dr. DeBakey would later state that the trauma experience gained by Army surgeons in one day exceeded years of experience in civilians practice. He was involved in the development of the ASGs and later helped establish the concept for Mobile Army Surgical Hospitals (MASH).³² MASH units served honorably throughout the Korean War as the highest refinement of a frontline surgical hospital in history. Their highly mobile configuration allowed for them to move as necessary to support forces across the battlefield.³³ Later generations of these mobile surgical hospitals saw service in Vietnam.

All the circumstances of war surgery thus do violence to civilian concepts of traumatic surgery. The equality of organizational and professional management is the first basic difference. The second is the time lag introduced by the military necessity of evacuation. The third is the necessity for constant movement of the wounded man, the fourth –treatment by a number of different surgeons at different places instead of by a single surgeon in one place-is inherent in the third. These are all undesirable factors, and on the surface they seem to militate against good surgical care. Indeed, when the overall circumstances of warfare are added to them, they appear to make more ideal surgical treatment impossible. Yet this was not true in the war we have just finished fighting, nor need it ever be true. Short cuts and measures of expediency are frequently necessary in military surgery, but compromises with surgical adequacy are not.³⁴

- Michael E. DeBakey, MD

Refinements in combat medicine continued through the Korean and Vietnam Wars. Among these, advancements in vascular surgery spared limbs which previously were routinely amputated. Also, subspecialty surgical teams were organized and sent to augment the MASH to provide unprecedented levels of surgical expertise in the combat zone.

The introduction of the helicopter for medical evacuation (MEDEVAC) purposes revolutionized patient transport and further improved care.³⁵ Maturation of the evacuation channels during American fighting in Korea, and later Vietnam, streamlined access to initial resuscitative and definitive surgical intervention. “Dustoffs” flew the injured back to the MASH or to larger evacuation hospitals, while also delivering blood and vital medical supplies. The

U.S. Air Force provided strategic evacuation of patients, routinely flying wounded servicemen to Army hospitals in Japan and the Continental United States (CONUS).

Historically, 90 percent of combat casualties will not require immediate surgical care (within the “Golden Hour”).³⁶ 10-15 percent of wounded in action need surgical intervention to control hemorrhage and provide stabilization for evacuation. Of this group, the greater majority will die without immediate access to trauma care. Success in battlefield medicine is how we best affect survivability for this group. (Figure 3).

Another method of comparison is to look at the combined number of killed or injured in action. Dividing this number by the number of deaths yields a “death rate.” In the conflicts in Afghanistan (OEF) and Iraq (OIF), the death rate is about 9 percent. Death rates for Korea, Vietnam, and the Gulf War (Desert Storm) were all approximately 24 percent.³⁷ The increased survival rates are principally attributed to a refined capability of emergency resuscitative trauma care closer to the fighting.

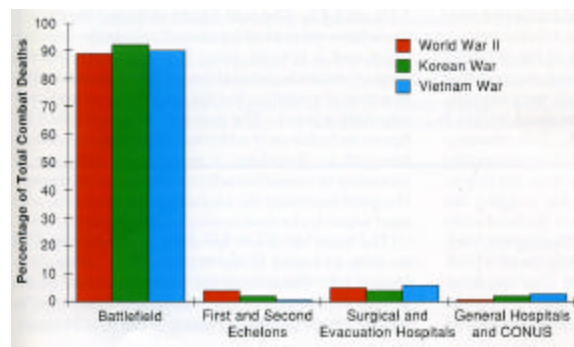


FIGURE 3. WWII/KOREA/VIETNAM COMBAT DEATHS.

In the post-Vietnam era, experience gained by wartime surgeons served as a catalyst for a revolution in civilian trauma medicine. Much of the lessons learned during this time were more the result of America's highways and criminal activity than military warfare. Dr. Donald Trunkey defined the effects of Trauma on American society:

Accidental and intentional injuries account for more years of life lost in the U.S. than cancer and heart disease. Among the prescribed remedies are improved preventive efforts, speedier surgery and further research.³⁸

Through the next two decades, American medical/surgical residency programs began training physician and surgeons in the new concepts for trauma medicine. Advanced Trauma

Life Support (ATLS), cardiopulmonary resuscitation (CPR), intensive care (ICU) medicine systems, burn care, and other emergency protocols are core principles widely in use today.

Cooperative agreements between civilian and military departments proved instrumental in the development of new protocols for the care of seriously injured patients. The period between the Vietnam War and OIF has seen phenomenal advancements in U.S. trauma medicine.

Today's Army Medical doctrine includes an integrated health services support system for triage, treatment, evacuation, and the return to duty in the most time efficient manner. From the point of injury to the hospitals located in the continental United States (CONUS), the goal is to initiate treatment and continue care, as required, through subsequent levels of care.³⁹

Beginning with self or buddy aid, combat lifesaver, or combat medic, delivery of care progresses rapidly through emergency medical care (EMT), advanced trauma management (ATLS), and resuscitative surgery. If needed, evacuation with critical care transport is accomplished to a level of even more sophisticated treatment. (Table 2).

- Level I. Immediate First Aid (self-, buddy-aid)
- Level II. Increased Medical Capability (Battalion Aid Station, FST)
- Level III. Highest level of medical/surgical care in combat zone. (CSH)
- Level IV. Definitive medical/surgical care outside the combat zone, but in theater
- Level V. CONUS based hospitals providing ultimate treatment capabilities

TABLE 2. LEVELS OF MEDICAL CARE

Current Doctrine: Hot Lights and Cold Steel

Today's soldier continues to reap the benefits of yesterday's Army medicine. Yet we must always be prepared for the future. As outlined in the 2001 Quadrennial Defense Report (QDR), the U.S. military is experiencing a fundamental shift from a "threat-based" to a "capabilities-based" approach to plan for future conflicts.⁴⁰ The terrorist attacks of 11 September 2001 occurred during a period when the Army was already undergoing the most comprehensive transformation since WWII. The daunting challenge for the AMEDD is to provide HSS to an Army simultaneously prosecuting a Global War on Terrorism (GWOT) while transforming to a more agile, mobile, and lethal force for the 21st Century.

