

Force Health Protection For The Objective Force

**A Monograph
by
Major Raymond Scott Dingle
United States Army**



**School of Advanced Military Studies
United States Army Command and General Staff College
Fort Leavenworth, Kansas**

Second Term AY 01-02

SCHOOL OF ADVANCED MILITARY STUDIES
MONOGRAPH APPROVAL

Major Raymond Scott Dingle

Title of Monograph: *Force Health Protection For The Objective Force*

Approved by:

COL Richard Proietto

Monograph Director

Robert H. Berlin, Ph.D.

Professor and Director
Academic Affairs,
School of Advanced
Military Studies

Philip J. Brookes, Ph.D.

Director, Graduate Degree
Program

Abstract

FORCE HEALTH PROTECTION FOR THE OBJECTIVE FORCE by Maj
Raymond S. Dingle, USA, 48 pages.

The transformation of the U.S. Army from a 2002 legacy force, into the future Objective Force will create unique challenges for the medical sustainment mission. As new methods and concepts are introduced that capitalize on information technologies and enhanced productivity, the Army Medical Department will seek parity in operational capabilities. This is not an easy task, as constraints to reduce the sustainment organization and operate within an extended contemporary operating environment will challenge the capability to provide medical sustainment. If the medical sustainment footprint is reduced, the capability to “Conserve the Fighting Strength” of the Objective Force soldier in the contemporary operating environment will be at risk.

The Army Medical Department (AMEDD) has the responsibility of transforming the U.S. Army’s Combat Health Support system into a seamless continuum that will sustain the life of the Objective Force in a complex contemporary operating environment. The future medical sustainment concept is called Force Health Protection. The AMEDD provides support at any cost, however, can it adequately support a force that is more mobile, dominant, and faster than any peer competitor?

In comparison, the Combat Health Support unit is a step behind the fighting force in regards to equipment, capability, and mobility. The advent of the Objective Force has the potential to widen the gap between the fighting force and it’s supporting Combat Health Support system. The Objective Force is the future combat force that will operate throughout the full spectrum of military operations. It will possess dominant maneuver, lethality, speed, and the technological advantage as it operates over extended distances. As military leaders demand a smaller and more mobile force, the Force Health Protection of the Objective Force soldier will require leap ahead medical technologies and innovations to support the force.

It is up to the AMEDD to develop an adequate Force Health Protection Concept and organization that will sustain the Objective Force Soldier in the contemporary operating environment. AMEDD planners must be thoroughly integrated into the planning and conceptual development of the Objective Force to ensure that adequate Force Health Protection will conserve the Fighting strength for the Objective Force.

TABLE OF CONTENTS

TABLE OF CONTENTS	1
LIST OF ILLUSTRATIONS	5
CHAPTER ONE	6
INTRODUCTION	6
CHAPTER TWO	10
THE OBJECTIVE FORCE	10
CHAPTER THREE	15
FORCE HEALTH PROTECTION.....	15
CHAPTER FOUR.....	22
MEDICAL CONCEPTS FOR THE UNIT OF ACTION	22
CHAPTER 5	29
MEDICAL INNOVATIONS AND CAPABILITIES	29
CHAPTER 6	39
RECOMMENDATIONS AND CONCLUSION.....	39
Conformity	40
Continuity.....	42
Flexibility	45
Economy.....	46
BIBLIOGRAPHY	50

LIST OF ILLUSTRATIONS

Figure	Page
1. Force Health Protection Echelons of Care.....	17
2. Unit of Action Medical Platoon Organization.....	22
3. Echelons of Care Comparison.....	23
4. Advanced Telemedicine Surgery.....	29
5. Telesurgery and Teleoperators.....	30
6. Life Support for Trauma and Transport.....	32
7. Cartercopter Design.....	35
8. Force Health Protection Continuity.....	43

CHAPTER ONE

INTRODUCTION

“It was founded by civilian physicians for the most part totally unfamiliar with military medicine, Handicapped by a serious and chronic shortage..expected to provide uniformly competent care for an untrained army whose health was jeopardized by poor hygiene and frequently inadequate Food and clothing”

FM 8-55

One of the greatest challenges in warfare is sustaining the life of the soldier on the battlefield. The preservation of life, limb, and eyesight is a challenging, difficult, and non-forgiving process that is made infinitely more difficult when the dimensions of war are interspersed. The methods and procedures for sustaining life in battle have challenged the healthcare providers since the world’s first battles. To meet these complexities, the United States Army Medical Department (AMEDD) and its system of health service support have evolved from its origins as an organization founded to support an untrained U.S. Army. The AMEDD in 2002 has transformed itself into an excellent system that provides responsive health service support to conserve the fighting strength. However, as technology, weapon lethality, and combat capability rapidly advances, the ability to provide life sustaining combat health support to a transforming military force will be tested.

The AMEDD is responsible for the provision of health services to its forces in peacetime and war. It has successfully provided combat health service support to the world’s most lethal and powerful army. The AMEDD’s three-tier mission effectively accomplishes this through maintaining a healthy fighting force, deploying a trained and equipped medical force, and providing world-class healthcare to beneficiaries. This mission is entrenched in the AMEDD’s motto, “to conserve the fighting strength.” As the AMEDD conserves the fighting strength through the twenty-first century, it must transform itself into a viable organization that will support tomorrow’s military force. The biggest challenge will not come from a military force,

new debilitating weaponry, or epidemic diseases; it will come from the ability to maintain pace with the rapidly developing technological advancements and capabilities of the Objective Force. If the AMEDD fails to successfully transform, it will not be able to sustain the Objective Force soldier in order to meet the United State's national security requirements in an evolving and complex strategic environment.

The 2002 U.S. Army medical doctrine evolved from the modular medicine concept, Medical Force 2000 (MF2K), Medical Force XXI (MF21), and Joint Health Service Support 2010 (JHSS 2010) to the current emerging medical reengineering initiatives (MRI) for the Objective Force.¹ The Objective Force is the U.S. Army's conceptual design for a future dominant combat force that can strategically respond across the full spectrum of military operations. The Objective Force will provide the national command authority and joint combatant commanders a rapidly deployable, responsive, and powerful deterrent and intervention capability that can, if deterrence fails, prosecute war at a dominant tempo without equal.² It is an evolving concept that incorporates leap ahead technologies and futuristic combat systems. As the U.S. Army transforms into tomorrow's Objective Force, the Army Medical Department Center and School (AMEDDC&S) is researching and developing parallel concepts and capabilities that will sustain the life of the objective force soldier.

Organizational learning is a difficult and challenging process. It may consist of implementing techniques, tactics, and procedures to adjust the organizational systems to the lessons learned. The U.S. Army Medical Command has experienced some tough organizational lessons learned as it has attempted to provide seamless combat health support to the U.S. Army. This was evident during operations Desert Shield/Desert Storm (1991), Implementation (IFOR) and Stabilization (SFOR) Task Forces (1995-1997), and KFOR in Kosovo (2000). Each of

¹ Army Medical Department Center and School, *Medical Reengineering Initiative*, Briefing prepared by the Directorate of Combat and Doctrine Development, 14 April 1999, 4.

² Army Medical Department Center and School, *AMEDD Capability Requirements for Future Combat System (FCS) and Other Key Enablers*, Information Paper Prepared by (CH) Major Eggleston, 1.

these operations revealed a gap between the fielded military force and the integration and capabilities of its supporting medical structure. The following primary lessons were learned from these operations³:

1. the medical support equipment and vehicles had difficulty with keeping up with fighting forces (supported forces)
2. the MEDCOM did not possess early entry medical units
3. the Army Medical Department command, control, communications, and computers (C4I) for 24 hour and split-based operations was inadequate
4. medical equipment sets did not exist for stability and support operations
5. MEDCOM could not get units onto the Time-Phased Force and Deployment List (The Time-Phased Force Deployment List is a document that manages movement and establishes the priority for forces deploying into a theater of operation)

The divide between the fielded medical force and combat force will increase with the advent of the Objective Force, if the Force Health Protection concepts, capabilities, and requirements are not inculcated into the proposed Objective Medical Force structure. To mitigate this divide, The Army Surgeon General, LTG James B. Peake is attempting to establish a “Balanced Score Card” that will measure how effectively the AMEDD executes (balances) its missions and strategies of FHP for the Objective Force.⁴ To achieve a Balanced Score Card, it is imperative that the most important component of the Objective Force, the soldier, receives essential medical care in a variety of complex and diverse environments. The question this monograph seeks to answer is whether adequate Force Health Protection (a balanced scorecard) can be provided to an Objective Force.

³ Army Medical Department, *Combat Health Support Lessons Learned*, Enterprise Consultancy. Internet, <http://www.ameddLL@us.aamedd.mil>. Accessed 15 November 2001.

⁴ Army Medical Department, “CHPPM gains benefits of Balanced Scorecard,” *Mercury*, December 2001, 3.

The AMEDD has a tremendous responsibility in closing the existing capability gaps to support the military force and in meeting the mission needs requirements to support a strategically dominant force throughout the full spectrum of joint and multi-dimensional operations. It must maintain a progressive pace and incorporate emerging medical technologies and initiatives into military medicine and equipment to sustain life in the future operating environment. As the U.S. Army transforms into the Objective Force, the challenge for the AMEDD will not be to labor with antiquated concepts and designs suited for today's obsolete fighting force, Force XXI designs, and the intermediate division (IDIV) force. It will be to establish a force health protection structure that supports the needs of tomorrow's army in a contemporary or future operating environment.

Force Health Protection is the concept that will provide the parameters for the future health programs that will sustain tomorrow's objective force soldier. It is imperative that the medical sustainment concepts and systems are bold, innovative, and superior to our current medical procedures. Tomorrow's objective force will require precise measures to ensure that the medical pillars are standing strong in the next century of contemporary warfare. This monograph provides a general overview of the Objective Force and Force Health Protection. It reviews the AMEDDC&S's initial medical sustainment concept of sustainment for the objective force Unit of Action Task Force. It concludes with a review of emerging medical technologies, and draw conclusions and make recommendations based on this review.

