MASH:
Advances in Treatment and Triage during the Korean War

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MASH is a military acronym for Mobile Army Surgical Hospital, a unit that saw its first active deployment during the Korean War. These "hospitals" were staffed by young doctors, nurses and corpsmen assigned to a specific army regiment in order to provide life-saving emergency and general care. The efficiency and invaluable treatment provided by these surgical stations saved the lives of a great many wounded, providing better frontline medical care for troops than ever before in the history of combat.

The story of these Mobile Army Surgical Hospitals in Korea has two intermingling elements. The first was the extraordinary advances in medical treatment on the warfront which included the implementation of antibiotics and other medicines, blood banking and supply, body armor, and advanced surgeries. The second was the harrowing personal experiences of the young surgeons who were sent into combat to serve their country. Surgeons had to deal with what seemed to be a never ending stream of casualties, as well as harsh climates, enemy combatants and the other horrors of war. These ordinary young army surgeons, thrust into an unfamiliar world torn apart by war, acted with bravery and intellectual astuteness. Their personal accounts are truly great historical artifacts and their young vigor was essential to the achievements of groundbreaking military medicine of the MASH.

Sources

At the end of the Korean War, the United States Military held many conferences and inquiries into all aspects of the MASH units, including their competence and organization. This series of investigations came in the form of scientific papers, annotated conferences of surgeons and upper staff, interviews with surgeons, and countless other statistics, images and casualty reports. Hundreds of these reports have all been converted into digital format and posted on the Internet by the U.S. Army Medical Department (AMEDD) and the Office of Medical History under the Surgeon General. These numerous and very lengthy reports will provide many of the primary sources and statistics used in this paper.

Numerous autobiographies will also provide information and perspective into the daily lives and experiences of the surgeons who served in Korea. Furthermore, these accounts give human evidence to the medical procedures, protocols and technologies implemented for the first time in the MASH. These include *MASH: A Novel about Three Army Doctors* by Richard Hooker, which gives loosely non-fictional accounts, based on real life events. It also spawned the movie titled *MASH* and following television series which ran from September 1972 until February 1983.[1] Other autobiographical accounts include *A Surgeon Remembers: Korea 1950-1951 and the Marines*, by Robert C. Shoemaker, M.D. and also *MASH: an Army Surgeon in Korea* by Otto F. Apel Jr., M.D.. These true accounts of the war and life near the frontlines are drastically different from the bland military reports and statistics, allowing for a look into the minds of the surgeons serving in Korea, yet they all hold the common theme of the military medical advancements of the MASH in Korea.

[1] Hooker , Richard. MASH: A Novel About Three Army Doctors. (3rd ed. New York, NY: HarperCollins Publishers, 2001)

The Beginning
1941-1950

The story of the MASH units begins at the end of the "last great war", that is during the final stages of World War Two. As the United States became involved in the war and began fighting in Europe and the Pacific, there were many casualties. Thus Military medical personnel and commands would see the need for change and innovation. There are records of early attempts at creating mobile medical units that would eventually evolve into the MASH program adopted by the Army during Korea.

A report titled *Portable Surgical Hospitals* by John T. Greenwood, Ph.D. Chief, Office of Medical History, U. S. Army, on the early surgical hospitals gives a wonderful description of smaller "mobile" hospitals of World War Two. These small hospitals were created in locations ranging from Australia to the islands of Sicily in the Mediterranean or Papua in the Pacific.[2] These remote locations, full of hostile terrain, caused Colonel Percy J. Carroll, Chief Surgeon of U.S. Army Services of Supply in 1942-1943, to develop the new concept of a mobile army hospital. [3]

The current chain of treatment and "evacuation" of a wounded soldier during World War Two started with a unit medic or corpsman who administered first-aid and tourniquets or pain medicines at attempts of treating and / or slowing bleeding and hemorrhaging.[4] From this point, the wounded were placed on stretchers also called "litters" and taken by ambulance corps or carried on foot to the field surgical hospital assigned to each division. [5] The problem with this setup, as noted by Colonel Carroll, and other military analysts post-war, was that of mobilization.[6] As the troops and vehicles in modern warfare surged forward, the division strength field hospitals could not keep up. The chain of treatment from the frontlines to these rear surgical hospitals could not provide and maintain "life-saving surgery" necessary. [7]

In the Australian theater Colonel Carroll divided the surgical hospitals under his command, which were 400-750 beds in number, into smaller, more mobile units of 25 bed station hospitals.[8] They were supported by a small number of nurses and corpsman as well as three general surgeons and an anesthesiologist. Colonel Carroll's plans, which came early in the war (WWII), were sent to the Surgeon General, and the Army adopted the idea of a portable surgical hospital. [9] 103 of these hospitals eventually came into service during the war, in various regions and theaters (European and Pacific).[10] These were the prototype MASH units; they proved worthy and saved "the lives of many thousands of critically wounded soldiers." [11]

The reason these units were only prototypes, according to the report by Greenwood, is that they had difficulties with supply and patient capacity. The small units of 25 beds lacked equipment and personnel to treat and diagnose battle wounds and injuries. Proper anesthetic measures, x-rays and other medical treatments needed improvement or were even lacking completely. The quantity of 25 beds was inadequate in number to treat the influx of troops after or during hostile confrontations. This made these small units not "entirely self-sufficient."[12]The final dilemma in Greenwood's report, as well as in the accounts of army surgeons who served in Korea, was that of lack of experience. This problem of inexperience will become evident in examining the personal accounts from Korea. Training and integrating young surgeons into the Army and teaching them proper, efficient care of medical wounds would be a constant problem, one that will be central throughout the developments of medical knowledge in Korea.

On August 1945, shortly before the end of the war with Japan, the army released plans for the newly developed MASH, Mobile Army Surgical Hospital. [13]The plans took into account the mistakes learned from the now ending war. The MASH was a 60-bed unit, designed to be "truly mobile, fully staffed" and it would provide "life-saving surgery and postoperative care."[14]

[2] Greenwood, John T. . "Portable Surgical Hospitals." (Office of Medical History. Office of Medical History, Office of the Surgeon General. 8 Dec 2008) http://history.amedd.army.mil/booksdocs/wwii/surgicalhosp/PortableSurgicalHospitals.html
[3] Ibid..
[4] Apel Jr. M.D. , Otto, MASH: An Army Surgeon in Korea.(1st ed. Lexington, Kentucky: The University Press of Kentucky, 1998).
[5] Apel, 1998.
[6] Greenwood, 2008.
[7] Ibid.
[8] Greenwood, 2008.
[9] Ibid.
[10] Ibid.
[11] Greenwood, 2008
[12] Ibid.
[13] Ibid.
14 Ibid.

