

HISTORY OF AEROMEDICAL EVACUATION IN THE KOREAN  
WAR AND VIETNAM WAR

A thesis presented to the Faculty of the U.S. Army  
Command and General Staff College in partial  
fulfillment of the requirements for the  
degree

MASTER OF MILITARY ART AND SCIENCE  
Military History

by

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Fort Leavenworth, Kansas  
2003

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MASTER OF MILITARY ART AND SCIENCE

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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

## ABSTRACT

HISTORY OF AEROMEDICAL EVACUATION IN THE KOREAN WAR AND VIETNAM WAR, by Major William G. Howard, 85 pages.

Modern US Army rotary wing aeromedical evacuation operations and doctrinal concepts can be traced back to the Korean and Vietnam Wars. These early concepts have formed the foundation for the current doctrine, structure, and employment of aeromedical evacuation assets on the battlefields of today. Aeromedical evacuation operations performed during the Korean and Vietnam Wars were executed in an exceptional manner. The medical personnel, hospital system, medical evacuation, and many other medical functions all contributed to the overall success of medical operations. The overall purpose of this research is to identify and describe the major historical operational factors of US Army rotary wing aeromedical evacuation system in the Korean and Vietnam Wars. The successful operations of US Army rotary wing aeromedical evacuation system in each of these wars permit a historical comparison between them.

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## ACRONYMS

AFB	Air Force Base
ARVN	Army Republic of South Vietnam
ASR	Air Sea Rescue
CASEVAC	Casualty Evacuation / Transport
CSAR	Combat Search And Rescue
FEAF	Far Eastern Air Force
MAAG	Military Assistant Advisory Group
MAC	Military Airlift Command
MACV	Military Assistant Command Vietnam
MASH	Mobile Army Surgical Hospital
MAST	Military Assistance to Safety and Traffic
MRO	Medical Regulating Officer
NSA	Navy Support Activity
OTSG	Office of the Surgeon General
PACAF	Pacific Air Forces
TO&E	Tables of Organization and Equipment
UN	United Nations
USAF	United States Air Force
VC	Viet Cong

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## CHAPTER 1

### INTRODUCTION AND BACKGROUND

#### Introduction

History has provided answers to future military questions. One just has to review the details and research for the answers, so the same mistakes will not be made repeatedly. For example, Napoleon's campaign in Russia during the early 1800s resulted in long supply lines that were unable to sustain his forces. Since the campaign was not over before winter, his forces were not prepared, were short of supplies, and forced to withdraw to France. During their long march, Napoleon lost 75 percent of his forces due to disease or nonbattle injuries and the cold weather. The Germans, however, did not review the problems and failures of Napoleon's campaign before their Russian offensive on 22 June 1941, during World War II; otherwise, they might not of had the same problems and failures that Napoleon had in the early 1800s.

Modern US Army rotary wing aeromedical evacuation operations and doctrinal concepts can be traced back to the Korean and Vietnam Wars. These early concepts have formed the foundation for the current doctrine, structure, and employment of aeromedical evacuation assets on the battlefields of today. The overall purpose of this research is to identify and describe the major historical operational factors of US Army rotary wing aeromedical evacuation system in the Korean and Vietnam Wars. The successful operations of US Army rotary wing aeromedical evacuation system in each of these wars permit a historical comparison between them.

The author will describe and discuss the general background of medical evacuation in chapters 1 and 2 and will address the primary and subordinate research

questions as they relate to the US Army aeromedical evacuation system utilized in the Korean War. During chapter 3, the author will address the research questions as they relate to the US Army aeromedical evacuation system utilized in the Vietnam War, to conclude with chapter 4, summarize the findings, draw conclusions, and make recommendations for action and further study.

### The Research Question

This research study focused on the primary question: How did the US Army rotary wing aeromedical evacuation system, utilized during the Korean and Vietnam Wars, contribute to and shape today's US Army rotary wing aeromedical evacuation system? The following secondary investigative questions were developed and analyzed in order to evaluate and answer the basic research question: What were the organizational structures of US Army rotary wing aeromedical evacuation system during each of the wars? This question will cover the initial history, structure, and how the US Army rotary wing aeromedical evacuation system evolved to include numbers and types of helicopters and unit size. In addition, it will include the geographic locations of these units. How were US Army rotary wing aeromedical evacuation assets utilized during each war? This question will cover how the units and helicopters were generally utilized and what were some of the challenges facing the unit commander. How were US Army rotary wing aeromedical evacuation assets employed during each war? This question will cover in more detail the tactical employment of the units, actual specific missions flown, and specific accounts of exemplary service. What rotary wing aeromedical evacuation lessons did the US Army learn in each war? How were US Army rotary wing aeromedical

evacuation lessons learned from the Korean War applied by the US Army during the Vietnam War?

#### Assumptions

The author assumes that the historical contributions of the US Army rotary wing aeromedical evacuation system can be evaluated, that both primary and secondary sources will be valid and reliable means in reaching a conclusion, and that the Combined Arms Research Library will have enough primary and secondary sources to provide historical data to complete the thesis.

#### Definitions of Terms

There are common key terms and definitions used in the thesis. While sometimes used in different context, the following list of definitions is used:

Aeromedical Evacuation. The movement of patients under medical supervision to and between medical treatment facilities by air transportation.<sup>1</sup>

Casualty. Any person who is lost to the organization by having been declared dead, duty status--whereabouts unknown, missing, ill, or injured.<sup>2</sup>

Casualty Evacuation/Transport (CASEVAC). The movement of casualties by nonmedical transportation assets without provisions of en route medical care.<sup>3</sup>

Died of Wounds (DOW). A hostile or battle casualty who dies after having reached a medical treatment facility.<sup>4</sup>

Disease and Nonbattle Injury. A person who is not a battle casualty but is lost to his organization by reason of disease or injury or by reason of being missing where the absence does not appear to be voluntary due to enemy action or to being interned.<sup>5</sup>

Dustoff. A tactical call sign or code name given to Army rotary wing medical evacuation helicopters performing aeromedical evacuation or medical evacuation (MEDEVAC) during the Vietnam War.<sup>6</sup>

Mass Casualty. Any large number of casualties produced in a relatively short time period, usually as the result of a single incident, such as a military aircraft accident, hurricane, flood, earthquake, or armed attack.<sup>7</sup>

Medical Evacuation (MEDEVAC). The timely and efficient movement of patients while providing en route medical care to and between medical treatment facilities.<sup>8</sup>

Medical Treatment Facility. A facility established for the purpose of furnishing medical and or dental care to eligible individuals.<sup>9</sup>

Patient. A sick, injured, wounded, or other person requiring medical or dental care or treatment.<sup>10</sup>

#### Limitations

The author lacked experience in conducting independent, original research, sufficient time during the ten-month Command and General Staff Officer Course, and access to outside funds to conduct face-to-face interviews. Moreover, the primary limitation for this research project was the reliance upon secondary sources for the majority of the information, even though the author utilized several primary sources. Keeping this in mind, an overwhelming amount of written material pertaining to the subject resulted in a limited focus to Army rotary wing aeromedical evacuation during these two wars. The limited time allotted, the seventy-five-page limit, and lack of opportunity to travel will constrain the amount of primary source information that will be available.