By the time of the 9-11 attacks, an AMEDD transformation had already been initiated. These changes in the medical force had been largely prompted by problems identified during DS/DS. Another powerful force of change was Congressionally-mandated restructuring, and subsequent downsizing of the American military. As the Army was reduced, AMEDD hospital

and tactical units were similarly affected. Between 1990 and 2001, approximately 20 percent of officer strength and 40 percent of enlisted personnel were eliminated from the Active Component medical force.⁴¹

Although Reserve Component soldiers traditionally have accounted for over 60 percent of the total medical force, in the years after DS/DS, their numbers had dropped by nearly 40 percent. By 1996, 25 percent of Reserve Medical Officers were gone and this situation continued to worsen with increased deployments to the Balkans and other contingency operations.⁴² The AMEDD leadership initiated a series of measures to address these critical issues challenging the ability to provide HSS to the Army. A major reorganization for the AMEDD was the central theme of this concept.

Beginning in 1994, the U.S. Army Medical Command (MEDCOM) was formed to replace the Health Services Command. This change empowered the Army Surgeon General as he was now dual-hatted as the principle advisor to the Army Secretary, Chief of Staff, and the Assistant Secretary for Defense (Health Affairs) on health-related issues. Additionally, the Surgeon General commanded the new MEDCOM, overseeing the Army's entire healthcare team.

This major AMEDD reorganization also created subordinate commands, Health Service Support Areas (HSSA) directed by regional medical center commanders. These units were redesignated to six Regional Medical Centers (RMC) in 1998. Another significant change under this reorganization effort involved the designation of the Medical Research and Materiel Command (MRMC) to assume responsibility for all medical logistics, research, laboratories, and information management within the AMEDD.

The appointment of LTG James B. Peake as Army Surgeon General in 2000 resulted in a paradigm shift in AMEDD transformation. LTG Peake, a cardiothoracic surgeon with combat experience as an Infantry officer in Vietnam, advocated changes in how the AMEDD would support Army component commands in combat. His Task Force Medical concept called for increased levels of cooperation and support between deployed medical units and the RMCs located within the continental United States. These changes have been implemented to varying degrees and have facilitated the ability of the AMEDD to provide HSS to the future combat force in OIF/OEF and other contingency operations. AMEDD transformation has accelerated under the current Surgeon General, LTG Kevin C. Kiley to meet the requirements of the Future Force.

The Medical Department learned many lessons from the DS/DS experience. This represented the largest deployment of Army Forces since the Vietnam War. Although combat operations were of a short duration and casualties relatively few, large numbers of enemy prisoners of war (EPW), an inefficient medical supply system, inability to rapidly move existing

hospital support, and the long evacuation distances challenged the AMEDD to provide HSS to the deployed force.⁴³

In response to these lessons learned, and subsequent GAO reports from DS/DS, the Department of Defense authored a Medical Strategic Plan. This initiative addressed shortcomings and directed the AMEDD, and other service medical components to improve their capabilities in medical planning, logistics, and evacuation. Emphasis was placed on developing more mobile and deployable medical forces.⁴⁴ These efforts prompted action to build a more modular medical force with rapid deployment capabilities similar to those units undergoing transformation across the Army.

The Army's transformation to a future force envisions radically new fighting tactics and requires new technologies and equipment. The employment of widely dispersed units moving rapidly across the battlefield is one of many operational concepts which will present challenges to those units that support the combat elements. Future US Force posture will reflect a strategy-based global posture composed of lighter, more expeditionary, mobile, and high-tech forces. The medical force must reflect this same capability.

To address these emerging concepts, the AMEDD initiated efforts to gain insight into the specific challenges of providing HSS for the transforming Army. From 1998 to 2002, the AMEDD sponsored a series of workshops to assess these challenges and identify deficiencies in existing doctrine and HSS concepts for the future force. Major observations from the series of workshops, conducted by the Rand Corporation included:

Dispersion of units, long lines of communication (LOCs), and limited surgical capacity were the most problematic characteristics of the operations supported by the scenario. Timely surgical intervention is imperative. Modular alternatives to provide far-forward surgical intervention may prove attractive, but mobility and security are significant concerns. The roles of Combat Lifesavers (CLS), combat arms platoon medics, and battalion aid stations need to be revised.⁴⁵

The medical force deployed in Operation Desert Storm had been designed to fight in a massive land war against the Soviets in Europe. Hospital units, including the Mobile Army Surgical Hospitals (MASH) required excessive strategic lift to get them to the battlefield and were too large and immobile to move with maneuverable combat forces. The Medical Department recognized the need for lighter, flexible, yet capable, units to reduce the medical footprint in a given theater of operations.

The aforementioned analyses, coupled with the lessons from DS/DS and other post-Cold War military operations, fueled the redesign of the medical force to support the evolving Army Force XXI. By 1993, the AMEDD initiated a reorganization of its deployable medical units

above the division level through the Medical Re-engineering Initiative (MRI). The centerpiece for the Medical Department's MRI transformation was the Combat Support Hospital (CSH).

Under the MRI, hospitalization requirements for a military force deployed to a theater of operations are provided by a newly-configured CSH. Previous AMEDD doctrine was based on a Medical Force 2000 (MF2K) concept, which called for 3 separate types of hospitals (field, general, and combat support). The MF2K CSH comprised 296 beds and required enormous strategic lift capabilities to deploy.⁴⁶ Once established, these hospitals were essentially immobile and as combat units maneuvered across the battlespace, the lines for evacuation of wounded grew exponentially.