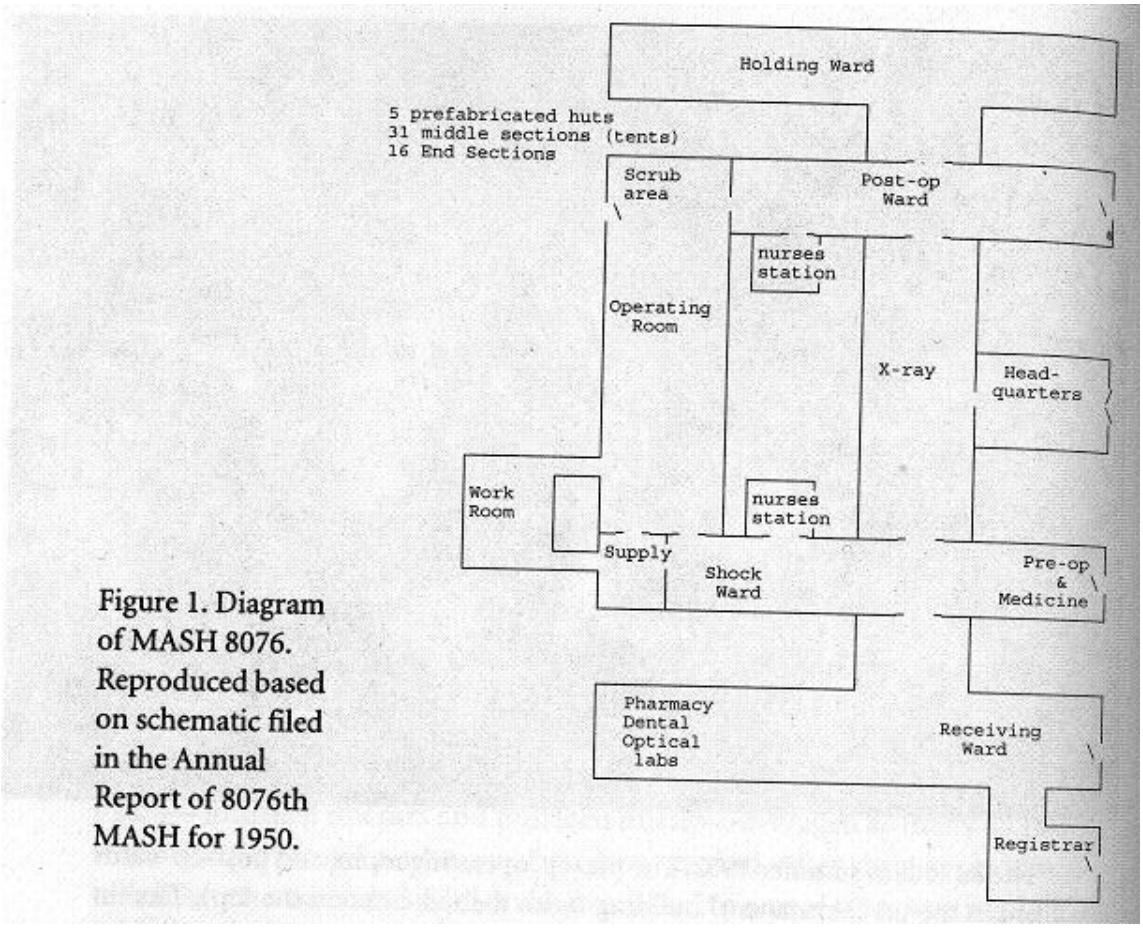

Figure 1[15] (Apel 1998)

These units would now include everything from technically advanced surgical rooms, x-ray facilities, dental and optical equipment for mouth and eye care. The pharmacy and attached laboratory would be advanced enough to measure critical lab values (blood and illness) to help treat the wounded more effectively. [16] A number of skilled nurses, surgeons and corpsmen would be both recruited and drafted to treat the wounded soldiers of their assigned regiment.

The MASH in Korea

The book titled *MASH: an Army Surgeon in Korea* by Doctor Otto F. Apel is a personal account of one young man in the 8076th MASH who served behind the 2nd, 7th, and 24th Infantry Divisions in Korea.[17] The 8076th was a typical MASH unit, and the AMEDD military archives display a very detailed and telling annual report and "debrief" first sent in January of 1951. This report titled *8076th MASH* is a very reliable and thoroughly interesting break-down of the inner workings and statistics of the unit when first deployed in Korea.

The 8076th MASH was activated on July 19th 1950 under order number 161.[18] Beginning operations in Miryang, Korea, the report details a history of the unit for 152 days from August 1950. [19] In this period of 152 days, the MASH had 9,008 admissions, they experienced 244 surgical patients in a single twenty four-hour

[15] Apel., 1998.
[16] Ibid.
[17] Apel., 1998.
[18] 8076th Army Unit, *8076th Army Unit Initial Report Headquarters Mobile Army Surgical Hospital, January 1951*. (Office of Medical History. Office of Medical History, Office of the Surgeon General. 8 Dec 2008) http://history.amedd.army.mil/books-docs/korea/KWUunithistories/8076thMASH.htm
[19] Ibid.

period, and had a maximum of 608 patients in another short period.[20] At one time there were 4,276 patients in the larger "wards" located in Miryang.[21] The 8076th MASH and other MASH located near the front experienced a high number of patients and were often overrun during times of intense combat, yet from all accounts were always able to keep up with the demands and provide around-the-clock care for wounded soldiers.

The equipment provided at this, and all other MASH units, was a main operating tent, a ward, a pharmacy, a laboratory and X-ray facilities. In addition, a dental surgeon or at least, a dental tech, was attached to each unit.[22] The 8076th Unit report is quite in depth in listing these various sections or tents within the MASH, however the following diagram from Apel's book is far more explanative.[23]

The 8076th report lists all of the many medical instruments that the MASH held. They included a full orthopedic set; a Minerva jacket for spinal injuries as well as Goldthwaite irons to aid in application of these jackets in the "hyperextend supine position."[24] Plates, Lohman clamps, surgical amputation and suture sets were also all standard issue.[25] As for heat during the cold Korean winters the report stressed that the 250,000 BTU gasoline space heaters were faulty in design and needed modification of their blowers.[26] The mention and importance of these MASH tent heaters painted a picture of how cold the Korean warfront became during winter. A common complaint and hazard that the doctors had to deal with was their own frostbite and exposure to cold, which in times made it challenging to care for the patients.[27]

The report then moves on to detail the day-to-day treatments and illnesses that were found and treated in MASH wards. Infectious diseases such as hepatitis, dysentery, various respiratory illness, gonorrhea, and malaria were all reported.[28] Dysentery, a bacterial infection of the digestive system, was blamed on poor sanitary conditions and was treated with eureomycin and chloramphenicol.[29] These antibiotics are all novel analogs of penicillin, which made its significant debut in World War Two, and helped cure other infections as well, such as gonorrhea. Before even reaching Korea, Surgeon Robert Shoemaker recounted treating five servicemen who had spent time in a Japanese whorehouse, and found that the new antibiotics worked wonders on gonorrhea.[30] The significance of these new classes of antibiotics is that they were all developed after World War Two from 1948-1950.[31] The Korean War was the first opportunity for the military to use these lifesaving, infection fighting drugs in a period of war.

Malaria, a disease spread by mosquitoes, was very common during the summer months in Korea. According to the 8076th Unit report, Robert Shoemaker, Otto Apel and others, the daily administration of chloroquine helped prevent the malaria infection. Apel noted that the only cases of MASH personnel acquiring malaria or its symptoms came after each individual had admitted to not taking their daily dosage.[32] Chloroquine, according to the Center for Disease Control, was only first administered as an anitmalarial agent in 1946, a year or so after World War Two. Again with the outbreak of the Korean War MASH units had yet another novel drug to combat disease effectively.[33]

The treatment of viral and bacterial diseases such as dysentery, gonorrhea, malaria, hepatitis and others was a great success during the Korean War. For example Rommel's forces in Africa during the Second World War lost three times as many men to disease as to battle wounds.[34] Throughout all of history these infectious diseases were spread by unsanitary conditions and also native fauna which plagued soldiers in combat. The MASH units in Korea were able to make great strides in preventing these outbreaks, and this prevention was used in Vietnam and the Gulf War.[35]

[20] Ibid.
[21] Ibid.
[22] Ibid.
[23] Apel., 1998.
[24] 8076th , 1951.
[25] Ibid.
[26] 8076th , 1951.
[27] Shoemaker M.D., Robert C.. A Surgeon Remembers: Korea 1950-1951 and the Marines . (1st ed. Victoria, BC, CAN: Trafford North American, 2005).
[28] 8076th, 1951.
[29] Ibid.
[30] Shoemaker, 2005.
[31] Ibid.
[32] Apel., 1998.
[33] "History-CDC Malaria", 2008.
[34] 8076th, 1951.
[35] Ibid.