### Scope and Delimitation

The scope of the thesis will be limited to US Army rotary wing aeromedical evacuation during the Korean and Vietnam Wars. The US Navy (USN) and US Air Force (USAF) neither during this time nor now have dedicated rotary wing aeromedical evacuation helicopters, even though the USAF made the widespread use of the term aeromedical evacuation. This term aeromedical evacuation utilized by the USAF actually refers to the evacuation at the operational and strategic levels through the means of transporting casualties by fixed wing aircraft from theater to theater and theater to continental US. The thesis will only briefly cover the contributions of the USAF tactical combat search and rescue (CSAR) rotary wing casualty evacuation and transport (CASEVAC) until Army aeromedical units were established. The medical personnel, hospital systems, and supply of all three branches of Army, Air Force, and Navy contributed to the overall success of medical operations in the Korean and Vietnam Wars. These areas were a very important part of the accomplishments of the medical services, but were not included in this research. In addition, the thesis did not focus in on the training, detailed command and control network, and the interwar periods.

Several other modes of casualty ground medical evacuation to nonstandard evacuation were utilized during the Korean and Vietnam Wars. The other modes were by ships, combat and civilian vehicles, animals, and foot. Even though these were an integral part of the evacuation system, they were not included in this research.

### Background

Aeromedical evacuation operations performed during the Korean and Vietnam Wars were executed in an exceptional manner. The medical personnel, hospital system,

medical evacuation, and many other medical functions all contributed to the overall success of medical operations.

To fully appreciate and understand the impact and importance of the US Army rotary wing aeromedical evacuation during the Korean and Vietnam Wars, it is important to have an understanding of how casualties and patients were evacuated in earlier times. The author will briefly cover casualty and patient evacuation from the American Civil War, Spanish American War, World War I, and World War II. With this understanding and evolution of earlier US military casualty and patient evacuation, one will understand the significant impact and importance of the United States Army rotary wing aeromedical evacuation during the Korean and Vietnam Wars.

The American Civil War was the last great conflict waged before germ theory warfare entered the battlefield. Hospitals were unsanitary places, where, as the surgeon W. W. Keen later described it:

We operated in old blood-stained and often pus-stained coats, the veterans of a hundred fights. We operated with clean hands in the social sense, but they were undisinfected hands. We used undisinfected instruments from undisinfected plush-lined cases. If a sponge or instrument fell on the floor it was washed and squeezed in a basin of tap water and used as if it were clean.<sup>11</sup>

A British surgeon by the name of Joseph Lister published his work on antiseptics two years after the end of the American Civil War. His effort would lay the groundwork for accelerated progress in the Spanish-American War, World War I, World War II, Korean War, and Vietnam War.

At the beginning of the American Civil War, the Union Army Medical Department was unprepared to treat and evacuate the number of casualties and patients this war produced. The experienced veterans of the Mexican War had no idea of the

magnitude of the difficulties that would be involved in dealing with casualty evacuation on the scale of those seen during the Civil War.<sup>12</sup> As a result, the Union Army surgeons were called upon, for the first time, to develop plans for evacuating and hospitalizing a great number of casualties. This was a huge new undertaking with no developed methods of transportation for the wounded; a formal ambulance service did not exist. Each regiment theoretically had two ambulances that did not belong to the Medical Department; the Quartermaster Corps was the Army's executive agent for patient evacuation. When ambulances were available they were driven by civilian drivers. These civilian drivers often fled at the first sound of shooting. The ambulances during this time came in two forms: the four wheeled and the two-wheeled version. The latter was issued in larger numbers in the beginning of the war and was very uncomfortable for the wounded. Near the end of the war, only the four-wheeled version remained in service.

In the first years of the war, medical ambulances were in such short supply that three days after the First Battle of Bull Run on 21 July 1861, some three thousand wounded men still lay on the field. Washington hospitals would find themselves so overcrowded with casualties that cots had to be set up in the halls of Congress in order to facilitate the care of many of the wounded soldiers. There were even reports that wounded soldiers were forced to walk unaided back to Washington due to a lack of a coordinated evacuation system. A few key individuals quickly identified a desperate need for improving or reforming casualty care and evacuation.

During the early months of 1862, the medical director of the Army of the Potomac Jonathan Letterman, a surgeon, took the first steps toward developing a system of evacuating casualties and patients from the front lines. His plan called for the

development of the first ambulance companies with permanently detailed soldiers from the ranks for ambulance work. Major General McClellan, commander of the Army of the Potomac, was so impressed with Letterman's plan that he approved and issued on 2 August 1862 a general order to the Army of the Potomac. This general order was executed before the Chief of Staff General Halleck or the Secretary of War Mr. Stanton approved it. Letterman's plan was initially rejected by Secretary Stanton, but was finally pushed through Congress and sanctioned by law on 11 March 1864.

Letterman's initial plan was first tested on 17 September 1862 at the Battle of Antietam, which employed field stations and ambulances. After the US Army officially adopted Letterman's plan, it was finally standardized during the Spanish-American War in 1898. Letterman's plan is the cornerstone for modern-day casualty evacuation.

During the Spanish American War, the Army fully implemented Letterman's plan. His plan was based upon a "chain of evacuation," where the casualties were carried or assisted from the battle area to aid stations. Finally, field ambulances carried them to clearing stations and transferred them to field hospitals for further treatment.<sup>13</sup> Casualties were evacuated by rail and water transportation back to the bases or general hospitals. Letterman's chain of evacuation forms the basis of today's evacuation doctrine including the evolution of modern aeromedical evacuation doctrine.

A soldier lies in a tent hospital in Siboney, Cuba, in July 1898, a victim of yellow fever. That month, senior US Army officers fresh from victories at San Juan Hill and Santiago proposed immediate evacuation: "The army is disabled by malarial fever to such an extent . . . that is in a condition to be practically entirely destroyed by the epidemic of yellow fever sure to come."<sup>14</sup> The country of Spain actually surrendered before the

president had time to weigh his options. Even though, the US had used the new evacuation doctrine for clearing the battlefield. The real enemy of the Spanish American War of 1898 would prove to be of another nature. The US suffered fourteen times as many deaths from tropical diseases than from enemy action. Malaria and yellow fever would be the new enemy during this war.

World War I, like other wars before it, saw many new medical improvements to meet the ever-changing threats. The introduction of mustard gas and the increased efficiency of conventional weapons meant larger numbers of combat casualties. The initial use of mustard gas resulted in too many casualties to be cared for in the nearby field hospitals. The result would be dramatic improvements in the total number of hospitals and in triage. In addition, the first motorized ambulances replaced the horse or mule-drawn wagons of early wars. The doctors observed that the casualties' recovery rates were increased when the wounded soldiers could be evacuated from the front lines before infection had set in.