CHAPTER TWO

THE OBJECTIVE FORCE

At the U.S. Army Symposium 2000, the Chief of Staff of the United States Army, General Eric K. Shinseki, unveiled a plan to transform the United States Army to meet the future military warfare requirements and demands of tomorrow's battles. He envisioned the U.S. Army undergoing a pragmatic transition period called transformation to become the ideal fighting force.⁵ Transformation is a word that indicates change. The ideal fighting force that this change will result in is called the Objective Force. The Objective Force will allow the army to remain relevant in a period of warfare and conflict that requires rapidly deployable and highly lethal units.

The Army's current force structure is too resource intensive to play a major role in a contemporary or future operating environment that requires rapid responsiveness, mobility, and lethality. The U.S. Army is a heavy force that currently possesses good mobility and dominant lethality. Strategic responsiveness, however, requires a smaller Army with greater force projection capabilities. A smaller more deployable force will require less strategic lift support to move it into a theater of operations. The objective of force projection is to "conduct decisive operations so rapidly that the enemy is defeated before he can effectively confront U.S. forces."⁶ A responsive force projection capability will allow the Army to serve as the nation's 911 (emergency response) strategic land force.

The Objective Force is a conceptual force that inculcates developing leap-ahead technologies and yet-to-be developed advanced weapons systems across each of the battlefield operating systems. Battlefield operating systems (BOS) are "a list of critical tactical activities that provide a means of reviewing preparations or execution in discrete subsets."⁷ These systems

⁵ Army Medical Department, "Shinseki Views Objective Force," Mercury, December 2001, 3.

⁶ U.S. Department of the Army. FM 3-0 Operations. Washington, D.C.: Office of the Chief of Staff of the Army, 2001.

⁷ U.S. Department of the Army. FM 101-5-1 Operational Terms and Graphics. Washington, D.C.:

consist of: intelligence, maneuver, fire support, air defense, combat service support, mobility/countermobility/survivability, and command and control. The Objective Force will ignite a revolution in military affairs that will result in a strategically responsive and dominant army. Each of the battlefield operating systems will be enhanced to support a decisive land force in all phases of military operations. This dominant force will allow the U.S. Army to remain relevant in future missions, and will allow it to protect and defend the interests of the United States of America. The danger of the U.S. Army not undergoing transformation will result in it “becoming irrelevant to national security.”⁸

A transformed objective force army will not only provide the United States with a more rapidly deployable and lighter force, but it will also provide the United States with a force that can operate across the full spectrum of military operations. Army Field Manual, 3-0 (Operations) discusses four types of operations that the U.S. Army forces conduct⁹:

1. Offensive Operations: Operations that aim at the destruction or defeat of an opposing force/enemy. Their purpose is to impose the United States’ will on the opposing force in order to achieve a decisive victory.
2. Defensive Operations: Operations that defeat or repel an enemy attack, buys time, economizes forces, or creates conditions for future offensive operations. Their purpose is to set the conditions for a counteroffensive.
3. Stability Operations: Operations that promote, protect, and secure US national interests by influencing the threat, political, and informational aspects of the operational environment through peacetime development, cohort activities, and coercive responses when required.

Government Printing Office, 1997.

⁸ Army Medical Department, “*Shinseki Views Objective Force*,” Mercury, December 2001, 3.

⁹ U.S. Department of the Army, FM 3-0 Operations, Washington.: Office of the Chief of Staff of the Army, 2001.

4. Support Operations: Operations that employ US Forces to assist the civil and local authorities, foreign or domestic, as they anticipate and respond to a variety of situations to relieve human suffering.

The Objective Force will operate seamlessly as it transitions between each of the military operational environments. In contrast, the military force of 2002 has difficulty with deploying and executing operations within the full range of military operations. When the Army of Excellence (2002) and Force XXI units deploy to conduct stability and support operations, their wartime skills erode and it takes a period of train-ups to re-acquire their wartime proficiency and focus. They are focused on a single mission and are not prepared to operate at multiple points within the realm of military operations. The military forces that will operate in tomorrow's contemporary operating environment will be required to be multifaceted in order to transition between various types of operations. The Objective Force will be able to execute stability and support operations, while maintaining sharp combat skills for high intensity combat operations. In essence it will be a "multi-dimensional combined arms maneuver force with revolutionary operational concepts."¹⁰

It must be pointed out that many of the revolutionary concepts inherent in the objective force are in developmental stages and some have yet to be discovered. General Shinseki said, "...the science and technology insights and breakthroughs are being discovered today in labs, workshops, and simulation centers all across the country. We're looking for capabilities that will gird a capabilities-based force for the full spectrum of missions we will face in the 21st century."¹¹

The Objective Force will acquire quantum leap technologies, exploit maneuver dominance, speed and lethality (in the delivery of munitions), and maximize the use of aerial platforms. It will be a force that is ready to deploy anywhere in the world on a moment's notice.

¹⁰ Command and General Staff Officers School, *Objective Force Briefing Overview*, Prepared by the School of Advanced Military Studies, 7 Aug 01, 5.

¹¹ Army Medical Department, "*Shinseki Views Objective Force*," Mercury, December 2001, 3.

The U.S. Army's Objective Force will be a relevant organization to the leaders of our nation as it competes with the U.S. Marine Corps as the nation's emergency response agent. It will operate over great distances, and will be an offensively oriented and multidimensional maneuver force capable of executing a variety of roles and missions.

The breakthroughs that Gen Shinseki speaks of present various challenges to the development of the Objective Force. A force cannot be fielded if the technology, equipment, and capabilities as identified in the mission needs statements do not exist. In absolute terms, the Objective Force is not in the final stages of development. It is still a conceptual force that is comprised of a systems-of-systems. The "systems-of-systems" is the phrase used to conceptualize the ideal equipment, vehicle, or weapon that will allow the objective force to be a dominant force. However, we do not know what the systems-of-systems is going to look like, because it has not yet been developed. It is an emerging creative concept that has yet to take physical shape and design. Although, some of the force developers and innovators may have conceptual sketches and prototype models, the end state required systems-of-systems that will meet the mission needs requirements has still not been designed. This end state system-of-systems is called the future combat system (FCS).

The emerging concept description of the FCS is described in the Training and Doctrine Command's (TRADOC) concept brief as, "a networked systems of systems comprising a family of advanced common, modular, networked, and multifunctional maneuver, maneuver support, and maneuver sustainment systems that are networked for dominant lethality and survivability, and highly deployable manned and unmanned air and ground platforms that are linked to a global information grid with organic and distributed engagement network."¹² The FCS will be the solution to each of the service branches (combat, combat support, and combat service support) requirements in their designs for the ideal combat vehicle and/or associated items of equipment to perform their respective missions on the battlefield.

¹² U.S. Army Training and Doctrine Command, *Mission Needs Statement Briefing*, 2001.

The integrated future combat system (FCS) required by the U.S. Army will enable the Objective Force to dominate combat across the full spectrum of military operations and significantly improve the Army's ability to conduct responsive strategic maneuver as part of a Joint Task Force.¹³ Whether the Objective Force is conducting humanitarian assistance operations in the Middle East or peace enforcement operations on the horn of Africa, its systems will be able to maintain a common operating picture and rapidly respond to the changing strategic situation with information superiority and operational dominance. The U.S. military's current operating systems, on the other hand, are not fully integrated and networked for total digital situational awareness and understanding.

The Defense Advanced Research Projects (DARPA) has been commissioned as the organization to work with TRADOC (to include the various branch schools) to develop the future combat system for the objective force. The future combat system is not a stand-alone single system, but can be various integrated platforms across the battlefield operating systems. Each of the battlefield operating systems (service schools) will have a mission specific integrated Future Combat System (FCS) that will meet the mission needs requirements to support the Objective Force.

The Objective Force and its associated future combat systems are the decisive components that will decide the outcome of tomorrow's battles. It will operate in an environment that is vastly different from today's environment. The environment will be non-contiguous and require a force that can operate over extended distances and in austere environments. The force will face challenges that will require different and more advanced sustainment methods than those that the U.S. Army employs today. The development of Force Health Protection for the objective force soldier is the responsibility of the U.S. Army Medical Command. It is charged with ensuring that the motto of "Conserving the Fighting Strength" is successfully executed for the Objective Force on the future battlefield.

¹³ Ibid, 2.

CHAPTER THREE

FORCE HEALTH PROTECTION

Force Health Protection (FHP) is the new term for the set of future health programs that will protect the objective force soldier on tomorrow's battlefield. It is a comprehensive system that builds upon the combat health support organization that conserves the fighting strength of today's deployed forces. Force Health Protection embraces and supports the doctrinal concepts of Joint Vision 2020, and is the vision statement for future medicine. The current combat health support system consists of evacuation, treatment, hospitalization, dental, veterinary, preventive medicine, combat stress control, medical logistics, and area medical support in a tactical/field environment.¹⁴ Combat health support does not include health service support, which is the medical support rendered to beneficiaries (soldiers, family members, and retirees) in a non-tactical environment. FHP encompasses both combat health service support (tactical/field medicine) and health service support (garrison medicine) in a strategy that is characterized by the "integrated preventive and clinical programs that are designed to protect the total force."¹⁵ This extensive preventive and clinical medical protection will be initiated when the Objective Force soldier enters active duty and extends throughout the full spectrum of military operations. FHP is "a seamless life cycle health maintenance program for the human weapon system."¹⁶ It is focused on aggressive preventive healthcare measures prior to deployment, and incorporates state of the art treatment throughout a soldier's military career.

There are three essential pillars to Force Health Protection that will support the Objective Force soldier. The three pillars are a healthy fit force, casualty prevention, and casualty care and management. The FHP system is summarized in these pillars as it strives for the goal "of

¹⁴ U.S. Department of The Army. FM 8-10 Planning for Health Service Support, Washington, D.C.: Government Printing Office, 1994, i-iii.

¹⁵ U.S. Department of the Army. TRADOC PAM Draft 525-50 Force Health Protection, Government Printing Office, 2001, 1.

¹⁶ Ibid, 2.

providing a fit and healthy force when and where the mission requires it...”¹⁷ Currently, Medical Force 2000 (MF2K) and Medical Force XXI are built upon the ten functional areas of combat health support: evacuation, logistics/blood, area support/medical treatment, preventive medicine, hospitalization, laboratory, dental services, veterinary services, combat stress control, and command and control. FHP streamlines the ten functional areas down to three supporting pillars of health services support that are responsible for maintaining the objective force’s most important system, the soldier.