The report then moved onto describe times when the fighting was "extremely heavy" Casualties from five divisions (Infantry, Cavalry, Marine) as well as R.O.K. (South Korean) soldiers were diverted and sent to the 8076th MASH.[36] There is an explanation of the battle wounds and their specific treatments. The scientific wording is starkly different from the personal accounts as discussed later. However, both accounts paint a vivid picture of how gruesome and horrid battle wounds and the destruction of war can be.

Battle wounds that required surgery were segmented into a variety of sections; the main areas are Intra-abdominal wounds, chest wounds, gastro-urinary tract wounds, and limb or extremities wounds.[37] The 8076th Unit report outlined how hemorrhaging livers, kidneys, lower intestines, bowels, lungs, and bladders should be treated and how each particular wound and area was incised, assayed (assessed) and then "marked and clamped" or sutured.[38] The treatments described seem relatively straightforward, yet gruesome to the utmost extent. The fact of the matter is that the wounds of battle, those from shrapnel and bombs ("missiles" as Apel calls them) are unlike anything any regular physician will ever see in their lifetime.[39]

The 8076th Unit report closes in stressing two things; the first is the essential supply route which ran from the 6th Medical Depot in Pusan to the MASH in Miryang, Korea. This was an important strategic supply route for the reasons of re-supplying the MASH with donated blood, new medical supplies and medicines and even the essentials of food and water.[40] The closing statement of the 8076th report also included a *Section # 8* titled "TRAINING" This is where the real story of the MASH surgeons really begins, as the report alludes to.

"*During the majority of the time, the personnel of the hospital have been working. Because of the steady influx of work, "on the job training" has been the source of knowledge acquired by personnel. It is believed that "doing" plus an occasional helping suggestion is the best way of learning under field conditions."*[41]

Venturing into the personal accounts of MASH surgeons, there can be no statement more true, than relating their experiences to "on the job training" -- training that took place in real-time and in the middle of a war zone.

Interviews from the 8076th

The brief statements of Colonel Raymond E. "Bodie" Adams and Colonel Edwin L. Overholt, are found in military records of interviews held during the 1960s by the AMEDD (Army Medical Department). Reviewing these gives a good leeway into the much more detailed personal accounts (novels) of Robert C. Shoemaker MD, Battalion Surgeon 3-11 of Marines and Otto F. Apel JR. M.D., a surgeon assigned to the now very familiar 8076th.

Colonel Raymond E. "Bodie" Adams was assigned to the 21st infantry regiment's medical company.[42] He was present for field exercises in Japan, and served during the initial battles in Korea. Colonel Adams unit was a part of Task Force Smith, which fought the battle of Osan, the first meeting between the US and North Korean troops.[43] Task Force Smith had 540 men and suffered 180 casualties U.S. commanders viewed it as a "calculated risk" with such a high ratio of wounded.[44]

Colonel Adams was one of the first surgeons activated during the war. He was given very short notice and flown from Japan to aid in the retreat of troops along the Pusan Perimeter.[45] The details of his account mostly described the retreat. The medical platoon had 30 men all together, and only 3 litter jeeps (ambulances) and two surgeons, Colonel Adams and his superior Captain Edwin Overholt.[46] Adams vividly described the conditions which brought to light how close to the action these MASH units were deployed. Within hours they

[36] 8076th, 1951.
[37] Ibid.
[38] 8076th, 1951.
[39] Apel., 1998.
[40] 8076th , 1951.
[41] Ibid.
[42] Apel., 1998.
[43] Ibid.
[44] Ibid.
[45] Ibid.
[46] Ibid.

were confronted with enemy bugle calls and then gunfire and the approach of Russian T-34 tanks. [47] The surgical station was placed in a "12 foot square and about 5 feet deep" trench, dug by the corpsmen. [48] The wounded were placed in the ground to avoid being in the direct line of fire, the battle was often very close to the MASH. [49] Colonel Adams did not fully describe much of the lifesaving work he was busy completing during this first engagement of the Korean War. However, his account did stress how close the surgeons and MASH were located to the fighting. He stated that the Russian tanks (30 in numbers) moved right around the MASH and destroyed surrounding artillery units, but not the MASH itself. [50] Hours before complete evacuation to the Pusan Perimeter, he witnessed the advance of a North Korean Division and another three tanks. [51] This account establishes how close the MASH was located to the fighting, at this point treating wounded while they were still under enemy fire, essentially still on the battlefield.

The AMEDD interview of Colonel Adams' superior Colonel Edwin L. Overholt is slightly more detailed discussing the harsh conditions through which Task Force Smith was operating. The terrain is described as "mountainous country, rugged terrain" with roads not meant for the travel of tanks and jeeps.[52] The temperatures ranged from 110 degrees to sub-zero weather. During task Force Smith, heat and dehydration were constant stressors.[53]

Colonel Adams and Overholt both observed the difficulty for the corpsmen to act as litter-bearers and carry the wounded off the mountains and rough terrain, down into the aid station. Troops were spread out in many directions, sometimes a few miles away, and the North Koreans were ever present, "taking pot-shots" at the aid station. [54] Overholt finished his debriefing with a few interesting statements. He stated that many "bitter" surgeons questioned why they were needed so close to the front lines. [55] They thought that trained medics could perform first-aid until the evacuation of the wounded to a real hospital could be completed. However, Overholt countered this by saying that surgeons were essential to treat the myriad of wounds and illnesses on the front lines and also provided an essential huge morale boost to the troops. [56]

Overholt's second and last key observation was of the types of wounds and treatments that were available at the aid station. He made a point about the types of wounds being "no different than any of the general wounds that we received in World War II." [57] He does credit the timely application of tourniquets, the administration of blood and plasma, and a speedy evacuation to the MASH as being the major factors whether the wounded lived or died. [58] All of these factors as Overholt summarizes were the essential successes of the MASH, in saving a greater percentage of wounded than in the previous war, World War Two. [59]

Medical advances spawned by the Korean War

The MASH units of Korea, and the overall treatment and study of casualties during and after the war, lead to a great number of medical advances. These advances ushered in new knowledge and techniques into the military and civilian medical establishments in the years following the war.

A report from the Walter Reed Army Medical Center of Washington D.C. documents the lessons learned from the Korean War. The publication is called *Recent Advances in Medicine and Surgery (1954)* and is purely based on the experiences of medical personnel in Korea and Japan from 1950-1953. As a caveat this report is a tremendously large volume, and the following will focus only on the captivating discoveries that give evidence of the progress made in military medical treatment, in MASH during the Korean War.

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[47] Ibid.
[48] Ibid.
[49] Adams, Raymond E. "The Army Medical Department In the Korean War: Interviews and Reminiscences: Colonel Raymond E. "Bodie" Adams, Medical Corps." Office of Medical History. Office of Medical History, Office of the Surgeon General. 8 Dec 2008) http://history.amedd.army.mil/booksdocs/korea/TaskForceSmith/adams.htm.
[50] Ibid.
[51] Ibid.
[52] Overholt, Edwin L. *The Army Medical Department In the Korean War: Interviews and Reminiscences: Officer Edwin L. Overholt, Medical Corps*. (Office of Medical History. Office of Medical History, Office of the Surgeon General. 8 Dec 2008) http://history.amedd.army.mil/booksdocs/korea/TaskForceSmith/Overholt.htm
[53] Ibid.
[54] Ibid.
[55] Ibid.
[56] Overholt, 2008.
[57] Ibid.
[58] Ibid.
[59] Ibid.

