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US ARMY MEDICAL CENTER OF EXCELLENCE

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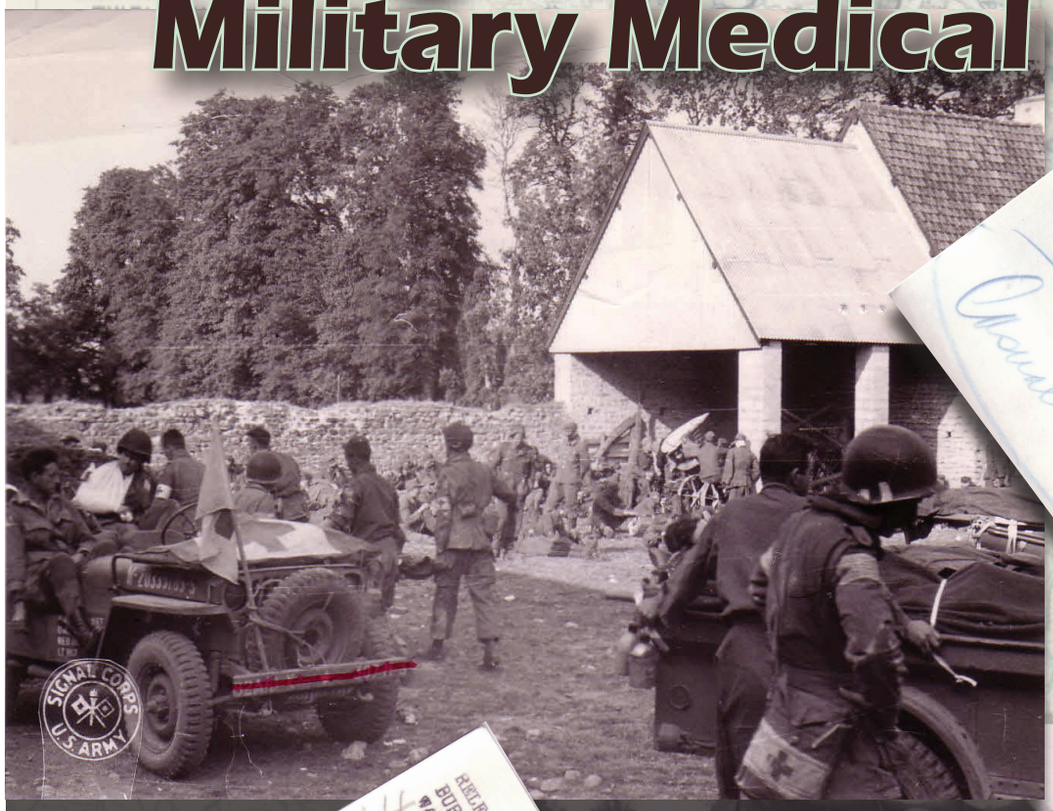
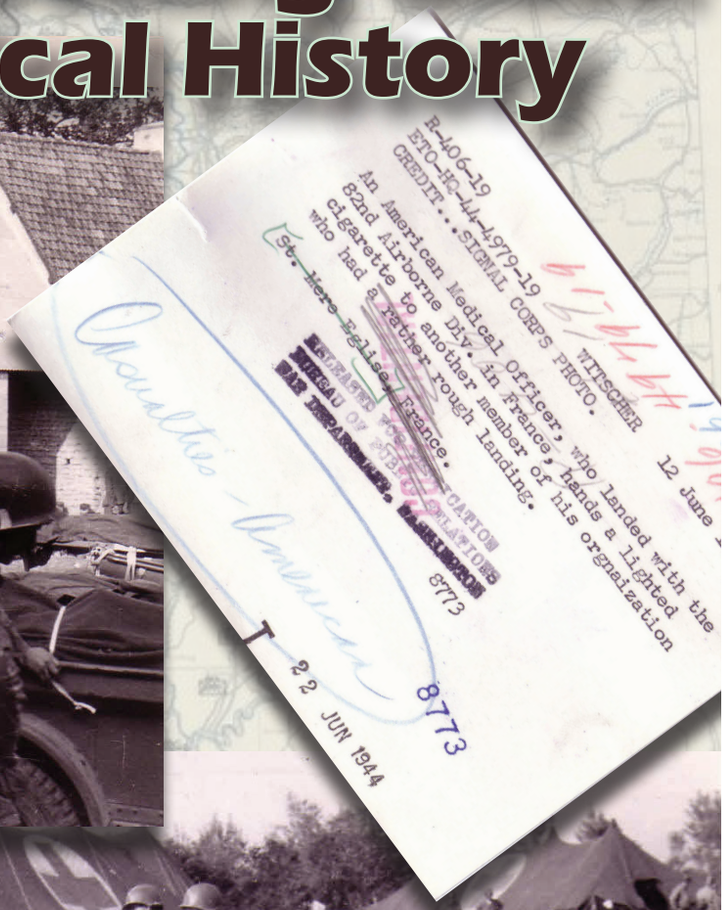
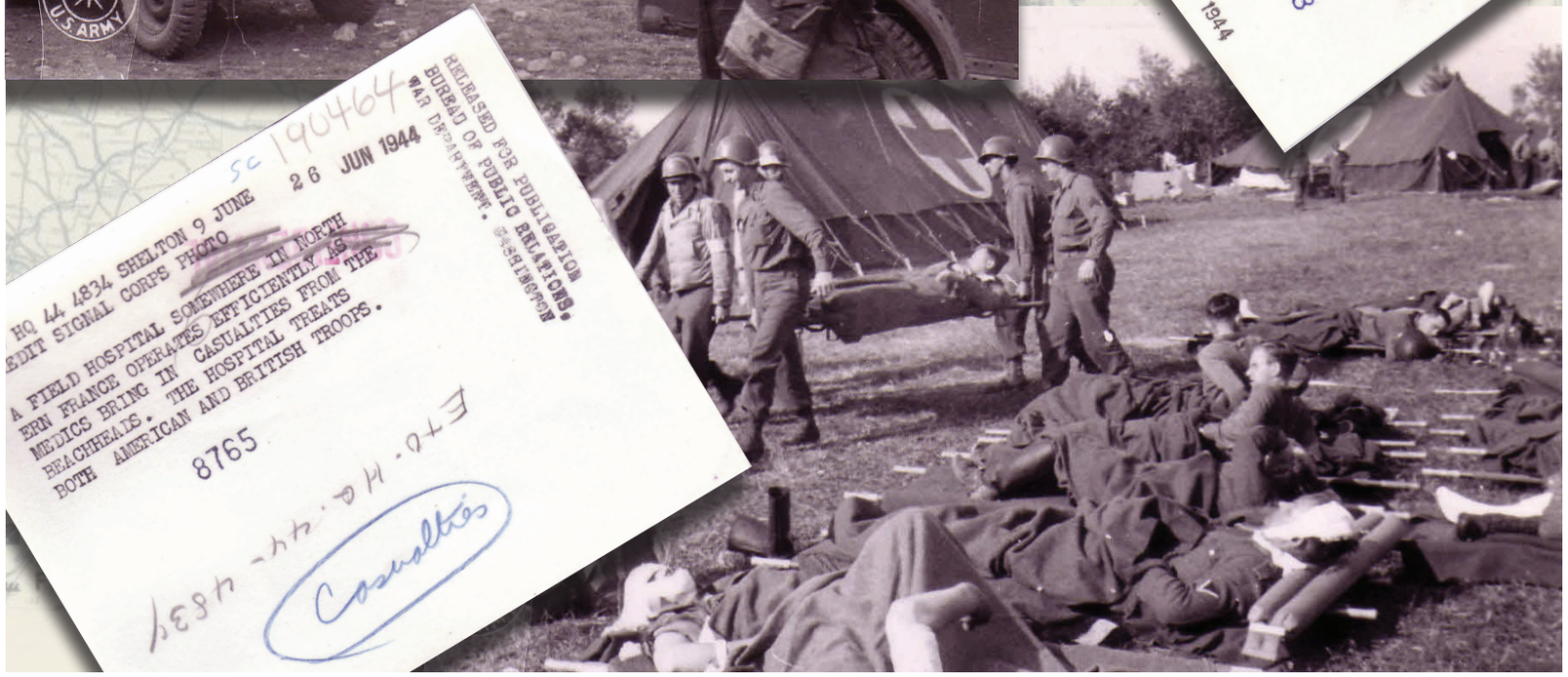
Through the Looking Glass: Military Medical History







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Note from the Editor...

This edition of *The Medical Journal* closes out the winter quarterly for 2022. Changing gears a bit, this issue includes articles covering military medical history, to include a brief backstory about the Borden Institute, under which *The Medical Journal* resides.

The Medical Journal accepts general topic submissions year round. Email submissions to usarmy.jbsa.medical-coe.list.amedd-journal@army.mil. Submission guidelines are included in each issue of the journal, but log on to find out more information about the journal and view electronic issues online.

The Medical Journal has 2 current calls for submissions. One focuses on military veterinary medicine, and the other is devoted to all things related to physician assistants. You can view the calls for submissions on the journal's website.

Is your agency, team, or unit working on something special? Is there a specific topic you and your team would like to cover? Contact The Medical Journal with your proposed topic to discuss publication details.

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Borden Institute Records 35 Years of Excellence in Military Medical Publishing

Ernest J. Barner

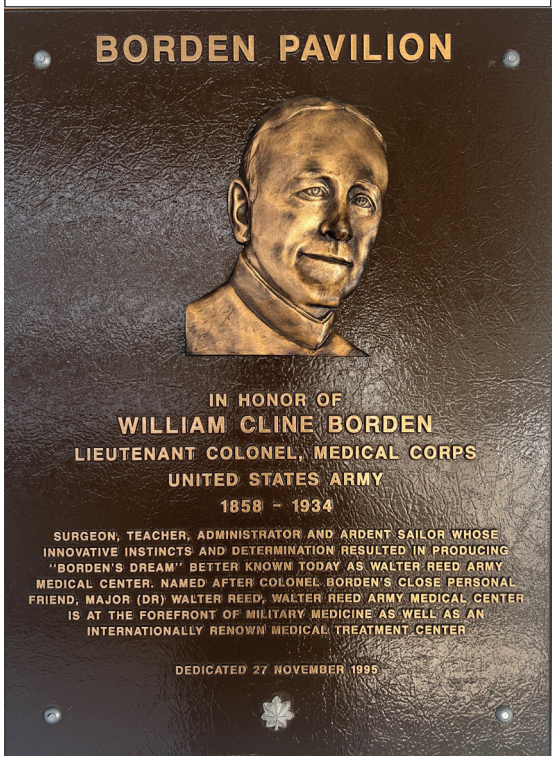
The Borden Institute, an agency of the US Army Training and Doctrine Command (TRADOC), Medical Center of Excellence (MEDCOE), is marking 35 years of excellence in publishing academic military medical textbooks in the year 2022.

In 1987, US Army retired Brigadier General Russ Zajtchuk, then Colonel Zajtchuk, Army retired Colonel Ron Bellamy, and Dr. Donald Jenkins collaborated and the "Center of Excellence in Military Medical Research and Education" was born. Their vision to promote excellence through the development and publication of military medical scholarship was made a reality and the Center was aligned under the Office of The Surgeon General (OTSG).

As a way to honor US Army Surgeon Lieutenant Colonel William Cline Borden, who was a close friend and personal physician to US Army Physician, Major Walter Reed, the center's name was officially changed to Borden Institute. This act of good will was very fitting since Lieutenant Colonel Borden heavily advocated and lobbied congress for the establishment and naming of the original Walter Reed General Hospital in 1902.

The institute was located at Delano Hall on the campus of Walter Reed Army Medical Center (WRAMC), in Washington DC (Figure 1). After WRAMC's closure, Borden Institute relocated to its current location at Fort Sam Houston in San Antonio, Texas.

Figure 1. Borden Institute was originally located in Delano Hall at Walter Reed Army Medical Center, Washington DC.



Retired Lieutenant General Ronald Blanck, DO and Surgeon General of the US Army from 1996 to 2000, played an important part in the early organization and guidance of the Borden Institute. "The Borden Institute provided a way to capture the history of military medicine as well as updating military medicine practices," Blanck said.

In 1992, then Brigadier General Blanck recognized that Borden Institute's original placement under the OTSG was complex and didn't provide for clear support authority. Blanck then directed WRAMC to provide exclusive services in order to support the institute's mission. This decision proved to be the catalyst for the institute's growth and advancement. "The Borden Institute was recognized early as filling in a much needed gap," said Blanck, 39th Surgeon General of the US Army.

Since its inception, the Borden Institute has produced

75 publications and won numerous awards from the American Medical Writers Association, Washington Book Publishers, and the Army Historical Foundation for excellence in publishing.

Several Borden publications are well received around the world as evidenced by permission requests to translate into 34 languages. In addition, through analytics, Borden Institute's website eBook download tracker identifies 120 countries with an interest in certain published volumes.

Currently, Borden publishes and maintains 3 categories of books which consist of *Textbooks of Military Medicine*, specialty titles, and historical titles.

Textbooks of Military Medicine volumes constitute a comprehensive treatise on the art and science of military medicine. Covering such diverse topics as biological and chemical warfare, military preventive medicine, military medical ethics, combat behavioral health, harsh environments, and care of combat injuries.

Borden Institute also publishes specialty titles, such as *Emergency War Surgery* (6th edition in progress now), *Promoting Successful Integration*, and *Pediatric Surgery and Medicine for Hostile Environments* (3rd edition in progress now).

The institute's volumes on biological, chemical, and nuclear warfare are regularly updated and are required by the Department of Defense (DoD) as training texts in several military and civilian programs of instruction.

Additionally, the Borden Institute also publishes a diverse series on military medical history, which includes the latest releases *Army Medicine Starts Here! A Pictorial History of the Army Medical Center of Excellence, 1920-2020*, *A History of the Army Blood Program*, and *The Evolution of Forward Surgery in the US Army.*

For the latest publication information or to order complimentary copies from the Borden Institute, please visit https://www.medcoe.army.mil/borden. In addition to the print version, publications are also available in PDF and eBook formats on the website.

Figure 1. Army Reservist Captain Shannon Bogues, 256th Field Hospital, Cleveland, OH, attending the Medical Center ofExcellence Captain's Career Course, receives a book from Ernest J. Barner, Borden Institute Public Affairs Officer.

The 44th Medical Brigade in the Great War: Vietnam, 1966—Activation, Deployment, and Initial Operations

COL (ret) Donald E. Hall, PhD, MSc

AMEDD vs AMEDS

In 1950, Congress changed the name of the Army Medical Department (AMEDD) to the Army Medical Service (AMEDS) as part of the Army Organization Act of 1950. In March 1968, at the urging of Army Surgeon General Leonard D. Heaton, then in his ninth year of service as the Surgeon General, Secretary of the Army Stanley R. Resor petitioned Congress to restore the name of the Army Medical Service to the Army Medical Department, and Congress approved the restoration of the department's name in June 1969.[1]

Why "The Great War?"

Why "the Great War?" Simply put, the US fought four "Great Wars" in the Twentieth Century—multi-year operations involving large formations in extended combat operations in the field—what, from the Army's perspective at least, could be considered a major theater war against a near-peer competitor. These operations were World War I—considered the original Great War—World War II, the Korean War, and the Vietnam War. The Army's paradigm for delivering health service support in combat shifted over time as operational, technological, and medical capabilities changed. As part of this paradigm shift, during the last "Great War," the AMEDS would deploy a new type of command and control headquarters—a medical brigade. This work examines the activation, deployment, and initial operations of the medical brigade headquarters in the context of the AMEDS in the mid-1960s.