The first evacuation of wounded military personnel by an airplane occurred during World War I at Flanders, France, on 18 April 1918. A French medical officer Dr. Chaissang had drawn plans for the modification of two French planes. He supervised the modifications of the planes, which provided enough space for two wounded soldiers behind the pilot's cockpit. The patients were inserted through the side of the fuselage. Aeromedical evacuation of the wounded was used to a minor extent in World War I because of the practical availability of the airplane for this type mission. The fuselages of the converted military tactical types were too narrow to accommodate stretchers, and the patients were not helped by exposure to the cold air.<sup>15</sup>

The first successful air ambulance in the United States was created by Captain William C. Oaker and Major William E. Driver in 1918. They converted a biplane so a standard army stretcher would fit into the rear area. This airplane was used in giving assistance to mail-carrying pilots who experienced a high rate of crash landings during this period. Oaker and Drivers' plane could land near the remote crash sites and evacuate the injured pilots. The use of the air ambulance plane allowed a doctor to fly to the injured pilot, treat him on the spot, and then fly him to a hospital if required.<sup>16</sup>

Some 80 percent of all World War II injuries were from bombs, mortars, and shellfire--not bullets. The result was more severe wounds accompanied by shock. World War II would be the first war that plasma was introduced. When required, the plasma was mixed with sterile water and injected into the blood stream to sustain life until surgery could take place.

Even though during World War I the air ambulance made significant advancement, at the beginning of World War II many military authorities believed air evacuation of patients was not only dangerous, but also, medically unsound and militarily impossible. General David Grant's, the first air surgeon of the Army air forces', proposal for an air evacuation service was met with much opposition in the upper levels of the Army. However, Grant continued to push for an air evacuation system, and in June 1942 he succeeded.<sup>17</sup>

The first large-scale combat aeromedical evacuation of the war took place in New Guinea in August 1942. The Fifth Army air force evacuated more than 13,000 patients over 700 miles to Australia in a period of seven days because of an Allied counteroffensive against the Japanese.<sup>18</sup>

By 1943, the Army Air Evacuation service had moved significant numbers of wounded soldiers by air transport. That year alone, over 173,500 casualties were air evacuated back to the United States. During the following year 1944, over 545,000 casualties were air evacuated, and in 1945 at the wars end, over 454,000 more soldiers were evacuated with a three- year total of over one million. The new air evacuation doctrine showed that aeromedical evacuation was a new alternative. One key leader who was convinced of the importance of aeromedical evacuation was General Dwight D. Eisenhower, Supreme Allied Commander in Europe. Weeks after D day, General Eisenhower stated, “We evacuated almost everyone from our forward hospitals by air, and it has unquestionably saved hundreds of lives--thousand of lives.”<sup>19</sup>

Helicopters were rarely used during World War II. The first aeromedical evacuation test flight was the Sikorsky R-6 in November of 1943. The Sikorsky R-6 helicopter carried one pilot, one medical attendant, and two simulated litter casualties that were attached to the outside of the helicopter to facilitate loading and unloading. The casualties could be seen by the pilot and attendant during flight. On 23 April 1944 the first actual US Army helicopter aeromedical evacuation rescue mission took place by Lieutenant Carter Harman. Lieutenant Harman rescued casualties from stranded forces about twenty-five kilometers west of Mawlu, Burma.

Air evacuation of military patients continued after the end of World War II. On 7 September 1949 the Secretary of Defense directed that evacuation of all sick and wounded, in peace and war, would be accomplished by air as the method of choice. Hospital ships and other means would only be used in unusual circumstances.<sup>20</sup> An era of aeromedical evacuation had finally emerged.

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<sup>1</sup>US Army, Field Manual (FM) 101-5-1 and Marine Corps Reference Publication (MCRP) 5-2A, *Operational Terms and Graphics* (Washington, DC: Headquarters, Department of the Army, United States Marine Corps, 30 September 1997), 1-3.

<sup>2</sup>Ibid., 1-24.

<sup>3</sup>Ibid., 1-24.

<sup>4</sup>Ibid., 1-52.

<sup>5</sup>Peter Dorland and James Nanney, *Dustoff: Army Aeromedical Evacuation in Vietnam* (Washington, DC: Department of the Army, 1982): 29-30.

<sup>6</sup>US Army, FM 101-5-1/MCRP5-2A, 1-54.

<sup>7</sup>Ibid., 1-98.

<sup>8</sup>Ibid., 1-99.

<sup>9</sup>Ibid., 1-99.

<sup>10</sup>Ibid., 1-119.

<sup>11</sup>“Military Medicine,” *American Heritage* 35 (June 1984): 65.

<sup>12</sup>Mary C. Gillet, *The Medical Department, 1865-1917* (Washington, DC: Center of Military History United States Army, 1995): 153.

<sup>13</sup>Eloise Engle, *Medic: America's Medical Soldiers, Sailors, and Airmen in Peace and War* (New York: John Day, 1967), 29.

<sup>14</sup>“Military Medicine,” 69.

<sup>15</sup>*A Concise History of the USAF Aeromedical Evacuation System* (Washington, DC: Department of the Surgeon General, United States Government Printing Office, 1976): 2-3.

<sup>16</sup>Ibid.

<sup>17</sup>Ibid, 8.

<sup>18</sup>Allen D. Smith, “Air Evacuation--Medical Obligation and Military Necessity,” *Air University Quarterly Review* 6 (summer 1953): 103.

<sup>19</sup>*A Concise History of the USAF Aeromedical Evacuation System*, 11.

<sup>20</sup>Smith, 102.

## CHAPTER 2

### KOREAN WAR

A specialized vehicle of high cost and limited effectiveness, the medevac chopper won its fame as an evacuation vehicle under conditions that were unique to the Korean War. As a wealthy nation that admired technical innovation and placed a high value on individual life, the United States was well fitted to finance such a pioneering effort. Preexisting medical skills of a high order were necessary to make the trial a success, for only a medical service of great sophistication could have dealt competently with the massive and near-fatal injuries that were the helicopter's specialty. The endeavor was not militarily significant, but it boosted morale by demonstrating that, against all purely material considerations, the nation intended to save every possible life. The typically high-cost, low-yield experimental period during the Korean War proved the potential of a vehicle whose future impact on all emergency medicine, both military and civilian, would be great indeed.<sup>1</sup>

“Seeking the Roots of Dustoff--Helicopter Proves  
Self as Life Saver in Korean War, Part Two”

#### Introduction

The research for this chapter focused on the first portion of the primary question: How did the US Army rotary wing aeromedical evacuation system, utilized during the Korean War, contribute to and shape today's US Army rotary wing aeromedical evacuation system? The author developed the following subordinate investigative questions in order to evaluate and answer the basic research question: What were the organizational structures of US Army rotary wing aeromedical evacuation during the Korean War? How were US Army rotary wing aeromedical evacuation assets utilized during the Korean War? How were US Army rotary wing aeromedical evacuation assets employed during the Korean War? What rotary wing aeromedical evacuation lessons did the US Army learn during the Korean War?

Dr. Richard Meiling, Chairman of the Armed Forces Medical Policy Council, stated with conviction before the outbreak of the Korean War in 1950:

As a peacetime operation, the air transportation of patients is steadily improving in efficiency. As a military operation under combat conditions, a lot of improvement is still required. There still is the small minority which is unable or unwilling to recognize the inherent soundness of air evacuation.<sup>2</sup>

Many senior officers from the Army, Navy, and Air Force still believed that ships and ground transportation were the most efficient and best ways to evacuate casualties. The resistance and reluctance to utilize rotary wing aeromedical evacuation at the beginning of the Korean War impeded the development of a sound detailed system of aeromedical evacuation. The primitive state of the road network in Korea attributed to the significant transportation difficulties (see figure 1). The scarcity of hard-surface roads, the lack of lateral links between the few main highways, and the harsh climate often made it extremely difficult to transport casualties from forward units. This lack of both infrastructure and adequate US medical facilities in Korea helped to establish Army rotary wing aeromedical evacuation as the reasonable and necessary course to follow.