To address these limitations, the Medical Re-engineering Initiative has melded AMEDD capabilities into the overall Army transformation plan. By the end of fiscal 2004, more than 40 percent of all MRI unit activations and conversions were complete.⁴⁷ Efforts to further refine the medical force are being accomplished through the Adaptive Medical Increments (AMI) concept. AMI further reduces the size of deployable increments supporting smaller troop concentrations in an expeditionary force.⁴⁸ The AMI modularization allows for incremental increases to right-size the medical unit capabilities for the supported force. Modularity is the key to the AMEDD transformation and AMI is the tool to ensure the MRI units are capable of supporting any level of combat operations.⁴⁹ AMI will enhance the ability to "tailor" HSS to adapt to mission requirements when a larger, complete CSH is not required.⁵⁰

A MRI-transformed CSH has a 248-bed capacity and provides medical treatment for all types of patients. From earlier analyses, other capabilities have been modified to include an enhanced surgical capability (six operating room tables). The Corps CSH is also capable of conducting split-based operations by dividing into separate 84-bed and 164-bed hospitals.⁵¹ A 44-bed "early entry" hospital can also be deployed as a lead element to provide medical support in the early stages of combat operations. These modularized units represent an incredible advance in mobility, flexibility, and HSS delivery to warfighters. Figure 4 graphically depicts the conversion from MF2K to MRI CSH capabilities.

In addition to the MRI transformation of the Combat Support Hospitals, the Forward Surgical Team (FST) concept has been refined. Combat operations in Grenada, Panama, Somalia, Iraq, and Afghanistan have demonstrated the growing need for forward surgical intervention as the lines of communication (and evacuation) increase. Development of small, specialized units capable of providing far-forward resuscitative surgical care was recognized as a legitimate requirement for optimal combat casualty care.

Transforming the Medical Force

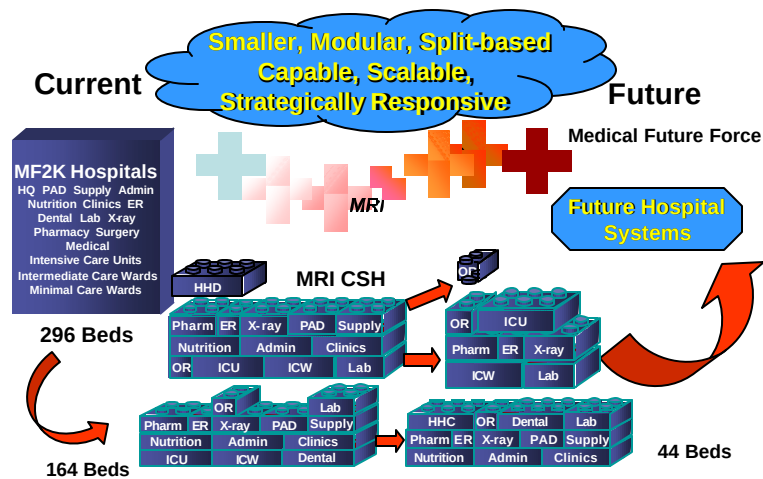


FIGURE 4. COMBAT SUPPORT HOSPITAL (CSH) TRANSFORMATION UNDER THE MEDICAL RE-ENGINEERING INITIATIVE (MRI).

In fact, earlier attempts at creating these units failed to establish universally acceptable surgical elements which could be consistently employed across the Army. Small, ad hoc surgical "teams" were utilized primarily by special operations forces until the early 1990's. Experience from the 82d Airborne Division during Operation Just Cause impressed upon many the real potential for utilization of a far-forward surgical capability.

Following Operation Desert Storm, and concurrent with the MRI, a formalized FST structure was established and AMEDD doctrine has been adopted for this surgical asset.⁵² The FST, consisting of 20 personnel is readily deployable and 100 percent mobile with organic transportation. Team composition includes 10 officers and 10 enlisted soldiers: 3 general surgeons, one orthopaedic surgeon, anesthesia providers, nurses, and combat medics. Their mission: "to provide a rapidly deployable urgent initial surgical service forward in a division AO."⁵³ FSTs are assigned to a brigade combat team and supported by a forward support medical company (Level II) on the battlefield.

These uniquely-qualified teams are not hospitals. FSTs lack the X-ray, laboratory, and additional medical support capabilities of a CSH. Carrying only enough surgical supplies to perform up to 30 lifesaving operations in 72 hours, they rely on others for logistical support.⁵⁴ The real value in these teams, and the reason they have been developed, is to deliver lifesaving

resuscitative surgical care at the leading edges of the battlefield within the “Golden Hour.”

Figure 5 graphically depicts the time in which emergency treatment must be rendered to optimize trauma patients’ outcomes.

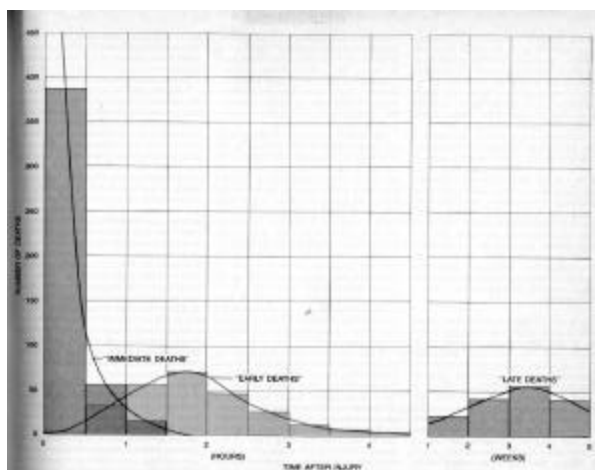


FIGURE 5. “GOLDEN HOUR”- LIFESAVING EMERGENCY INTERVENTION HAS GREATEST BENEFIT IN FIRST HOUR AFTER INJURY.

OIF represents the first, large scale utilization of FSTs in the Army’s history. Creation of these specialized units represents an incredible evolution for combat casualty care; the ability to provide emergency surgery on the battlefield. The AMEDD has been very successful in “selling” this far-forward surgical concept to the combatant commanders. The FST requires support from the unit to which the team is attached, and these factors must be considered during planning. (Table 3).⁵⁵ Indeed, the modern warfighter has grown to expect this surgical capability to be present throughout combat operations.