Although to many today the Vietnam War seems a very recent event, it is important to remember the Vietnam War is as far behind us now as World War I was to the soldiers who fought in Vietnam. World War I is now as far behind us as the Civil War was to those soldiers who fought in the Tet Offensive. It is important to remember these aspects when examining how individuals behaved, the tactics that were used, the technology available on the battlefield, how medical care was provided, or even how communication flowed.

Medical Operations in the Early Years

So how did we get to the decision to deploy a medical brigade to Vietnam? For that we must go back to April 1962, when the first real deployment of AMEDS units began. The 8th Field Hospital from Fort Lewis, WA, deployed the hospital headquarters and one hospital unit of 100 beds by sea to Vietnam, arriving at the port of Nha Trang on 10 April 1962. A field hospital in 1962 could operate independently of each other or, when co-located at one location, operate a single 400-bed facility. The headquarters provided only administrative services to the organization.

The other major unit to deploy in April 1962 was the 57th Medical Detachment (helicopter ambulance), bringing with it the first five UH-1s to deploy to Vietnam. These were not the first 5 medical UH-1s, but the first five of over 7,000 UH-1s the US would eventually deploy during the war.[2] Its second commander, Major Lloyd Spencer, selected the unit's callsign Dustoff. He chose it because it seemed fitting for a noncombat unit, and during a major battle in 1963 when callsigns were due to make a periodic rotation, command authorities decided not to rotate the 57th's callsign in the middle of the battle, later deciding it probably made sense for the medical evacuation units to have a permanent callsign and a dedicated frequency.[3] The callsign Dustoff was used by all medical evacuation units in Vietnam, save one—and continues to be used to this day, nearly 60 years later.[4]

The 57th's third commander was Major Charles L. Kelly (Figure 1). He was killed in action on 1 July 1964 on a medical evacuation mission when he was shot down trying to retrieve a wounded American patient. His dying words became a rallying cry to all medical evacuation (MEDEVAC) pilots following him when he responded to repeated requests to leave the area with, "when I have your wounded."[5]

Figure 1. Major Charles L. Kelly, Commander, 57th Medical Detachment (helicopter ambulance).

The 57th Medical Detachment became the longest serving AMEDS unit in Vietnam, finally redeploying on 19 March 1973 to Fort Bragg NC. Its redeployment was 9 days before the final withdrawal of US combat forces from Vietnam under the terms of the Paris Peace Treaty.[6] Other units in the initial deployment included several specialty augmentation teams, dispensary detachments, a preventive medicine unit, and a medical laboratory.[7]

The US Army Pacific (USARPAC) surgeon and his deputy made a visit to Vietnam in April 1962, to ensure these early deploying units—the 8th Field Hospital, the 57th Medical Detachment, and the rest—arrived and successfully became operational. Deploying from the surgeon's office was the command surgeon, Major General Achilles L. Tynes, Medical Corps, US Army and his deputy surgeon, Colonel Thomas P. Caito, Medical Service Corps, US Army.[8]

With President Lyndon B. Johnson's announcement of a troop buildup in 1965, a medical surge occurred. Thus, on 12 May 1965, when the medical section of the 1st Logistical Command was activated, there were only 11 medical units in country and would ultimately be assigned to the logistical command, providing limited dispensary support, 200 hospital beds, 2 helicopter ambulance detachments (with 10 aircraft between them), laboratory, preventive medicine, veterinary, and dental support. Planning began immediately to increase the medical footprint to support the arrival of the large number of combat troops announced by the president, secretary of defense, and the US ambassador to the Republic of Vietnam through the end of December 1965, and the proposed troop list was approved as requested—but there was a slippage on the arrival dates of dispensaries, hospitals, and medical logistics units. This caused much concern because at any given time there was a projected shortage of available beds to support combat operations. A lower than expected casualty rate coupled with the arrival of units beginning in September finally alleviated the projected shortages.[9]

AMEDS Power Projection Construct in Vietnam War

To understand the AMEDS of 1965, you must understand how it arrayed the deployable forces in the US. In modern terms, essentially, there were 4 AMEDS power projection platforms in the US at the time. Each of these installations had a large deployable medical footprint, which would additionally help to activate, equip, train, and deploy other medical units for service in Vietnam. While all major and many smaller Army installations deployed medical units to Vietnam, many of the major units came through these 4 installations.

The first power projection platform was at Fort Lewis, WA, home of the 43rd Medical Group. The 43rd had been activated in 1954, and deployed to Vietnam on 20 September 1965, arriving at Tan Son Nhut Air Base on 24 September.[10] Before they deployed to Vietnam in 1965, they activated and deployed 100-bed hospital units of the 3d, 9th, and 523d Field Hospitals and 1 medical detachment. They deployed 2 more medical detachments and had started the process of activating another medical detachment and the deployment of the 51st Field Hospital (-), both of which deployed after the 43d's departure for Vietnam.[10] Once they arrived in Vietnam, the 1st Logistical Command assigned the group the responsibility for all medical support in the Qui Nhon and Nha Trang support areas and the Cam Rahn Bay logistics area, relieving the 58th Medical Battalion of those responsibilities.[10]

The second was at Fort Meade, MD, home of the 68th Medical Group, which had been activated there on 27 July 1954.[11] Fort Meade served as a power projection platform because at that time there were several table of organization and equipment (TO&E) units at Fort Meade, including the 11th Armored Cavalry Regiment. Since it was located close to Walter Reed Army Medical Center and the Valley Forge General Hospital, they could obtain the professional staff for those units easily. The 68th had been deploying units since the departure of the 57th Medical Detachment (helicopter ambulance) in April 1962. Units deployed by them included the 57th,[2] the 36th Evacuation Hospital,[12] the 3rd Surgical Hospital,[13] and 2 other medical detachments.[14,15] Some were still in the final stages of deployment preparation when the 68th departed Fort Meade on 17 January 1966, arriving in Vietnam on 6 February 1966.[16] Once the group became fully operational at Long Binh Post on 7 March 1966, it was assigned the mission of providing medical support in the III and IV Corps areas, relieving the 58th Medical Battalion of that mission, which was in turn attached to the 68th as a subordinate unit.[16]

The third power projection platform was at Fort Bragg, NC, home of the XVIII Airborne Corps and the 55th Medical Group. The 55th had been activated at Fort Bragg on 6 September 1955 as a medical battalion headquarters and was converted to a medical group headquarters on 20 December 1956.[17]

To complicate things, elements of the group, minus the group headquarters, deployed to the Dominican Republic on 1 May 1965,[18] and would gradually redeploy over time before the headquarters deployed to Vietnam on 16 May 1966, arriving at Qui Nhon aboard the USNS General William H. Gordon on 10 June 1966.[19]

Before their own deployment, the 55th Medical Group deployed the 2d Surgical Hospital,[20] the 563rd Medical Company,[21] the 584th Medical Company (following their return from the Dominican Republic),[18,22] and the 39th Medical Detachment,[23] although some of those units were still in the process of preparing for overseas movement when the 55th headquarters departed for Vietnam.

The fourth, final, and most active medical power projection platform was at Fort Sam Houston, TX, home of the Army Medical Department. There, the 67th Medical Group, which had been activated on 20 October 1954,[24] would raise, train, and deploy units, including the headquarters of the 44th Medical Brigade before the group itself would deploy in September 1967.[25] Prior to the deployment of the 44th, the 67th Medical Group had deployed the 6th Convalescent Center,[26] the 32nd Medical Depot,[27] the 7th Medical Laboratory,[28] the 20th Preventive Medicine Unit,[29] the 498th Medical Company (air ambulance),[30] 19 additional medical detachments,[31-48] including the 82d Medical Detachment, the second helicopter ambulance detachment to deploy to Vietnam.[49]

Following the 44th's deployment, the 67th continued to deploy units, including the 24th Evacuation Hospital,[50] the 45th Surgical Hospital (medical unit, self-contained, transportable),[51] and an additional 10 medical detachments. Although as in the case of the other 3 medical groups, some units were still in the process of deploying when the 67th departed Fort Sam Houston for Vietnam.[52-62]

The Army had a requirement to maintain a strategic reserve, and once its 4 stateside medical groups deployed, it had to reconstitute. To do this, it first activated the 18th Medical Brigade at Fort Lee, VA, on 18 August 1967,[63] then moved it to Fort Meade on 14 March 1968,[64] where it would serve until reflagged as the redeploying 44th Medical Brigade on 16 December 1970. The 44th Medical Brigade headquarters would remain stationed at Fort Meade until it was inactivated on 19 March 1973; it was reactivated at Fort Bragg on 21 September 1974.[65,66] On 3 January 1968, the Army reactivated the 1st Medical Group (now the 1st Medical Brigade) at Fort Sam Houston to replace the 67th Medical Group.[67] At Fort Lewis, the Army activated and then quickly inactivated the 98th Medical Group.[68] It then attached all non-divisional TO&E medical units on the installation to the US Army Dispensary at Fort Lewis before finally organizing a Table of Distribution and Allowances (TDA) Medical Services Activity (Provisional) on 25 November 1967 to command those medical units[69] until the 62d Medical Group (now the 62d Medical Brigade) conducted a unit permanent change of station move from Bad Kreuznach, Germany, on 2 June 1968 as part of Operation REFORGER.[70] REFORGER was part of a withdrawal of US forces from Europe with the proviso the US would be capable of rapidly reinforcing NATO from the continental US—tested annually in the REturn of FORces to GERmany (REFORGER) exercises. Finally at Fort Bragg, the 39th Medical Group was activated to replace the 55th Medical Group, being inactivated when the 55th was again activated at Fort Bragg in 1971 following its 1970 inactivation in Vietnam.

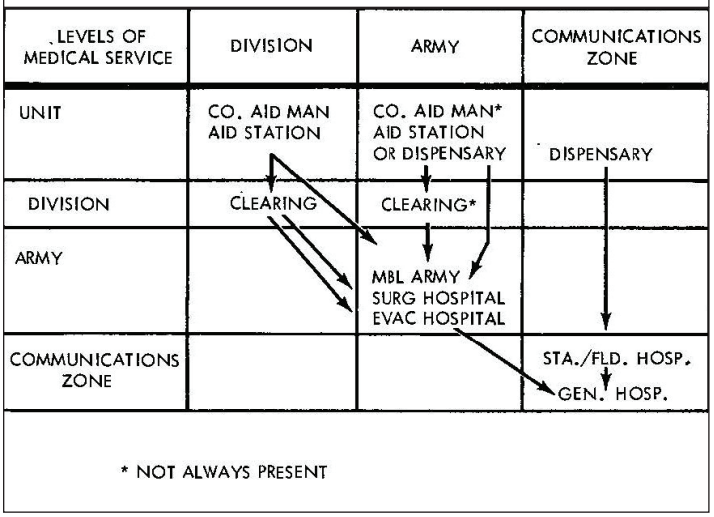
Doctrinal Support

Combat health support was doctrinally provided on the battlefield in 1965, as outlined in the November 1959 edition of *Field Manual (FM) 8-10, Medical Service, Theater of Operations with Change 2* dated 3 October 1962.[71]

The Letterman system was in full effect. There were four echelons of support, what we would now call roles,

due to the non-linear nature of today's battlefield. The four echelons of support were at the unit level, division level, and theater Army level, which provided in the communications zone. (Figure 2) From World War II until after the Vietnam War, corps were strictly tactical formations and had no logistical support assigned to them. All logistical support the corps required was provided by the theater Army, even when located in the corps rear area (Figure 3).

Figure 2. Diagram of echelons of theater medical treatment and evacuation functions.



The theater Army surgeon provided command and control to all echelon 4 medical assets using his staff. However, he was not commander. He functioned solely through the authority of his position and the theater Army commander's authority. This worked well when the surgeon got along with his subordinate commanders. When he didn't, it didn't. This held true for the other technical services as well.

In the early 1960s, the Army Surgeon General developed a new construct to provide for a senior medical headquarters, commanded by flag officer, called the medical brigade. This headquarters would provide a senior level command and control element for the theater Army medical system, reporting directly to the commanding general of the Field Army Support Command, also a new construct.[72] Indeed, the first published reference to the medical brigade in AMEDS doctrine would not appear until the publication of *Field Manual 8-16, Medical Support, Field Army* on 23 June 1965.[73] And, as 1965 drew to a close, there was only one medical brigade in the Army's inventory—the 7th Medical Brigade in Europe, activated in July 1965.[74]

Decision to Deploy a Medical Brigade Headquarters

There were 3 key medical planners involved in the buildup of Army medical forces in Vietnam in 1965. The first was Colonel Spurgeon H. Neel, Jr., Medical Corps, US Army, serving as the Command Surgeon of the US Military Assistance Command, Vietnam (MACV) (Figure 4).[75]

The second was Colonel Thomas P. Caito, former Deputy US Army Pacific (USARPAC) Surgeon. He was now assigned as the Chief of the Plans Division at the US Army Office of the Surgeon General (OTSG).[77]

The third was his deputy and Chief of the Contingency Plans Section of the Plans Division at OTSG, Lieutenant Colonel Woodus A. Carter, Medical Service Corps.[78] Carter had been assigned to the plans branch after completing a tour commanding the 24th Medical Battalion, 24th Infantry Division, in the Republic of Germany. These 3 were involved in all the significant medical planning conferences during 1965.

Although several planning conferences during the year focused on determining the number of beds required, evacuation policy and the different types, deployment dates, and numbers of medical units to be deployed, the planning conference most significant to the deployment of the 44th Medical Brigade occurred from 27 September to 1 October 1965. It was a Commander in Chief, US Pacific Command (CINCPAC) planning conference, and it was this conference to first recommend adding a medical brigade headquarters to the deployment troop list. This is important because at the time, plans called for deploying 10 evacuation hospitals with 4,000 operational beds to Vietnam in 1966, and the Logistical Command commanding general favored attaching medical groups to each of his area support commands to manage the medical system in-country, rather than having a single medical headquarters.[79]

To put this conference in context, by 1 November 1965 there were 100,000 US troops in Vietnam, and 1,700 operational US hospital beds in country to support them. The Battle of the Ia Drang Valley was fought by the 1st Cavalry Division's 1st Battalion (airmobile), 7th Cavalry, between 14 and 18 November 1965,[80] and on 31 December 1965, the 44th Medical Brigade was constituted.[66] A unit is constituted when it is added to the official rolls of the Army. It doesn't mean the unit exists per se; it simply means the Army has recognized there is a unit with a particular numerical designation.[81] When a unit is activated, it is moved from the inactive rolls of the Army to the active rolls, is stationed at a specific location, and personnel and equipment are assigned to it.[81] The 44th Medical Brigade was activated on 1 January 1966 at Fort Sam Houston, TX.[82]

Picking a Leader

Once the decision was made to add the 44th Medical Brigade to the troop list for deployment to Vietnam, it became necessary to staff it. Colonel James A. Wier, serving as the Executive Officer and Chief of Professional Services of the Letterman General Hospital at the Presidio of San Francisco, CA, was notified he had been selected for promotion to Brigadier General and would be assigned as the senior medical officer in Vietnam, with a report date of 29 January 1966 (Figure 5). Initially serving as the 1st Logistical Command Surgeon, he would assume command of the 44th Medical Brigade once it arrived in country, as policy was Medical Service Corps officers would command units in a training status, to be replaced by Medical Corps officers once the units were ready to assume a patient care mission.[83,84]

Wier, a native of Newberry, IN, graduated from the University of Louisville School of Medicine in 1938, completed a civilian internship, and entered the Army in 1939. He spent most of World War II in the Surgeon's Office of the Panama Canal Department, serving as

Figure 3. Schematic diagram of Army Medical Service (AMEDS) facilities in theater of operations.[71]