Helicopters appeared in significant numbers for the first time during the Korean War. They were utilized primarily in a support role, performing logistic resupply to ground forces, transporting soldiers, as well as reconnaissance missions; however, planners failed to realize the importance of the helicopter as an essential option for casualty evacuation.

During the early months of the Korean War, rotary wing aeromedical evacuation was thought of as a last resort method of transporting the wounded, as it was only utilized in those extreme cases when the casualties could not be evacuated by means of stretcher

bearers, field ambulances, trains, or hospital ships. The US Army's policy and doctrine at this time was to keep the casualties as far forward as possible, so they could be returned to combat; the Army's medical evacuation system was designed to be in line with the Army's policy.

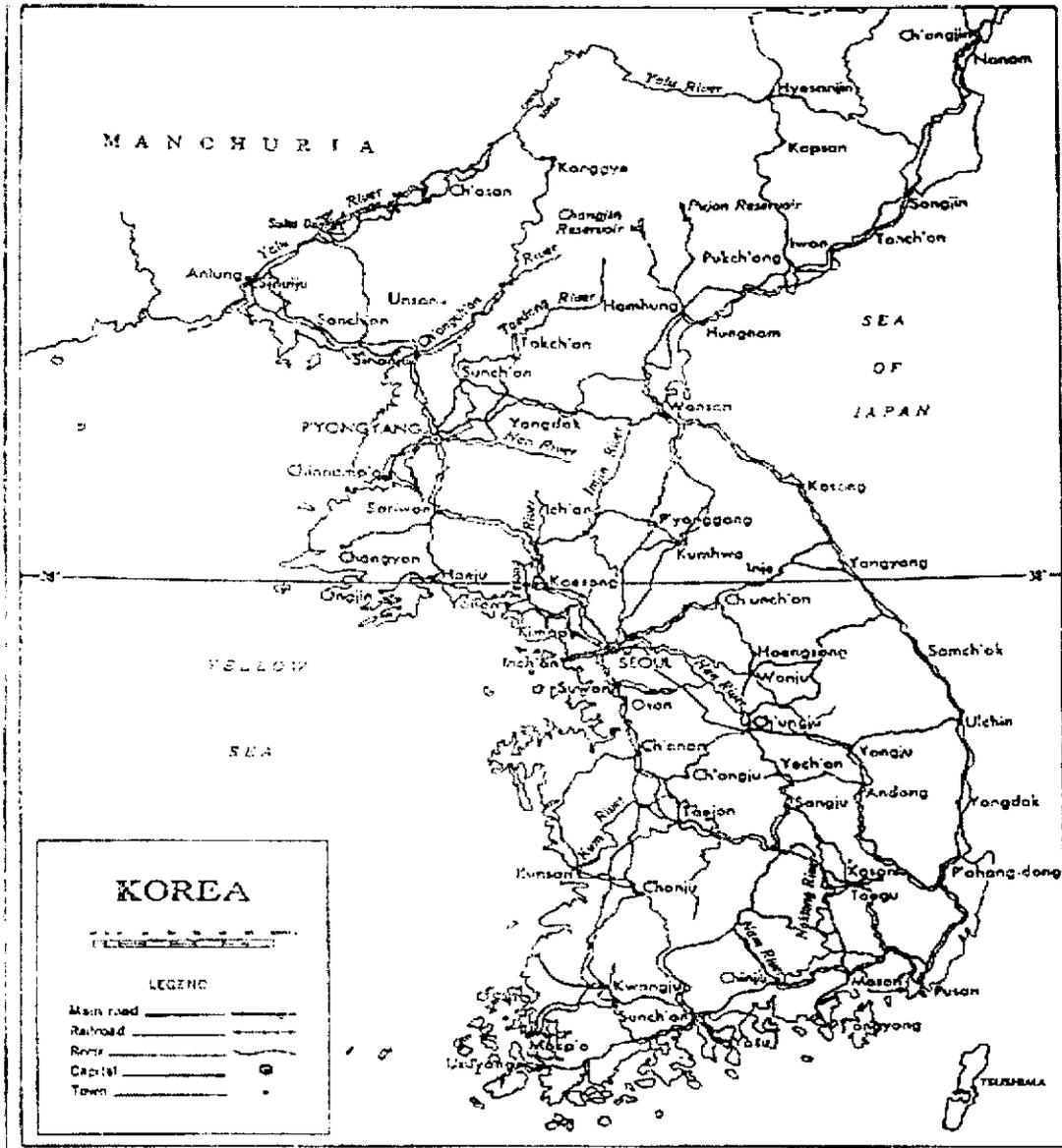


Figure 1. Korean Map. Source: Frank A. Reister, *Battle Casualties and Medical Statistics* (Washington, DC: Department of the Army, 1973), 25.

Senior officers recognized at the strategic level that USAF fixed wing aircraft offered the cheapest and fastest means to evacuate casualties from Korea to the US. Even though this was recognized early on, it still would take approximately eighteen months after the beginning of the war to see fixed wing and rotary wing aeromedical evacuation aircraft gain widespread acceptance--not through policies or doctrine but through its proven usefulness and effectiveness.<sup>3</sup>

### Aeromedical Evacuation Organizational Structures

The initial history of the organization starts with the USAF, and later Army aviators, employing the equipment available to them, developed a rotary wing aeromedical evacuation doctrine that would become a sophisticated part of the Army's medical evacuation and treatment system during the war. However, the Army aeromedical evacuation "MEDEVAC," as it became known, concept was created and developed by the soldiers and officers in Korea, such as the Eighth Army surgeon, with little backing from the Army Medical Service establishment back in the US. Nevertheless, as the concept proved itself, the Surgeon General recognized the need to create a formal MEDEVAC structure in the Army Medical Service and to staff MEDEVAC units with true medical aviators, rather than pilots borrowed from other branches. During the war, pilots from other branches flew the lifesaving helicopters and became de facto Army Medical Service members; others would actually transfer to the Army Medical Service Corps. While these pilots from other branches flew the MEDEVAC missions, no true Medical Service Corps pilots existed in Korea until after the 1953 armistice.