FHP entails much more than fixed (Table of Distribution and Allowance) facility medical care. It will provide innovating advanced measures to prevent casualties on the battlefield before, during, and after a military deployment. It accomplishes this task by strictly abiding by the guideposts of¹⁸:

1. Emphasize fitness, preparedness, and preventive measures;
2. Improve the monitoring and surveillance of threats and forces engaged in military operations;
3. Enhance military members’ and commanders’ awareness of health threats before they can affect the unit; and
4. Support the health requirements of the fighting forces and their dependents across the continuum of medical care.

The first pillar (a healthy fit force) is the foundation for the success of any military organization. If a military force intends to win in the contemporary operating environment battlefield, it’s soldiers will have to withstand the inherent physical and mental demands of warfare. A military organization mitigates these demands through rigorous physical fitness programs and tough realistic training. This pillar is established first at home station and sustains soldiers throughout the deployment life cycle of the fighting force. The contemporary operating

¹⁷ Ibid, 1.

¹⁸ Ibid, 1.

environment will be characterized by continuous operations. Continuous operations consist of uninterrupted contact with opposing forces that will require the soldier to be mentally, physically, and emotionally stable. Under these conditions the soldier's performance degrades over time. This degradation in a soldier's performance in combat means he does not possess the same initial effectiveness and alertness as when operations were initiated. A healthy fit force will ensure that the objective force soldier will survive in austere challenging environments. He will possess strong stamina and a healthy body through tough physical training, receive injury and disease prevention, nutrition, and dental health support through a responsive force health protection system.

The second pillar of Force Health Protection, casualty prevention, is divided into two distinct categories. The first category consists of environmental and occupational health threats. Environmental and occupational health threats are composed of a variety of environmental factors that combine to produce a large number of military casualties (those caused by disease non-battle injuries). The second category is from enemy or opposing forces, and "usually produces smaller numbers of more serious casualties."¹⁹ When casualties cannot be prevented, both of these categories of casualties will require Force Health Protection that encompasses highly technical equipment and capabilities, acute trauma life-saving measures, and rapid stabilization and evacuation from the battlefield.

Casualty prevention is a force multiplier that military leaders use to prevent unnecessary losses. The opposing military force produces the most combat related casualties commonly called battle injuries (BI), while the total environmental threat (weather, disease, flora, fauna, and climate) produces disease non-battle injuries (DNBI). DNBI have historically produced three-quarters or more of battlefield hospital admissions (those who have been treated at medical treatment facility).²⁰ Another subcategory is non-battle injuries (NBIs). Non-battle injuries are

¹⁹ Ibid, 5.

²⁰ Ibid, 5.

accidents/incidents that occur when soldiers are not engaged with an enemy. Battle injuries are often the most severe type of injuries and often require surgical intervention to save life, limb, or eyesight. Although the rate of casualties is dependent on the military action and situation, the reduction of DNBIs/NBIs can be effectively reduced to eliminate unnecessary casualties through a “much greater emphasis on environmental and occupational exposures, combat stress, and non-battle injuries.”²¹ The goal of casualty prevention is to significantly reduce and prevent each of these types of injuries to maintain a viable combat force to execute the military mission. When they cannot be prevented a strong third pillar is very important.

Casualty care and management is the third and final pillar of FHP. Once a healthy and fit force is deployed and all measures to prevent casualties are unsuccessful, casualty care and management are critical components to the sustainment of the soldier’s life. The contemporary operating environment that the Objective Force soldier will operate in creates challenges to the casualty care and management pillar. Casualties will be incurred over great distances, in an area of operations that is fluid, non-contiguous, and nonlinear. The third pillar of Force Health Protection will support the objective force soldier through “essential care within the area of operation and with rapid aeromedical evacuation to a definitive healthcare facility without sacrificing the quality of care.”²² The care provided will integrate leap ahead medical technologies and equipment that will provide critical resources and care within the close combat battle space area of the objective force. There are four levels of combat healthcare that comprise the casualty care and management pillar for the Objective Force and these are: first responder, forward resuscitative surgery, theater hospitalization, and enroute care (see figure 1).

The most critical person in medical treatment is the first responder. LTC Ronald Bellamy conducted a series of studies during the Vietnam era about combat casualty deaths. He discovered that of “80% of casualties who died of their wounds, fully 50% bled to death.”²³ The

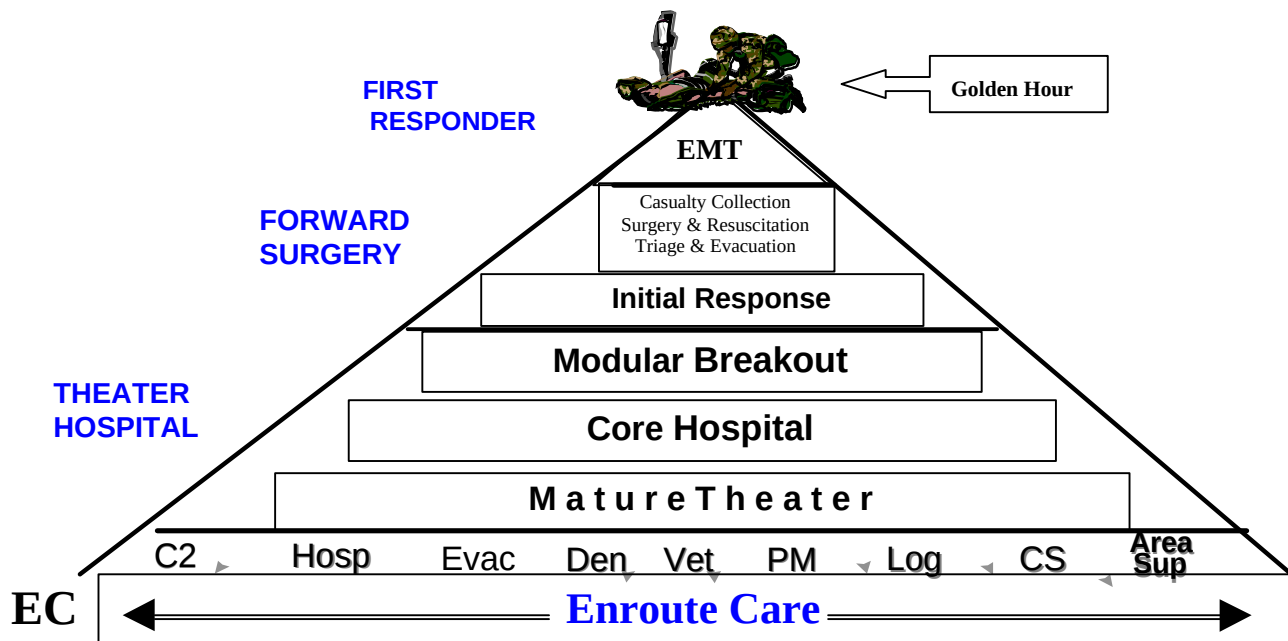
²¹ Ibid, 17.

²² Ibid, 25.

²³ AMEDDC&S, *Combat Health Support Doctrine, MDO0420*, December 1995.

Bellamy study theorizes that if these combat injuries would have received advanced trauma management (ATM) care to stop the bleeding in a timely manner, they would have survived. This theory initiated the “Golden Hour” concept. The Golden Hour is a rule of thumb that attempts to place combat casualties within the hands of the first responder or forward surgical intervention within the first hour of their combat injury.

The first responder in past and present battles has always been vital to the survival of the injured soldier, and will continue to be so in future battles. The common denominator is that casualties will occur in war and will require advanced trauma life-saving management methods to stop bleeding and prevent the loss of life, limb, or eyesight. ATM consists of the use of IVs, fluids, airway, bleeding intervention, breathing and circulation management. The combat lifesaver and combat medic are the first medically trained responders who perform ATM. They are trained in a level of core competencies commensurate with airway management, breathing, bleeding, fluid therapy, wound care, analgesia, triage, and patient transportation.



(Figure 1, FHP Echelons of Care)

The mission of the first responders in the Objective Force will be to “provide immediate medical care and stabilization of the severely wounded, treat common acute minor illnesses within their scope of medical training, and maintain a firm understanding of preventive medicine and field sanitation to eliminate additional threats.”²⁴ After the first responder stabilizes the casualty, he/she is then evacuated to the next level of care, forward resuscitative surgery.

Forward resuscitative surgery is the second level of care in FHP. Forward resuscitative surgery will exploit the most advanced medical capabilities to provide the Objective Force soldier with the required medical intervention far forward on the battlefield. Surgery will be far forward on the battlefield collocated with the unit of action to ensure that the injured are treated within the area of operation and stabilized for evacuation. Forward resuscitative surgery is the urgent initial surgical procedures required to render a patient stabilized enough to withstand further movement to the next level of care.²⁵ Forward resuscitative surgery will be present at the lowest levels of medical treatment within the Force Health Protection system of the Objective Force. This conforms to the combat health support principle of proximity. Proximity places critical assets as far forward and as close to the point of injury as the tactical situation permits.

The third level of casualty management and care is theater hospitalization. Theater hospitalization will be modular, flexible, and capable of being tailored to support the mission requirement. Theater hospitalization will provide the essential care and recovery within the theater that cannot be provided at the first two levels of care. The theater hospitalization is based upon the modular concept that will allow modules to displace forward to support the objective force. Theater hospitalization will be “incrementally transportable with limited mobility and positioned within the theater near a transportation hub for easy access to strategic lift.”²⁶ Theater

²⁴ Chairman, Joint Chiefs of Staff, Joint Publication 4-02 Doctrine for Health Service Support in Joint Operations, 1-5.

²⁵ Ibid.

²⁶ Ibid, 1.

hospitalization is also a temporary holding location for the Objective Force soldiers who will return to duty (after treatment and recovery) within the prescribed evacuation policy period. The evacuation policy is a maximum time period that stipulates the length of time a patient can remain at the hospital for treatment without being evacuated. In-theater hospitalization allows for soldiers to be treated and returned to duty within the area of operations. If the patient cannot be returned to duty within the prescribed time period (evacuation policy), they are inserted into the evacuation system and transported to a U.S. based fixed (healthcare) facility.

The final level of casualty management for the Objective Force soldier is enroute care. Enroute care consists of the medical treatment of injured and ill service members during evacuation. Enroute care is provided to stabilized patients who can endure evacuation to the next level of care. It begins at the lowest level when the casualty enters the medical system. A casualty enters the medical system when the combat medic receives him/her at the casualty collection point or treatment station. Enroute care ensures that the stabilized casualty does not expire from his wounds by monitoring the patient's vital signs and responding with the appropriate medical treatment as required. The capability to provide quality enroute care to patients will be in the ground and air medical vehicles of tomorrow's medical force.