- Requires minimum of 1.5 hours to become operational
- Two Operating Tables per Team
- Maximum Caseload per 24 hours=10 Cases
- Average time per Patient= 135 Minutes
- Postoperative Care up to 6 Hours with Maximum of 8 Simultaneous Patients
- Must Not Begin Surgery Unless Sufficient Time to Safely Begin and Conclude Required Procedures and Permit Postoperative Recovery
- Relief/Reconstitution is Required After 72 Hours

TABLE 3. FST CLINICAL PLANNING FACTORS

During the initial phases of OIF, FSTs were appropriately attached to the brigades and maneuver combat units for far forward emergency support. As American and coalition military forces completed the initial combat phase of OIF, more robust medical capabilities had been established within the area of operations. But the continued reliance on FSTs by combatant commanders is detrimental to the goal of optimal medical care delivery. As previously mentioned, a FST has vital, but limited, capabilities.

Combat Support Hospitals were deployed to provide HSS even before the onset of the combat operations. For example, from March 2003 through March 2004, the 47th CSH was deployed to Southwest Asia and established the largest hospital in the theater. This was an MF2K hospital comprising 296 beds, eight operating rooms, X-ray, laboratory, pathology, specialty care, blood bank and other services. Surgical capabilities included, neurosurgery, head and neck, ophthalmologic, general and vascular surgery. The 47th was not only the biggest, but quickly became the busiest (Level III) hospital delivering state-of-the-art medical care to the battlefield.

However, the 47th CSH lacked the mobility, flexibility, and modularity of an MRI-converted CSH. These limitations reinforced the wisdom of the MRI transformation concept. Figure 6 demonstrates the large footprint established by an MF2K CSH.

Presently, there are two MRI Combat Support Hospitals conducting (doctrinal) split-based operations. Army surgeons also augment an Air Force hospital unit at Balad Air Base. Including this cooperative medical partnership, there are five (Level III) hospitals in Iraq.



FIGURE 6. AERIAL VIEW OF 47TH CSH IN KUWAIT 2003-2004.

As OIF continues into 2006, a large medical force presence is saving lives in Iraq. Current data shows that American soldiers are surviving combat wounds at an unprecedented rate.⁵⁶ During World War II, for example, approximately one in every three wounded servicemen died. Statistics improved slightly through the Korean, Vietnam and first Gulf Wars to about one death in every four. For OIF, one in every eight injured troops dies of wounds.

An important contributor to improved survivability is the enhanced training for Army combat medics in caring for trauma victims. Regardless of the number of medical units deployed to a combat zone, it is the skills of a combat medic (or other “first responder”) that determines the outcome for most of the wounded.⁵⁷

The Army has emphasized “First Responder” training for soldiers in recent years. A critical element of the AMEDD transformation has been the transition of Army medics into Military Occupational Skill (MOS) 91W, Health Care Specialist. During the late 1990’s, combat medics’ training was changed to provide emergency medical technician (EMT)-paramedic skills and trauma care.

A major evolution in Army combat medic (MOS 91W) training has been the development of medical courses utilizing the latest simulation technology and emphasizing trauma training based on Lessons Learned from recent combat operations in Afghanistan and Iraq. Medics are now better suited to provide emergency aid at the point of injury and to sustain casualties during transport. Enhanced skill sets for these medical providers have been a key enabler for saving lives on the battlefield.

Increased survivability for combat wounded is directly attributable to accessible emergency medical treatment, surgical capabilities, decreased evacuation times, enroute medical care, and the use of body armor.⁵⁸ This fact is supported by the patterns of wounds statistics maintained by the Joint Trauma Treatment Registry (JTTR). These data show that many more soldiers are surviving significant wounds which would previously have proven lethal.⁵⁹

It may be correctly assumed that the presence of specialized surgical units is a major factor in the low mortality rate. But, as U.S. military forces have completed the “major combat phase” of OIF and entered stability operations, what part of this contribution currently comes from the FSTs?

The answer to this question: very little.⁶⁰ The presence of multiple CSHs in Iraq provides an incredibly robust surgical capability and full complement of other ancillary services found only in a hospital setting. These Level III units regularly receive battle casualties through a mature

evacuation system. Wounded soldiers are routinely transported to Combat Support Hospitals from practically any location in Iraq within one hour.⁶¹

Rotary wing Medevac and ground ambulance units enable quick access to emergency treatment at a CSH. In fact, FSTs are regularly bypassed by Medevac in order to deliver wounded soldiers to the best facility for care. Emerging data suggests that some patients have experienced poor outcomes secondary to surgery at an FST, rather than a readily-available CSH.⁶² Once definitive care has been provided at the CSH, patients are flown out of theater for further medical/surgical treatment. Evacuation to the continental U.S. is now routinely accomplished in a matter of hours, faster than in any previous conflict.⁶³ To date, more than 32,000 casualties have been evacuated from Afghanistan and Iraq for treatment in CONUS.⁶⁴

Then why are there still approximately *14 Forward Surgical Teams* deployed to Iraq? The answer lies in the inability of the AMEDD to “regain control” of these surgical teams from combatant commanders. Each brigade combat team, in addition to separate maneuver brigades and joint task forces, are still being supported by FSTs. This continued reliance on a valuable surgical asset has created a strategy-capabilities for the AMEDD.

According to Army doctrine, appropriate employment of a FST includes attachment to the CSH for general support. When operationally employed, these units provide immediate surgical intervention in the forward area of a division or separate brigade prior to further evacuation to a higher level of care. These teams have limited holding capability and are not designed to provide routine medical care.⁶⁵

The requirement to project this surgical capability far forward increases as a result of fast moving operations that extend the evacuation lines beyond the “golden hour” of optimal trauma care. Once stability operations are achieved, the FST is best utilized by co-locating the team with the Level III CSH to augment the hospital’s surgical element. Otherwise, the FST should be redeployed.