First Looks into Biochemical and Psychological Factors

Recent Advances in Medicine and Surgery (1954), as well as the eleven-day conference which it covers, began with a very interesting study of stress and anxiety of combat titled *Some General Considerations of Homeostatic and Adaptive Mechanisms to Stress in Effect Prior to Wounding* by Stanley H. Eldred. The "homeostatic," "physiological" and "biochemical" processes of troops under stress were investigated.[60] The fatigue and horrors of war took a great toll on soldiers and changed their metabolisms and other normally healthy body systems, including immunity and cardiovascular systems. [61] These are fascinating studies especially because they link to the casualty of war, as the wounded soldier would already be in an unhealthy state before being wounded and then admitted into a MASH. [62]

The psychological states of the soldiers and doctors present are greatly detailed in Eldred's report, giving a fascinating look into the mindset of those casualties coming into the MASH for treatment. Doctor Stanley H. Eldred summarizes that depending on what happened before a wound is afflicted will greatly determine what an individual feels or how they relate to that wound. [63] He compared many examples that seem to all fall into two categories. Soldiers either fell into an immobilized state and would later feel guilty and/or relieved or alternately they would continue to fight with "effective aggressive action" until they were truly too weak to continue.[64]

Doctor Eldred gives examples of men who all suffered left leg wounds of the same magnitude but under varying conditions. One soldier, who was wounded during a mortar attack, while two others died, fell into a guilty state and was overwhelmed with grief. [65]Yet in comparison a Captain, who was holding a bunker with five others, was the only one wounded (again left leg) and continued to furiously throw grenades and man a machine gun until he literally went into shock, the difference being his mindset was one of anger not guilt. [66] This second story is one of valor and inspiration, however, knowing the situations surrounding each war-story gives a perspective and shows that all of these men are heroes, but the psychological demands of war brought out various reactions from soldiers. Doctor Eldred classifies them as "individual precombat adaptations" that effect aggressiveness and dealing with shock, which was fascinating. [67] The Doctors of MASH and military medicine as a whole was for the first time beginning to combine all aspects of treatment into wound and personnel care. [68] It was not only physical wounds but now biochemical and psychological factors that were taken into account, to a greater degree than in World War Two. [69]

Advances in Triage

Upon being admitted to a MASH, the *Recent Advances in Medicine and Surgery (1954)* report outlined the considerations of patient triage and emergency treatment. The breakdown of triage is somewhat different than in today's hospitals. It was more direct and less reassuring. In Korea, as described in all the accounts of Apel, Shoemaker and many other reports, triage was meant only to sustain life. The military's guide to triage gives this perspective quite well, and shows that when mortars and shrapnel wounds were so common, basic life-saving surgery is all that one can provide. The report titled *Triage in the Korean Conflict*, by John M. Howard, M.D demonstrates how the MASH allowed for a innovation in triage, the essential link of MASH surgeons allowed a greater freedom and depth of field-medicine when compared to the past. [70]

Triage, in summation, goes as follows: A wounded soldier's life takes precedent over their limbs, and maintaining function is more important than anatomical correctness (Howard, 1954). [71] A hemorrhage of wounds was the major cause of death and bleeding must be stopped and blood transfused immediately. Antibiotics should be administered. If wounds did not heal the area should be "debrided" or removed/amputated, as this would prevent

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[60] Eldred, Stanly H. M.D. "Some General Considerations of Homeostatic and Adaptive Mechanisms to Stress in Effect Prior to Wounding." Office of Medical History. Office of Medical History, Office of the Surgeon General. 8 Dec 2008http://history.amedd.army.mil/booksdocs/KOREA/recad1/ch1-1.htm

[61] Ibid.

[62] Ibid.

[63] Ibid.

[64] Eldred 1954.

[65] Ibid.

[66] Ibid.

[67] Ibid.

[68] Ibid.

[69] Ibid.

[70] Howard, John M. M.D., "Triage in The Korean Conflict." Office of Medical History. Office of Medical History,Office of the Surgeon General. 8 Dec 2008 http://history.amedd.army.mil/booksdocs/korea/recad1/ch2-2.htm

[71] Ibid.

increasing infection and fluid loss.[72] Finally, the last and possibly most important triage note was that treatment and evacuation must go hand in hand, this was where the MASH was essential, and saved many lives. Howard's report relates MASH units as the critical link in the newly developed evacuation line of wounded, one which led to many lives saved through the recent triage changes.[73]

In returning to the body of *Recent Advances in Medicine and Surgery (1954)*, the Blood Banking system is mentioned in numerous sections and is dedicated to the issue of blood supply. The surgeons, doctors and medical corpsmen present at this meeting discussed the efficacy of the blood banking system. There was a great deal of knowledge gained about the correct volume and transfusion therapies during the Korean War. The safety of blood transfusion and also the possible harmful effects of massive transfusions and plasma was also noted, and the reasons for plasma eventually being discarded.[74] Blood plasma is essentially the liquid in which blood cells are suspended, it makes up a very large percentage of the bodies blood volume and is made mostly of water containing various proteins, hormones, and cellular matter. It is vital in maintaining proper blood pressure, blood clotting and overall bodily processes. The problem of compatibility arises when the injected patient's immune system response and own antibodies attack the foreign plasma making the patient sick and even causing death.

It is a somber note that a majority of knowledge contained within this colossus *Recent Advances in Medicine and Surgery (1954)*, comes at the expense of many lives. The studies use of postmortem examinations was a major facet of the reports on the effectiveness of newly developed body armor on chest wounds or renal complications that developed through wounds and infections. The study on chest wounds titled *An Analysis of 2,811 Chest Casualties of the Korean Conflict* by Major A. R. Valle, for example, detailed 2,811 casualties that occurred during the Korean War. The number and percentage of times that the heart, lung, intestine, liver or spleens were injured, and the number and size of projectiles, were all given in great detail. The conclusions of the report point to some positives, first the increased use of body armor and second the MASH units' lifesaving ability.[75] The higher survival rating (from WWII to Korea), according to this report, were due to the close placement of MASH units.[76] They included knowledgeable surgeons, antibiotics, blood transfusions and other life-saving equipment, mere miles from the front. Also, as a cautionary note, it was discovered that the more conservative an operation was on a chest wound, the more successful it was.[77]

The study also links nine of the seventeen deaths (of 2,811 casualties) resulted in the serum hepatitis, proving again the need to stop plasma distribution.[78] This problem of adverse reactions to blood plasma, and the serum hepatitis came when Serum Albumin was substituted for the "dried plasma" of World War Two.[79] While this medical advance at first was a success there were soon seen the immunological reactions which caused serum hepatitis and eventually death, thus the military finally shifted to plasma expanders which are a more pure and simplified way of replacing lost blood volume.[80]

Savings Bank: The Blood Bank system during Korea

Naturally with the many causalities and the extreme number of cases that each MASH dealt with, there would arise a need for blood and plasma. The frontline MASH stories gave accounts of nurses and doctors, along with corpsman and others, donating blood at times of severe need; however this was rare. The truth was that the U.S. had developed a plan to supply blood and plasma to prepare for a future war, even before the end of WWII as detailed in *The Blood, Plasma, and Related Programs in the Korean War.* The collection, processing and distribution of this vital fluid to a MASH unit was not an easy task. It seems that even though a plan had been developed, the sudden outbreak of war proved to be of great difficulty in setting up the blood and plasma system. Despite these difficulties, the wounded in Korea never lacked the blood that they needed and the program was proven to be a success.

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[72] Ibid.
[73] Ibid.
[74] Kendrick, Colonel Douglas B, "Operation of Blood Bank Systems." Office of Medical History. Office of Medical History, Office of the Surgeon General. 8 Dec 2008 http://history.amedd.army.mil/booksdocs/KOREA/recad1/ch3-2.htm
[75] Valle, Major A. R. MC, " An Analysis of 2,811 Chest Casualties of the Korean Conflict." Office of Medical History. Office of Medical History, Office of the Surgeon General. 8 Dec 2008 http://history.amedd.army.mil/booksdocs/korea/recad1/frameindex.html
[76] Ibid.
[77] Ibid.
[78] Ibid.
[79] Ibid.
[80] Valle, 2008.