FHP incorporates new concepts and innovative changes within the AMEDD that will provide improved medical support to the Objective Force. It is designed to meet the medical mission requirements to support the Objective Force soldier. The success of FHP is going to be dependent on how MEDCOM organizes and integrates the medical units and technology into the Objective Force. Force Health Protection is "the broadest reformation of military medical needs in more than fifty years...the program will require correspondingly broad changes in the infrastructure."²⁷ This new infrastructure will provide a sound foundation for a healthy and fit force, casualty prevention, and casualty care and management pillars that will uphold the AMEDD motto of "conserving the fighting strength."

²⁷ TRADOC, *The Objective Force Unit of Employment Concept*, 4.

CHAPTER FOUR

MEDICAL CONCEPTS FOR THE UNIT OF ACTION

The Objective Force consists of a Unit of Purpose organizational framework deliberately developed to help the Army and its subordinate directorates to explore the complex questions, ideas, and concepts of echelonment, command and control, and mission tailoring for the Objective Force.²⁸ The two basic command and control elements in the Unit of Purpose framework are the Unit of Action (UA) and the Unit of Employment (UE). The UA can be paralleled to the Army's current brigade and below sized organizations (less than 5,000 soldiers), while the (UE) is paralleled to division and above sized organizations (greater than 16,000 soldiers). The UA is a "modular organization that can be combined and integrated as the basic building blocks of combined arms combat power to form larger organizations."²⁹ The Unit of Action Task Force can be task organized to meet any military requirement within the spectrum of military operations. It will also be able to smoothly transition between operations on the same deployment.

Likewise, the current (AOE, Force XXI, IBCT, and IDIV) echelons I and II combat health support systems are modular medical building blocks that can be combined, augmented, and reinforced to provide seamless medical support. This pre-existing modular medical sustainment structure facilitates the transition and development of a UA medical organization. The current combat health support structure, however, cannot support the full range of military operations within the same deployment. Once the UA Medical organization is established, it will be able to provide FHP within the full spectrum of military operations.

The Unit of Action Task Force (UATF), Ft Knox, Kentucky is the responsible agent for the development of the UA. The UATF began conducting a series of exercises and simulations in August 2001 to determine the requirements, mission needs statements (MNS), organizational and

²⁸ TRADOC, *The Objective Force Unit of Employment Concept*, 4.

²⁹ AMEDDC&S, 1.

operational concepts (O&O) and force structure of the UA. The UATF is organized into working groups with participation from each army service school. The AMEDD has representation on each of the working groups to ensure that the medical concepts for the UA are in synchronization with FHP.³⁰ The Unit of Purpose organizational framework assisted the UATF AMEDD team with the development of the UA medical platoon. The UATF established a medical capabilities requirements list for the UA medical platoon. In order to provide adequate FHP to the UA combat battalion, the medical platoon must³¹:

- a. Have situational understanding, mobility, and survivability equal to the Objective Force.
- b. Provide enroute treatment aboard an appropriate platform.
- c. Provide advanced resuscitation, stabilization capability, and internal stabilized treatment for enroute surgery.
- d. Provide hold capability for up to 72 hours
- e. Provide a capability to extract and evacuate severely injured casualties.
- f. Provide medical C2/consultation/telemedicine to support combat medics.
- g. Have a combat battalion future combat system (FCS) that can transport two litter patients and receive telemedicine link.

These identified requirements are the building blocks of a medical concept of support that will allow the medical platoons to “treat on the move” and provide adequate FHP to the UA.

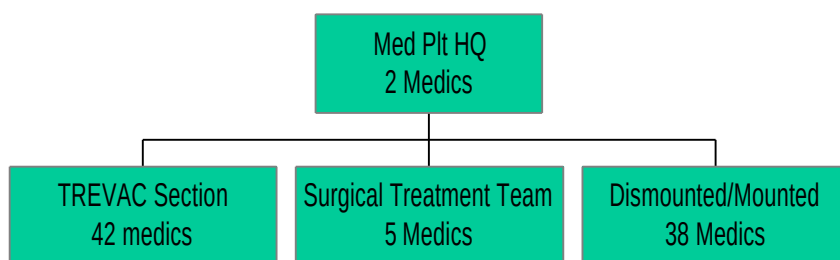
The UATF designed a robust medical platoon to support the UA combat battalion. The UA medical platoon consists of eighty-seven highly trained soldier-medics. The AOE, Force XXI, and IDIV medical platoons consisted of 16-44 medics.³² The size of the platoon was

³⁰ AMEDDC&S. *AMEDD Capability Requirements Information Paper*.

³¹ AMEDDC&S. Medical Information Paper, Aug 01.

³² Raymond Dingle. *Health Service Support Handbook*, Command and General Staff College, 2001.

significantly increased, placing a larger medical footprint within the headquarters section of the combat battalion. The platoon is organized with a platoon headquarters, a mounted/dismounted medical support section, treatment and evacuation section, and surgical treatment team (See Figure 2). The dismounted/mounted section will pre-position medics with each Combined Arms Maneuver Platoon, each RSTA section, and to the Maneuver Support, Fires, and Forward Support nodes of the UA combat battalion to provide First Responder medical sustainment.³³



(Figure 2, UA Medical Platoon Organization)

The building block of the UA medical platoon is the combat medic. The combat medics will be highly trained Medical Specialists (91Ws). 91Ws will be the First Responder in tomorrow’s complex operating environment. The 91Ws will be trained in acute trauma management and certified as emergency medical technicians. These combat medics will “combine the skill sets of the traditional combat medic and the licensed practical nurse.”³⁴ This provides the UA combat battalion with super medics who possess an increased set of skills and capabilities to perform independently on a non-contiguous and widely dispersed battlefield. It also provides the UA combat soldier with the point of injury medical support required in an austere environment. The first responder will not only possess the core competencies to provide

³³ AMEDDC&S, UA Action Concept of Support, 8.

³⁴ AMEDDC&S. online at www/armymedicine.army.mil.

focused precision medical care, but he will be augmented by the telepresence (audio/visual assistance) of the surgeon in a theater hospital.

The size increase of the treatment section (TREVAC), and the addition of the surgical treatment team (STT) gives the medical platoon the increased capability to provide level II care within the UA framework. This increased size and forward capability will mitigate medical exhaustion within the UA medical platoon. The echelons of care and their locations on the battlefield are pushed forward in the Objective Force structure, in comparison to those utilized in today's AOE, Force XXI, and IDIV force structures (See Figure 3).

Echelon of Care	AOE, Force XXI, IDIV	Objective Force FHP
I	Self/buddy Aid, EMT/ATM (Medical Platoon)	Self/buddy aid, EMT/ATM (Medical Platoon)
II	Initial Resuscitative Surgery, Holding, lab, x-ray, dental	Forward resuscitative and stabilizing surgery, holding, lab, x-ray, dental (Medical Platoon)
III	Resuscitative surgery,	Theater hospitalization
IV	Rehabilitation and definitive care/therapy	Enroute Treatment
V	Convalescent, restorative, and rehabilitation care	

(Figure 3, Echelons of Care Comparison)

In addition to the increased level of care forward with the UA Medical Platoon, it will also have an organic holding capability. The medical platoon will have the capability to hold patients for seventy-two hours (in synch with pulse logistics concept). Pulse logistics is a sustainment method that pushes logistical packages, personnel, and equipment every three to five days. The UA Medical Platoon will be required to operate and sustain patients within this period, until a line of communication (LOC) for the pulse logistics packages can be opened and secured. The LOC is the umbilical cord that provides sustainment to the fighting force.

The treatment and evacuation section is comprised of seven teams consisting of six personnel each who will execute the holding and evacuation mission of the platoon. The medical

concept of sustainment is identical to the concepts of the AOE, Force XXI, and IDIV concepts of the medical company (level II care). However, the difference is that the level II capability of the medical company is now pushed forward to the medical platoon level. The medical concept of sustainment for the UA Medical Platoon will operate as follows³⁵:

1. Combined arms maneuver company FCS vehicle is hit.
2. Self/buddy aid is administered on site by 91W medic/Combat Lifesaver.
3. Medic conducts triage, treatment, and returns to duty (if able).
4. Casualty evacuation makes seamless contact and link-up.
5. TREVAC treats and returns to duty or transfers to Surgical Treatment Team (STT).
6. STT provides initial resuscitative surgery and holds patients for up to 72 hours to await evacuation via secure LOC to theater hospital.
7. Medical Platoon headquarters in the UA coordinates air evacuation.
8. Air Ambulance evacuates to the forward support hospital.

This is a seamless medical concept that will sustain the UA. It provides precision and increased medical sustainment forward within the UA combat battalion, and is a linked process from the point of injury to the theater hospital.

One of the greatest obstacles to any medical concept of sustainment is the mass casualty (MASCALs) situation. A MASCAL situation is when “a large number of casualties has been produced simultaneously or within a relatively short period of time. It also means that the number of patients requiring medical care exceeds the medical capability to provide treatment in a timely manner.”³⁶ The MASCAL challenge for the UA medical platoon will be further complicated by extended distances and pulsed LOCs. As LOCs and next echelon (level III) care

³⁵ AMEDDC&S. Unit of Action Medical Concepts Brief, 20.

³⁶ U.S. Department of the Army. FM 8-10-6 Medical Evacuation in a Theater of Operations. Washington, D.C.: Government Printing Office, 1991, 1-3.

evacuation routes operate on a 3-5 day Pulse System, there is a grave potential for the wounded to backlog at the UA medical platoon. If the distances are extended between the UA Medical Platoon and the mission support area (supply hub/theater hospital location), the survival of the casualty will be dependent on precise care and enroute stabilization (Objective Force echelon IV care) capability.