At present, FSTs remain under the operational control of divisions and brigades. This command relationship has resulted in these units remaining under direct command authority of the combatant commanders. As mentioned previously, these commanders have become accustomed to having “their surgeons” remain with them throughout their deployments. Commanders have developed a preference for “just in case” medicine and have been reluctant to relinquish control of Forward Surgical Teams.⁶⁶

As a result, most of the FSTs in Iraq have remained underutilized for many months. Team members have experienced long periods of inactivity, resulting in low morale and concerns for the erosion of very perishable surgical skills.⁶⁷

Compounding this problem is the fact that there are presently only 138 general surgeons in the Active Component medical force.⁶⁸ Of this number, about 109 (79%) have deployed in support of Operation Iraqi Freedom or Operation Enduring Freedom. Approximately 45 percent have deployed more than once and that number is growing.⁶⁹

Given the limited pool of available surgeons with which to staff Forward Surgical Teams and hospitals, a shortage is inevitable. In addition to the wartime mission of the AMEDD, there remains a large requirement to provide surgical care to soldiers and other beneficiaries at Army hospitals around the world.

The strategy-capabilities mismatch caused by a flawed policy of saturating Iraq with surgeons must be corrected by immediate AMEDD action. Unless changes are made soon, the current inventory of surgeons will be insufficient to meet the on-going support requirements for the GWOT and the needs of military hospitals in the continental United States.

Southwest Asia is not the only area where U.S. military forces are currently deployed. Worldwide commitment of combat units, and support elements, will likely continue for years to come. (Figure 7). An increased operational tempo combined with the reality that deployed FST surgeons currently have little opportunity to operate, has consequences. Surgeons are leaving the military while the Army considers options to counter this worrisome trend.⁷⁰

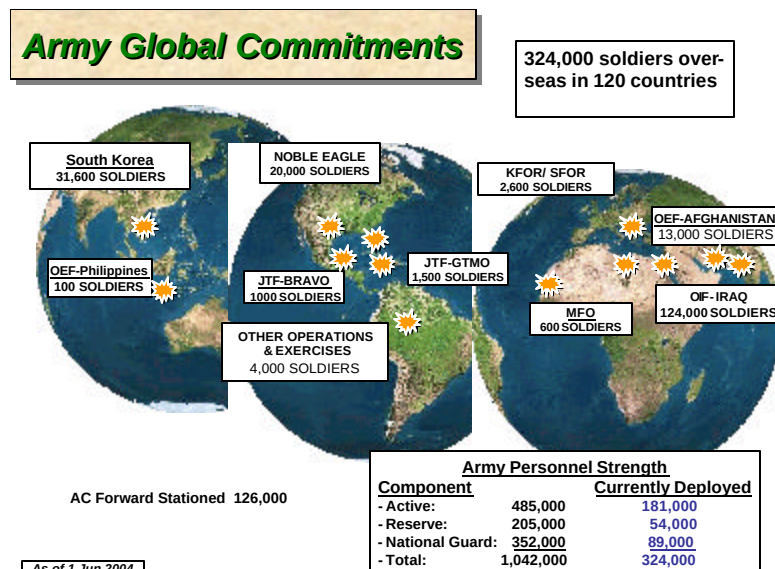


FIGURE 7. U.S. ARMY DEPLOYED FORCES.

Doctrinal Dilemma

While Forward Surgical Teams provide critical lifesaving capabilities to the leading edges of the battlefield, optimal combat casualty care can only be achieved through appropriate employment of this surgical unit. Techniques, Tactics, and Procedures (TTPs) and After Action Reports (AARs) provide insight to doctrinal deficiencies, highlighting “gaps” between existing health service support concepts and requirements for combat casualty care. These gaps represent significant risk to the ability of the AMEDD to accomplish its support mission for the future force.

To best mitigate the medical risks imposed by these gaps, TTPs, AARs, and Lessons Learned are continually evaluated for future application. Through scholarly analysis, lessons learned can be incorporated into the development of new doctrine and concepts for care. It remains the responsibility of medical leaders to ensure appropriate scrutiny of recommendations and observations. Medical doctrine, based on tasks, conditions, and standards is often slow to change. After all, unless change is effected, “lessons learned” are merely observations.

Some key points and recommendations to address this doctrinal dilemma and strategy-capabilities mismatch include:

1. Command and Control.

- Establishing clear command relationships is the key to ensuring surgical assets are appropriately utilized on the battlefield. Currently in Iraq, the FST remains under the direct operational control (OPCON) of the tactical (BCT) commander. Because of this arrangement, commanders are unwilling to release the FST to the CSH “just in case” they are needed. This has resulted in a situation where highly-skilled surgeons sit idle while patients are routinely evacuated to a nearby CSH.
- Current AMEDD doctrine states that the FST should be attached to a hospital (CSH) for general support.⁷¹ However, an MRI-converted CSH is structured to serve as a Medical Task Force Headquarters element.⁷² Operational Control (OPCON) of the FST should remain with the CSH to best assure appropriate training, equipment maintenance, and medical logistical support.⁷³
- Under the operational control of the CSH (Medical Task Force) commander, a FST is uniquely qualified to serve as a surgical “Quick Reaction Force.” As the tactical situation requires, a CSH commander can temporarily attach a FST to provide emergency surgical support to a maneuver brigade. While Tactical Control (TACON) of a FST may be delegated to the supported combatant commander, OPCON would appropriately remain with the CSH/Medical Task Force commander.⁷⁴ Once it is

determined that the supported unit no longer requires FST surgical capabilities, the team should re-locate to the CSH.⁷⁵

2. Erosion of Surgical Skills.

- Sustainment of perishable medical skills is best accomplished by ensuring surgeons keep busy in a high-volume practice. Medical professionals assigned to FSTs in Iraq have expressed concerns for the erosion of their surgical skills from prolonged periods of inactivity.⁷⁶ By maintaining OPCON of FSTs with a CSH, team members augment hospital surgical sections, maintain skills, and unit morale is bolstered.⁷⁷

3. Attrition of Military Surgeons.

- Currently, there is a requirement of approximately 4847 authorized positions for physicians in the U.S. Army Medical Corps. Today only about 3827 doctors serve on Active Duty and the trend is for this gap to continue to grow.⁷⁸ Surgical specialties represent the greatest shortfall in endstrength numbers with general surgeons facing critical shortages.⁷⁹ Approximately 64% of the Army's general surgeons have deployed (over 34% more than once) and many of these officers have left, or are planning to leave the Active Duty military.⁸⁰

Curtailing the loss of Army surgeons will require a multi-faceted solution set. In the past, shortages of military physicians prompted Congress to pass legislation such as the "Doctor Draft Law" in September 1950.⁸¹ More than 90 percent of the doctors required for the Korean War were produced by this "doctor draft."⁸² Most of these physicians had attended medical school with military financial support and repayed their obligations with Active Duty service.