At the outbreak of the war, blood collecting teams were immediately activated in Japan; however the demand for blood was overwhelming.[81] A request for whole-blood was sent to the Zone of Interior and the American Red Cross.[82] The American Red Cross provided a collecting agency for blood that was airlifted from the United States to the frontlines, as was done during World War Two. The Red Cross simply expanded their pre-existing civilian program located in hospitals in the U.S. Soon even this great aid would not be enough to keep up with the carnage at the front.[83]

To expand the collection and storage of blood, the Armed Forces Blood Program and the National Blood Program were created.[84] Together these four systems played an important role until the end of the war. Plasma was also collected and administered but it was discontinued after the risk of serum hepatitis.[85] This human serum albumin was later supplemented by plasma expanders, known as blood substitutes. These programs once up and running did a fine job until the end of the war, however there was still criticism that the U.S. had not learned from previous wars, and waited too long to initiate a full scale blood collection program.

Body Armor

Modern fiberglass-plastic body armor made its first active field trial on the battlegrounds of the Korean War in 1951. It is very interesting that a report titled *Medical Aspects of Body Armor in Korea* By Robert H. Holmes, M.D., is the first of its kind in exploring the tactical effectiveness of this life-saving and newly developed technology. It was the statements of MASH doctors and corpsmen that first accounted for the usefulness of the body armor and shrapnel proof vests. This protection resulted in a drastic decrease in the casualty rate and number of severe chest wounds suffered during combat.[86] This same report was again based mainly on autopsies, and contributes the main cause of wounds (75%), to be caused by shell fragments, and that a majority of these wounds were on the thorax.[87]

Doctor Robert H. Holmes' study and others lead to the further development of the Kevlar vests used by today's military.[88] The early body armor tested in Korea was made from a fiberglass-plastic combination, known as "Doron," which was developed by Dow chemicals during the Second World War.[89] This material would be applied as pads for life jackets in the waning days of the fighting in Japan. It was only through further development at the Medical Research Laboratory at Camp Lejeune during the late 1940s and the initial field tests by the Navy Bureau of Medicine & Surgery (during the first days of the Korean War) that the US military would fully grasp the importance of body armor. Beginning with an original 45 combat tested Doron vests in the spring of 1951, there were a final number of some 80,000 to 90,000 jackets issued during the war.[90] Again this data as well as the photograph below were collected on site at MASH units by doctors, scientists and others such as Marine Corps medical teams, all whom urged the importance of body armor.

Picture from *Medical Aspects of Body Armor in Korea* By Robert H. Holmes, M.D., taken at a MASH of soldier shot twice in the back, only small bruises were noted.

[81] Kendrick, 2008.
[82] Ibid.
[83] Ibid.
[84] Ibid.
[85] Holmes, Robert H. MD., "Medical Aspects of Body Armor in Korea." Office of Medical History. Office of Medical History, Office of the Surgeon General. 8 Dec 2008) http://history.amedd.army.mil/booksdocs/KOREA/recad1/ch4-1.htm
[86] Ibid.
[87] Ibid.
[88] Ibid.
[89] Ibid.
[90] Ibid.

Face to Face

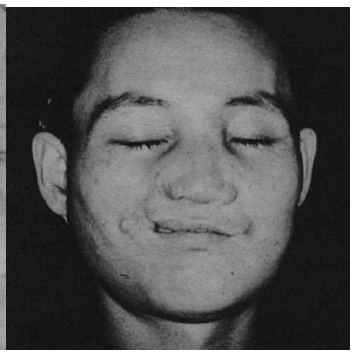
Maxillofacial injuries and their subsequent repair is a very advanced facet of medical care whether it is military or civilian both in the past or today. Serious wounds to the mouth and face are most always life-threatening and require immediate medical attention. The information found in *Maxillofacial Injuries* by Colonel Bernard N. Soderberg, gives accounts as well as graphic pictures of the facial wounds and their surgical repairs that often occurred in a MASH near the front. [91] These surgeries stand as a testimony to the skill of MASH surgeons as well as the advances in frontline treatment and synthetic applications developed and implemented during Korea. [92]

Facial wounds, as with most wounds, must be treated very early. To preserve or repair soft tissue and bone was of key importance; later came the restoration of function, such as movement, speech and chewing [93] This restoration of function however could be accomplished through a later more well-planned surgery, for example, hospitals in Japan. [94] MASH units that did not have the skill for reconstruction were simple advised to reduce the loss of bone and soft tissue, also infections, until proper surgery could be performed. [95]

In the examples and case studies there are both descriptions and pictures of horrendous facial wounds that are repaired both in MASH units and also in Japan. The first two figures below show wounds treated at a MASH some 12 and 14 days after injury, although the wound was repaired within hours, reconstructive surgery had to wait. [96]

Further, reading of these reports tells of a ROK (Republic of Korea) soldier and another American who experienced facial wounds at various times throughout the war. The pictures of first the wound and then the treatment say much about the excellent skills of the MASH surgeons. (figures 1-6 from *Maxillofacial Injuries* by Colonel Bernard N. Soderberg)

The report details many newly developed prosthetics and implants, both metal and acrylic, that were used to connect bone and help heal fractures. The onsite MASH surgeries and these newly developed splints and implants greatly assisted in the treatment of maxillofacial wounds. [97] The treatment of these wounds in Korea was of "marked improvement" compared to the previous World Wars. [98] The Korean War provided yet another learning and proving ground to further a specific aspect of medical knowledge and treatment.



[91]Soderberg, Colonel Bernard N. " Maxillofacial Injuries: A Supplement to the Discusion of Specific PrimaryConsiderations in Plastic Surgery." Office of Medical History. Office of Medical History, Office of the Surgeon General. 8 Dec 2008 http://history.amedd.army.mil/booksdocs/KOREA/recad1/ch10-2.htm.

[92] Ibid.

[93] Ibid.

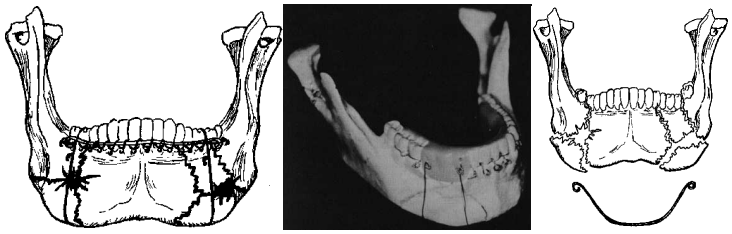
[94] Ibid.

[95] Ibid..

[96] Ibid.

[97] Ibid.

[98] Ibid.



The above are pictures of a wounded ROK soldier on the day of his injury, a day after surgery and 6 weeks after surgery. The illustrations are various types of wiring and synthetic implants used in maxillofacial repairs. All are found as figures in the report titled *Maxillofacial Injuries* by Colonel Bernard N. Soderberg

"**The Mechanized Angels**"

"Mechanized Angels" is the chapter heading for the 4th chapter in Otto F. Apel JR., M.D.'s book MASH. Apel as well as Shoemaker and others, all spent a great deal of time heralding the newly developed military helicopters and their pilots who were assigned to evacuate the wounded during the war. Early helicopters were used in very limited roles during World War Two, but with the development of the turboshaft and more powerful engines and hydraulics they would become common place in the Korean War.[99] One of their functions would be to act as airborne ambulances, quickly transporting wounded for immediate care at a MASH. This remains one of the main jobs of helicopters today. These newly developed and implemented MASH assigned helicopters proved to be essential saving many lives and also lifting the morale of the soldiers.