If the Medical Platoon operates in an austere environment and is restricted to a pulse logistics system, casualties will have the potential to expire from the lack of care in a MASCAL situation. Regardless of the number of soldiers placed forward at the Medical Platoon, surgery is a precise science that cannot be abridged. The current AOE, Force XXI, and IDIV Forward Surgical Teams (FST) consist of twenty personnel and can only operate two operating room tables for 48 hours or twenty surgeries.³⁷ The UA medical Platoon is organized with a STT of five medics. The limited surgical workload that the STT (five medics) can provide, combined with the required evacuation pause (pulse logistics and secured LOC requirement), places the life of the UA soldier at risk in a MASCAL situation. When the medical evacuation system is constrained (pulse logistics) a greater hold capability is required to support MASCALs. The mass casualty situation will remain a difficult problem to solve for the UA Medical Platoon as it conserves the soldier's fighting strength on the battlefield.

The AMEDD has identified some key enablers that will assist the UA Medical Platoon with its mission to provide medical sustainment to the UATF in the MASCAL situation. These enablers will improve the quality of medical and surgical treatment provided, give additional protection to the medic, and increased FHP to UA casualty. A few of the key enablers are the:³⁸

1. Armored Medical Evacuation Vehicle. A ground evacuation tracked vehicle with an M2A2 Bradley Fighting Vehicle chassis that provides the UA Medical Platoon with improved protection and enroute care capability.

³⁷ FM 8-42, Employment of the Forward Surgical Team, 15.

³⁸ AMEDDC&S, *AMEDD Capability Requirements for FCS*, September 95.

2. Healthcare Specialist (91W). The EMT certified and ATM capable medic who combines the skills of combat medic and licensed practical nurse
3. Medical Communications for Combat Casualty Care. Provides information infrastructure for a digitized Theater Medical Information Program.
4. Improved air ambulance (UH60Q). Enables casualties to be evacuated rapidly over greater distances and is equipped with improved avionics and interior for enroute treatment.
5. Chemical and biological products. Increase the protection of the UA against asymmetrical threats of weapons of mass destruction and provides pretreatments and vaccines that ensure healthy deployments worldwide.
6. Personal Information Carrier. A small electronic storage device that records, stores, and transmits medical data on a dog tag sized chip.

The austere operating environment and complexities of tomorrow's environments will create challenges for the medical platoon. However, equipped with the super medic, an improved platoon organization and capability, and the presence of forward surgery the Medical Platoon is prepared to support the UA combat battalion. The medical concept of sustainment will face challenges, but these challenges can be mitigated with the use of key enablers. The medical key enablers and concept of medical sustainment for the UA are sound and adequate to support the FHP mission of the UA medical platoon. The concepts and enablers, however, can also be further improved through the incorporation of leap ahead medical technologies. There are a variety of medical innovations that will revolutionize the combat medical capability of the military medical force. In the next chapter, a variety of medical innovations that will revolutionize the combat medical capability of the military medical force, will be discussed.

CHAPTER 5

MEDICAL INNOVATIONS AND CAPABILITIES

Visualize the Objective Force soldier engaged in combat on the battlefield in tomorrow's complex future operating environment. The battlefield is characterized by uncertainty, lethality, widely dispersed formations, non-linearity, and non-contiguous operations. The soldier is shot while conducting military operations and is many kilometers from home base and the nearest medical treatment facility. The wound is life threatening and beyond the capabilities of the combat medic on hand. The enemy threat is too dangerous for aeromedical evacuation and the local facilities are antiquated and hostile towards American soldiers. Will the Objective Force soldier's fate be sealed in this future operating environment? Is the Force Health Protection system inadequate to respond, treat, and save his/her life? Is his/her injury beyond the medical reach of the Unit of Action medical platoon? If the military medical command embraces "creep ahead" medical technology and concepts, the fate of the Objective Force soldier will be sealed. In order for the fighting strength and life of the Objective Force soldier to be conserved in the future operating environment, it is imperative that MEDCOM incorporates "leap ahead" technologies, innovations, and capabilities into the FHP system.

The combat lifesaver and combat medic are the "first responders" who perform Emergency Medical Treatment/Acute Trauma Management (EMT/ATM) on the battlefield. EMT/ATM are the initial lifesaving measures applied to a wounded soldier in war. The immediate EMT/ATM lifesaving measures consist of, "the use of intravenous fluids and antibiotics, the preservation of the patient's airway by invasive procedures, treatment of shock, the stopping of bleeding, and the application of more secure splints."³⁹ However, once treated and stabilized by the combat medic/lifesaver, the patient must survive the transport ride to the

³⁹ AMEDDC&S, *Combat Health Support Doctrine*, 21.

nearest medical treatment facility. The life of the soldier is dependent on the Force Health Protection that provides support to the fighting force.

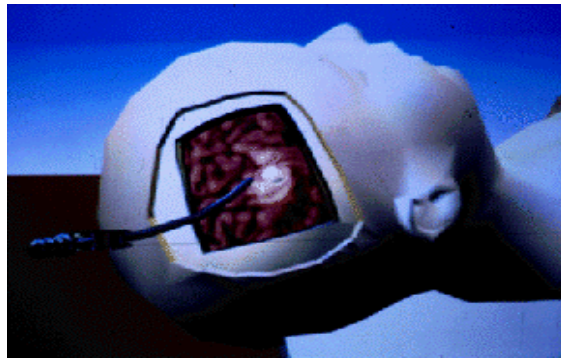
There are numerous medical innovations that will be able to exceed the standards of the Golden Hour (casualties must be treated by first responders within the first hour of the injury) and sustain the life of the Objective Force soldier on tomorrow's battlefield. The pace of implementation of the Objective Force is not beyond the scope of some of the current emerging medical technologies and equipment. The Objective Force is predominantly conceptual in nature with many of its future operating systems not developed. In contrast, many new medical innovations and technologies have been successfully tested and validated within the civilian healthcare sector. Five years ago it was hard to envision surgeons operating on patients without being present in the operating room. Today, through the use of telemedicine and robotics, it is a reality.

The fusion of human capability and knowledge with computer speed and precision has allowed surgeons to make a quantum leap in medical care. There are many innovations like: telemedicine, telepresence, telesurgery, bio-informatics, and the M400 Skycar that will be combat multipliers in the contemporary operating environment. The realm of sustaining life in tomorrow's environment will continue to increase as we merge computer technology, speed, and capability with human wisdom, research, and development. The merging of the human and computer realms will decrease the combat mortality rates and drastically improve the quality of FHP provided in the contemporary operational environment.

Telemedicine is defined as "the use of telecommunications to provide medical information and services."⁴⁰ Telemedicine can be as simple as the on call community health nurse providing consultation over the phone, or as complex as neurosurgeons conducting an operation on a patient within a theater of war while physically being in another part of the world. One of

⁴⁰ Telemedicine Research Center. *What Is Telemedicine:Telemedicine Coming of Age, Internet*, <http://trc.telemed.org/telemedicine/primer.asp>. Accessed 5 December 2001.

the initial telemedicine initiatives equipped the combat medic on the battlefield with a small kevlar camera and ear microphone. These items establish AM audio and visual communications link with a surgeon who is located at a theater hospital or major medical center outside the immediate threat location. If the combat medic encounters critically wounded soldiers, the surgeon provides instant medical consultation and guidance. If an emergency procedure beyond the scope of the combat medic's capability is required, the surgeon can instruct the medic or first responder through the procedure.



(Figure 4, Advanced Telemedicine Surgery)

Today telemedicine has taken a quantum leap forward from its initial employment initiatives (See Figure 4). In the fall of 2001, the first trans-Atlantic telesurgery was successfully conducted on a human patient. Medical surgeons located in the United States conducted a gall bladder removal operation on a patient located in eastern France. Physicians at the European Institute of Telesurgery said, “the procedure was a success and that there were no complications.”⁴¹ This capability brings into reality the possibility of military surgeons at Walter Reed Army Medical Center in Washington D.C. conducting an operation on a soldier injured in a contemporary operating environment on another continent. Professor Jacques Marescaux called

⁴¹ British Broadcasting News. *Doctors claim world first telesurgery*, internet, http://news.bbc.co.uk/1/hi/english/sci/tech/newsid_1552000/1552211.stm, accessed 25 September.

this successful procedure “the framework that lays the foundation for the globalization of surgical procedures.”⁴²

The globalization of surgical procedures is a capability that the Objective Force Soldier will require in tomorrow’s battles. This capability will allow the best surgeons in the world to conduct telemedicine procedures on soldiers from the safe-haven of their U.S. based hospitals and medical centers on patients outside of the country. Tele-surgery globalization will also allow the best and brightest physicians to augment and reinforce the Force Health Protection mission of the United States Army Medical Command without the threat of becoming a casualty themselves on tomorrow’s non-contiguous and non-linear battlefield.



(Figure 5, Telesurgery and Tele-Operators)

Teleoperators are robotic devices that combine human movements and machine robotics through a virtual reality system (See Figure 5). The robotic devices are not autonomous and require human programming, interaction, and direction. A robot is a programmable automated materials handling machine, while a teleoperator is a remotely controlled materials or procedural handling and executing machines. These are basically human-machine systems. Through the

⁴² British Broadcasting Channel. *Doctors Claim World’s First in Telesurgery*. Internet, <http://news.bbc.co.uk/1/hi/english/sci/tech/mewsid-1552000/15522211/> Accessed 10 September 2000.

combination of the two (man and machine), they exponentially decrease the margin of error in medical procedures conducted on patients.

There are some barriers that prevent the universal implementation of telemedicine procedures such as lack of funding, inadequate bandwidth for some applications, and high cost equipment. In addition, the Health Care Financing Administration is cautious towards the financial reimbursement and support of some telemedicine applications like teleradiology, telesurgery, and teleconsultation for Medicare patients in the fear of malpractice suits. Many patients furthermore do not like the impersonal atmosphere that the use of machinery and robotics give through the lack of hands on interaction.⁴³ These issues have caused hesitation in the reception of these innovative advanced telemedicine procedures.

Image Overlay is an emerging medical technology that gives the surgeon and physician x-ray vision as they conduct medical procedures. Image overlay has been proposed for use in various types of surgery: neurosurgery, orthopedics, microsurgery, obstetrics, plastic surgery, and other specialties. Visualize the Surgeon within the Objective Force hospital with the capability to see his every action from the inside of the cavity in three-dimensional overlay. This application is refined and maintains the human dimension of touch and human interaction. The margin of error in surgery procedures will be reduced and internal complications will be immediately identified. Image overlay allows the physician to identify internal complications through the telemedicine system. Today healthcare providers can view enhanced quality 3D images, in contrast to outdated two dimensional image systems. Image overlay provides the observer with an unimpeded view of the actual procedure location, while in surgery.⁴⁴

Image overlay can be pushed forward to the unit of action medical facility. This is an ideal system for the treatment of battlefield traumas and emergency medical surgery. This will almost perfect the Acute Trauma Life Saving measures that the first responders provide. The

⁴³ Telereasearch Company. *What is Telemedicine:TelemedicineComing of Age*. Internet, <http://trc.telemed.org/telemedicine/primer.asp>. Accessed on 15 November 01.