Drafting of physicians was abolished with the all-volunteer force and coincidental establishment of a military medical school and Health Professions Scholarship Program (HPSP) in the early 1970's. Until recently, these programs provided sufficient numbers of physicians to meet the demands for the AMEDD (approximately 300 per year).

The AMEDD now faces a challenge: convincing medical professionals-in-training to accept military financial scholarships, such as the HPSP.⁸³ These scholarships, in which the government pays for medical training in return for a commitment to serve on active duty, have been the mainstay of Army medicine since their introduction over thirty years ago. The combination of increased deployments, wartime service with higher stress levels, and decreased recruitment numbers have resulted in the current burgeoning manpower shortage.

Direct recruitment of fully qualified physicians is extremely difficult due to the highly competitive civilian market for these skills.⁸⁴ After graduation from medical school, physicians must train in a medical (or surgical) specialty area for several more years. For general

surgeons, training programs require another 5-6 years to become a qualified surgeon. Therefore, retention of these skilled professionals is essential to address the growing military doctor shortage.

Expansion of financial aid programs and increasing bonus pay for military doctors will help recruitment and retention up to a point. But these programs alone will do little to correct the inability to retain fully qualified surgeons. Unless the current operational tempo is scaled back, over-deployed (and under-utilized) surgeons will continue to leave the service.

There is no longer a requirement to maintain large numbers (14) of FSTs in Iraq. The number of U.S. casualties has declined by 26 percent in the past year.⁸⁵ Medical Department assessments confirm that surgical capabilities currently available at the CSHs are sufficient to care for wounded warriors.⁸⁶ Keeping FSTs in theater without legitimate need to justify their presence is a misuse of Army surgeons. The well is running dry and we are facing a crisis due to poor management of trained medical personnel.⁸⁷

The Way Ahead: More Sweat in Training, Less Blood in Combat

The condition of the Army today can only be understood when one considers where we have been and where we are going...The changes in the world have made us realize that to ultimately be successful in the Global War on Terror, we must transform our capabilities. We will not be ready and relevant, more joint, more rapidly deployable and adaptive, as well as enhance our capability to be successful across the entire range of military operations from major combat to the condition of stability.⁸⁸

Future U.S. military forces will reflect a strategy-based global posture composed of lighter, more expeditionary, mobile, high-tech units. The Army's transformation goal is encompassed in the "Future Combat Systems" (FCS) program, consisting of manned and unmanned systems, connected by a common network that enables the modular force. FCS modernization will provide soldiers with leading-edge technologies which allow them to dominate in complex environments.⁸⁹ The entire Army is being reorganized into modular Brigade Combat Teams (BCTs) to serve as experimental organizations for the new FCS technologies. FCS is the most complex, ambitious, and expensive program in Army history.⁹⁰

All components of the Future Force will tap into powerful FCS technology which will protect warfighters and put unparalleled resources in the hands of soldiers. Networked systems of sensors, communications, battle command and computational power will enable soldiers to "see first, understand first, act first and finish decisively" on the future battlefield.⁹¹ 21st Century Medical capabilities will similarly be empowered by embedded FCS.

To ensure support to the Joint and Army warfighter in the Future Force, a restructuring of the processes and relationships that provide medical support is necessary. The U.S. Army Medical Command (USAMEDCOM) offers several proposals to enable effective and efficient utilization of medical assets to support the transforming Army.⁹²

The central concept of the future Medical Department restructuring envisions the USAMEDCOM as a CONUS-based medical Unit of Employment (UEX) and redesigns existing Regional Medical Centers into Regional Medical Deployment Support Commands (RMDSC). Each RMDSC will control technical supervision over deployable medical units assigned to its CONUS region. This concept will, in effect, blur the historical distinction between the Table of Distribution and Allowances (TDA) and Table of Organization and Equipment (TOE) unit functions.⁹³ The goal of AMEDD reorganization is to develop a seamless medical structure from existing regional activities in the U.S. to the deployed tactical units anywhere in the world. Implementing these organizational changes will see MEDCOM as the sole medical force provider for the Army. These proposed changes will minimize the inefficiencies in utilization of medical assets as currently experienced in OIF.

Reorganization will ultimately refine responsibilities and eliminate many of the current inefficiencies caused by conflicting command and control chains. Previously defined programmed changes (i.e. MRI, AMI) are essential elements to successfully alter existing command and control chains in the tactical (deployable) medical force. Increased modularity achieved through these initiatives will enhance flexibility and enable medical units to meet requirements from combat, disaster relief, humanitarian assistance, or other missions.

Depending on the mission, the size and complexity of the deployed medical force will determine the structure of the medical battle command element necessary to synchronize all assets. For example, in smaller operations, a multi-functional medical battalion may be adequate to exercise command and control of a medical task force. As the operation grows in size, a CSH commander may assume command of the medical task force and subordinate medical units. Modularity in the design of these deployable units allows for tailored structuring to optimize medical capabilities.

Effective and efficient accomplishment of the medical mission mandates that medical commanders have direct control of medical assets. AMEDD leaders are uniquely qualified to manage the complexities of the modernized military health system. By ensuring command of deployed medical units remains with the medical task force (CSH) commander, more efficient use of these assets will be possible.

USAMEDCOM, commanded by the Army Surgeon General, will be the lead agent to coordinate the provision of joint medical capabilities with the Surgeons General of the Navy and Air Force. Coordination between these service component medical commanders and the Joint Staff will enable a mutually supportive health care system.⁹⁴ A continuum of care from the battlefield to CONUS-based military hospitals can be assured by this new joint medical force network.