The helicopters that were commonly used were the very light and inexpensive H-13D which had a 176 horse-power engine and an effective range of around 250 miles. [100] The cost was $34,000 compared to $4,621 for a field ambulance and $340,000 for an H-25 (a larger helicopter which could carry 3 litters). [101] The H-13D was a "bargain" for the army as it was much faster and more efficient than an ambulance, and yet cheaper than larger helicopters of that time. [102] The wounded had to be strapped to the outside of the aircraft however, as its small cockpit only sat two people.

These small "workhorses," as Apel called them, flew on countless missions bringing troops off the battlefield. [103] They had to make very dangerous landings in the direct line of enemy fire -- they would only sit on the ground for mere seconds as the patients were loaded and then would take off again. To economize, these helicopters would also carry supplies on their return trips to the frontlines. In one story by told by Apel, supplying the frontlines and also retrieving wounded was often life or death for some pilots. (found in appendix).

Helicopters proved to be an invaluable piece of equipment during the Korean War. The pilots showed great skill and bravery in their missions along the battle-front. The speedy evacuation of wounded and the delivery of important medical supplies enabled by this new technology saved the lives of many soldiers in Korea, and the helicopter was immortalized as a life-saving angel in the air.

The Korean Winter and Treatment of Frostbite

Nearly every surgeon and soldier who was stationed in Korea had the unfortunate opportunity to experience winter warfare and will often recount its horrors. Frostbite was the major complaint of the troops and preventing and

[99] Apel, 1998.
[100] Ibid.
[101] Ibid.
[102] Ibid.
[103] Apel, 1998.

treating this debilitating "illness" was accomplished almost ad hoc. Surgeons Otto F. Apel, Robert C. Shoemaker and Harold Secor all stated that they had no training in the treatment or the triage of frostbite cases that came in.

Robert C. Shoemaker M.D., who was present at the battle for the Chosin reservoir ("the Frozen Chosin") recounts his firsthand dealings with frostbite. He had troops come in with frostbite on their hands and toes, and did not have any training in how or if to thaw and/or treat the appendages.[104] In his writings he struggled over the unknown; he was never sure when to send the men back out to fight, or if these wounds (which were all too common) should require them to be relieved of duty at least to some extent (Shoemaker, 2005). [105] Dry socks and gloves were key to avoiding frostbite. Soldiers as well as Shoemaker and Apel would run a string through their jackets and tie their gloves to this string, for losing a glove at night or in a hurry meant later losing a finger. Also, tucking wet socks into a jacket to thaw them, or simply freezing wet socks and then hitting off the ice was common to keep feet dry and semi- warm.

Everything froze, so it was not simply human flesh that couldn't withstand the Korean winter. "Fuel oil is solid at 20 degrees below zero" says Army Surgeon Harold Secor.[106] Plasma and other medical liquids, MRE (meals ready-to-eat) and even drinking water froze solid. All accounts of the tiny stoves within the MASH living areas were that they provided just enough heat to keep water warm or at least in a liquid state. [107]Apel and Shoemaker recount using a water bucket near or above the stove in which to thaw out MREs. MASH Surgeon Harold Secor is quoted as saying that these stoves prevented frostbite but did not make the tents "comfortably warm." [108]

The MASH surgeons, nurses and corpsmen developed a series of triage and treatment methods to deal with frostbite and other cold weather ailments. Obviously, there had been cold weather confrontations in World War Two which lead to the loss of limbs from frostbite; however treatment occurred at rear hospitals a good time later. The advantage of frontline and almost immediate MASH care was that a protocol was developed to treat frostbite and trench foot.

A report on the AMEDD site titled *Developments in Prevention and Treatment of Cold Injury* by Lieutenant Colonel Kenneth D. Orr, MC, outlines the evolution of dealing with what is an almost unavoidable problem in winter warfare. At the end of World War Two the pertinent problems in cold injury remained unanswered.[109] It was during the Korean War that a standard procedure of treatment was developed that took into account exposure time and temperatures, and also other ways of preventing further damage. [110] The report closes by stressing that the standard treatments and management programs developed during the war by medical personnel reduced the average hospital stay from 50 to 28 days, a great accomplishment to further military medical knowledge in dealing with extreme environments. [111]

Who They Were

..he who desires to practice surgery must go to war..
-Hippocrates

The aforementioned improvements and overall effectiveness of MASH units could not have been so substantial without the staff who worked so tirelessly to serve their country. Each MASH surgeon, doctor, nurse, corpsmen has their own interesting and unique story of their experience in Korea. Perhaps the reason these MASH were so successful is that they were staffed by young surgeons just out of medical school, and this youthful energy helped them to survive in a war zone, learn about surgery and save lives while furthering the improvement of emergency military medicine.

The personal accounts and popularized books following MASH tell stories mainly of the surgeons who staffed them. These were young men in their 20s and 30s who had recently graduated medical school or had just began medical practice as a civilian in the United States. These men had grown up in small towns all across America, excelled in school and eventually went into medical school with the hopes of becoming a surgeon or doctor in the prosperous

[104] Shoemaker, 2005.
[105] Secor, 2008.
[106] Shoemaker, 2005.
[107] Secor, 2008.
[108] Orr, Lieutenant Colonel Kenneth D. MC " *Developments in Prevention and Treatment of Cold Injury*." Office of Medical History. Office of Medical History, Office of the Surgeon General. 8 Dec 2008) http://history.amedd.army.mil/booksdocs/KOREA/recad2/ch1-6.htm.
[109] Ibid.
[110] Ibid.
[111] Orr, 1954.

American economy. They had been college football stars at Columbia such as Apel, or newly married men trying to start a family.[112] As news of the Korean War hit the press, it would only gradually dawn on these men of the possibility that within months they would be serving as Army personnel in Korea, as MASH surgeons.

Doctor Draft

One day after making rounds and going to classes, the intramural baseball team at the Columbia School of Medicine discussed the war and the initiation of the "Doctors Draft." Apel recounts his colleagues discussing it in a relaxed manner as they took swings warming up for a game. [113] There were rumors of ways to escape the draft and that it was not as imminent as some perceived, however they had already coined a name for the draft letters, as "Death Notices." [114] Doctors Apel, Shoemaker, Secor, Horwitz and countless others received their "Death Notices" in the early days of the war. They would report within two weeks, and within months go from brief training at a military base (Fort Knox or Camp Pendleton for example), to San Francisco, Japan and then the Korean frontlines, unprepared in many aspects of training and the military medical techniques they would help transform.

The system for the "Doctor Draft" had been created in peacetime in 1948 with the Selective Service Act. [115] It stated that members of the health care field could be conscripted into service for twenty-one months of active service.[116] On the first of September in 1950, Congress passed Law 779 which initiated the official Doctor's Draft just nine weeks into the Korean War. [117] The draft was preferential for the induction of young interns or residents fresh out of medical school, and this was the primary cause for such an abundance of youth in the MASH. [118] Thus they arrived…

Time Spent

As the young surgeon, nurse or corpsmen arrived to the MASH to which they were stationed, their "on the job training" would often begin immediately. This was the harsh realty of things and, many of the doctors would complain of the lack of proper and former training provided by the military. However, there is no real way to prepare for the sights and actions of a MASH, and the US military realized this. They would allow surgeons and other personnel to learn through doing and in the end this would be the most productive way of treating such a large influx of wounded.

Many of the surgeons were thrown head first into the action For example Apel explains after his arrival at his assigned MASH the 8076th, he was rushed via jeep from the landing port at Wonju to the outskirts of Chunchon where there was a great surge of fighting. [119] From the jeep he was escorted directly to the surgical tent, given instructions to wash up and would spend the next 80 hours performing surgery after surgery. [120] Amongst the fire of 105 artillery shells, sweltering heat, and constant influx of wounded, Apel would certainly gain on the job experience and then some. He eventually he collapsed after almost three days of around-the-clock surgery.