⁴⁴ Image Overlay. Internet, <http://www.mrcas.ri.cmu.edu/projects/overlay.html>. Accessed Jan 2002.

complications and difficulties of the medical care often occur within the first hour of the injury (Golden Hour). This includes the evacuation, triage, and treatment of the injury. Medical imaging will allow the combat medic to rapidly triage and accurately diagnose the injury and required treatment. This will greatly enhance the triage process. Triage is the process of identifying the most serious injuries and prioritizing them in medical precedence order. Image overlay is not only a treatment multiplier, but also a triage multiplier that eliminates the margin of error in the diagnosis and classification of battlefield injuries.

The Life Support for Trauma and Transport (LSTAT) is a smart litter that combines many of the functions that the combat medic performs and monitors on the battlefield. LSTAT (See Figure 6) is designed and manufactured by the Integrated Medical Systems Incorporated. It is a two-in-one portable, automated, networked intensive care unit and surgical table that is built upon a patient litter platform with an integrated defibrillator, ventilator, suction, fluid and drug-infusion pump, blood chemistry analyzer, and patient monitoring systems.⁴⁵



(Figure 6, Life Support for Trauma and Transport)

Once a patient is connected (and in transport) to the LSTAT, his vital signs are not only available at litter-side, but also through an internet connection with the hospital's information system.

The LSTAT provides the receiving medical treatment facility with information, status, and pertinent readings about the inbound patient. This allows for the medical personnel to rapidly prepare for and receive a trauma patient. Although the LSTAT combines high technology and

⁴⁵ Medical Design Excellence Awards. Canon Communications 2001. Internet at www.devicelink.com/expo/awards02/integrated.html.

sensitive equipment, it is built to endure tough environments, shock, pressure and electromagnetic contacts. This makes the LSTAT the super litter for the Objective Force. One of the toughest challenges in combat medicine is the triage, stabilizing and monitoring of a patient who has entered the medical evacuation system. The LSTAT will allow the medic, who is also the co-driver for the ambulance to monitor his/her patient while enroute. The LSTAT increases the chances for survival by providing critical suction, defibrillator, and patient ventilation. The LSTAT is a combat multiplier that will increase the patient's chance of survival by acting as the medic enroute after he/she has received emergency medical treatment on the battlefield.

As the battlefield becomes more lethal, extended, and complex, the sustainment of the fighting health of the Objective Force becomes a vital component in the success or failure of the force. Regardless of the future treatment capabilities and medical innovations, life will not be sustained unless there is effective evacuation from the foxhole to the fixed healthcare facility. Patient evacuation is the timely and efficient movement of wounded, injured, or ill soldiers from the battlefield and other locations to medical treatment facilities. Evacuation begins when medical personnel receive an injured or ill soldier. It continues as far rearward as the patient's medical condition warrants or the military situation requires.⁴⁶ Enemy air defense weapons, artillery, surface to air missiles, and manual launched systems will complicate the future operational environment. Medical evacuation vehicles/aircraft will be exposed to a wide range of threats in a very hostile environment.

A patient's condition for evacuation is sustained only as long as the injury is medically stabilized and treated enroute with the appropriate responsive procedures. The LSTAT will assist in this process, but the requirement for rapid evacuation is even more paramount within a contemporary operating environment. MEDCOM has identified the need for a future combat system (FCS) that is tailored to the Objective Force. It must possess dominant speed and

⁴⁶ FM 8-10-6 Medical Evacuation in A Theater of Operations, 5.

maneuver and be able to travel over extended operational distances. The M400 Skycar and Carter Copter are two systems that have the potential to meet the Force Health Protection evacuation requirements.

The M400 Skycar is an innovation developed by Moller International with a medical variant that can meet the demands of the distances and speed required for the future operational environment. It has the capability to fly at 300 MPH, with a range of 900 miles, and flies at an altitude of 29,000 feet. This system when outfitted with the aforementioned medical technologies can be the ideal medical evacuation aerial platform for the Objective Force. The Skycar ambulance will be able to fly at great speeds and at heights that are out of the range of many current surface to air systems. Although it does not guarantee safety, it increases the speed and range that will allow it to maintain pace with the Objective Force future combat system.

The Skycar operates as a Volantor. A Volantor is a “vertical takeoff and landing aircraft that is capable of flying in a quick, nimble, and agile manner.”⁴⁷ It has the capability to travel over land, but is primarily an aerial platform that will provide the speed necessary to quickly evacuate the wounded over extended distances. It is a three dimensional vehicle that combines the vertical takeoff capability of a helicopter, the performance of an airplane, and the ground transport capability of wheeled vehicles in the event of inclement weather.

The Cartercopter Heliplane Transport (CCH-T) is a design developed by Cartercopters, L.L.C of Wichita Falls, Texas. The Cartercopter is a rotorcraft vessel that takes off, hovers, and lands like a helicopter. It converts into a gyroplane by unloading its rotor onto high-aspect ratio wings and slows its rotor to minimize flight resistance. The Cartercopter is a concept design that would be the largest vessel ever flown. The aircraft is “taller than a four story building and a fully loaded Greyhound bus can be driven up its ramp and parked inside with room to spare.”⁴⁸ The CCH-T is designed to cruise at 450 MPH and fly at an altitude of 32,500 feet. The

⁴⁷ Moller’s Skycar. M400Skycar, Internet, <http://www.moller.com/skycar/m-400>, Accessed December 2001.

⁴⁸ CarterCopter. Internet at <http://www.cartercopters.com/>. Accessed November 2000.

Cartercopter is the ideal vessel of transport for mass casualties or mass transport of stabilized casualties back to higher echelons of medical treatment.

The Cartercopter is comparable to the C130 Hercules, which can transport 70 litter or 85 ambulatory patients (or combination of the two). However, the Cartercopter has twice the cargo compartment size of the C130 Hercules. The Cartercopter has the capability to transport over 140 litter or 170 ambulatory patients (See Figure 7). That gives it a greater capability than a Boeing 767, which has the greatest single lift capability (111 patients) of any current medical evacuation vehicle/air craft. Modern warfare is likely to generate more casualties than the airlift system can handle. Aerial mass casualty transport platforms will be critical to support the Objective Force. The evacuation and transport complexities inherent to modern warfare are exponentially increased in the contemporary operating environment. The Cartercopter and the Skycar400 both have the capability to meet the evacuation requirements for the Objective Force. Each can travel



(Figure 7, CCH-T Cartercopter Design)

extended distances, allow for enroute care, and operate at a high altitude that provides for safety in a hostile environment.

There are many current and emerging medical innovations that have the capability to sustain the Objective Force soldier in the contemporary operating environment. Telemedicine, telesurgery, telepresence, image overlay, LSTAT, and innovative transport platforms are only a few of the many leap ahead technologies that are on the cutting edge of civilian and military

medicine. These leap ahead innovations are honing our understanding of future Force Health Protection concepts and capabilities. They greatly enhance the medical capabilities in treating battle injuries that require EMT/ATM to sustain the life of the soldier and they mitigate the potentially high numbers of casualties that can expire from lack of timely medical treatment. Conserving the fighting strength will take on new meanings as these medical innovations are incorporated into the U.S. Army's Force Health Protection system.

CHAPTER 6

RECOMMENDATIONS AND CONCLUSION

Can adequate Force Health Protection be provided to the Objective Force? The conclusion is that Force Health Protection can adequately be provided to the U.S. Army's Objective Force, providing that leap ahead medical technologies and innovations are incorporated into the medical force structure. The AMEDD can establish a Balanced Scorecard (FHP mission success) for the Objective Force if it effectively prevents disparity in the concepts, equipment, and capabilities of the supporting medical force. This will require bold and innovative initiatives that include the most advanced leap ahead medical technologies and equipment. If parallel supporting concepts are not secured and creep ahead (outdated) technologies instituted, the AMEDD will receive an unbalanced scorecard (FHP mission failure). The FHP pillars (a healthy fighting force, deploying a trained and equipped medical force, and providing world-class healthcare to beneficiaries) will be out of balance.

The AMEDD has a tremendous responsibility in balancing the FHP pillars and preventing any gaps in the support of a strategically dominant force throughout the full spectrum of joint and multi-dimensional operations. As the U.S. Army transforms into the Objective Force, the AMEDD must not template the antiquated concepts and designs from today's obsolete Army of Excellence, Force XXI, and the intermediate division (IDIV) designs onto the Objective Force initiatives. The AMEDD must successfully infuse key medical enablers to mold a medical platoon into the right shape, with the right equipment, and strategies to provide precise FHP.

The Objective Force's concept of success in the contemporary operating environment is centered on four basic tenets: information dominance, multi-dimensionality, technological superiority, and high mobility. In order to provide adequate Force Health Protection, the concepts and design of the medical force must be focused on these tenets. The FHP must possess conformity (FHP concepts conform to the Objective Force concepts), continuity (FHP assets/organizations maximize time and distance factors), flexibility (FHP assets tailored to

support non-contiguous operations and the full spectrum of operations), and economy (the FHP organization provides the most efficient support without jeopardizing the medical mission). After reviewing and analyzing the available research and material on the Objective Force, the Force Health Protection system, and civilian/military medical innovations the following recommendations are proposed for conserving the fighting strength of the Objective Force:

Conformity

To ensure that adequate Force Health Protection is provided to the Objective Force, it is imperative that the FHP concepts conform to those of the Objective Force. The AMEDD's medical concept of sustainment cannot be completed in a vacuum; it must be fully integrated with the Unit of Action Task Force concept development. This must begin in the conceptual phases of development and continue throughout the transformational process. Integration will prevent disparity in the associated concepts of sustainment, and will also facilitate the development of the capabilities, organization, and equipment required for the UA medical force. As the Objective Force's mission and capabilities continue to evolve through the Army Transformation Wargame process, the AMEDD must continue to refine the associated medical mission requirements. Mission requirements are the drivers that result in the endstate force organization. If the AMEDD's mission requirements do not evolve in conjunction with those of the Objective Force, the FHP system will be inadequate.