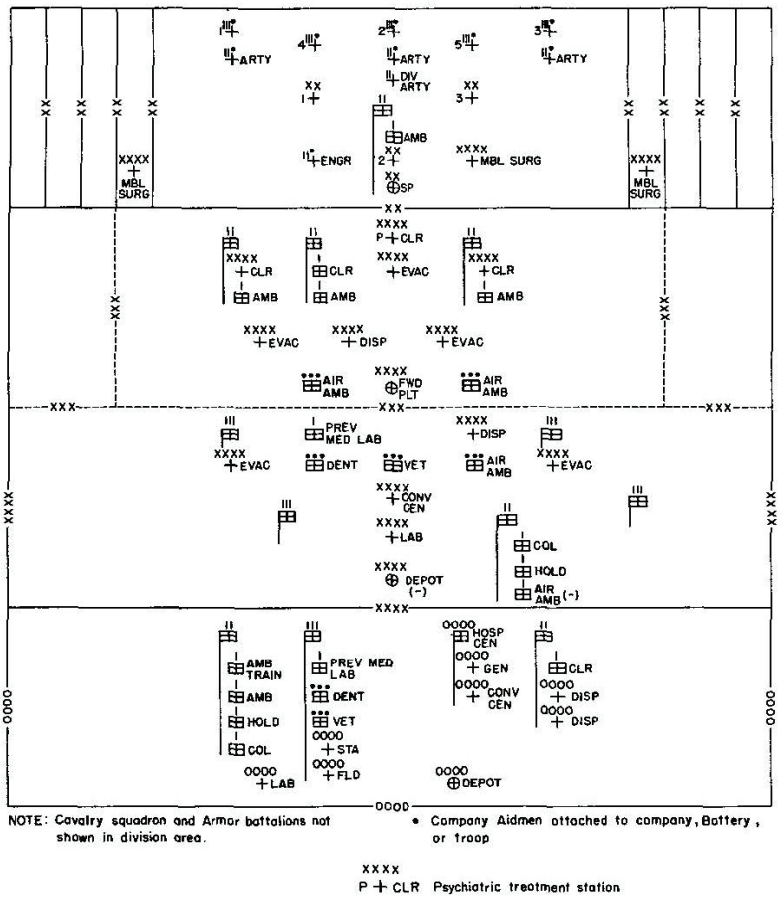


Figure 4. Brigadier General Spurgeon H. Neel, Jr., Commander, 44th Medical Brigade, Long Binh Post, Republic of Vietnam, 1968.[76]

Figure 5. Colonel (promotable) James A. Wier, Commander, Medical Brigade (Provisional) 24 March 1966 to 20 April 1966 and 44th Medical Brigade 21 April 1966 to 10 June 1966.[85]

Medical Inspector and Deputy Surgeon, then moved to Carlisle Barracks in 1944, to finish out the war as an instructor at the Medical Field Service School. From 1945 to 1946 he was Chief of Internal Medicine at the Letterman General Hospital at the Presidio of San Francisco, and from 1947 to 1949 he was the Professor of Military Science and Tactics at the University of Buffalo School of Medicine (part of the Army's Medical Corps Reserve Officer Training Corps [ROTC] programs), while simultaneously serving as a research fellow in internal medicine. Following that, he served as the Senior Resident in Medicine at the Gorgas Army Hospital in the Canal Zone.[86]

Figure 6. First Lieutenant Byron L. Evans, Medical Service Corps, US Army, as Commander, Company D, 24th Medical Battalion, 24th Infantry Division (Byron L. Evans, email communication, 2019).

Upon returning to the states, he was assigned as the chief of the Consultants Division at the Office of the Surgeon General, then as Chief of the "Officers and Women's Section" of the Department of Medicine at the Walter Reed General Hospital until June 1953.[87] In June 1953, Wier began a residency in pulmonary diseases at Fitzsimmons General Hospital in Aurora, CO, and then served as Chief of the Pulmonary Disease Service there from 1954-1960.[87]

From July 1960 to August 1961, Wier served as both the Eighth US Army and United Nations Command Surgeon in Korea, before returning to Fitzsimmons, this time as Chief of the Department of Medicine. After eight months in the position, he became Fitzsimmons' Executive Officer and Chief of Professional Services until he moved to Letterman General Hospital in April 1964, when he again served as hospital Chief of Professional Services and Executive Officer.[87]

After his service in Vietnam, Wier would return to command the William Beaumont General Hospital at Fort Bliss, TX, be promoted to Major General, serve as the Director of Staff for the Assistant Secretary of Defense for Health Affairs, and retire as the commanding general of the Fitzsimmons General Hospital in Aurora, CO.[87]

Once Wier was identified to command the deploying medical brigade, he was contacted by members of his future staff. First among them was his adjutant at Letterman General Hospital, Major Herbert F. Dorsett, who informed Wier he would be the brigade's adjutant in Vietnam. Indeed, Dorsett was the first person to inform Wier a brigade headquarters was being deployed as, according to Wier:

> [...] I got word first that we were sending the brigade over when I got a call from the Adjutant at Fitzsimons and said that he was going to be my Adjutant and what did I know about it. I said, well I don't know what I was having that I needed an Adjutant and then we started finding out from other people and at about the same time they did send word that the Brigade would be coming over.[84]

Finally, the personnel assignments were made official. On 6 January 1966, the Fourth US Army, then headquartered at Fort Sam Houston, after coordinating with the Army Surgeon General, issued instructions for losing organizations to issue orders to 14 officers to report for assignment to the 44th Medical Brigade. The first to be reassigned was First Lieutenant Byron L. Evans, from the 67th Medical Group to the 44th, effective the next day.[88]

1LT Byron L. Evans

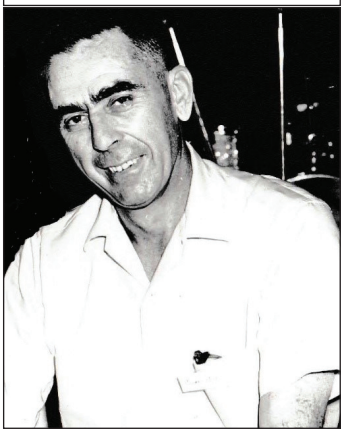
First Lieutenant Byron L. Evans (Figure 6), Medical Service Corps, US Army entered the Army in December 1962 and was stationed in Germany with the 24th Medical Battalion after completing his officer basic course. He was completing a successful company command, had met a nice German girl, and was planning on returning to the states, separating from the Army, perhaps getting married, and settling down to continue his life as a civilian.[89]

Evans then received the proverbial "call from Medical Service Corps Branch." In this case, it was from his former battalion commander, Lieutenant Colonel Woodus A. Carter, who was Chief of the Contingency Plans Section at the Army Surgeon General's Office. Carter contacted Evans at the flight terminal in Frankfurt, Germany on the day Evans was to fly to the US, said he knew that Evans was planning on separating from the service, and asked Evans to stop and see him in Washington on his way back home to Tennessee—just "to talk." Evans said he would do so, and they agreed to meet at Carter's office at the Pentagon.[89]

When Evans got off the plane at McGuire Air Force Base, NJ, there was a military policeman waiting for him with a note asking him to call Carter. Evans called Carter and was told the Pentagon was closed due to the Christmas holiday and would he please meet Carter at his quarters for dinner rather than at the Pentagon. Being a good lieutenant, Evans agreed.[89]

Over dinner, Carter asked Evans if he would remain in the Army and deploy to Vietnam as the aide-de-camp to Colonel (promotable) James A. Wier, who was to be the commanding general of a new medical unit—the first of its kind to be deployed in combat—the 44th Medical Brigade. Evans agreed and was told to report to Fort Sam Houston as soon as he could. Orders were quickly cut, and after a short leave, Evans headed to Fort Sam Houston (Byron L. Evans, email communication, 2019).

Figure 7. Colonel Thomas P. Caito, Executive Officer, 44th Medical Brigade, at the Medical Service Corps Anniversary celebration, Saigon, Republic of Vietnam, 1966.[95]



On 7 January 1966, Evans signed into the 67th Medical Group at Fort Sam Houston. He then signed 44th Medical Brigade General Order Number 1, dated 7 January 1966, assuming command of the 44th Medical Brigade, making him the first of a long and distinguished line of commanders of the 44th. Evans, in a rather humble manner, recalls he was "an emperor of nothing." Two weeks later he relinquished command to Lieutenant Colonel John W. Hammett, who would become the brigade S-3.[90]

The Ultimate Pick-Up Team

In a way, the staff of the 44th Medical Brigade was the ultimate pick-up team. Assembling at Fort Sam Houston in January 1966, their advance party would be deployed and operational in Saigon just over 90 days later, and their main body less than 60 days after that. To a force that today plans for routine deployments on an 18-month notification cycle, this seems extraordinary.

The brigade's executive officer was Colonel Thomas P. Caito (Figure 7). There was likely no one in the Army Medical Service better qualified for this position. Essentially, Caito had been training for this role the previous 5 years in his assignments at the USARPAC Surgeon's Office and as head of Plans Division, his second tour in the Office of the Surgeon General.[91]

Caito, a native of Ohio, enlisted as an Army medic in March 1941 and was commissioned in the Medical Administrative Corps in March 1942.[92] By the end of World War II, he found himself in command of the 4th Convalescent Hospital during the waning few days of its existence.[93] While serving in the USARPAC Surgeon's Office, he worked closely with the Eighth Army and United Nations Command Surgeon, Colonel James A. Wier.[84]

Caito originally planned to retire upon his return from Vietnam but changed his plans while deployed.[94] Returning to the Office of the Surgeon General and his position as Chief of the Plans Division after redeployment, Caito retired in mid-1968. As he told Surgeon General Leonard Heaton on the eve of his retirement, it was "a fitting climax to end my active military service in your office after having completed a tour of duty in Vietnam."[91]

The brigade S-3, or operations officer, Lieutenant Colonel John W. Hammett, had the most interesting backstory of any member of the brigade staff. He joined the Royal Canadian Air Force after graduating from high school in Louisiana, learned to fly, was sent to England with the Royal Canadian Air Force, was shot down over Dunkirk during the evacuation, and when the US entered the war, he was transferred to the US Army, becoming a field artillery aviator-observer spotting artillery fire in Europe.[96] In Korea, as a field artillery officer, he commanded the 49th Medical Detachment (helicopter ambulance).[97] When Lieutenant Colonel Spurgeon H. Neel, Jr., commander of the 30th Medical Group, decided to combine his 5 helicopter ambulance detachments into a single provisional air ambulance company, he made Hammett its first commander.[96] Now a Medical Service Corps officer, when the 54th, 57th, 82nd, and 247th Medical Detachments (helicopter ambulance) were activated at Fort Sam Houston in 1954, he became the first commander of each well as well.[98] By the time he was selected to be the brigade S-3, he had served as commander of the 52d Medical Battalion in Germany and had been serving as the Assistant Chief of Staff for the Fort Sam Houston Garrison for 9 months.[99]

The brigade sergeant major was Albert W. Kippes[56] (command sergeant major did not exist as a separate rank until 1968).[100] When Kippes returned from Vietnam, he was assigned as the Sergeant Major of Brooke Army Medical Center,[101] and when the Army's first command sergeant major selection board convened on 29 December 1967, Kippes was a member of the first cohort of 192 sergeants major selected,[100] becoming the first command sergeant major of Brooke Army Medical Center, before moving to Tripler Army Medical Center in 1969 for his final assignment before retiring from the Army.[102]

Preparation for Deployment

Within 3 weeks of Evans reporting to the 44th at Fort Sam Houston, the headquarters received a prepare to

deploy order[103] and determined who would be on the advance party. Led by Caito, and with Evans among them, the advance party had movement orders cut by 31 January. Although, multiple amendments would be published as personnel shifted in and out of the unit due to disqualification during the preparation for overseas movement process and changes due to mission analysis.[104]

The headquarters spent their time at Fort Sam Houston preparing for overseas movement. This entailed receiving individuals into the organization, cross-leveling equipment from other units into the 44th, starting a property book, obtaining supplies for the deployment, and all the other myriad activities entailed in pushing a unit out the door. Additionally, the staff worked to prepare standing operating procedures for use upon their arrival in Vietnam, as well as obtaining administrative and professional reference materials and arranging for transportation into theater.[56]

The 67th Medical Group was well versed in preparing units for deployment. It was in the process of deploying the 6th Convalescent Center,[105] and had deployed the 32d Medical Depot just over 3 months earlier,[27] as well as the numerous units deployed since 1962, described previously. Assistance was also provided by the Medical Training Center, an organization separate from the Medical Field Service School which ran combat medic advanced individual training at Fort Sam Houston.[90]

The Fort Sam Houston Garrison "smoothed the way" towards ensuring the headquarters met their equipment ready-to-ship date.[90] It was here Lieutenant Colonel Hammett's previous assignment as the Assistant Chief of Staff for the Garrison came into play, as he began to call in his chips. According to an oral history he gave in 2009, he was able to obtain needed supplies and equipment over and above the TO&E authorizations, which were unavailable through the supply system in Vietnam. This included, according to his recollection, a sedan to serve as the commanding general's staff car as well as associated spare parts and consumables.[95]

While the staff began to assemble at Fort Sam Houston, Wier travelled to the Office of the Surgeon General the second week of January 1966, to receive briefings on what he should expect and what would be expected of him, in his new position. There, he first linked up with Caito in his role as Brigade Executive Officer, although, as mentioned earlier, they had worked together as Eighth Army Surgeon and USARPAC Deputy Surgeon, respectively.[84]

Figure 8. Lieutenant General Charles W. Eifler, Jr. As a Major General, Eifler commanded the 1st Logistical Command in the Republic of Vietnam from January 1966 through May 1967.[107]

The Army Medical Service Historical Unit realized the opportunity available to them with Wier, Caito, and Lieutenant Colonel John Wrigley, who had been identified to deploy as the operations officer for the brigade, all being at the Surgeon General's Office at the same time. The historical unit explained the need for information to support the requirements for completing the "Maroon Books," the medical history of the US Army in the Vietnam War (which was never completed). It was also to include the projected study of "The Army Medical Service in the Buildup, 1962-1965," which was completed in draft form but never published.[106] On 14 January 1966, members of the AMEDS Historical Unit met with members of the brigade—Wier, Caito, and Wrigley—to sensitize them to the historical importance of the deployment of the brigade, and their requirements for documentation and preservation.[74]

Wier deployed to Vietnam at the end of January, replacing Colonel Ralph E. Conant as the 1st Logistical Command Surgeon on 26 January 1966.[56] Conant, Commander of the 43d Medical Group, had been performing the duties of the surgeon as an additional duty since 25 October 1965, when the group became operational.[9] When Wier arrived in Vietnam, he came with marching orders from Lieutenant General Heaton, the Surgeon General: Get the Medical Brigade assigned as a direct reporting unit to the US Army Vietnam (USARV) Headquarters, in a fashion similar to that of the 1st Aviation Brigade and the 18th Engineer Brigade, and not underneath the 1st Logistical Command, as called for under the new doctrine. Wier, having read the new doctrine,[72] told Heaton he "suggested politely that they had already lost the battle because in the COSTAR concept the regulation that was published on it shows the Medical Brigade at the Army Support Command level and not at US Army Headquarters," but he was told to "get the brigade up to the USARV level."[84]

Upon arrival, Wier found the situation was even worse than he anticipated, as the 1st Logistical Command's commanding general, Major General Charles W. Eifler, Jr. (Figure 8), told Wier he neither wanted nor needed a medical brigade, preferring to attach a medical group to each of his support commands supporting the II, III, and IV Corps Areas (the I through IV Corps Areas [later changed to Corps Tactical Zones] were operational

boundaries used by the Army of the Republic of Vietnam. They were also used as administrative boundaries by the US Army, Vietnam). This organization allowed the local commander to provide support as needed in a way the brigade would not be able to do centrally from Saigon. Although, as Wier noted, Eifler "managed his Log Command from Saigon and rather personally."[84]

Figure 9. Astronauts David R. Scott (left), pilot; and Neil A. Armstrong (right), command pilot, pose with model of the Gemini Spacecraft after being selected as the crew for the Gemini VIII mission.[108]

Advance Party Deployment

The 44th Medical Brigade's advance party left Fort Sam Houston on 15 March 1966 (Byron L. Evans, email communication, 2019), and spent 5 days en route to Vietnam. They departed from Kelly Air Force Base, TX, at oh-dark-thirty, bound for their first stop, Travis Air Force Base, CA. From there they flew to Hawaii, meeting with Admiral Roy L. Johnson, Commander of the US Pacific Fleet. They left Hawaii the next day, bound for Wake Island, where they stopped to refuel, then made an unscheduled stop at Iwo Jima, Japan. From Iwo Jima, they flew to Okinawa. Finally, they flew from Okinawa into Tan Son Nhut Air Base in Saigon, Vietnam, arriving there mid-afternoon on 18 March 1966.[89]

The delay at Iwo Jima was due to problems with the flight of the Gemini "VIII" spacecraft.[89] This mission, commanded by Neil A. Armstrong (Figure 9) on the first of his 2 spaceflights, was the first space mission to successfully dock 2 vehicles together while in space, an essential task for the upcoming Apollo missions. A malfunctioning retrorocket on the Gemini spacecraft required them to abort their mission after less than 11 hours of flight. The grounding of the 44th, and all other aircraft in the Pacific, was because the spacecraft was forced to land in the Pacific Ocean rather than its scheduled splashdown area in the Atlantic (Byron L. Evans, email communication, 2019).