As the battles raged on, this would become a common theme, the influx of wounded after immense fighting and then a sort of lull in the action. As the war progressed there would even be time for the more fitting pursuits of young intellectuals, socializing, entertaining and even some practical jokes. These are the stories on which the comical plots of *MASH* the television show and movie were based on.

Hawkeye, Hotlips and Radar O'Reilly

While the above characters are found in the book *MASH: A Novel about Three Army Doctors* by Richard Hooker which again spawned the movie and TV series, these impersonations are often very similar to the actual events that took place in a MASH during periods of downtime.

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[112] Apel., 1998.
[113] Ibid.
[114] Ibid.
[115] Apel, 1998.
[116] Ibid.
[117] Ibid.
[118] Ibid.
[119] Apel, 1998.
[120] Ibid.

There were certainly officers clubs and alcohol for the surgeons and nurses to enjoy. USO shows featuring popular acts of the day such as Danny Kaye, holiday parties and barbeques were common. [121] There was time for swimming in the summer months and ice skating in the winter. [122] The 8076th MASH even adopted a puppy as a mascot and would be entertained by an orphaned Korean houseboy named Choi "attached" to the MASH (see appendix #2). [123] Then there were the nurses…

Otto Apel has in his book pictures of the nurses in their bathing suits on the beach at Hwachon! Obviously, there was a great interest in the female nurses in a war zone populated mostly by young homesick men. The nurses were very competent in their care and brought great comfort to wounded or dying soldiers, but they were often objects of affection and jokes as well. [124] There was a hole cut into the shower tent to which soldiers and staff could buy tickets to watch the nurses shower. [125] Also there was a prank pulled off by helicopter pilot Ed Ziegler to expose the nurses while they showered. [126]

These stories are certainly the stuff movies and television shows are made of. The truth of the matter was that these young men and women were still human and their intellect perhaps got them into trouble. This would never interfere with their work saving lives, but it would provide stories for *MASH* the television show, which Otto Apel and other surgeons assisted the writers of that series. In closer viewing of many of the shows there is a background of medical innovation represented and definitely the message of dedicated doctors and nurses working under great pressure and adverse conditions.

Legacy

Americans will forever identify the acronym MASH with the television show, which may not entirely be a bad thing. In what is often called the "Forgotten War" this television show can draw interest from younger generations who may eventually wish to investigate and research the real story of MASH units in Korea.

The real story of MASH is one of personal sacrifices, American bravery, and the drastic improvement of medical care and technology at the frontlines of the Korean War. Medical advancements sparked by the MASH units would result in technologies still used by the U.S. Army today, such as the helicopter evacuations of wounded soldiers and the use of body armor. The cataloging of progressive and advanced surgeries on the frontline, blood banking systems, psychological and biochemical studies and cold weather triage were all pioneered in and around the MASH units of Korea. Because of these new medical innovations many lives were saved, more than in any war predating Korea. The impact and efficiency of the MASH units is best summarized in the statistics of battle casualties comparing World War Two and the Korean War (figures 1 and 2 in appendix). The first chart compares the average length of hospital stays in each war, showing a 36 day decrease in time between the two wars. The second graph shows the number and percentage of army personnel killed and wounded in World War Two and Korea, in which the number of soldiers who died of wounds is almost halved in the Korean War. These numbers highlight the medical developments made by the MASH units, if not only through the summary of all wounded and killed in action.

Finally, one must remember the great heroics and intellect of young doctors and nurses of a MASH. These ordinary young army surgeons, thrust into an unfamiliar world torn apart by war, acted with bravery and intellectual astuteness. Their personal accounts are testaments to the advanced medical treatments they helped innovate and implement. These young Americans helped usher in a new era of military medicine and saved countless lives.

[121] Ibid.
[122] Ibid.
[123] Apel, 1998.
[124] Ibid.
[125] Ibid.
[126] Apel, 1998.

Appendix

Figure # 1

Casualty and Morbidity Experience

Table 10.- *Average duration of stay in U.S. Army hospital and quarters, worldwide: World War II and Korean War; and combat units by area of disposition and type of case, Korea, July 1950-July 1953*

Area of disposition	Type of case			
	Wounded in action	All nonbattle cases	All disease	All nonbattle injury
Total Army, World War II	129	20	19	30
Total Army, Korean War	93	20	18	28
Divisions and regimental combat teams:				
All areas	96	21	15	40
Far East Command	34	14	11	22
All overseas areas	37	14	12	23
Continental U.S.	258	170	141	200

http://history.amedd.army.mil/booksdocs/korea/reister/frameindex.html

Figure # 2

CHAPTER THREE

Lethality of Weapons and Location of Wounds

Table 38.- *Killed-in-action and wounded-in-action admissions,[1] by type of case, U.S. Army, World War II and Korean War*

Type of case	All theaters, World War II		European theater, June 1944-May 1945		U.S. Army, Korea	
	Number	Percent	Number	Percent	Number	Percent
Killed in action	192,798	24.5	105,012	21.8	19,585	19.7
Wounded in action	592,623	75.5	376,832	78.2	79,630	80.3
Died of wounds	26,762	3.4	16,171	3.4	2,034	2.1
Nonfatal wounds	565,861	72.1	360,661	74.8	77,596	78.2
Total	785,421	100.0	481,844	100.0	99,215	100.0

[1]Based on The Adjutant General Casualty Reports

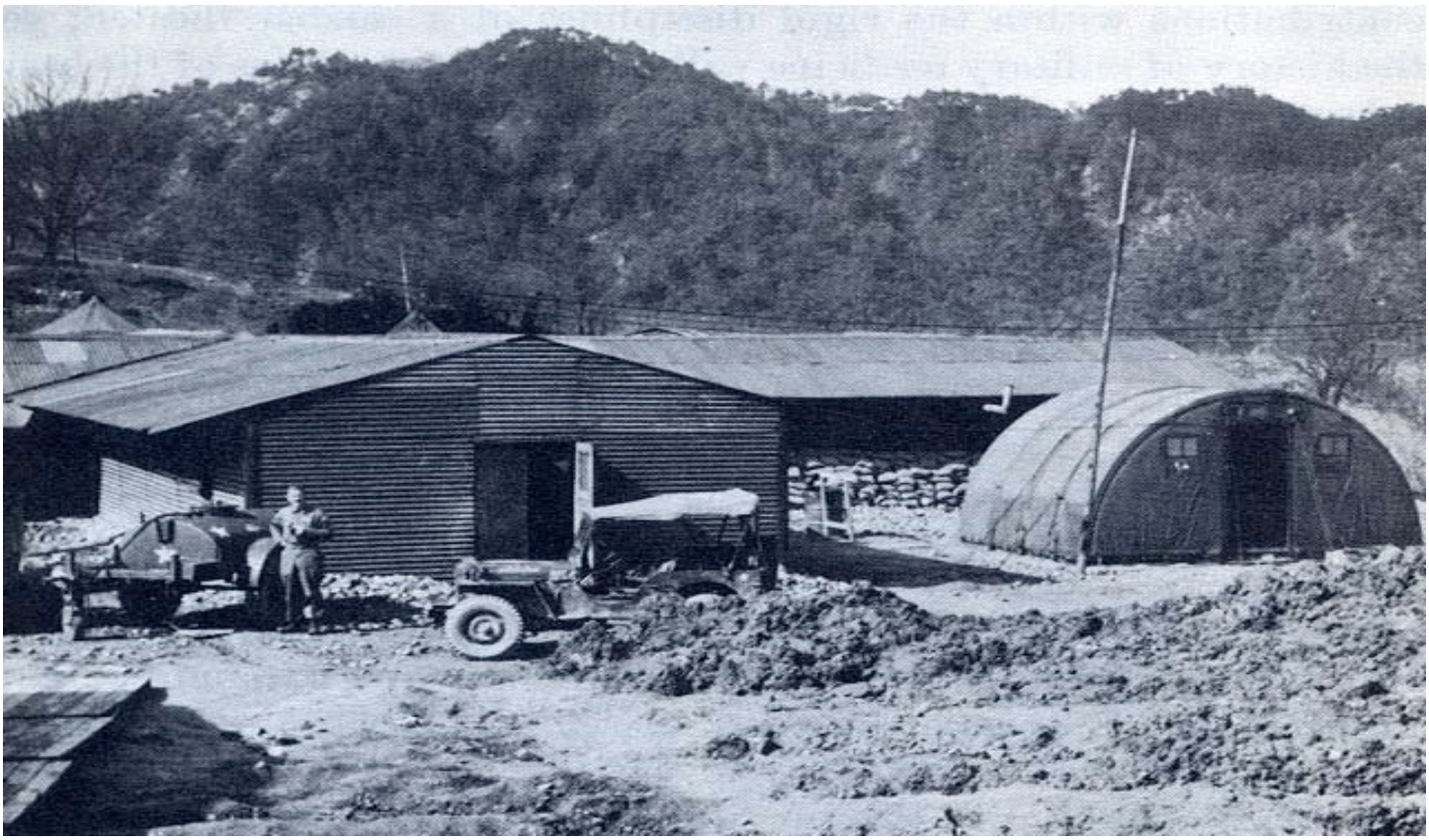
http://history.amedd.army.mil/booksdocs/korea/reister/frameindex.html