The Objective Force is a fluid organization that continues to refine itself to anticipate missions as determined by tomorrow's strategic requirements. One of the strategic requirements is for a force "that provides our ground forces with a dominant fighting system, second to none in the world in terms of holistic systems of systems lethality, survivability, and mobility for conducting standoff attack and close combat assault in all terrains, and which is highly deployable and sustainable meeting requirements articulated in the Army Vision, and the

Objective Force and Future Combat Systems combat battalion order and organization.”⁴⁹ The AMEDD has successfully conformed the FHP key requirements around those of the Objective Force. In order to medically sustain a force with the capability to be dominant, lethal, and mobile across the full military spectrum, the AMEDD has identified the following parallel key requirements as essential to sustaining the Objective Force⁵⁰:

1. Have situational understanding, mobility, and survivability equal to the Objective Force.
2. Provide an appropriate platform from which enroute treatment can be provided.
3. Provide advanced resuscitation, stabilization capability, and internal stabilized treatment for enroute surgery.
4. Provide hold/transport capability until casualties can be evacuated/extracted.
5. Provide hold capability for up to 72 hours within the UATF Medical Platoon.
6. Provide a capability to extract and evacuate severely injured casualties.
7. Provide medical C2/consultation/telemedicine to support combat medics.
8. Have a non-medical variant of the future combat system (FCS) that can transport two litter patients and receive telemedicine link.

Each of the mission needs requirements conforms to support a highly mobile and multi-dimensional Objective Force. However, the Objective Force is an evolving design. These mission requirements should be refined with each new organizational design update for the UATF. The most recent version (March 2002) of the UA Force Design included the requirements for the UATF “to be inserted into austere theaters, immediately employ operational distances, and conduct quick transitions without sapping operational momentum.”⁵¹ In order to achieve a balanced scorecard and maintain conformity with the UA Force Health Protection mission, the

⁴⁹ TRADOC, *Mission Needs Statement Briefing*, 2.

⁵⁰ AMEDDC&S, *Capability Requirements for FCS Information Paper*, 1.

⁵¹ TRADOC, *Unit of Action Force design*, 13 March 2002.

following key requirements are recommended as additions to the AMEDD's initial Mission requirements list:

1. Operate over extended distances and in austere environments (evacuation and sustainability).
2. Operate in a challenging Pulsed Logistics System (re-supplied every three to five days) with discontinuous, temporarily established lines of communication (LOCs).
3. Be prepared for the reception and evacuation of mass casualties.

The addition of these requirements allows the Medical Platoon to develop the required concepts and organizations to sustain an evolving force that will operate in the contemporary operating environment.

The Unit of Action Task Force, Fort Knox, Kentucky is developing the organizational and operational (O&O) concepts through a series of exercises to determine the design. The task force is divided into four working groups: Maneuver, Maneuver Support, ISR, and Sustainment. In order to ensure that the FHP concepts conform in the conceptual and developmental stages of the UATF, AMEDD representatives are embedded within each of the working groups.⁵² The integration of FHP subject matter experts will result in a responsive Force Health Protection system that will develop to meet the future requirements of the Objective Force.

Continuity

Continuity ensures that the Force Health Protection provided to the Objective Force is a seamless process that maximizes time and distance factors to sustain the life, limb, or eyesight of the Objective Force soldier. The UATF medical concept of support successfully accomplishes this through an echelon system of Force Health Protection. The continuum of care provided by this echelon system begins at the point of injury and extends throughout the full spectrum of

⁵² AMEDDC&S. Commanding General's Update Sheet. *The Army's Transformation effort*, 1.

military operations. The care provided within each of the echelons integrates key enabling medical technologies and equipment that will provide critical resources and care within the close combat battle space area of the objective force. The four levels of combat healthcare that comprise this continuum are: the First Responder, forward resuscitative surgery, theater hospitalization, and enroute care. The First Responder is the building block of FHP continuity and enroute care is the cornerstone. Together they will withstand the many challenges of operating in the contemporary operating environment.

The requirements to operate over extended distances and in austere environments are two challenges to FHP continuity. FM 3-0 refers to the Operational Reach of the fighting force as, “the operational positioning and efficient use of all available CSS assets and capabilities from the industrial base to the soldier in the field. They merge operational art and science into an operations enabler maximizing all available sources of support for follow on sustainment.”⁵³ Likewise, FHP reach is the ability to efficiently provide a continuity of medical care that utilizes all of the combat health support resources and assets from the point of injury to the continental United States (CONUS) based hospitals (echelon IV level of care).

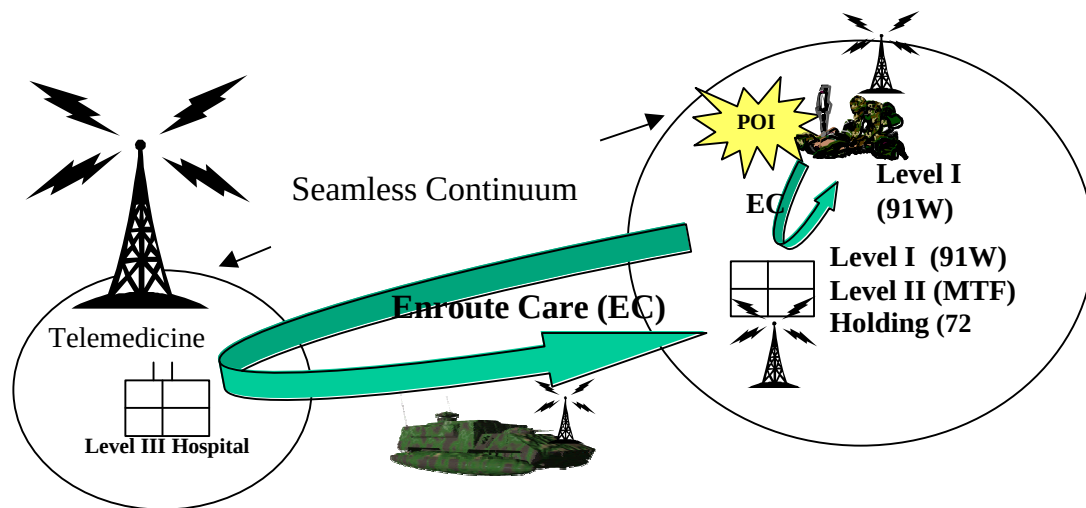
The AMEDD must also ensure that the “medical reach” (continuity) meets the mission requirements to evacuate casualties extended distances in the Future Combat Systems platform. A re-modified BlackHawk (UH60Q) should not be used as the AMEDD’s target or interim FCS. The UH60Q is an enhanced aircraft that provides support to today’s forces, but it should not be procured as the platform to meet tomorrow’s evacuation requirements. The M400 Volantar Skycar is the prototype aircraft that is required for tomorrow’s non-continuous and non-linear extended battlefield. The Volantar has the capability and speed required to evacuate casualties with speed and across extended distances. This will extend the medical reach of the UATF medical platoon and guarantee rapid evacuation and treatment to the next echelon of care.

⁵³ FM 3-0 Operations, 5-41.

The 91W medic transition program will also mitigate the time and distance factors that will threaten the Objective Force casualty in the contemporary operating environment. The AMEDD must aggressively maintain this transition course and incorporate training on the aforementioned emerging medical equipment. The 91W program is a new Army wide military occupational specialty conversion of the old 91B (Medical Specialist) and 91C (Licensed Practical Nurse) specialties. The transition is currently in progress and will be completed by the implementation of the Objective Force. The 91W transition-training program is designed to equip the First Responders with the ability to operate independently with increased capability and skills in an austere environment. The new “super medic” will be highly trained and certified with National Registry of Emergency Medical Technicians. Tomorrow’s Certified EMT First Responder will bring an increased level of expertise to an austere operating environment to mitigate the number of soldiers who die from their wounds on the battlefield.

To further enhance FHP continuity, First Responder training should incorporate and familiarize the 91W with telemedicine, tele-consultation, and leap ahead medical innovations to place greater medical presence forward in combat zone areas. This will solidify the FHP continuum at each level of care. The First Responder, level II, and III medical treatment facilities will all be linked through telemedicine/teleconsultation. Introducing the First Responder to the telemedicine equipment and capabilities during their transition training, will prepare them to operate it in the contemporary operating environment.

The U.S.Army Medical Department must prepare tomorrow’s First Responder today for the equipment and environmental changes that will be inherent in the Objective Force. The enroute care provided throughout the casualty management and care continuum should incorporate the most advanced medical technologies to sustain the objective force soldier in transport. The AMEDD should incorporate the emerging medical capability training into the 91W curriculum. The telemedicine and tele-consultation are FHP multipliers that are vital in overcoming distance and time factors as the augment a seamless FHP Continuum (See Figure, 6).



(Figure 6, FHP Continuity)

Flexibility

The FHP system is a tailorable system that allows for the medical sustainment elements to be organized to support a wide spectrum of military operations. It is a modular medical system that can be reinforced, reconstituted, or augmented at each level of casualty care and management. This modular medical concept and design allows for deployment, mobility, and split based operations. The base of the FHP is the First Responder (91W). The First Responder can be plugged into any mounted/dismounted squad and at any level within the Objective Force medical sustainment structure. This gives the platoon leader the organic capability to reconstitute and shift soldiers within the platoon to maintain FHP operations until replacements are received from the replacement system or reinforced from the next echelon medical treatment facility (Level III).

The Level III Hospital is a tailorable organization that provides early entry capability, split-based operations, and in theater Level III (proximity). It is now a functional modular

hospital that combines surgical teams and equipment sets to support the full range of military operations. The surgical teams can reconstitute the Surgical Treatment Team of the Medical Platoon or can reinforce to provide a more robust surgical capability within the UATF. The AMEDD has organized a flexible FHP unit structure at each echelon that can be tailored to support non-contiguous operations, and throughout the full spectrum of military operations.