Arrival & Operations in Vietnam

When the advance party arrived in Vietnam, they were assigned to the 1st Logistical Command, and by 1st Logistical Command General Order 38, the Medical Brigade (Provisional) was established under the command of Colonel Wier, assuming command and control of the 43d Medical Group and the 58th Medical Battalion.[90] But the Medical Brigade (Provisional), consistent with Eifler's view of how medical support should be provided, "became a working unit of the Medical Directorate, 1st Logistical Command."[56]

Wier found this arrangement for the brigade was workable, as Wier said Eifler "made the Director of Medical Service and Supply a member of his general staff and in matters that pertained to the Medical Service I had direct access to all the medical units."[84] Wier explained he could move people in an emergency, "I had nearly the same control that we would have had under a command structure. This, however, depended on General Eifler's being there, and it was feared that if we had a different commander it might not hold up to the same rules of the game."[84]

About mid-March, the 1st Logistical Command prepared a decision brief for Lieutenant General Jean E. Engler, the deputy commanding general of USARV, who at that time was examining whether USARV should assume the logistics advisory functions of the Military Assistance Command, Vietnam (MACV) headquarters. Engler's contention was logistics should be performed by the operational headquarters (as well as the advisory function), and USARV should be expanded to a full-fledged Army Component Command.[84,109] In this decision brief, the 1st Logistical Command presented alternatives for where the 44th Medical Brigade headquarters should be located. Wier would brief on behalf of the Army Medical Service; Eifler would brief on behalf of the 1st Logistical Command. Wiers's position, reflecting his guidance from Heaton, was the brigade should be a direct reporting unit to USARV, with the brigade commander also serving as the USARV surgeon. Eifler's position was the brigade should remain under the command and control of the logistical command, consistent with the COSTAR doctrine. Engler's decision was that nothing had been presented to show the structure outlined in the doctrine—having the theater medical brigade under the control of the theater logistical command—would not work, or having the brigade work directly for USARV would work any better.[84] Engler did like one part of the plan, however, the idea the senior medical officer in theater should be the USARV surgeon and directed Wier to move to the USARV Surgeon's Office.[84]

The main body of the brigade headquarters arrived at Tan Son Nhut Air Base on 21 April 1966. Its members were met by the entire advance party and escorted to their billets. On the same day, the Medical Brigade

Figure 10. Photographs of the 44th Medical Brigade headquarters area at 24/8 Troung Quoc Dung in Saigon.[89]

(Provisional) was disestablished, and the 44th Medical Brigade was assigned to the 1st Logistical Command by USARV.[90] The brigade then issued guidance to its subordinate units: primarily the 43d and 68th Medical Groups, the 32d Medical Depot, and the Veterinary and Dental Headquarters and through them, their downtraces—through individual letters of instruction.[110] A third medical group, the 55th, would expand their command and control structure in June, and a fourth, the 67th Medical Group, would be added in 1967.

The brigade quickly discovered their TO&E was inadequate for the tasks assigned to the brigade in Vietnam. Specifically, the brigade S-3 section was understaffed, and the non-commissioned officers assigned to the section lacked experience in medical operations, a particular skill set not easily learned on the job. They also found they lacked sufficient vehicles and communication equipment for basic communications and medical regulating, particularly given the poor commercial phone system available in Vietnam. Further, the brigade S-1 section was severely understaffed, to the point it could not even handle the personnel actions of the brigade headquarters.[110] The problems with personnel actions would not be solved until the arrival of the 222d Personnel Services Company and its assignment to the brigade, an Adjutant General Company, but with Medical Service Corps officers assigned instead of Adjutant General Corps officers. The company became operational on 1 February 1967 with one composite personnel team attached to each medical group.[111]

Moreover, during the first 7 months in operation, the hospitalization capability of the 44th grew significantly, with the 12th Evacuation Hospital arriving on 9 September 1966, the 45th Surgical Hospital arriving on 4 October 1966, the 12th Evacuation Hospital becoming operational on 15 November 1966, and the 45th Surgical Hospital becoming operational on 18 November 1966. Additionally, the 71st Evacuation Hospital had arrived in country on 15 November 1966 and the 91st Evacuation Hospital on 3 December 1966, but neither had begun operations by 31 December.[112] The 71st became operational on 29 May 1967[113] and the 91st on 15 March 1967.[114]

Figure 11. Medical Service Corps anniversary celebration, Saigon, Republic of Vietnam, May 1966. Left to right: Colonel Thomas P. Caito, Executive Officer, 44th Medical Brigade; Colonel (promotable) James A. Wier, Commander, 44th Medical Brigade; Colonel Spurgeon H. Neel, Jr, US Military Assistance Command, Vietnam, Surgeon; Colonel Samuel C. Gallup, US Army Vietnam Surgeon.[95]

The brigade headquarters itself was a group of rented villas at 24/8 Troung Quoc Dung in Saigon (Figure 10).[56] It had previously served as the headquarters of the 58th Medical Battalion, which had vacated the buildings on 15 April 1966,[115] and it sat in the middle of a residential neighborhood in Saigon. At this time in the war, the security threat was not as high as it would later become, and units were able to provide their own security.[61] One would be hard pressed to imagine a unit

Figure 12. Photos of Captain Byron L. Evans, Executive Officer, Bravo Company, 1st Medical Battalion, 1st Infantry Division.[89]

today setting up a medical headquarters in the middle of Sadr City in Baghdad or on the outskirts of Kabul, Afghanistan, but perhaps these were more innocent times.

It was not all work for the 44th Medical Brigade, and much of the senior leadership gathered at the Vietnamese Officers Club in Saigon for the Medical Service Corps' birthday in May 1966, hosted by the senior Medical Service Corps officer in theater, Colonel Caito. But far from being an outing just for the Medical Service Corps, he ended up surrounded by senior Medical Corps officers including Colonel (promotable) Wier, the Brigade Commander; Colonel Spurgeon Neel, the MACV Surgeon; and Colonel Samuel C. Gallup, the USARV Surgeon (Figure 11).[95]

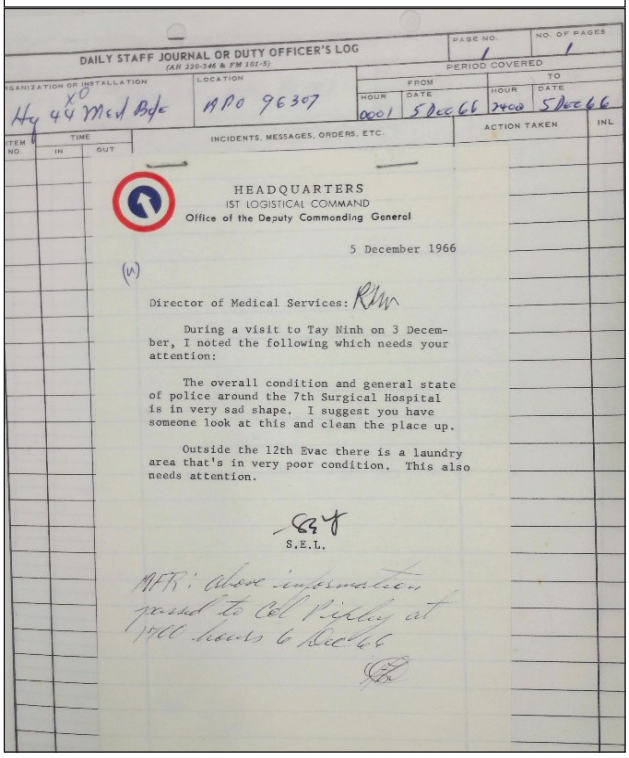
On 9 June 1966, Colonel Samuel C. Gallup, Medical Corps, US Army, left his position as the USARV Command Surgeon, assuming the duties of Deputy Surgeon and Chief of Professional Services for the USARV Surgeon's Office the next day.[116] Then on 10 June 1966, Colonel Wier was transferred to serve as the USARV Surgeon, and Colonel Ray L. Miller replaced him as 44th Medical Brigade Commander.[56] Wier also attempted to take Colonel Caito with him to serve as the executive officer for the USARV Surgeon's Office, noting in a string of correspondence with the Army Surgeon General that Caito was "probably the most knowledgeable officer on medical organization and operations in Vietnam."[117]

When Wier originally broached the idea of moving Caito to the 1st Logistical Command's, Commanding General Eifler said he would release Caito "over his dead body," and Wier told the surgeon general he hoped to get Caito released upon the assignment of Colonel Larry W. Coker, Medical Service Corps, to Vietnam, hoping to get Coker assigned as the 44th executive officer and Caito released to be his executive officer at the US Army Vietnam Surgeon's Office.[117] Apparently the combined efforts of Wier and Heaton had no effect on Eifler, as Coker ended up assigned as executive officer to the USARV Surgeon.[116] Caito spent his entire tour as the executive officer of the 44th Medical Brigade.[61] Coker would become the executive officer of the 44th on 7 March 1967, the day after Caito departed the brigade to return to the US.[111]

Wier would finally receive his stars on 10 November 1966, from the deputy commanding general of USARV.[118] Evans, having been promoted to captain just before Wier was reassigned, never actually served as a general's aide, as a captain could not serve as the aide for a brigadier general.[89] He was offered his choice of assignments and chose to be transferred to become the executive officer of Bravo Company, 1st Medical Battalion, 1st Infantry Division (Figure 12),[89] because "if you gotta be one, be a Big Red One!"

Although the 1st Logistical Command Surgeon's Office always maintained a presence in the command headquarters, after 1 October 1966, all of the responsibilities of the surgeon's office were absorbed by the appropriate staff sections of the brigade, and the surgeon's office served only as a liaison cell.[56] Wier had intended to do this from the beginning, but Caito had disagreed with him. The 2 headquarters were 2-3 miles apart, and travel between them could take 15-20 minutes in Saigon's traffic. Wier found, however, there was a significant amount of confusion caused by the situation. Wier stated in an interview:

Figure 13. 44th Medical Brigade Executive Officer's Staff Journal entry for 5 December 1966.[122]



DAILY STAFF JOURNAL OR DUTY OFFICER'S LOG
(AR 220-346 & FM 101-5)

PAGE NO. 1 NO. OF PAGES 1

ORGANIZATION OR INSTALLATION: Hq 44 Med Bde
LOCATION: APO 96307
PERIOD COVERED: FROM HOUR 0001 DATE 5 Dec 66 TO HOUR 2400 DATE 5 Dec 66

ITEM NO. | TIME IN | TIME OUT | INCIDENTS, MESSAGES, ORDERS, ETC. | ACTION TAKEN | INL

HEADQUARTERS
1ST LOGISTICAL COMMAND
Office of the Deputy Commanding General

5 December 1966

(N)

Director of Medical Services: RMW

During a visit to Tay Ninh on 3 December, I noted the following which needs your attention:

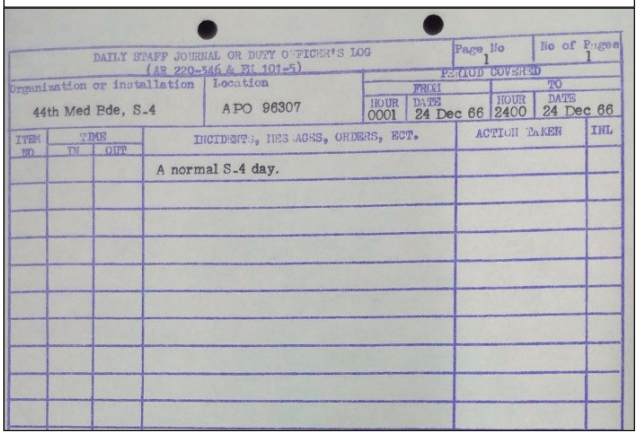
The overall condition and general state of police around the 7th Surgical Hospital is in very sad shape. I suggest you have someone look at this and clean the place up.

Outside the 12th Evac there is a laundry area that's in very poor condition. This also needs attention.

S.E.L.

MFR: Above information passed to Col Pixley at 1700 hours 6 Dec 66

Figure 14. Christmas Eve, 1966 was "a normal S-4 day."[122]



DAILY STAFF JOURNAL OR DUTY OFFICER'S LOG
(AR 220-346 & FM 101-5)

Page No 1 No of Pages 1

Organization or installation: 44th Med Bde, S-4
Location: APO 96307
PERIOD COVERED: FROM HOUR 0001 DATE 24 Dec 66 TO HOUR 2400 DATE 24 Dec 66

ITEM NO. | TIME IN | TIME OUT | INCIDENTS, MESSAGES, ORDERS, ECT. | ACTION TAKEN | INL

A normal S-4 day.