In the Korean War Air Force units actually provided the first rotary wing CASEVAC--not aeromedical evacuation, even though the term “aeromedical evacuation” was used out of context throughout the war describing USAF rotary wing casualty evacuation. The Air Force unit 3rd Air-Sea Rescue (ASR) Squadron arrived in Korea in July 1950 under the command and control of Captain Oscar N. Tibbetts and was the first helicopter unit utilized during the Korean War for this mission. It is important to know that this unit actually was not an aeromedical evacuation unit by the true definition of the word, since the USAF did not have dedicated rotary wing aeromedical evacuation helicopters. The USAF was able to dedicate helicopters to the CASEVAC mission since there was little air opposition in Korea. Consequently, one of the squadron’s detachments began responding to evacuation requests for Army casualties. Recognizing the effectiveness of rotary wing evacuation, Captain Leonard A. Crosby, Army Medical Service Corps, set up a demonstration in the courtyard of Taegu Teacher’s College on 3 August 1950. Captain Crosby demonstrated how to employ MEDEVAC helicopters for tactical frontline evacuations with great success, and one week later, the Fifth Air Force commander authorized the use of helicopters for tactical frontline evacuation of Army soldiers.<sup>4</sup>

After hearing of the success of Captain Crosby’s demonstration, Major General Raymond W. Bliss, US Army Surgeon General, became convinced that the Medical Department needed its own air ambulance helicopters. During a visit to Korea in October 1950, General Bliss discussed medical evacuation problems with General MacArthur and upon his return reported to his staff that: “MacArthur feels that helicopters should be in the Tables of Organization and Equipment (TO&E) and should be part of medical

equipment--just as an ambulance is.”<sup>5</sup> The Surgeon General requested two helicopter ambulance companies of twenty-four helicopters each. By 20 October 1950, the Army for immediate airlift had purchased eight helicopters for the Far East Command. Major General George E. Armstrong, deputy surgeon general, successfully carried the fight to the Army staff and would succeed Bliss later in 1951. At this point, the USAF and Army agreed that Army units would provide tactical frontline rotary wing aeromedical evacuation, and USAF units would provide strategic fixed wing aeromedical evacuation outside the combat zone.

The first four Army aeromedical evacuation helicopter detachments arrived in Korea and were assigned to the operational control of the Eighth Army, but supervised by the Eighth Army Surgeon beginning in January 1951. Each of these detachments was broken down into two sections, a pilot or commissioned officer section that included the commander and an enlisted mechanic section. The sections were authorized four personnel each, one pilot and mechanic per helicopter. In addition to the personnel sections, the detachments were authorized two Bell H-13s and two Hiller H-23s helicopters, equipped with two exterior pods for litter casualties; one ambulatory casualty could also be carried at the same time under ideal conditions in the cockpit if required.

The 1st Helicopter Detachment never became operational, because its helicopters were diverted to other units immediately upon arrival to Korea, but the remaining three detachments were each attached to a forward-deployed Mobile Army Surgical Hospital (MASH) for command and control, rations, quarters, and administrative matters, since the detachments did not have internal support capabilities.<sup>6</sup> The Army's 2nd Helicopter Detachment had four helicopters that flew from the 8055th MASH located at ASCOM

city, south of Kimpo Airfield (K-16) outside Seoul. The 3rd Helicopter Detachment with four helicopters was attached to the 8063rd MASH located at Changhowon-ni, Yojo, and Chongpyong-ni. The 4th Helicopter Detachment had four helicopters which flew from the 8076th MASH located at Chunchon.

There were four mobile Army surgical hospitals (MASHs) in Korea at this time. One MASH was assigned to each of the three Corps, I, IX, and X, and one was held in reserve. As the hospitals rotated forward, one of the MEDEVAC helicopter detachments was attached to each of the active MASHs, which resulted in the detachments moving from hospital to hospital, as they rotated.

The 2nd Helicopter Detachment was the first actual MEDEVAC helicopter detachment to arrive in Korea at Kimpo Airfield (K-16) in January 1951. The detachment was organized from assets of the 82nd Airborne Division that had been activated at Fort Bragg in October 1950 before its deployment to Korea. The detachment shipped its four H-13C models from San Francisco to Korea but never saw them again. To fix the loss, the Army airlifted eight H-13Ds to Korea directly from the Bell factory in Niagara Falls, New York. However, mishandling of the helicopters at the airfield in Korea damaged four of them and the 2nd Helicopter Detachment could only salvage four airworthy helicopters. Eventually, the 3rd and 4th Helicopter Detachments came on line and provided Army rotary wing MEDEVAC support to the United Nations' (UN) forces throughout the war from their rotating MASH attachments. The 2nd, 3rd, and 4th Helicopter Detachments were originally considered general aviation units and not medical units since they did not have an official medical TO&E.

On 20 August 1952, the Army published the first official TO&E 8-500A for an air ambulance detachment with seven officers, twenty-one enlisted soldiers, and five helicopters. The first 8-500A Detachment was the 53rd Medical Detachment (Helicopter Ambulance), activated at Brooke Army Medical Center, Fort Sam Houston, Texas, on 15 October 1952. Three more official MEDEVAC units with the 8-500A TO&E--the 49th, 50th, and 52nd Medical Detachments (Helicopter Ambulance--were organized to replace the existing more or less ad hoc detachments in Korea during December 1952. During the early part of 1953, these units plus three others--the 37th, 54th, and 56th (the latter two existed only on paper)--were combined to form the 1st Helicopter Ambulance Company (Provisional) that combined all MEDEVAC detachments under a unified command for the first time. The official sources differ on whether this took place in February or June 1953.

In November 1952, the 49th Medical Detachment (Helicopter Ambulance), commanded by Captain John W. Hammett, was organized as the first purely medical aviation detachment with the new 8-500A TO&E in Korea, which evolved from the 2nd Helicopter Detachment. Hammett, a World War II artillery liaison pilot, later actually transferred to the Medical Service Corps. The helicopter and personnel authorization for the new 49th Medical Detachment (Helicopter Ambulance) remained the same as the 2nd Helicopter Detachment.

When the Army decided branch chiefs should have their own aviation staff sections, the Office of the Surgeon General (OTSG) received an aviation section to coordinate planning, operations, staffing, and supply for medical helicopter units. That strengthened medical control over MEDEVAC. The OTSG also pushed for training

Medical Service Corps officers as helicopter ambulance pilots. The push began in early 1951, but it took a year to amend regulations to allow it, which resulted in the Army creating a quota for twenty-five Medical Service Corps officers, mainly new lieutenants, to take flight training in October 1952. Eight Medical Service Corps officers started the first flight training class, and seven completed it successfully in February 1953.<sup>7</sup> By the summer of 1953, the Medical Service Corps received a standing quota for ten Medical Service Corps officers to enter the Army Aviation School each month; and by 1 October, the Army Medical Service Corps had twenty-four qualified pilots and had five additional pilots transfer over from other branches.

Shortly after the end of the Korean War, the OTSG persuaded the Army to consider litter capacity in all future helicopter purchases whatever the primary mission. This was a factor in the selection of the Bell UH-1 Iroquois (Huey), which carried MEDEVAC to new levels during the Vietnam War.

Now one can understand the initial history and evolution of the Army's rotary wing MEDEVAC detachments in Korea to include, the first more or less ad hoc detachments of the 2nd, 3rd, and 4th without actual official TO&Es evolve into the new 49th, 50th, and 52th Medical Detachments (Helicopter Ambulance) with an official new 8-500A TO&E. Also, covered were the troop strengths, numbers of helicopters and their geographic locations of the detachments. The detachments were required out of necessity to evolve to meet the new challenges of the war in Korea, and these changes in organization would be the initial framework leading to the Helicopter detachments that later would be called upon to serve in the Vietnam War.