Economy

Economy is providing the most efficient FHP support without jeopardizing the life, limb or eyesight of the Objective Force soldier. The Army Transformation Wargame 2001 identified a requirement for “smaller sustainment theater footprint” within the UATF.⁵⁴ However, the requirement to operate in a Pulsed Logistics System (PLS) generates some key issues about the economy/size of the UATF Medical unit. Pulse Logistics (sustainment pushes every 3 days) requires units to be self-sustaining until the next sustainment package arrives. This requires a medical force to hold all urgent, immediate, and routine patients until the next line of communication/evacuation route is opened (72 hours).

A Medical Platoon with the requirement to hold patients for 72 hours (as identified in the mission requirements list) will require the right amount of medical equipment sets (MESs), personnel, and medical supplies to sustain casualties. The Medical Platoon will be configured with a holding section capable of providing holding care. The organic bed space requirement requires additional CL VIII, MESs, and personnel within the medical platoon. If the Medical platoon is forced to make a smaller footprint, the mission requirement for 72 hour hold will not be met. It is imperative that the medical representatives within each working group firmly articulate this point.

The Pulse Logistics System will create additional strain for the medical unit in an austere environment. Force Health Protection is a seamless continuum from the point of injury to the

⁵⁴ U.S. Army War College, “Army Transformation Wargame 2001,” 22-27 April 2001, 16.

highest levels of care for the soldier. If it is constrained by a PLS, the life of the soldier will be in jeopardy. The sustainment of the Objective Force soldier's life should not be categorized with ordinary classes of supply/sustainment. Thus, the size of the FHP organization should not be inhibited by a "smaller footprint" requirement. Increased care and capability (Level II) forward on the battlefield within a PLS system, will require a larger UATF medical platoon or company. This explains why each of the maneuver, maneuver support, and maneuver sustainment organizations are smaller, while the medical footprint grew larger.⁵⁵

If the size of the UATF medical platoon is reduced from its current organization, it will not be able to adequately provide Level II care within the UATF, and a pulse Logistics System. One strategy to mitigate the strain of a Pulse Logistics System on the Medical Platoon's ability to provide FHP, is to establish a Critical Casualty Pulse (CCP). A CCP is the controlled approval for the evacuation of urgent casualties inside of the 72 hour pulse. This will be for casualties who require more definitive urgent resuscitative care. CCPs will require escort and utilize rapid aerial evacuation to the theater hospital. The security of the evacuation route will not be as critical since the platform is flying at an altitude of 29,000 feet. However, CCP security (whether organic or non-organic) will be required. One security recommendation is to provide armed robotic aerial leads or unmanned aerial platform connections to accompany the CCP. CCPs will facilitate urgent casualty evacuation and prevent the backlog of casualties. This gives the Objective Force soldier a greater chance of survival within a seamless and responsive evacuation system.

The size of the Medical Platoon should also be determined by its ability to treat and clear mass casualty situations. The mass casualty is the UATF Medical Platoon's greatest threat to sustaining life on the battlefield. When the system is overwhelmed, casualties will die of wounds because they will not receive the adequate amount of care required to sustain life. The austerity of the contemporary operating environment will be a threat to the Force Health Protection

⁵⁵ AMEDDC&S, Medical Concept of Operations for Unit of Action Task Force, 22.

capability of the Medical Platoon. The MASCAL situation will easily overwhelm the Medical Platoon's resources and will result in culmination. Medical culmination will result in the loss of the Objectives Force's most important component, the soldier. The UATF Medical Platoon must be properly sized to treat MASCALs and provide level II care. If it is not properly resourced, it will only be a speed bump in the way of an out of control vehicle. If the Medical platoon maintains its current structure and size (87 soldiers) it will be able to meet the medical demands of combat in the COE and mass casualties in a Pulse Logistics System.

In conclusion, adequate Force Health Protection can be provided to the Objective Force. However, it will require the incorporation of the latest medical technologies with the developing Objective Force designs and concepts. The AMEDD is well on its way to achieving a "Balanced Scorecard" if it aggressively maintains conceptual conformity with the Objective Force, maximizes time and distance factors through a seamless continuum of care, maintains a flexible FHP system structure, and provides the most proficient support without jeopardizing the medical mission. An unbalanced scorecard will result in the failure of the FHP pillars (of maintaining a healthy fighting force, deploying a trained and equipped medical force, and providing world-class healthcare to beneficiaries) to support the Objective Force. If these pillars do not stand strong in the contemporary operating environment, the Objective Force soldier will die from his wounds.

The AMEDD's Force Health Protection concept of sustainment for the Unit of Action is a seamless system that successfully sustains the Objective Force soldier in a non-contiguous environment to prevent the loss of life, limb, or eyesight. However, it must be enhanced with emerging medical innovations and technologies. The Army Medical Department must be thoroughly integrated into the conceptual development of the Objective Force to ensure that "leap ahead" life saving technologies like telesurgery, the Life Support for Trauma Transport, and the Cartercopter are incorporated. The medical concept of sustainment should not be limited by resource constraints or jeopardized by easy medical remedies to tough sustainment problems. There are no easy solutions or templates to treating the wounded soldier on the battlefield. The

Objective Force soldier deserves highly trained First Responders, and the most precise medical care and equipment.

The AMEDD is responsible for the provision of Force Health Protection to its forces in peacetime and war. It has successfully provided combat health service support to the world's most lethal and powerful Army. As the AMEDD conserves the fighting strength through the twenty-first century, it must continue to transform itself into a viable organization that will support tomorrow's Objective Force. It must close all existing gaps in capability, equipment, and mobility with medical innovations in order to provide adequate Force Health Protection to the Objective Force. Once these gaps are closed, it will achieve a balanced scorecard in "conserving the fighting strength" in tomorrow's complex operating environment and throughout the full spectrum of joint and multi-dimensional operations.

BIBLIOGRAPHY

- Barlas, Pete. "The Flying Car-Plus Down To Earth Ideas," Investors Daily Business, 2001.
- BBC News, located at http://news.bbc.co.uk/1/hi/english/sci/tech/newsid_1552000/1552211.stm, accessed September 2001.
- CarterCopters, Presentation briefing; available from <http://www.cartercopters.com/>. Internet accessed November 2000.
- Command and General Staff Officers School. *Objective Force Briefing Overview*. Prepared by the School of Advanced Military Studies, 7 Aug 01.
- Command and General Staff College. *Joint Combat Health Support Capabilities Handbook*. Prepared by Student: Major Raymond S, Dingle, 2001.
- Mollar, Paul. *Mollar 400Skycar*. Internet, <http://www.moller.com/skycar/m-400>, accessed December 2001.
- National Endowment For The Arts, *Life Supportt For Trauma and Transport*, available from <http://arts.endow.gov/endownews/news00/feddesign/feddesign29.html>. Internet accessed November 2001.
- Telemedicine Research Center. *What Is Telemedicine:Telemedicine Coming of Age*. Internet, <http://trc.telemed.org/telemedicine/primer.asp>. Accessed 5 December 2001.
- Telerobotics, Presentation available at www.ornl.gov/rpsd/humfac/page01d00.html. Internet accessed December 2001.
- Telepresence in Medicine, presentation available at http://www.doc.ic.ac.uk/~nd/surprise_96/journal/vol2/kwc2/article2.html, accessed October 2001.
- Turabian, Kate L. *A Manual for Writers of Term Papers, Theses, and Dissertations*. 6th ed. Chicago: University of Chicago Press, 1996.
- U.S. Army Medical Department Center and School. *Medical Reengineering Initiative Briefing*. 14 April 1999.
- U.S. Army Medical Department Center and School. *AMEDD Capability Requirements for Future Combat System (FCS) and Other Key Enablers* Information Paper, 7 September 2001.
- U.S. Army Medical Department Center and School. *Combat Health Support Doctrine*. MD0420. 1998.
- U.S. Army Medical Department Center and School. *Objective Force Information Paper*. 6 September 2001.
- U.S. Army Medical Department, "Shinseki Views Objective Force," AMEDD Mercury Newsletter. Internet, www.armymedicine.mil December 2001.

U.S. Army Medical Department Center and School. *Medical Concept of Operations for Unit of Action*, December 2001.

U.S. Army Medical Department Center and School. *Objective Force Process and AMEDD Involvement Information Paper*. September 2001.

U.S. Army Training and Doctrine Command, *Mission Needs Statement Briefing*. Fort Monroe, VA,; 2001.

U.S. Army Training and Doctrine Command, *The Objective Force Unit Employment of Concept: Seminar Wargame*. Fort Monroe, VA,; 2001.

U.S. Army Training and Doctrine Command, *The Contemporary Operational Environment and Threat Briefing*. Fort Monroe, VA,; 2001

U.S. Army Medical Department Center and School. *AMEDD Capability Requirements for FCS*. September 2001.

U.S. Army Medical Department Center and School. *Medical Force 2000 White Paper*. 1997.

U.S. Army Medical Department Center and School. *UA Action Concept of Support/Sustainment Brief*.online at [www/armymedicine.army.mil](http://www.armymedicine.army.mil).

U.S. Army Medical Department Center and School.. TRADOC PAM Draft 525-50 Force Health Protection. Washington, D.C.:Government Printing Office, 2001.

U.S. Army Training and Doctrine Command. *Unit of Action Force design Briefing*. 13 March 2002.

U.S. Army Training and Doctrine Command. *The Objective Force Maneuver Unit of Action Concept Briefing*. 14 Aug 2002.

U.S. Army Training and Doctrine Command. *Unit of Action Force design Briefing*. 13 March 2002.

U.S. Army Training and Doctrine Command. TRADOC PAM Draft 525-50 Force Health Protection.Washington, D.C.: Government Printing Office, 2001.

U.S. Army War College, "Army Transformation Wargame 2001 Magazine," Carlisle, PA.: Government Printing Office, 22-27 April 2001.

U.S. Department of the Army. FM 8-10-6 Medical Evacuation In A Theater of Operations. Washington, D.C.: Government Printing Office, 1991.

U.S. Department of the Army. FM 8-55 Planning for Health Service Support, Washington, D.C.: Government Printing Office, 1994.

U.S. Department of the Army. FM 101-5-1 Operational Terms and Graphics. Washington, D.C.: Government Printing Office, 1997.

U.S. Department of the Army. FM 3-0 Operations. Washington, D.C.: Government Printing Office, 2001.

Walsh, Joe. "New 91W MOS Requires More Skills, Internet," Mercury Magazine Vol. 29, No 3 (2001). Internet, www.armymedicine.army.mil/armymed/news/mercury/01-06/91W.htm, accessed 13 March 2002.