> [p]apers would not get properly staffed—we had to write letters to ourselves at times—I would indorse a paper to the Brigade to go through Log Headquarters and I would find it in my basket again to put an indorsement on it as Director of Medical Services. Some of these were ridiculous. We were able to eliminate some of this but it actually was a duplication of effort. I believe that Colonel Caito agreed with this and I think later they did away with the [Surgeon's] Section; kept only one man over at the Log Command Headquarters.[84]

Other things happened to the 44th during that first year. When they deployed to Vietnam, the members of the brigade wore the 1st Logistical Command shoulder sleeve insignia, because the brigade hadn't been authorized one of its own. That authorization came from the Institute of Heraldry on 5 October 1966.[119] Once they were authorized their own shoulder sleeve insignia, the brigade commander eagerly presented a plaque containing one to the 1st Logistical Command's Commanding General, Major General Eifler.[120]

For anyone who has spent time at Fort Bragg, where the 1st Logistical Command redeployed at the end of the war and where the 44th Medical Brigade was restationed in 1974, it is no surprise an intense rivalry has always existed between the 2 commands. This rivalry appears to have existed since the beginning, as witnessed by a document found in Colonel Caito's staff Journal for 5 December 1966 (Figure 13). There, the deputy commanding general of the 1st Logistical Command informed the director of medical services, not the medical brigade commander, (although we've already explored the 1st Logistical Command's commanding general's position on this) that he found fault with the conditions of police call around 2 hospitals in the brigade and directed corrective action be taken. Caito's memorandum for record on the note states he passed the information to Colonel Charles C. Pixley, commander of the 68th Medical Group (future surgeon general), under which the 2 hospitals fell, at 1700 on the day after the note was written.[121]

Other staff sections were not as diligent in their record keeping, perhaps because they had not been briefed before deployment by the AMEDS Historical Unit the way Caito had been. The brigade S-4, for example, noted 24 December 1966 was "A normal S-4 day (Figure 14)."[122]

USARV began a campaign to move units out of Saigon and into more secure quarters, and in September 1967, the 44th Medical Brigade moved to a new headquarters on Long Binh Post, northeast of Saigon.[61] (Figure 15)

The 44th Medical Brigade received its first full-time chief nurse on 12 March 1967, when Lieutenant Colonel Rose Straley was assigned as a full-time brigade chief nurse.[61] From New Jersey, Straley joined the Army in 1942, served in North Africa and Italy, including on the Anzio beachhead, and during the Korean War served as a nursing consultant to the Republic of Korea's Army Medical Service.[123]

It wasn't until 10 August 1967, when the 44th finally got its general officer in command. It moved from under

Figure 15. Headquarters, 44th Medical Brigade, Long Binh Post, 1967.[61]

the 1st Logistical Command to become a direct reporting unit to USARV, with the assignment of Brigadier General Glenn J. Collins, Brigade Commander and USARV Surgeon (Figure 16).[61] Collins came to the brigade after serving as the commandant of the Medical Field Service School at Fort Sam Houston, and following his return from Vietnam, he would be awarded his second star and serve as deputy surgeon general, retiring as the commander of Walter Reed Army Medical Center. He had previously served as the last commander of the 1st Medical Regiment (now the 1st Medical Brigade) before it was broken up in August 1943. He received a Masters of Hospital Administration from the Army-Baylor Hospital Administration program in 1960, reportedly the first Medical Corps graduate.[124]

Putting into perspective the support the 44th Medical Brigade provided, at the end of 1965, the 1st Logistical Command had 58 medical units under its command and control. On 1 May, the day the 44th Medical Brigade became operational, it had 65. On 31 December 1966, the 44th Medical Brigade was composed of 121 units.[56] At its peak, the 44th had more than 220 subordinate units, ranging from 2-person specialty teams to 400-bed evacuation hospitals.[126] Designed to operate as a subordinate headquarters of a field army logistics command but spending most of the war acting as major subordinate command to an army component command level headquarters, it fell between the operational paradigms used in World War II and Operation Desert Storm.

At their peak, the men and women of the 44th Medical Brigade were supporting a force in the field of 359,800,[127] some 74% of today's entire active army strength of 485,000.[128] A force with 3 corps (I Field Force Vietnam, II Field Force Vietnam, and XIV Corps), 7 divisions (1st Cavalry Division (airmobile), 1st, 4th, 9th, and 25th Infantry Divisions, the Americal Division, and the 101st Airborne Division (airmobile)), 4 separate brigades (1st Brigade, 5th Infantry Division (mechanized); 3d Brigade, 82d Airborne Division; 173d Airborne Brigade, and the 199th Light Infantry Brigade (separate)). Although deployed as separate infantry brigades, the 11th, 196th, and 198th Infantry Brigades are counted here as subordinate brigades of the Americal Division), a special forces group (5th) and an armored cavalry regiment (11th), along

Figure 16. Brigadier General Glenn J. Collins, Commander, 44th Medical Brigade, Long Binh Post, Republic of Vietnam, 1967.[61]

with all their enablers—nearly 80% of our current active Army's combat strength—in the field in near-continuous combat operations. Add to this, a Marine Amphibious Force of 2 divisions to which the brigade would provide some support, as well. By any definition, this meets a major theater war, and it bears more study for that reason, before it fades from memory, as The Great War faded from our organizational memory over time, or our memories of how we supported the massed armies of the Second World War.

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Korea and the Bloodstained Path to Pusan: A Medical Calamity of Retreat and the Redemptive Genesis of MASH

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Abstract

June of 1950 found the US forces poorly prepared to stop North Korean forces rolling into South Korea. First encounters scattered American soldiers and presented unique challenges for care of the casualties; battalion doctors and medics hustled the wounded along, sometimes themselves trapped, captured, or killed. Finally, within the Pusan perimeter American and South Korean resistance stiffened. It was in this defensive position the first Mobile Army Surgical Hospitals (MASH) were deployed far forward—heretofore simply a paper concept. MASH units performed magnificently, resuscitating and evacuating gravely wounded American and South Korean casualties, ushering in a new dimension to combat casualty care.

Tripwire

"By God, I'm going to let them have it."
President Harry S. Truman, July, 1950[1]

On 25 June, North Korean forces of Kim Il-Sung flooded across the 38th Parallel into South Korea in a bold attempt to rally support from the South Korean military and begin the hoped for process of creating a unified Korea. Il-Sung launched a formidable army, spearheaded by Soviet-made tanks and more than 100 Soviet-made planes. Seoul was directly in its sights.

The nascent South Korean army was not fit to provide much resistance, so American involvement was inevitable. With the massive June invasion, Republic of [South] Korean (ROK) forces were quickly routed and began retreating southward. President Harry S. Truman was incensed. At first, he ordered in air and naval support for the South Koreans, but all knew, without saying, American ground troops would be necessary if South Korea was to be salvaged. Truman knew it too. He soon sent General Douglas MacArthur, then in Japan, to immediately tour the peninsula and appraise the situation. MacArthur shortly gave a sobering report:

> The South Korean forces are in confusion... It is essential that the enemy advance be held or its impetus will threaten the over-running of all of Korea... The only assurance for holding the present line and the ability to regain later the lost ground is through the introduction of United States ground combat forces into the Korean battle area.[2]

Even more concerning were the medical capabilities for any American expeditionary force. In the wake of World War II, the US Army had dramatically downsized. It had been a resounding victory, but Americans were tired of war and the accouterments reminding them of it. By 1948, the Army's entire strength was down to half a million. In fact, MacArthur's command totaled less than 200,000. In actuality, it was closer to 114,000. In Japan, ready ground forces of 8th Army at MacArthur's disposal were 4 understrength and poorly equipped units: the 7th, the 24th, the 25th, and the First Cavalry. They were the tripwire forces, a speed bump for Il-Sung and his zealous troops. The first up was the 24th Infantry Division stationed closest, on the island of Kyushu. The division was 15,965 strong, but combat green and led by officers, commissioned and non-commissioned alike, who were fill-ins from other units. Two remaining regiments were in deplorable shape: the 34th and 21st

Infantry. Yet, leadership was superb. General William Dean, a seasoned combat veteran and the only division commander who had any knowledge of the mountainous terrain of Korea, commanded.

The 8th Army Medical Corps was in even worse shape. Out of an authorized strength of 346 doctors, attrition, cutbacks, and disinterest mustered only 156 in the summer of 1950.[3] A visit by Deputy Surgeon General George Armstrong on the eve of the Korean conflict found "the Medical Service in Japan is fine; they are not short of doctors."[4] Because of this outlandish report, the number of hospitals was shortly reduced. Major General James Bethea, former surgeon for the Far Eastern Command, of which 8th Army was an integral part, suspected 1950 would be a grim year for medical corps officers.[4]

Contact

"The wounded seldom cry—there's no one with time and emotion to listen."

Marguerite Higgins[5]

July filled with terror for American troops: on the move, trying desperately to halt the North Korean juggernaut. It would be a harrowing opening phase for casualty care, and many medical personnel felt it would be their last days alive.

The First Battalion, 21st Infantry, nicknamed Gimlets, was the leading unit of Americans to arrive in Korea. They airlifted to Pusan the morning of 1 July. Battalion commander Lieutenant Colonel Charles Smith loaded his men on trains and rushed them north. Orders from Major General William Dean, commander of the 24th Division were clear: "We want to stop the North Koreans as far from Pusan as we can. Block the main road as far north as possible."[6] At Taejon, Lieutenant Colonel Smith marched his force farther north to Pyongtaek, and then set up a roadblock 12 miles north of it, beyond Osan. Two battalions of the 34th Infantry soon followed. Regimental commander of the 34th Infantry, Colonel Jay Lovless, split his forces, sending one battalion 10 miles east of Pyongtaek to Ansong and the other taking up defensive positions just north of Pyongtaek. Out in front of Lovless's men, Smith, with 2 companies of the 1st Battalion, planted his riflemen on a high hill overlooking the main highway south, Route 1. In fact, Route 1 cut through a saddle of the hill allowing deployment of the 2 companies on either side of the road. Here, in the rain and mud, 40 miles south of Seoul, would be the first encounter with North Koreans. Whether they knew it or not, troops of Task Force Smith, as it was now called, 2 companies of infantry and a battery of field artillery, would be a tripwire for the North Koreans, a deterrent designed to stop the enemy by their mere presence—or provide a speed bump on the roll towards the south.

The 3rd Medical Platoon was one of the 3 assigned to the 21st Infantry. When Task Force Smith formed, the 3rd Medical Platoon then attached as the medical component for the 500-man unit. A bare bones team, the platoon had a few litter jeeps, some dried plasma, and very little else. In charge was 26-year-old Captain Edwin Overholt, barely out of internship. The Army had pulled him from his residency training because of an acute shortage of Army medical officers. He ended up in Japan for 90 days temporary duty, or so he thought. It was there mobilization for Korea caught him unawares. With no prior field experience, no training at Fort Sam Houston, TX, and no field gear, he found himself at Itazuke Air Force Base on 1 July for deployment to Korea. Overholt spent the rest of the night scrounging up equipment: helmet, web gear, sidearm, and rucksack. On the plane over, not entirely sure what he was doing, Overholt scratched out the basics of his medical plan and footprint of his aid station. It was on that flight he first met his staff of medics and the other officer, Lieutenant Raymond Adams, Medical Service Corps. He and Adams, together with their 30 or so enlisted, would patch together some type of field care in God only knew what type of mess. In the rain and mud of Pusan, they loaded up and moved north on Route 1 with combat Gimlets to those lonely hillocks beyond Osan. By the book on the reverse slopes, Overholt scooped out his aid station, a 6 by 8-foot hole for collecting wounded. Suitable defilade he thought, shelter from fire. Then everyone dug their own foxholes in pouring rain, put on ponchos, and waited for the inevitable.[7]

To support Task Force Smith, the 24th Medical Battalion, all 28 officers and 273 enlisted men received orders on 2 July, 1950, that they would be moving to Korea. On 6 July, after a brief stay in Pusan, one clearing platoon—usually manning a tented field hospital—and an ambulance section travelled by train to Taejon, a sprawling metropolis just south of the Kum River. Commanders hoped between the Kum itself and buttressed defenses in Taejon, their troops could slow the North Korean juggernaut.[8] To the men of the 24th Medical Battalion fell the dubious task of clearing the battlefield of casualties wrought by the onslaught of North Koreans.

At 0745 on 5 July in Korea's notorious summer rains, 33 North Korean T-34 tanks lumbered down the road to Osan, slammed through the roadblock of Task Force Smith, and clanked on to Osan itself. Bazooka and howitzer fire from Smith's men were worthless. Outdated weapons and faulty ammunition failed to halt the tanks;

rounds literally bounced off the armor. Soviet T-34s lumbered on as if the Americans were not even there. About an hour later, infantry followed, maybe 1,000 or more. At first engagement, American troopers held well, but then North Koreans began slipping right and left, outflanking them until they were surrounded. In his hollowed-out aid station, Overholt's wounded stumbled in, some even crawled. In the melee, standard 4-man litter teams evaporated. Every infantryman who could shoulder a rifle was fighting, including stretcher teams. The young doctor went from casualty to casualty, ripping open shirtsleeves and pants legs, unbuttoning blouses and undoing trousers, probing gashes and holes, feeling bellies, checking breathing. Usually, it was no more than slapping on a field dressing, tying on a splint, slugs of morphine, and sending those who could, walking or on all fours, back down the hill and heading south. Not an ambulance was in sight. His work was all the worse with the relentless downpour, tape failed to stick to skin and dressings. Everything was drenched. With so many wounded, supplies—meager to begin with—ran low, bandages particularly. And in the midst of this mix, an occasional tank round would explode, scattering his men into their foxholes. After he expended all the field dressings, Overholt improvised, using T-shirts and whatever clothing was handy. Torn up strips and patches would have to do for now, anything to cover a wound, compress bleeding. The rain soon soaked everything anyway. Sterility gave way to simple pressure and splinting of fractures. Some of the medics were at a loss on how to mix plasma or find a vein to give it. Frustration mounted as casualties who sorely needed blood volume could not get even the meager supplies of plasma available.

The troops were near panic. The anti-tank bazookas were mostly firing duds with the sickening sounds of impact merely a thunk as unexploding metal hit steel. Even some of the World War II era M-1 Garands would not fire. Casualties climbed. Lieutenant Phillip Day recalled:

> One of my young guys got it in the middle. My platoon sergeant... ran over to him. I followed. "No way he's gonna live Lieutenant," Oh, Jesus the guy was moaning and groaning. There wasn't much I could do but pat him on the head and say "Hang in there."[9]

Fearing they would be overrun, Colonel Smith ordered a withdrawal off the hill. The retreat under fire, even at best a tricky maneuver, turned into a route with everyone for himself, stumbling and wading in paddy water and mud trying to avoid North Korean troops. But the enemy was all around, even to the rear, and their fire was horribly accurate.

Communications were abysmal. It is likely, at first, Overholt never got the order to pull out. The weather, noise, and maniacal clutter of his own aid station blinded him to unfolding events. Some of his cases were moribund, close to death. Some were salvageable but laid up, confined to stretchers; and a number were walking wounded. There was no way to get the litter cases out. The others, anyone who could walk, even those with splinted fractures, he told to take off through the rice paddies east and west. North Koreans had completely cut off any escape route to the rear. That left a group of 2 dozen or so immobilized casualties. When he finally heard of the withdrawal, Overholt knew he would have to stay behind. Two medics and the chaplain volunteered to stay with him. The 4 continued to do what they could, trying to keep the injured calm and comfortable. Finally, at one point, an American officer bolted over the hill, saw them, and exclaimed, "What are you doing here?" Did Overholt realize they were on their own? Gimlet riflemen with their M-1s and bazookas and grenades had evaporated. It was then that some, in pitiful shape, crawled off their stretchers over the lip of the crater, and tumbled down the hill. Doctor, chaplain, and medics helped whom they could, but North Koreans were closing in with steady cracks of rifle fire and soft thuds as lead met earth. One of the medics and some casualties were hit, sickening thuds as, this time, lead met flesh. In one paralyzing moment, the fate of his wounded, indeed of everyone, came into sharp focus. Leave at once or be overrun and probably shot. Overholt doubted their Red Crosses would offer any protection. One poor soldier, immobilized with a belly wound, looked up at Overholt and told him to move out, leave them. As the doctor later remembered:

> The situation seemed hopeless, so the chaplain and I did just what the wounded man urged us to do—get the hell out of there... I didn't have enough men to carry all the wounded off... When the North Koreans reached the litter patients and the chaplain who had remained with them, they shot them.[10]

That chaplain, Lieutenant Colonel Carl Hudson, in fact, was not shot. He was very much alive at the end, helping in evacuation of wounded. As for the litter patients, Raymond Adams, Overholt's fellow medical service officer, made no mention of them in his interview on 16 June and 22 July, 1965 with Army Korean War archivist Samuel Milner. Adams remembered only some stragglers, "Several [soldiers] were lost in other groups because they were so exhausted they could not keep up... These men were left behind and the enemy caught up with them, and, in some cases, killed them."[11]

In fact, others remembered a distinctly different scenario.