### Aeromedical Evacuation Utilization

Quick adoption and utilization of the Army helicopter, as an aeromedical evacuation platform was the result of both the nature of the Korean War and the Korean countryside. The broken and rugged terrain separated troops from each other and from medical facilities while the poor infrastructure and guerrilla warfare tactics used by the enemy initially, also contributed to the problem. Roads were rough and crowded making the ground evacuation of casualties traumatic, slow, and full of problems. In contrast, the MEDEVAC helicopter flight was fast and generally much smoother causing fewer traumas to the already injured casualties.

Army rotary wing MEDEVAC was only a subdivision of the overall evacuation procedure in the Korean War. A basic understanding of the tactical frontline rotary wing MEDEVAC utilization process is necessary to fully understand the mission and the process.

Injured soldiers from the front lines were initially brought to battalion aid stations by the means of litter teams, jeeps, trucks, and ambulances. At the aid stations, the casualties would receive first aid and emergency treatment as needed, and once stabilized, they were transported by ground to collection stations, where the more critically wounded casualties were flown by Army MEDEVAC helicopters to a MASH. Other casualties went by ground ambulance to division clearing stations. From the division clearing stations, casualties were then evacuated by Army MEDEVAC helicopters or ground to evacuation hospitals.<sup>8</sup>

During the Korean War the utilization of the rotary wing aeromedical evacuation system developed into a more routine procedure. At the beginning of the war before

Army MEDEVAC detachments arrived in Korea and became operational, the 3rd ASR Squadron utilized the H-5 and the H-19 helicopters and was given the task of evacuating tactical frontline casualties to MASH units located further to the rear. During the late summer of 1950, General Stratemeyer, Commanding General of the Far East Air Force (FEAF), wanted to expand his unit to develop a new squadron with more helicopters and trained medical personnel, but the USAF refused Stratemeyer's request. Meanwhile, the Army authorized more helicopters for its units and started organizing helicopter ambulance detachments for utilization in Korea.<sup>9</sup> In essence, these decisions meant that the Army would be responsible for the majority of the tactical frontline rotary wing MEDEVAC, while the USAF would provide strategic fixed wing aeromedical evacuation farther to the rear.

During MEDEVAC missions, the Army helicopter detachments flew the H-13D and the Hiller H-23B, both of which were equipped with external pods. The casualties were originally placed in the open litters for evacuation, but the detachment soldiers modified the litters into pods to provide casualties with a protected environment. Then eventually the pods were modified again to allow casualties to receive transfusions while in flight. The rapid evacuation of these seriously wounded soldiers directly from the front lines to the appropriate level of the medical treatment significantly enhanced the survivability of the soldiers. The fatality rate from seriously wounded soldiers, which had stood at 4.5 percent during World War II, fell to 2.5 percent during the Korean War. MEDEVAC pilots evacuated more than 20,000 casualties of all nationalities during the Korean War. For example, First Lieutenant Joseph Bowler of the 2nd Helicopter Detachment evacuated 824 casualties between 10 January and 2 November 1951.<sup>10</sup>

The new Army Medical Detachment (Helicopter Ambulance) commanders had many challenges facing them, their personnel, and most of all their equipment during their general utilization of the detachments. "There were conditions the weak, fragile Korean War helicopters could not work in, and things they could not do. Both machines and pilots were too scarce to be lightly risked."<sup>11</sup> The pilots and ground mechanics had to learn by trial and error how to get the most out of the MEDEVAC helicopters under these conditions.

Almost any damage from enemy fire was fatal to the helicopters. Therefore, the commander's rules for their use were strict and tightly monitored by the Eighth Army Surgeon's Office. Missions were restricted to serious injuries, and the pilots had a right to refuse any mission that would damage the helicopters. Pickups were supposed to occur only at medical treatment facilities and only in daylight hours. Nevertheless, the pilots often ignored the rules when there were emergencies. As one officer put it, they would go to "any spot that was big enough to get the blades into."<sup>12</sup> MEDEVAC helicopters were supposed to avoid fire, because any hit could be fatal to the helicopter and pilot. Helicopters could not fly high or fast enough to evade fire, and if hit they could not glide to safe landing areas; on a few occasions, it was even reported that MEDEVAC helicopters were shot at by Chinese jet fighters. These helicopter pilots, if shot down, could not even use parachutes due to low altitudes and rotors.

MEDEVAC helicopters were not supposed to even fly at night because the Bell H-13 helicopter had no radios, instrument lights, or cockpit lights. Still, pilots often flew to aid wounded soldiers in enemy territory day or night, and there were several reports

where pilots held flashlights between their legs to read the instrument panel to get back to the airfield or MASH.

Additional challenges were the training of the ground troops to guide helicopters in, provide coordinates, utilize marker panels, and utilize colored smoke grenades, to name just a few since the early MEDEVAC helicopters did not normally have radios. Sometimes the lack a of radio was a blessing, making the language largely irrelevant. MEDEVAC helicopter detachments supported all the polyglot UN troops. Attempts to communicate with the helicopters arriving into a Turkish or Greek landing zone might have been more dangerous than helpful, but the panels, smoke and sign language worked regardless of the language. For example, in September 1951, a pilot trying to evacuate two wounded Turks could not find them until a Turkish spotter plane buzzed him to get his attention and led him to the wooded summit where the casualties waited. The pilot descended just far enough to clip the treetops with his rotors, thereby alerting watching Turkish soldiers that the trees were too high. Quickly, the Turks chopped enough trees down for a landing, and the pilot flew the casualties to the MASH without ever talking to the ground forces.<sup>13</sup>

The range of the helicopters was limited. A MEDEVAC helicopter could fly only two hours unless the pilot carried along five-gallon jerry cans of gasoline in the cockpit or on the empty litter pods and refueled while the patients were loaded. Even the batteries in the helicopters were also very weak, to the point that some of these helicopters could not be restarted sometimes without external power. To avoid being stranded, pilots often kept the engines running during refueling.

Maintenance was always a commander's nightmare during this time because parts shortages were common due to a slow procurement that the Army could not control. These helicopters required six hours of maintenance for each hour airborne and averaged only a little over an hour of flying a day, carrying an average of perhaps 1.5 casualties per day.

One of the major challenges for detachment commanders was identified with the Army helicopter aeromedical evacuation system communication network. Requests from forward units for helicopter assistance went to headquarters and back through poor communication systems for approval. This caused a delay in the quick response, which could have been possible.

With the reasons stated above, one could clearly see all the initial challenges for the detachment commanders and the reluctant reasoning of the senior generals on the utilization of the MEDEVAC helicopter. Even though the Eighth Army specifically ordered that Army MEDEVAC helicopters not be utilized or jeopardized in missions likely to encounter enemy action, MEDEVAC pilots often took risks that higher authority would have not granted to save lives and justify the use of the helicopter.

With the knowledge of general utilization of these detachments, flying from MASH location to tactical frontline collection stations and division clearing station to MEDEVAC wounded soldiers, at sometimes great risk to themselves; one will understand the general utilization of these detachments. Along with this knowledge and knowing all the challenges of the detachment commanders, helicopter maintenance, lack of radios and cockpit lighting, rules for utilization, and range restrictions; one will have

the background knowledge that will compel changes in these detachments after the Korean War to be implemented before and during the Vietnam War.