By designating the MEDCOM commander/Surgeon General as the Army's principle medical force provider, more efficient synchronization within the military medical healthcare system can be achieved. A singular command structure to provide analysis of emerging missions and determination for deployment of medical forces will optimize specialty care support to Combatant Commanders. MEDCOM will be the agency responsible for selecting, organizing, and coordinating resources from a joint medical force pool.⁹⁵ Streamlining the process for deploying medical units by reducing layers of redundant headquarters will promote efficiency.

Within CONUS, the MEDCOM will assign designated geographic areas of responsibility to the aforementioned Regional Medical Centers (RMCs). In addition to managing regional healthcare facilities, these RMCs will be responsible for training and maintaining both Active and Reserve Component medical forces in support of mobilizing and deploying units. Each CONUS-based RMC will have a deployable medical headquarters affiliated with the Combatant Commands they habitually support. The relationship between these medical units and the forces they support should extend from peacetime operations to the battlefield. The MEDCOM Commander will direct strategic medical support while the Combatant Commanders measure the effectiveness of senior medical commanders and the support they provide.⁹⁶

The senior deployed medical commander, in coordination with the command surgeon, would then be responsible to assess the tactical situation and synchronize employment of all medical assets within the Joint Operational Area. The envisioned technical control would be more than advisory, becoming directive in nature regarding the delivery of all health service support in theater.⁹⁷ This process defines a new relationship which will ultimately ensure fully synchronized medical operations and enhance support to the Combatant Commanders.

Although this paper addresses the concept of medical support to Army commanders, it should be recognized that units must be *joint-capable* organizations, and will integrate medical support to other services aligned under the Combatant Commander. Theater medical support is an essential joint, interagency, interdependent function. Continuity of care will require

synchronization of the joint medical system, to include planning, treatment, evacuation, and sustainment of the force.

Military medicine has developed into a sophisticated specialty..(and) includes such disciplines as tropical medicine, nuclear warfare, chemical weapons, flight surgery, industrial medicine, hygiene, disaster triage, transport and the care of the wounded during transport, combat nutrition, immunizations, epidemiology, management of venomous bites and stings, and the emotional disorders of military life.

- COL Walter J. Pories, MD, USA⁹⁸

Modularizing field medical forces alone will not ensure outstanding healthcare for the Future Force of the 21st Century. While modularization and restructuring of medical command and control are paramount to the AMEDD transformation, key enablers to this process include incorporation of medical technology advances and training innovations.⁹⁹ Today, AMEDD researchers are developing more effective vaccines, hemorrhage control devices, patient transport equipment, and blood products to further improve survivability. By leveraging technology, more lives will be saved and the deployed medical footprint will be reduced.

On-going combat operations in Southwest Asia and elsewhere present opportunities for learning and improving capabilities. The Army's system of training combat medics is adapting to reflect lessons learned from OIF/OEF and to incorporate new technology.¹⁰⁰ Trauma training for combat medics and Combat Lifesavers (CLS) are principle contributors to improved survival rates. Combat Lifesavers, non-medical soldiers who receive enhanced first aid training under the direction of medics, help extend the reach of the medics and buy precious time for the wounded.

Time remains the enemy in combat casualty care. Historically, about 50 percent of combat deaths were the result of unchecked hemorrhage and 62 percent died within ten minutes of wounding.¹⁰¹ Innovative training of medics and soldiers in battlefield medicine is reflected in improved survival statistics of combat casualties: 12 percent over the past decade. (Figure 8).

Today, combat medics receive advanced trauma training through programs not previously available.¹⁰² An example of such innovative training is the 101st Airborne Division's Rascon School of Combat Medicine (SOCM) established at Fort Campbell, Kentucky in 2002. To address the need for enhanced combat medic training, the 101st Airborne Division Surgeon Section developed a Tactical Combat Casualty Care Course (TC3).¹⁰³ Training conducted at this institution is focused on treating trauma victims in tactical scenarios.

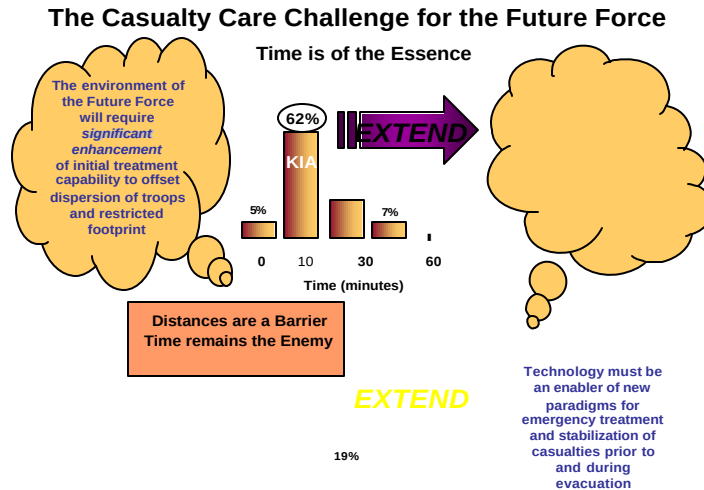


FIGURE 8. FUTURE FORCE CASUALTY CARE CHALLENGE: TIME.

TC3 was designed to introduce frontline medical providers to a new approach to battlefield medicine. The curriculum focuses on providing medics with the skills necessary to extend the “golden hour”, and in turn, save more lives on the battlefield.¹⁰⁴ Incorporating medical lessons learned from recent combat operations enables a state-of-the-art curriculum.¹⁰⁵

Utilization of “cutting-edge” technology with medical simulation models has led to an unprecedented level of skill for combat medics. During combat operations on Roberts Ridge in Afghanistan, survival of a seriously wounded pilot was attributed to treatment rendered by a TC3-trained medic.¹⁰⁶ Saving a soldier who, by most current medical models should have become a Died Of Wounds (DOW) statistic, is a measure of success for the TC3 program.