According to SGT Ezra Burke, one of the Overholt's medics, all were evacuated. His claim:

> I suggested to CPT Overholt that he take the walking wounded out and that I would handle the evacuation of the litter cases... I do not recall any dead being in or around the aid station. There was never a suggestion or thought on the part of the medics that the casualties would be left behind.[12]

Burke recalled that all litter cases made it out. No one was left behind. Still others thought that Smith's force "carried out as many wounded as possible." That some escaped is indisputable. A few medics with their piggyback patients, some walking wounded, and even 1 or 2 litter teams headed into rice paddies. A handful, maybe more, were picked off by North Korean sharpshooters as Adams claimed. But more, in groups of 2 or 3, found their way back to safety. Sadly, though, Overholt, in fact, was telling the truth. It was confirmed by a report from Captain Ambrose Nugent, a forward liaison officer with the 52nd Field Artillery Battalion. Nugent also was unaware of the withdrawal order by Smith. Out snooping for artillery, he found the command post empty on return. Confused as to their whereabouts, he started south but then doubled back. A flurry of gunfire stopped him in his tracks. Dropping to the ground, he hid near the command post but with a clear view of the aid station. By his estimation 30 wounded remained. "The enemy came in shooting and bayoneting those people," he later recalled.[13] Nugent was soon captured and remained a prisoner of war until 1953. Another soldier said "[w]e fired our last round and then just got out. I don't know how many wounded we left behind." And yet another, wounded himself, told war correspondent Marguerite Higgins about a boy whose leg was hanging by slivers:

> I dragged him into a thicket. There was no way I could have carried him out and no one to help me. I started to explain... but he just shook his head. "It's okay, Sarge. I don't expect to get out of here, but maybe I can take some of them with me". I handed him a grenade and crawled out...[14]

Yet there were others. "Hey, Lieutenant, sir, I'm not gonna go running across this damn field . . . we got six or eight guys down here. I'm gonna stay with them... Somebody's got to take care of them. They're in bad shape..."[9] And they did, and they were most certainly captured or executed on the spot.

How many of Overholt's patients died or were massacred is unclear. Anyone who could get up and get out, did. It is probable the rest, those near death, the crippled, the delirious, met with a bullet to the brain or bayonet to the heart. The fate of Task Force Smith proved a tragic combination of poor training, poor equipment, and poor support. Only the courage and fortitude of individual soldiers brought any salvation.

Twelve miles to the south, near Pyongtaek ("a shabby huddle of colorless huts lining narrow, dirt streets"[15]), 1st Battalion of Loveless's 34th Infantry, arriving on the heels of the Gimlets, set up defensive positions on either side of the road and rail tracks. They were a backstop for Gimlets north of Osan. Around midnight forms appeared from the dark, Gimlet stragglers telling their horrendous tales of butchery near Osan. At dawn, through the fog, their own nightmare would develop. A line of enemy tanks rumbled, unseen until they broke the veil of early morning mist, followed by columns of infantry. Nervous GIs fired half-heartedly (only about half the men actually discharged their weapons) and took off, bugged out, as the term became known. Some just flat ran, leaving packs, ammunition, and weapons behind. "It looked like the entire city of New York moving against two little under-strength companies,"[16] one trooper said. Some attempt was made to regroup 2 miles south near the village of Cho'nan, but no one could forestall the panic. Disorganization again carried the day. North Koreans seemed invincible, pushing aside puny American skirmish lines. Soldiers, despite sound defensive positions, simply crawled away, leaving the injured to their fate. Major John Dunn, the 34th Infantry's operations officer was disgusted: "This exhibition of a superior force abandoning wounded men without making an effort to rescue them was nauseating."[16]

Broken and dispirited, GIs slipped away under cover of darkness to the town of Chochi'won. Chochi'won was a key checkpoint on the South Korean Army's "Main Supply Line," thus held some tactical significance. Third Battalion of the 21st Infantry deployed to defend it. Major General William Dean, Commander of the 24th Division, had stressed the importance of this place telling battalion commander Lieutenant Colonel Carl Jensen "[h]old in your new position, and fight like hell."[16] The regimental surgeon, Captain Donald Duerk helped set up an aid station with battalion doctors Captain Alexander Boysen and Captain Douglas Anderson. The morning of 11 July, they came. More than 1,000 North Korean troops launched a perfectly coordinated attack 4 miles north of Chochi'won, quickly outflanking the 3rd Battalion, killing Jensen in the process. The small aid station was overrun, Boysen and Anderson both captured, and the medical company "shot to pieces." Survivors pulled out and fell back, completely unnerved by the experience. Injured and uninjured alike lay by the side of the road refusing to go on. One exhausted soldier told his officer, "Lieutenant, you will have to go on. I'm too beat

up. They'll just have to take me."[16] Regimental Surgeon Duerk was livid; even years later the stark scene clung to his memories. "They never did give an order to fall back. They were overrun. They were decimated. That to me was a monumental military blunder."[17] By noon, it was finished. Those alive, 200 of the original 800 men, worked their way in small groups back towards town, joining forces with bewildered remnants of Smith's 1st Battalion that had wandered in. Most had no weapons or ammunition, many neither helmets nor even shoes.

In Chochi'won, Duerk saw the effects of the bloodbath. A number of casualties actually reached him, brought by buddies, some on litters precariously perched on jeeps. One of the last men he treated was a young major, a big hole in his chest from an American .50 caliber machine gun, friendly fire. Death came quick.

> I particularly remember him because his widow wrote me weeks and months afterwards as to the particulars of his death—how he died, what did he say, did he have pictures of his family... it was... a very wrenching experience.[17]

Smith's attempts to hold Chochi'won failed. North Koreans drastically outnumbered American defenders, and a vicious assault on 12 July threatened to encircle and wipe out young, untested American replacements. Colonel Richard Stephens, head of the 21st Infantry, sent an urgent message to General Dean, "Am surrounded. 1st Bn left giving way. Situation bad on right. Having nothing left to establish intermediate delaying position am forced to withdraw to river line. I have issued instructions to withdraw."[16]

Those first precarious days had not afforded the luxury of field hospitals, no time nor safety. Doctors and medics delivered what first aid they could and rounded up vehicles to transport injured back to Pusan. Those in need of emergency surgery to stop bleeding suffered. Fortunately, (although it is not known for certain) these men were a minority, perhaps 1 in 10 or 12. One of Duerk's clearing platoons, accustomed to running a tented infirmary, was hardly more than an aid station at Chochi'won. At Taejon, on July 10, one platoon of the 24th Medical Battalion's clearing company arrived by train from Pusan. One doctor, 1 dentist, and 1 medical service lieutenant headed a group of 35 enlisted. Their aim was to find space for a hospital and capability for limited surgery. A schoolhouse was located, equipment moved in, and doors opened for wounded. Still, it was hardly more than a collecting point. Almost at once, they arrived, casualties from action around Chochi'won, about 30 miles away and from Kongju to the west. The lone physician, Major Austin Doren, saw all the wounded, did all the examinations and prioritizations, and treated whom he could. He was shortly swamped. A number of injuries were beyond his ability, damaging wounds threatening to life. Those he shipped off to the first of newly configured medical units called the Mobile Army Surgical Hospitals; MASH was the acronym. The 8055th MASH had arrived the day before. Front line doctors and medics were told this new unit could stop bleeding, secure an airway, and, if time permitted, preliminarily stabilize and repair injuries. A perfect solution, if it would work.

MASH: DeBakey & His Vision

An Example of Official Blindness: During the Second World War, Colonel Percy Carroll's Portable Surgical Hospitals in the Pacific and Colonel Edward Churchill's Auxiliary Surgical Groups in the Mediterranean and European Theaters attested to the value of forward surgical care. Third Army Surgeon Charles Odom saw it first hand:

> Early, skilled care of the wounded, as near the front as possible, conclusively proved its worth. Such care can best be provided by proper triage, with diversion of nontransportable casualties to the platoon of a field hospital staffed by trained surgical teams and located in close proximity to the clearing station.[18]

Seventh Army Surgeon, Colonel Myron Rudolph, was another proponent. He pointed out, as early as July 1944, that field hospitals with attached surgical teams, were eminently equipped to deal with so called "nontransportable" casualties, those in shock and with cardiothoracic, intra-cranial, or abdominal wounds, and those in danger of life-threatening infections.[19] While vital to a minority of combat wounded, perhaps 15% or less, in those cases blood loss during the first hours after wounding could prove fatal if not stopped.

For the hemorrhaging soldier, delayed surgery and the jostling from usual evacuation methods could promote further bleeding, let alone suffering in the hours needed for transport.[19] Chief Consultant in Surgery, Brigadier General Elliot Cutler, had advocated as early as 1942, surgeons must go to the patient, not the patient to the surgeon. That called for experienced surgeons, trained general surgeons, not general medical officers such as battalion surgeons.[20] By 1943, he was convinced mobile surgical teams were a requisite to expert field care. Large, general hospitals with a wealth of well-trained surgeons could feed these smaller units, sending their skilled but idle surgeons forward, close to the front. He named them auxiliary surgical groups. Yet the model was not completely satisfactory. Dependence of auxiliary surgical groups on a parent organization limited their

ability to provide for extended periods in combat. In a memorandum to the Chief Surgeon dated April 18, 1943, Cutler commented:

> The defect in the Auxiliary Group is that they only carry with them their instruments and would have to be given all of the rest... by the hospital to which they were attached... [in contrast] The... "mobile surgical team" [...] is to have its own transport and take with it everything it needs in the way of professional supplies to cover the completion of 100 major surgical operations.[18]

The Army argued forcibly for a self-contained surgical hospital replete with trained surgeons and complete sets of surgical equipment, all under the unit command of officers. Despite efforts to maintain autonomously functioning surgical teams such as the Axillary Surgical Groups—more to the liking of civilian-surgeons—Army doctrine prevailed. Some veteran Army doctors, like Lieutenant Colonel Michael DeBakey, former consultant to the surgeon general, were incensed. DeBakey retorted, as he wrote to pal Edward Churchill in June 1945: "[t]he big difference and the main point of issue is that this proposed hospital has attached to it surgical teams as organic personnel... We have strongly opposed it,"[21] he stressed, citing loss of flexibility that was the hallmark of the auxiliary surgical groups.

The Regular Army prevailed. The new configuration was decided upon and published 23 August 1945. In fact, the new surgical hospital would adopt the same Table of Organization and Equipment (TO&E) (TO&E 8-571) was used for the auxiliary surgical groups in World War II. The initiative was renamed Mobile Army Surgical Hospital. Doctor DeBakey did not suffer foolish ideas graciously. He would write Churchill the next April: "[c]ertainly this is an example of official blindness to facts bathed in the bright light of experience."[22] While Dr. DeBakey would forever be credited with the development of the mobile surgical hospital, in its final form it was a product he passionately opposed. Nevertheless, its basic premise, early surgical care of the critically injured had indeed carried the day.

But, as of 1 July 1950, there was not a MASH unit to be found. In typical hurried fashion, TO&E 8-571 was provided to the 155th Station Hospital in Yokohama, Japan. Implement was the directive. In a scramble deserving of an episode from the television show *M.A.S.H.*, a nucleus of physicians, nurses, supply officers, and enlisted were rounded up from all over Japan, brought to Yokohama, and indoctrinated. This was to become the 8055 MASH. Most were not even aware of what a MASH was supposed to do. Lieutenant Colonel Ike Tender was named first to command. Events unfurled quickly. Tender garnered quipment from almost every depot on the islands. Without delay, all staff were on a train headed for Sasebo 2 days later. From there, boat took them directly to Pusan, Korea. Supplies followed in bits and pieces, mixed with those of the 8054 Evacuation (Evac) Hospital, also slated for Pusan. Once sorted out, staff were then herded onto a train and sped to Taejon where the 24th Division and several Republic of Korea (ROK) divisions established a new line of defense around the town on the south bank of the Kum River. By 9 July, the 8055 MASH was in business: 10 doctors, 12 nurses, and 95 enlisted put together resuscitation bays, operating rooms, and recovery areas. The operating room was designed to handle 4 patients at once (4 tables side-by-side, sometimes sharing 1 or 2 anesthetists). It rarely emptied. "You wear boots, pants, a rubber apron, and gloves most of the time – occasionally a cap and gown" one surgeon recalled. "All wounds, of course, are dirty, so there is no need for strict asepsis."[23] There was little desire to step outside the compound. Taejon was bug and vermin infested, hygiene primitive, and water came from a well of unknown quality. All bathed using their helmets. And they were in the midst of active combat, not far from front line troops across the Kum River.

Evacuation of wounded from the 8055 MASH was an ordeal in itself. The road system in South Korea was primitive, clogged with traffic, and dangerously slow. Doctors, nurses, and medics were at a premium; ambulances were antiquated and not favorites anyway because of enemy targeting. Trains proved much more satisfactory. At Taejon, the 24th Division procured 2 self-propelled Japanese railroad cars, affectionately called Doodlebugs. The cars could hold 17 litter and 50 ambulatory patients. Doodlebugs shuttled casualties from nearer the front to Taejon and from Taejon south to Pusan.[24] War correspondent Marguerite Higgins took one of those rides. She described it as a "stench and darkness of a filthy, bug-ridden hospital train:"

> Stretchers were placed across the backs of the wooden benches. A gangrenous odor of untended wounds mingled with the car's own smell—that of a very old latrine. Many of the wounded tried to lie down on the floor and on the wooded seats. But we were so crowded that there was no way for anyone to stretch out. The heat and fetid air made me agonizingly sleepy.[5]

According to planners, after the 8055 MASH had stabilized critically wounded patients, they were to be shipped back to the 8054 Evac located near the port town of Pusan. The 8054 Evac was a key element in the echeloned care of injuries. The new MASH system of forward surgical care depended on evacuation hospitals

to receive patients from field units and continue treatment. They were surgical in nature but hardly mobile, their task being the continued repair of wounds and care of critically injured. But once again, the Medical Corps had been caught short, and the 8054 Evac had auspicious beginnings as well. "Due to events originating in Korea 25 Jun 1950, the organization and establishment of the 8054th Evacuation Hospital was precipitous,"[25] so read the hospital's Annual Report for 1950. There were simply no functioning evacuation hospitals in Japan available for immediate deployment. TO&E 8-581—organizational tables for 400 bed semi-mobile hospitals—clearly spelled out personnel and material, but none was at hand. From the 155th Station Hospital, calls went out across the country recruiting doctors, nurses, and enlisted from Osaka Army Hospital, Tokyo Army Hospital, the 25th Medical Battalion (25th Infantry Division), and bases in Kobo and elsewhere. Eventually 5 general medical officers, 4 general surgeons (no orthopedic surgeons could be found) 2 anesthesiologists, 2 radiologists, 1 psychiatrist, and 1 ophthalmologist were located. The mission, of course, was to provide surgical care for men of the trip wire 24th Infantry Division. By 4 July, just 3 days later, an advance party had already arrived in Pusan and scouted for a suitable location for the hospital. The first location, the Pusan Middle School, proved too confining, not nearly enough space, so another school building a block away was commandeered. Before long, both were in use, the middle school as an annex and convalescent center. That would not even be enough. Surgeons found space for 200 more beds and shortly after that, another 200. In all, the 8054 Evac soon claimed a bed capacity of 800. No sooner had doors opened than casualties poured in. The first wounded from Task Force Smith made their way back, and from then on, it was a steady stream of 24th Division victims from Osan to Taegu. Three operating tables would not be enough. Medics set up a second operating room. They were seldom idle.