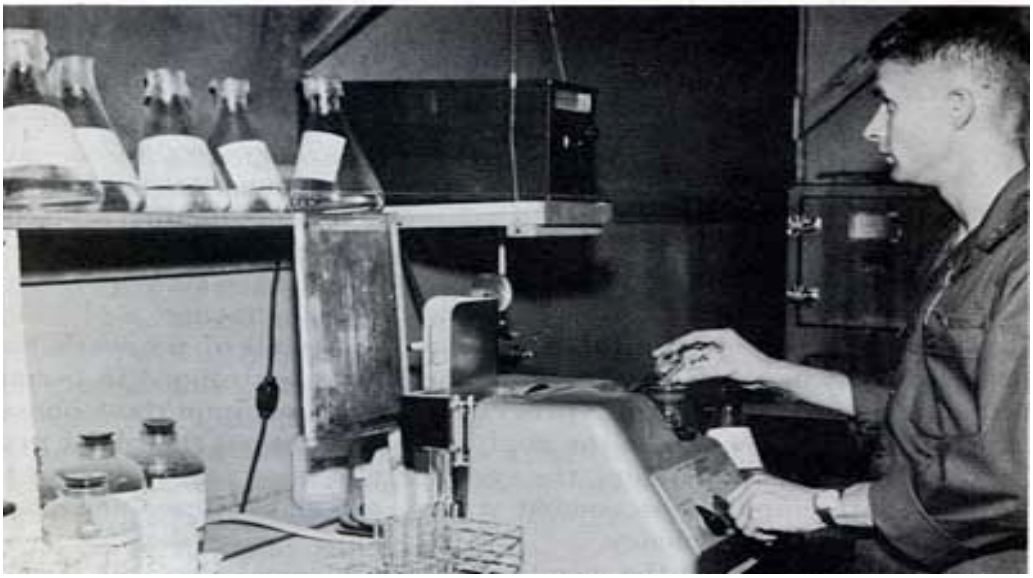
Appendix #2

Pure Coincidence

I work in neuroscience laboratory located at Upstate Medical University. My work centers on cutting micron thin sections of tissue (brain) using a device known as a Microtome. I have spent countless hours over the past years using this archaic cast iron microtome to slice brain tissue embedded in a paraffin wax. I have always noticed that the particular microtome I use came to Upstate by way of the United States Army, and it has the name F.A. Simeone M.D. U.S. Army both painted and etched into its sides. I wondered who this doctor was….

After typing the name into a Google.com search the very familiar AMEDD website came up. I thought it must be a mistake. As it turns out it was no mistake, Doctor Simeone had served in a MASH during the Korean War, and he was even a leader in the field of scientific research attached to MASH in Korea. Doctor Simeone had lead clinical investigations in the Mediterranean during World War Two, and was stationed into Korea to help expand clinical investigations. They would study the more biological effects of war on "wound infections, dehydration, post-traumatic renal insufficiency and vascular injuries" (Howard, 2008). This included many studies that are similar to the lab work I do today, including protein analysis and of course tissue collection. Doctor Simeone's main objective was to determine the "practicality of field research" he was stationed with the 8209 Mobile Army Surgical Hospital (Howard, 2008). Could the microtome I use today be the same one in the labs of Korea pictured below?





Taken from *Introduction-Historical Background and Development*
Captain John M. Howard, MC, USAR Director, Surgical Research Team in Korea
http://history.amedd.army.mil/booksdocs/korea/Vol1-BattleCasualties/Chapter1.htm

South Korean "Houseboys"

A common aspect of personal accounts from the surgeons are what they call "houseboys" or aids. Apel first meets his South Korean "aid" named Choi when he arrives to his assigned MASH. Horwitz tells of two orphaned Korean boys named Lee and Kim who were houseboys of the 47th MASH (Horwitz, 1997). It is interesting how long these essential servants stay attached to the MASH as it moves from place to place. These children have obviously been displaced by the war, and have no safer place to go than a MASH that provides food and shelter, as well as something to keep them busy during the war.

Choi stays active helping Apel with his clothes, food, bed and tent. He is often found sleeping at the foot of Apels army cot, and upon Apel's return will take his boots and shine them overnight (Apel, 1998). He brings Apel food and freshly shined shoes daily, and also helps out with unloading or loading supplies from trucks or helicopters.

The accounts of these poor orphaned and lost young men show a very different side of the war. They are always told of as happy and hardworking, positive and endlessly completing small jobs around the MASH. It is sad to think what their lives were like before the war, or what family they have lost, however they were none-the-less very helpful to the U.S. Personnel which they served.

Mechanized Angels Part Two

During the battle of Heartbreak Ridge (also a Clint Eastwood movie) in September of 1951, American troops were clearing enemy bunkers along hillsides and under a great deal of opposing fire. The 23rd Infantry had radioed back to HQ that they needed flamethrowers to clear out the bunkers still inhabited by both Chinese and North Koreans (Apel 82). An airplane pilot was sent out to parachute in 2 flame throwers to Hill 931. The Helicopter pilot that would become Apel's "Mechanized Angel" and his close friend Ed Ziegler would also be selected to land and deliver a third flamethrower (Apel 82).

Ziegler straps the flamethrower into his passenger seat and flies directly into the valley below Heartbreak Ridge. Ducking under enemy fire he touches down and jumps out handing over the flamethrower and then taking off again. The two parachuted flamethrowers missed their drop targets and oddly enough smashed into a Chinese bunker. "The flamethrower Ziegler delivered was the only one put into use that day on Heartbreak Ridge" (Apel 83). Oddly enough both pilots were nominated for the Distinguished Flying Cross and in what could be called an extreme paperwork mix-up, only the airplane pilot was awarded the honor (Apel 83).

There is also another daring story which provided the troops with a great deal of morale as well as humor. Apel recounts that one day a helicopter came flying in very low above the MASH unit. The pilot which was later found to be Ziegler seemed to be having trouble controlling the pitch. The Helicopter wobbled about until it was oddly enough just over the shower-tent, then it suddenly recovered and pushed off in a great gust of wind (Apel 72). The shower-tent blew completely over exposing to everyone the nurses of the 8076th completely nude and embarrassed as well (Apel 72). According to Apel everyone even the nurses were able to laugh about it and Ziegler gave little sign that it was obviously a prank he had concocted (Apel 72).

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