The SOCM medic training program proved so successful, MEDCOM adopted it as a new standard for trauma skill-enhancement training. This innovative program was subsequently recognized with the Army Surgeon General's prestigious Excalibur Award for Medical Excellence for its contributions to combat medical training.¹⁰⁷ SOCM has evolved into the Combat Trauma Patient Simulation (CTPS) program now being established at Army installations worldwide.¹⁰⁸

Tough, realistic medical training programs like CTPS result in high-quality frontline medics. These advanced trauma training tactics have also been adopted by the Army Medical Department Center and School to enhance initial entry-level training of combat medics.¹⁰⁹ Future trauma training will be incorporated into multiple medical simulation centers being

established Army-wide. Figure 9 depicts the sites of current and future medical simulation centers which will utilize the CTPS program.

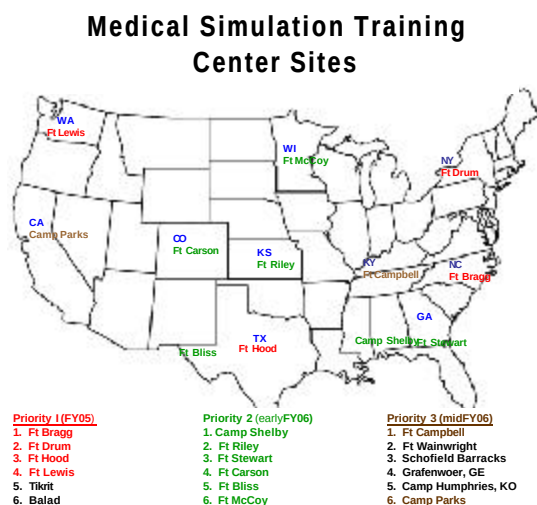


FIGURE 9. AMEDD CTPS SITES.¹¹⁰

MEDCOM has now contracted with several leading civilian trauma centers to establish advanced trauma training programs for Army physicians, surgeons, and medics.¹¹¹ These programs assure that Army medics are fully prepared to face the challenges of treating combat casualties on the battlefield.

The AMEDD continues to adapt doctrine and take advantage of advanced technology to field a medical force to meet the requirements of today's military at war. Innovations such as the aforementioned MRI and AMI initiatives improve flexibility and deployability for medical units while reducing the medical footprint on the battlefield.¹¹² Development of new technologies by agencies such as the U.S. Army Medical Research and Materiel Command (MRMC) has resulted in advances in treatment and evacuation of combat casualties.¹¹³

On-going research efforts by both military and civilian agencies continue to deliver benefits to soldier medical care. Improvements include an advanced casualty evacuation helicopter, the HH-60L Black Hawk. A variant of the Stryker, the medical evacuation vehicle (MEV) has been introduced for service in Iraq and provides more speed, mobility, and enhanced communications than previous evacuation platforms.¹¹⁴

In addition to evacuation capabilities, new high-tech wound dressings which facilitate blood clotting (hemostasis) and improved tourniquets have been developed for soldier use.

Other advanced technologies being introduced include new vaccines, patient monitoring systems, and lighter, modular medical equipment to further reduce strategic lift requirements for the medical force.¹¹⁵

Conclusion

The U. S. military medical force possesses unparalleled capabilities with which to accomplish the AMEDD mission: “To conserve the fighting strength.” Protecting soldiers’ health and welfare has been the principle focus of the AMEDD since before the United States was founded. In the more than 230 years since its establishment, the Army Medical Department has evolved into the preeminent medical force in the world.

Military medical personnel have been responsible for numerous innovations and technological advancements throughout the history of our nation. Lessons learned from wartime service by many thousands of dedicated healthcare professionals have revolutionized American medicine. In particular, the evolution of trauma medicine is directly attributable to American military experiences with combat casualty care.

Today’s AMEDD provides state-of-the-art medical care to over 9 million beneficiaries in hospitals and clinics across the globe. More importantly, Army medical personnel are delivering life-saving combat casualty care to patients injured in Afghanistan and Iraq. Enhanced evacuation capabilities, improved trauma training for combat medics, and the presence of surgical assets have resulted in historically low death rates for soldiers wounded in OIF and OEF.

In addition to improvements in trauma training for frontline medics, the AMEDD has developed an incredibly valuable tool for treating battlefield casualties: the Forward Surgical Team (FST). These new modular units are capable of performing emergency surgery far forward, in the area of a maneuver brigade or armored cavalry regiment. Uniquely designed to provide initial resuscitative treatment, FSTs have proven their value by intervening within the “golden hour” to save lives and limbs during combat operations.¹¹⁶

Challenges facing today’s Army healthcare system are as diverse as the military operations it supports. Perhaps the most significant enhancement to military health care in recent years has been the increased awareness by the chain of command for the vital role of force health protection. Modern commanders fully understand the importance of a medical force to their mission success.

This awareness has, however, led to an increased desire by non-medical commanders to maintain strict control of these medical assets while deployed. Operational control of Forward

Surgical Team assets by combatant commanders has resulted in a strategy-capabilities mismatch which presents significant challenges for the AMEDD to provide sufficient numbers of surgeons for these teams.

To address this strategy-capabilities mismatch, changes to current command and control relationships are necessary. By maintaining operational control of the FST, and other deployed medical assets with a CSH/Medical Task Force commander, optimal utilization of these vital surgical teams can be best assured.

We are a Nation, an Army, and an AMEDD at war. As the GWOT enters a fourth year, the impact of the misutilization of surgeons is reflected in declining retention rates and leading to a manpower crisis for the AMEDD. Whether deployed for combat, humanitarian assistance, or disaster relief missions, we can not afford to squander critical surgical assets by permitting "just in case" medicine to become a planning factor.

American soldiers clearly understand that medical support is a true force multiplier and commanders would not conceive fighting without their medics. It will always be the physical presence of medics on the battlefield that reinforces the medical department core tenet: "Be There." Through appropriate allocation of medical assets and the continued application of new technologies, the AMEDD will continue to project medical power into the 21st Century.

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