The Gauntlet

"There will be no more retreating."

GEN Walton Walker, 8th Army Commander[16]

At Taejon the second of the 24th Medical Battalion's clearing platoons finally caught up; the other platoons would arrive the following days. Their field hospital set up right next to the 8055 MASH. Both hospitals were conveniently located near a railhead where Doodlebugs stopped and specially outfitted Korean coaches, 2 Pullman-style cars and a modified box car, coupled with freight trains. Fresh from surgery, men were loaded in and moved on to Pusan and the 8054 Evac.

North Koreans soon pressured the defenders of Fortress Taejon. Fearing another encirclement, medical units were hustled out of the city, beating a path south. The sole 24th Med Battalion clearing platoon and the 8055 MASH moved back to Yongdong, 30 miles to the south. Most left by rail. It was a 4-hour "flea-infested train ride," 8055 Chief Nurse Phyllis LaConte remembered. "The train didn't need an engine, the fleas could have pushed it."[26] The clearing platoon left by trucks and barely made it. An ambush caught them in the open. Battalion surgeon Frank Thompson remembered that passage: "[i]t was a matter of running a gauntlet of fire for about three miles... Gasoline blazed, ammunition blasted, and tracers laced the convoy."[9]

Unbelievably, only 2 men were wounded and none killed.[27] At Yongdong the 24th Med Battalion again linked up with the 8055 MASH, both occupying an abandoned building. For medical teams, Yongdong was only a stop along the way. As 1st Cavalry soldiers withered before North Korean assaults, Yongdong would have to be abandoned. Before long, all were packing up and traveling even further south to the town of Taegu. Finally, a clean building, a teacher's college, was located for the 8055th. No more bugs, no more rats.

By 20 July, Taejon was encircled. North Korean troops girdled the city and lined the only road south to Taegu. Through this gauntlet passed remnants of the 24th Division. Some scrambled over the hills, but the main column persevered, suffering almost 30% casualties in the process. General Dean was captured after a 36-day odyssey in the mountains, along with more than 800 of his men. Surgeon Duerk wondered how far they would retreat. Another Dunkirk?

"I've been around water all my life," he told his jeep driver, "If I get to Pouson [sic]... I will get us back to Japan on a barn door if I have to."[16] He, his jeep driver and other survivors regrouped at Yongdong, a skeleton crew of disillusioned young men, as told to Roy Appleman in 1952:

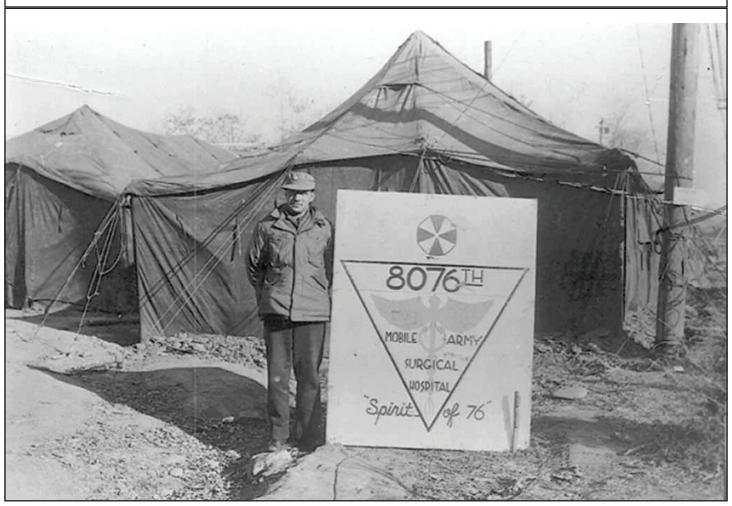
> The men and officers had no interest in a fight which was not even dignified by being called a war... a bitter fight in which many lives were lost, and we could see no profit... except our pride in our profession as well as the comradeship which dictates that you do not let your fellow soldiers down.[16]

Troopers of the 24th Division eventually fell back to Yongdong and on July 22 turned their positions over to the 1st Cavalry Division. In bitter fighting, they too buckled under flanking and infiltration by North Koreans. It would be behind the Naktong River Americans and ROK soldiers would have to fight, their final defensive

line. Eighth Army Commander General Walker issued the following statement on 29 July, called his "stand or die" order:

> There will be no more retreating, withdrawal, or readjustment of the lines or any other term you choose. There is no line behind us to which we can retreat... There will be no Dunkirk, there will be no Bataan. A retreat to Pusan would be one of the greatest butcheries in history. We must fight to the end.[16]

Figure 1. Lieutenant Colonel Kryder Van Buskirk and the 8076 MASH.[28]



Again, caught in the melee were the wounded. Captain Linton Buttrey ran one of the advanced battalion aid stations and, in short order, had accumulated 30 seriously wounded men. As North Korean forces closed in, he was faced with transporting these men across rocky, mountainous terrain. By that time, the main evacuation route had already been severed. He and his litter bearers took to the hills. Footing steep terrain exhausted everyone; endurance had been sapped by continuous combat, lack of sleep, and little to eat or drink. Buttrey and 2 chaplains, Captains Herman Felhoelter and Kenneth Hyslop, told the uninjured and those wounded who could still walk to take off and the 3 would stay with the stretcher patients. Buttrey himself was shortly wounded. Hyslop also was hit. Felhoelter told them to head off. Herman Felhoelter, a Franciscan priest, stayed with the wounded, doing what he could for their comfort and giving last rites. He knew what was coming. Buttrey later told Marguerite Higgins the awful tale on their filthy train ride back to Pusan. He witnessed the North Koreans, no older than teenagers, maybe 16 to 18 years of age, move in on the litter patients and, despite the pleadings of the wounded, killed them all. Chaplain Felhoelter fell victim as well, shot in the back of the head as he knelt over a casualty.[5]

Taegu lay within what would popularly be known as the Pusan Perimeter, a 150-mile rectangular line anchored by the towns of Taegu and Pusan. Thanks to the horrific sacrifices of the 24th Division, North Korean advances were halted around Taejon. This provided valuable time for arrival of 2 more American divisions, the 1st Cavalry and the 25th Infantry Divisions. By 1 August, 3 US divisions, the 24th, 25th, and 1st Cavalry on the southwest sector, and several ROK divisions arrayed to the northeast, were crammed into this space bordering the snaking Naktong River to the west and mountainous, inhospitable terrain to the northeast. The Sea of Japan and Strait of Korea were at their backs. Thinly spread, the American troops, already enduring continuous days of combat, were spent.

Through the month of July, American losses totaled 6,003 men including 1,884 killed in action, 2,695 wounded, and 1,424 missing or captured. But more reinforcements were on the way. In the first days of August, the 5th Regimental Combat Team arrived from Hawaii and attached to the 24th Division. On 2 August, the First Marine Brigade, elements of the 11th Marines (artillery), and Company B of the 1st Medical Battalion (Navy), landed at Pusan and scrambled to the southwest sector to shore up the 25th Division. Elements of the 2nd Infantry Division began arriving around that time as well. By that same date, with arrival of reinforcements, General MacArthur reported to the Department of the Army that the combined United Nations forces in South Korea, all by then in the Pusan perimeter, totaled almost 142,000 men.[16]

The Perimeter

Speed, Succor, & Surgery: By early August, 3 MASH units had located within the Pusan Perimeter. The 8055 had moved from Taejon to the village of Yongdong, fled from there and moved to Taegu. This, too, proved precarious, so fearing lines might give way, the unit withdrew all the way to Pusan. A second unit, the 8063 MASH, had also set up in Taegu 29 July, but moved to Pusan and then to Changwon (near Masan on the western edge of the perimeter). By then, the 3rd MASH unit had arrived. Lieutenant Colonel Kryder Van Buskirk's 8076 MASH put up in Miryang.

Van Buskirk (Figure 1) knew little about MASH units until he was placed in command of the 8076 MASH.[13] Of the doctors who appeared at his assembly site, 7 of the 10 had only completed an internship. One, Captain George O'Day, just finished a surgical residency at Ohio State University, and the remaining doctors had 1 year each of

residency training in internal medicine. With some ingenious raiding of supply stores, his team, 126 strong—nurses and enlisted added—set out for Korea. In Pusan by 25 July and Taegu 2 days later, they muscled into the same schoolhouse occupied by the 8055 MASH. Van Buskirk's team would support the 24th Infantry Division around Miryang, south of Taegu. On 2 August, his MASH found an empty factory building and warehouse and moved in. Close by were the 24th Med Battalion and a clearing company for the newly arrived 2nd Infantry Division. Five abdominal wounds rolled through the doors the next day; 3 died on the operating table. At first, only 1 nurse was available to pass gas, Lieutenant Katherine Wilson, who circled 6 operating tables. So busy dropping ether, she was "nearly anesthetized from the fumes." Dozens of wounded men poured in over the next few days. Before long, bed capacity expanded from 60 to 200. Hardly a moment passed where operating tables were empty. There were no easy cases. All brought in were desperately injured, some in the pasty throes of shock, many with multiple wounds.[28,29]

The Pusan perimeter was a compact combat zone. Front lines were never very far away, and the danger of North Korean infiltration tangible. Brigadier General Jack Pollock was a maxilla-facial surgeon with the 8054 Evac back then. He recalled 3 occasions when male officers helped to man the perimeter around the hospital "because an attack was considered imminent." Everyone was aware of the consequences should they be overrun. In the meantime, work was steady enough to keep minds focused, including those of the nurses who spent hours on their feet, pushed to the point of exhaustion. At the height of the Pusan fighting, when touring the hospitals, including the 8054 Evac, Colonel Chauncey Dovell, 8th Army Surgeon, marveled at the resilience of the nurses:

> I've seen those nurses giving anesthetic, and scrub nurses that would work... until they were practically gone. Somebody would hold a cup of coffee [for them to drink]... And of course they had a bath last week sometime, I suppose, when they got down to a branch of a stream... I never heard a woman that was a nurse complain as to the roughness and the hardships or anything of the kind.[29]

Well over half the wounds involved bones or joints. Splintered and exposed bony fragments were the result of high velocity rifle fire, usually shearing away skin and muscle in the process. Surgery to clean up wounds, pull out loose fragments, clothing, and dirt was straightforward, but reconstruction of fractured limbs needed skill and training. Through 1950, the Army was woefully short of experienced, board-certified surgeons and particularly orthopedic surgeons, thanks to demobilization. There were very few capable surgeons for deployment, particularly orthopedic specialists.[30] Of 96 doctors labeled as surgical specialists serving in the Far East through February 1951, only 16 (17%) were fully trained and judged competent by the examining boards of surgery. The balance had some but not complete training in surgery. And few had any orthopedic skills.[32]Moreover, with their training, however rudimentary it had been, few of these men had experienced combat injuries. The magnitude of trauma caused by military ordnance eclipsed anything seen in civilian practice. In the tight confines of the Pusan perimeter, surgeons quickly found themselves immersed in a cesspool of gore. Within a brief period of time, treatment for hemorrhagic shock, mutilated limbs, and eviscerating trauma became almost second nature for them.

What augmented the effectiveness of MASH units was the introduction of rotary aircraft (helicopters) for casualty evacuation from very near battle lines. Wary of the vulnerability of helicopters, field commanders had been loath to incorporate them into casualty evacuation until trial runs demonstrated their effectiveness and relative safety.[14] Once their role was expanded though, by 1 January 1951, the US Air Force alone had picked up 1,394 casualties from the front lines. Patients with head, chest, or abdominal trauma, injuries where time was of the essence, received preferential transport.[31]

The 8063 MASH was the third such unit deployed to Korea in those first days, commanded by veteran doctor Colonel Frank Neuman. While initially slated as division surgeon for the 25th Infantry Division, he was quickly reassigned to command a new MASH unit, the 8063. Of course, it existed only on paper. Neuman had little idea what his MASH would do, and, scanning the TO&E list, he saw no familiar faces. Somehow, Neuman rounded up his crew: 11 doctors, 14 nurses, and 122 enlisted. They all met for the first time in the staging area near Yokohama, shook hands, and loaded aboard the troopship USS Cavalier with troopers of the 1st Cavalry Division. Staff and equipment were deposited at P'ohangdong 2 days later. It was 18 July 1950. The 8063 MASH tailed the 1st Cavalry Division to Kumch'on, 30 miles northwest of Taegu. By 22 July, casualties were streaming in. 1st Cavalry soldiers had clashed with swarming North Koreans. Frustrated by lack of equipment and supplies, and overwhelmed by casualties, Neuman was barely able to evacuate his hospital when the 1st Cavalry pulled back in the face of renewed North Korean attacks. Only the fortuitous location of railroad cars saved his men.

The 8063 MASH then moved to Changwon, in the Pusan perimeter. They would be there until mid-September.

Here they had the luxury of buildings and escaped from the hot, smelly tents at Kumch'on (Figure 2). Three miles distant was the clearing station of the 25th Medical Battalion. This field hospital proved vital to the success of the MASH. Their commander, Captain Charlie Baker, understood the role of triage and the role of his nearby MASH. His men identified the critically wounded, loaded them on railway cars and sped them to the 8063.[34] In August, Neuman's MASH acquired 2 anesthesiologists and 2 anesthetists, easing the burden of a surgical unit beleaguered with casualties. One seasoned nurse, Oree Gregory, wrote in her diary:

Figure 2. Receiving ward in a MASH.[32]

> I'll never forget these casualties; in all my 17 years of experience I've never seen such patients. Blind, or with legs, arms or buttocks blown off. Many chest and abdomen injuries. Many died despite skilled surgery.[26]

There was no end to the work, Van Buskirk remembered. It taxed every member of the staff. "You would work 24 hours pretty well straight through... you would nap between cases... Most [nurses] would work 12 to 16 hours a day without rest and some until they collapsed,"[34] he commented in an interview July 7, 1966, at Walter Reed Army Medical Center, Washington DC.

It all changed with MacArthur's bold plan to sweep around the North Korean flank to land at Inchon. Outflanked, North Korean resistance withered, and American and South Korean units broke out of the Pusan perimeter to enter a new phase of the Korean conflict. Bold intrusions into North Korea would prompt a backlash of Chinese aggression and the Korean War would become a stalemate for the next 3 years. During that time, MASH units would continue to provide early surgical care for combat casualties and establish the effectiveness of these units in medical management of war wounded.

Conclusion

The Bloodied Road: The opening phase of the Korean conflict was a nightmare for US forces and almost proved a calamity of the greatest proportions if forward units had not been able to conduct a successful rearward movement. Much of this was accomplished through the bravery of individual units, commanders, and soldiers. Similarly, frontline medical care degenerated into makeshift aid stations and treatment on the run. Only those injured able to evacuate under their own power had a chance of survival. The immobilized, the non-transportables, were doomed. Lack of immediate surgery and onrushing presence of vindictive enemy troops sealed their fate. The placement of surgical facilities, such as MASH units, would have been impractical until a sturdy defensive perimeter could be established as it eventually was around Pusan.