### Aeromedical Evacuation Employment

Army helicopters accomplished almost all of the forward tactical MEDEVAC of casualties, and the USAF strategic fixed wing aircraft were not used generally because there were no landing facilities forward. The initial primary employment mission of the helicopter during the Korean War was CSAR, but this research only covered the Army helicopter's aeromedical evacuation missions and employment, due to the focused question and thesis restrictions. Developing the helicopter as the basic tool for medical evacuation employment was one of the most important logistical innovations of the Korean War.<sup>14</sup> The initial missions or employments assigned to the first helicopters in Korea were to fly high-ranking officers from one location to another. This was generally forgotten as the missions were changed to MEDEVAC and rescue missions in the first weeks of the war.

The incident that changed the employment of the helicopter in Korea occurred in August 1950. The Air Force CSAR helicopter squadron was notified of a seriously wounded soldier at a frontline aid station on top of a 3,000-foot mountain with the aid station cut off from the rear area. The mission was to fly in and evacuate the soldiers; this was successfully accomplished with the soldier's life saved. The following day the primary mission of helicopters changed to aeromedical evacuation and rescue.<sup>15</sup>

The Air Force accomplished most of the initial helicopter CASEVAC in Korea, until the Army Helicopter Detachments arrived for employment. The following is a

memo to the Surgeon General from Brigadier General Jarred V. Grabb, Deputy for Operations, Headquarters FEAF.

Until 1 January 1951, the USAF performed all helicopter evacuation, except within the 1st Marine Division. The Marines handled their own evacuations except in isolated cases where help was needed they called on the Air Force. There have been 1394 personnel picked up from front line and behind the enemy line areas by USAF helicopters. Percentages of USAF versus Marine Corps or Army helicopter pickups are not available. This was discussed with the Eighth Army Surgeon and he stated the Army did not keep a consolidated record of evacuations. It is the opinion of operations personnel, Fifth Air Force, that 85 percent of all evacuations are performed by Air Force helicopters.<sup>16</sup>

The Army regularly employed helicopters for MEDEVAC missions in the early part of January 1951. On 3 January 1951 First Lieutenants Willis G. Strawn and Joseph L. Bowler flew the first MEDEVAC mission. Bowler went on to set a record of 824 medical evacuations in ten months.

The British author and Korea veteran George Forty credits the MEDEVAC helicopters with evacuating 10,000 casualties including himself. Others give higher figures though. The official Army history notes 5,040 casualties in 1951, then 7,923 in 1952, and 4,735 during the half year of fighting in 1953. The figures do not include casualties evacuated by Air Force and Marine helicopters and non-MEDEVAC Army helicopters.<sup>17</sup> This was 10 to 20 percent of total battle casualties, which is directly in line with the memo, quoted above, to the Surgeon General from Brigadier General Jarred V. Crabb, Deputy for Operations, Headquarters FEAF.

Helicopter Detachments were doctrinally and tactically attached and located at a MASH and employed to the front lines by the surgeon in charge. Initially, there were not enough MEDEVAC helicopters to meet all evacuation needs, so they had to be used discretely thus involving the chief surgeon. Helicopter evacuation was tactically

employed, when a soldier had a head wound, chest wound, or stomach wound, because the speed with which such wounded received medical attention determined the chance for survival. Wounded soldiers who were evacuated by helicopter from the front lines were often in surgery within an hour.<sup>18</sup>

With I Corps, the following procedure for tactical employment was used by Detachment I. A battalion aid station notified the surgeon's office at I Corps of the location of the wounded soldiers; and using direct communication with the 8055th MASH, the I Corps surgeon gave the element commander the exact coordinates, the type of wound, security status of the area, and the type marker used. The pilot and the medical technician then made the necessary pickup.

The Eighth Army Surgeon said that half of the 750 critically wounded soldiers, evacuated on 20 February 1951, would have died if they had been moved by surface transportation--not by Army MEDEVAC helicopters. General Stratemeyer also had nothing but praise for the Army MEDEVAC pilots. He also continued to insist that Army MEDEVAC should continue to be separate from air rescue. On 16 January 1951 in Tokyo, General Stratemeyer gave General Hoyt S. Vandenberg, USAF Chief of Staff, a requirement for thirty-one additional helicopters for Korea.<sup>19</sup>

Army and Air Force agreements concerning Army MEDEVAC employment operations made on 2 October 1951 and 4 November 1951 made the Army responsible for tactical employment to pick up battle field casualties, their air transport to initial points of treatment, and any subsequent move to hospital facilities within the combat zone.

It is important to answer the question: How was US Army rotary wing aeromedical evacuation assets employed? The tactical employment of these MEDEVAC helicopters would lay the initial doctrine groundwork for the tactical employment of MEDEVAC helicopters in the early months of the Vietnam War. Furthermore, it is important to know who some of the heroes were and the specific missions flown during the Korean War because this mind-set of the MEDEVAC detachment commanders and pilots will lead to even more heroes flying even more complicated, specific, and dangerous mission during the Vietnam War to save soldiers' lives.

#### Aeromedical Evacuation Lessons Learned

Many people had high praise for Army MEDEVAC during the Korean War. General Matthew B. Ridgeway, Commanding General of the United Nations Forces in Korea, singled out Army MEDEVAC in the Nineteenth Report of the UN Command in Korea to the UN Security Council.

High praise must be paid to the elements engaged in evacuation by air of wounded personnel and individuals from behind enemy lines. Countless numbers of soldiers and countless numbers of men who would have become prisoners have been saved by prompt and efficient action of the air rescue and evacuation units. The wounded soldiers in Korea had a better chance of recovery than the soldier of any previous war. This was not only by virtue of improved medical treatments available at all echelons, but also in large measure because of his ready accessibility to major medical installations provided by rapid and evacuation.<sup>20</sup>

Other praises included Doctor Elmer L. Henderson, President of the American Medical Association, who, after returning from a visit to FEAF medical facilities, described air evacuation as "the greatest thing that has come out of this Korean incident as concerns saving lives."<sup>21</sup> In 1952, the USAF Office of the Surgeon General stated, "Responsible medical officers at the front lines in Korea estimated that without rapid

transportation by helicopter and immediate emergency aid including blood transfusion, 80 percent of the wounded would have died.”<sup>22</sup>

Another advantage of Army MEDEVAC identified by the FEAF was from the humanitarian standpoint. Army MEDEVAC had an extremely positive effect on casualty’s morale. Knowing that they would be transported quickly and in as much comfort as possible to a medical facility, the casualties developed a “the worst is over” feeling, and their spirits were raised at this difficult time.<sup>23</sup>

Allen D. Smith compiled a list of the advantages of Army MEDEVAC in Korea. His list included the following:

1. Morale--Casualties being evacuated realized that they would receive the best possible medical care in a very short time.
2. Economy of time--Casualties were aeromedically evacuated in a matter of hours, not days.
3. Economy of personnel--Evacuation by air allowed medical personnel to remain in fixed locations where more effective medical care could be provided.
4. Economy of material--The use of helicopters and other aircraft reduced the need for forward hospitals.
5. Economy of lives--Patients were transported in relatively smooth conditions, in comparison to the bumpy, dirty surface travel in Korea.
6. Economy of transportation--Moving casualties by air saved ground transportation for use by actual fighting troops. The mobility of the forward unit was also greatly increased by removing the injured from the forward area.
7. Increased range and mobility of air travel over surface travel.<sup>24</sup>

Many people had high praise for just the performance of the newly introduced MEDEVAC helicopter during the Korean War. Spurgeon Neel points out five.

1. The speed with which casualties can be evacuated by helicopter is greater than with any other method.
2. The helicopter is very flexible in that the controlling surgeon can shift the support from one unit to another unit if necessary.
3. The patient is more comfortable since he moved in the shortest time and in the best conditions possible by helicopter.
4. The patient can be moved to the treatment facility, which can best service him because of the speed, flexibility, and range of the helicopter.

5. The proper use of the helicopter permits economy of use of medical personnel. Since the helicopter will bring the casualties to the doctor, specialized people can be concentrated in forward areas and more and better surgery can be provided with fewer people.<sup>25</sup>

There were also disadvantages of Army medevac operations. Ground forces had to learn that the helicopter had certain operating limitations. Helicopter could not fly in bad weather, could not land on any type of terrain, and could not then operate at night. Medical personnel had to overcome these among many different obstacles. The marking of landing sites, the transmission of accurate coordinates, and restricting helicopter evacuation to only critical cases were just a few of the solutions.

The most useful helicopters used for MEDEVAC operations were the Bell H-13 and Sikorsky H-5. A problem with the later was the type in use was no longer in production creating continuing problems with parts and making maintenance very difficult. Another disadvantage described by Neel was the cost. Transporting patients by helicopter was much more costly than using the field ambulance. Assuring the helicopters were used efficiently and for severe cases could minimize this cost.

The ratio of maintenance time versus flying time of helicopters in Korea was about six to one. This had to be considered when planning helicopter evacuation.

The following list is the top seven combined MEDEVAC lessons learned from both the Army and Air Force's experience in the Korean War.

1. In every theater of operation there should be a definite air evacuation plan, and this plan should be given to all units in the command.
2. The air evacuation detachments and squadrons assigned to the theater should be manned at 100 percent with personnel and equipment at all times.
3. All aeromedical aircraft is used for the purpose within the theater should be under a single transport headquarters. The air evacuation detachments and squadron should be assigned directly to this headquarters. Such centralization

would make more aircraft available and would permit critically wounded personnel to be used more effectively.

4. Medical evacuation should have top priority within the theater.

5. The Air Force should assume and maintain the responsibility for operating patient holding facilities.

6. Only school-trained air evacuation technicians should be furnished to air evacuation detachments and squadrons as combat crew replacements. These technicians should be

7. A field-grade Medical Service Corps Officer, experienced in all phases of troop carrier operations, should be attached to the office of the theater surgeon in a combat theater or operation.<sup>26</sup>

There was a large difference in airpower used by the enemy during the Korean War from other wars in the past. The lack of an air offensive by the enemy made Army MEDEVAC operations a much easier job than it possibly could have been. With the exception of a few incidents, helicopters were relatively free from enemy air attacks. If the enemy in Korea had committed more aircraft to fly in South Korea, the success of Army MEDEVAC might not have been as great. Helicopters evacuating casualties under the attack of fighter aircraft may have found it to be an impossible task. The use of the Army MEDEVAC helicopters during the Korean War fundamentally changed the Army's medical-evacuation doctrine, existing organizational structure, utilization, and employment of these Medical Helicopter Detachments, which will lead the Army into the Vietnam War. The initial success of the air-evacuation system in Korea led to further refinements in medical and aviation doctrine during the Vietnam War and into the present day. These refinements are: better performing and reliable helicopters, helicopters that could transport more casualties, helicopters that could transport casualties inside the aircraft, and most of all a helicopter that could provide medical treatment en route by a

medic. In addition, the Army realized the further forward the MEDEVAC helicopter could go, the better chances of soldiers' lives being saved. This along with the helicopter evolution changed the Army Medical Department's evacuation doctrine going into the Vietnam War. These early pioneer MEDEVAC pilots, despite having no medical training, pushed the envelope and broke the mold on MEDEVAC methods. Despite the limited capabilities of their equipment, the MEDEVAC helicopter pilots of the Korean War established procedures and doctrine that laid the foundation of the modern Army MEDEVAC pilots.

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Seeking the Roots of Dustoff--Helicopter Proves Self as Life Saver in Korean War, Part Two," 7

<sup>2</sup>Allen D. Smith, "Air Evacuation--Medical Obligation and Military Necessity," *Air University Quarterly Review* 6 (summer 1953): 104.

<sup>3</sup>Ibid., 585.

<sup>4</sup>Warner F. Bowers, "Evacuating Wounded From Korea," *Army Information Digest* 5 (December 1950): 51.

<sup>5</sup>Rober F. Futrell, *The United States Air Force in Korea, 1950-1953* (Washington, DC: Office of Air Force History, 1983), 589.

<sup>6</sup>"Aeromedical Evac," *Air Power History* 14 (summer 2000): 38.

<sup>7</sup>Seeking the Roots of Dustoff--Helicopter Proves Self as Life Saver in Korean War, Part Two," 7

<sup>8</sup>Albert E. Cowdrey, *The Medic's War* (Washington, DC: United States Government Printing Office, 1987), 93.

<sup>9</sup>M. T. Martin, "Medical Aspects of Helicopter Air Evacuation," *Journal of Aviation Medicine* 23 (February 1952): 20.

<sup>10</sup>Harry G. Armstrong, *Theater Aeromedical Evacuation System*, (Washington, DC: Department of the Air Force, 1957), 20.

<sup>11</sup>Cowdrey, 95.

<sup>12</sup>Kenn Finlayson, "Helicopters in Combat: Korea," *Special Warfare* 14 (summer 2001): 39.

<sup>13</sup>Richard V. N. Ginn, *The History of the United States Army Medical Service Corps* (Washington, DC: Office of the Surgeon General and Center of Military History United States Army, 1997), 244.

<sup>14</sup>Seeking the Roots of Dustoff-Helicopter Proves Self as Life Saver in Korea War ... Part Two," 6

<sup>15</sup>Ibid.

<sup>16</sup>United States Air Force, *The United States Air Force Medical Service and the Korean War (1950-1953)*, (Location: Department of the Air Force, Office of the Surgeon General, 22 August 1960), 14.

<sup>17</sup>Seeking the Roots of Dustoff-Helicopter Proves Self as Life Saver in Korea War ... Part Two," 6

<sup>18</sup>Ginn, 244.

<sup>19</sup>Seeking the Roots of Dustoff-Helicopter Proves Self as Life Saver in Korea War ... Part Two," 7

<sup>20</sup>United States Air Force, 76.

<sup>21</sup>Ibid.

<sup>22</sup>Ibid.

<sup>23</sup>315th Air Division. *History 315th Air Division (Combat Cargo), 1 January 1951--30 June 1951* (Location: Historical Office, 315th Air Division (CC) APO 959, 1951), 106.

<sup>24</sup>Smith, 323-332.

<sup>25</sup>Spurgeon Neel, "Medical Considerations in Helicopter Evacuation," *United States Armed Forces Medical Journal* 5 (February 1954): 220-227.

<sup>26</sup>United States Air Force, *The United States Air Force Medical Service and the Korean War (1950-1953)*, 76.