Combat casualty care in the midst of an unstable front without established and secure lines of evacuation are all a recipe for disaster, particularly for critically wounded troops. Only the actions of selfless medical providers saved any. However, once safely behind the defensive positions around the port of Pusan, MASH units established their superiority in forward medical care under the most severe conditions. Author Richard Hooker delivered a sobering commentary on their exploits:

> The surgeons in the MASH hospitals were exposed to extremes of hard work, leisure, tensions, boredom, heat, cold, satisfaction and frustration that most of them had never faced before. Their reaction, individually and collectively, was to come with the situation and get the job done.[35]

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Old Blood and Guts and the Damned Doctors

LTC (ret) James Kelly Morningstar, PhD

Figure 1. General George S. Patton, Jr.[13]

You have probably heard the story. On the afternoon of 3 August 1943, while his 7th US Army battled the Germans across northern Sicily, Lieutenant General George S. Patton Jr. (Figure 1) stopped outside Nicosia to visit the 15th Evacuation Hospital. The hard-pressed 1st Infantry Division's commander, Brigadier General Clarence R. Huebner had only recently warned him that "the front lines were getting thinner" because numerous soldiers malingered in the field hospitals to avoid combat.[1]

Entering the tents Patton greeted each wounded soldier "by shaking his hand or patting his head and telling him what a fine job he had done with the war effort."[2] The men appeared "brave and cheerful."[3] The general then came across 28-year-old Private Charles H. Kuhl of L Company, 26th Infantry Regiment, 1st Infantry Division, who sat on a stool, in uniform, wearing his helmet liner. The previous day Kuhl's battalion aid station had diagnosed him as suffering from "exhaustion" for the third time in less than a month.[4] The station sent him to a medical company where he recieved sodium amytal before moving on to the 15th Evac. There, medics evaluated Kuhl as suffering from "moderate severe" psychoneurosis anxiety and noted: "He can't take it at the front evidently."[4]

Patton asked Kuhl where he was hurt. The private shrugged, "I guess I can't take it."[2] Patton became irate, cursed Kuhl, called him a coward, and ordered him out of tent. The soldier froze, sitting at attention. Patton exploded in anger. Eyewitnesses reported he slapped Kuhl's "face with a glove, raised him to his feet by the collar of his shirt and pushed him out of the tent with a final 'kick in the rear.'"[4] Medics rushed the soldier to a separate tent, where they discovered he was running a fever of 102.2 degrees, apparently caused by malarial parasites. That night Patton wrote in his diary he had met "the only arrant coward I have ever seen in this Army... Companies should deal with such men, and if they shirk their duty, they should be tried for cowardice and shot."[4]

Unfortunately, this wasn't the end of the infamous slapping incident. Exactly one week later, on 10 August, Patton arrived unannounced at the 93rd Evacuation Hospital near San Stephano. After greeting 3 wounded

soldiers, he approached a 21-year-old private shivering in a cot. Four days earlier Private Paul G. Bennett, a 4-year veteran artilleryman with C battery, 17th Field Artillery Brigade, witnessed one of his friends get badly wounded. Doctors later reported, "He could not sleep that night and felt nervous."[1] Back on the front line he became increasingly anxious. A corpsman in his battery sent him to the 93rd Evac where he was diagnosed with a fever and symptoms of dehydration, fatigue, confusion, and listlessness. Bennett asked to return to his unit, but the medical staff kept him in the hospital.

Failing to see any signs of injury, Patton asked Bennett what was wrong. Bennett replied: "It's my nerves."[4] Patton asked, "What did you say?" leading Benet to sob as he replied: "It's my nerves, I can't stand the shelling anymore."[3] According to Major Charles B. Etter, the hospital receiving officer, Patton shook with anger and ranted: "Your nerves, hell; you are just a goddamned coward, you yellow son of a bitch."[1] Patton then slapped Bennet, shouting, "Shut up that goddamned crying. I won't have these brave men here who have been shot seeing a yellow bastard sitting here crying."[4] Patton then struck Bennett a second time, knocking his helmet liner into an adjacent tent. Patton turned to Major Etter and ordered him, "Don't admit this yellow bastard; there's nothing wrong with him. I won't have the hospitals cluttered up with these sons of bitches who haven't got the guts to fight."[4] Etter said Patton turned back to shaking Bennett and growled:

> You're going back to the front lines and you may get shot and killed, but you're going to fight. If you don't I'll stand you up against a wall and have a firing squad kill you on purpose. In fact, I ought to shoot you myself, you goddamned whimpering coward.[3]

As doctors and nurses rushed in, Patton reached for one of his pistols while hospital commander Colonel Donald E. Currier jumped between the general and the private. Patton departed saying, "I want you to get that man out of here right away. I won't have these brave boys seeing such a bastard babied."[3]

Patton completed his inspection of the 93rd Evac with apologies to his medical escorts. "I can't help it, but it makes my blood boil to think of a yellow bastard being babied."[3] He told Currier, "I meant what I said about getting that coward out of here. I won't have those cowardly bastards hanging around our hospitals."[3] Outside the tents, reporters Noel Monks and H.R. Knickerbocker arrived in time to observe Patton "shouting and gesticulating to a worried-looking Army doctor and several nurses" before climbing into his jeep and departing in a cloud of dust.[2]

Besides serving as an obvious example of outrageous mistreatment of subordinates, Patton's outburst towards Private Khul and Private Bennett provides evidence of the deleterious effects of cumulative stress and physical injury on commanders. The 58-year-old general had been in motion without break since arriving at the newly formed 2nd Armored Division at Fort Benning, GA, 3 years earlier. The first slapping incident occurred on the 23rd day of the Sicily campaign, in which Patton had been constantly at the front, often exposed to fire, and short on sleep. He carried the enormous burden of his mounting casualties, visiting the wounded men on numerous occasions. He continuously battled the Germans, his higher headquarters, the press, and his own reluctant subordinates. Foremost in his mind, Patton felt compelled to beat British General Bernard Montgomery's 8th Army to Messina in order to rescue the reputation of the American Army so tarnished at Kasserine Pass in North Africa. On the day of the second slapping incident, Patton—suffering the first symptoms of a severe illness—had reluctantly overridden his unwilling commanders to force an amphibious end run around the German line.[5]

The next day, Patton felt so shaky his physician, Colonel Charles B. Odom, confined him to bed. The general ran a fever that spiked to 104 degrees.[6] Odom recalled,

> It was initially feared that he had developed malaria, but since I had seen numerous cases of malaria during my training in Louisiana, I recognized that this was definitely not malaria. With bed rest, plenty of fluids, and aspirin, he was up and around within three days.[6]

Still on 18 August, Patton reported: "Stayed in camp all day as I still feel rather shaky as a result of my sand fly fever."[5]

Cumulative Injury: Stress and fatigue alone may explain Patton's outbursts, but his medical history calls for further contemplation. Biographer Martin Blumenson, who was with Patton during the war, thought the episode not unusual:

> He was moody, temperamental, savagely profane, and easily moved to tears. He flared up in anger for no apparent reason and was immediately and abjectly contrite. He was subject to uncontrollable rage and the next instant tendered his sincere apology.[7]

Blumenson came to suspect Patton suffered from a lingering subdural hematoma resulting from a lifetime of injuries. In the 1970s, doctors explained to the biographer their understanding of how repeated blows to the head could produce a pooling of blood between the brain and the skull leading to pressures that could spark

such episodic anger, irrationality, and overt hostility.[7] In a similar vein, today's medical experts might say Patton suffered from Chronic Traumatic Encephalopathy (CTE), thought to cause changes in mood and behavior in patients over 40 years old.[8] Patton's personal history of annual injuries certainly supports such a diagnosis.

A track and field star athlete who competed in the 1912 Olympics, Patton repeatedly put his body through extreme physical trials. For instance, after running track at West Point on 13 May 1905, the 20-year-old wrote: "I almost brought my fiery life to a sudden and tragic conclusion. I tripped over a hurdle going full speed and lit on my head about thirty feet further on."[7] Many times in his athletic career he similarly pushed himself until he either passed out or got knocked out while habitually absorbing blows to the head.

Patton's lifelong love of horses added to his injuries. During cavalry drills at Fort Sheridan, IL, on 6 March 1910, Lieutenant Patton's horse bucked him off, rolled over his leg, and butted him leaving a half-inch gash above his eyebrow. "I certainly looked like a stuck pig," Patton wrote to his wife.[7] Two years later he suffered a 5-inch laceration of the sagittal suture region—the seam on top of the skull—that required 16 stitches to close. On a steeplechase on 5 April 1913, he fell from his horse and suffered a 1-inch laceration at the fronto-parietal region and a nearly 2-inch cut in the occipital region that resulted in 2 days in sick quarters.[7] The next year he suffered a concussion so severe it resulted in a temporary partial paralysis of his right arm. While riding at Fort Riley, KS, on 3 April 1915, Patton's horse stumbled, rolled over him, and kicked him in the head. He told his wife that despite 5 stiches he came away without a head ache and joked: "When I get less hair than I now have I will look just like a German duelist."[7] That wound required quarters for 9 days.

An embrace of emerging technology further exposed Patton to injuries. He drove General John J. Pershing's car in Mexico and France, became the US Army's first tanker, and even earned a pilot's license. Late on 1 December 1917, he was riding in a car with Colonel Frank Parker in France when they ran into a closed railroad gate. Patton reported, "I carelessly put my head through the front window and cut an artery on my left temple and cut a hole at the point of my jaw on the right side about an inch long and deep."[7] Doctors at Neuilly closed the wound with 5 stitches. Five years later he suffered another laceration on his head requiring 2 stitches.

The cumulative damage done by all these injuries may have become apparent after a polo match in Hawaii in the summer of 1937. Patton violently collided with other players and fell limply to the field. After several minutes, he got up and continued the game. Sailing with his family 2 days later, he suddenly turned to his wife and asked her what the hell had happened. The last thing he remembered was falling off his horse. Doctors diagnosed a concussion. "After that," explained Blumenson, "even mild drinking had a pronounced effect on him. He quickly became maudlin, sobbing openly as he recited verse with slurred and slipshod diction."[7]

That concussion corresponded with the start of a dark period in Patton's life. His career seemed to be going nowhere; his destiny looked unfulfilled. He often became surly with family and friends. He drank more often, or at least appeared more often affected by drink. He had an affair that almost ended his marriage. The onrush of World War II encouraged Patton to pull himself together, but it was still not unusual for him to confide to his diary during idle moments: "I have the most awful blues all day. Nothing seems to be happening and I just sit."[1]

Philosophical Differences: Even concussion syndrome, however, explains only 1 of the motivations behind Patton's behavior. There remained his philosophy anyone could overcome weakness and injury if they maintained proper determination. Add to that, his suspicion doctors often interfered in the process. These attitudes grew from personal experience. As a boy, Patton had been weak, pampered, and homeschooled until he was almost 12 years old. Some biographers suggest he was dyslexic. His early letters from West Point clearly indicate he saw himself as soft, with a sensitive stomach and an addiction to candy.[7] On his 19th birthday he wrote to his father: "Infact [sic] the sum total of me is that I am a character-less, lazy, stupid yet ambitious dreamer; who will degenerate into a third rate second lieutenant and never command anything more than a platoon."[7] After attending a lecture on bloody fighting in the Russo-Japanese war, he surprisingly confessed to his then-girlfriend Beatrice:

> From the amount of mortality it must be a good deal safer to jump off a cliff than to be an infantry officer in a frontal attack... I shall take the artillery if I get a chance for while they get to wear badges and are called veterans they stay off at a respectable distance and eventually return to their loving families.[7]

By the end of his first year at West Point, however, Patton had begun to reinvent himself.

Patton maniacally pushed himself in sports and even set school records in track. After being held back for failing math he went out for football. He wrote Beatrice, "I know that unless I am found [flunked out] or killed I

shall make this team."[7] When his reckless play resulted in a fracture at the radius and ulna heads of his right arm, he tried playing with a cast. Two years later Patton wrote:

> [... football] practice has been killing but I am all right as far as nerve goes. It is funny I have changed entirely and realy [sic] enjoy getting hurt though aside from a small kick in the head I am not much the worse for the first weeks work.[7]

In a letter to Beatrice during his senior year, Patton revealed his newfound philosophy while describing his part in a tug of war contest:

> I thought I had broken some thing inside but could not ask anyone for if some thing had been broken they would not have let me pull the next time. It was pretty hard to pull the second heat when I was expecting all my inside to rip but they did not and this morning I went to the hospital and found that it was only a muscle pulled out of place a little. It is all right now only a little stiff. It only shows what a coward a man is to always think he is killed when he is not even hurt.[7]

Patton cultivated indifference to injury. When he got kicked in the head by his horse in 1910, he wrote, "I did not know it was cut until I saw the blood running down my sleeve but I hated to pay any attention to it so kep [sic] on drilling for about twenty minutes with out even wiping my face."[7] When a doctor complemented him for not flinching while receiving a tetanus shot, Patton wrote, "It is a good thing… for naturally I am not over bold and am inclined to show emotion – a most un military trait."[7] His stoicism faced a supreme test under Pershing in Mexico in 1916, when a malfunctioning lantern spewed burning gas into Patton's face and set his tent afire. He wrote, "I ran outside and put my self out" before extinguishing the tent.[7] Instead of seeking immediate medical attention, however, the freshly scarred lieutenant made sure to report to Pershing to say he was going to be incapacitated.[7] Worse wounds were yet to come.

On 26 September 1918, Patton was on foot leading his tank brigade through thick fog in the Meuse-Argonne Offensive. As they came under machine gun fire, soldiers begged Patton to take cover but he replied: "To hell with them—they can't hit me."[2] The Germans shot him. He explained to his wife:

> The bullet went into the front of my left leg and came out just at the crack of my bottom about two inches to the left of my rectum. It was fired at about 50 meters so made a hole about the size of a [silver] dollar where it came out.[7]

Despite his noticable pain, by Thanksgiving he was playing football with troops and riding horses.[7]

The injuries continued. In December 1920 at Camp Meade, his horse violently threw Patton forward on the pommel, causing bilateral orchistis, severe injury to both testicles, and left him incapacitated for several weeks.[7] He fractured his left hip in a horse show in Syracuse in September 1921.[7] In January 1922, he suffered near cardiac arrest from an allergic reaction to tainted shell fish.[3] In 1924, another riding accident left him with fractures of the eighth and ninth left ribs, a lacerated head, and a severely sprained left knee. Patton seemed to take each blow as a challenge to his manhood. In an illustrative incident in 1923, after being thrown from a horse while attempting a jump, a cursing Patton remounted and repeated the jump "a number of times in rapid succession" before explaining to a bystander, "I did it just to prove to myself that I am not a coward."[3]

The Obstacles of Doctors: Any of these injuries might have ended Patton's career, but it was a pleasant Sunday afternoon ride at his home in Massachusetts on 25 July 1937 that almost did the trick. He was riding adjacent to Beatrice when her horse kicked his leg and made a sound "like a dry stick snapping."[3] Patton had suffered a compound fracture of the right tibia and fibula. Doctors at the hospital in nearby Beverly operated and discovered he had developed a severe phlebitis due to an embolus in his right leg and had a pulmonary embolus lodged in his lower left lung. His friend Dr. Peter P. Johnson operated and likely saved Patton's life.[3] Informed of the accident, the Army's Boston-based Corps area commander mistakenly informed the War Department Patton had been hurt while playing polo. Still in the hospital a month later, Patton learned the commander of the Harbor Defenses of Boston had called a board of officers to determine if his injury had been in the line of duty. If not, Patton faced the possible end of his career. He was finally released from the hospital on 4 November but restricted to sick quarters with an iron leg brace.

In January 1938, the medical board began its investigation and eventually unanimously concluded Patton's injury was not a result of misconduct.[7] Still, they ordered him to report to the Fort Banks Hospital in Winthrop, MA, to determine if he was fit for active duty. Although he walked with a limp and complained of weakness and pain in his right leg, the doctors allowed him to resume his career. One wonders what impression the brush with the medical board made on Patton. He left no record of his feelings. We have only intriguing glimpses in letters and diaries of his thoughts on the medical profession in general.[1]

From an early age Patton believed doctors and hospitals shielded shirkers. At the end of his first semester at West Point, he informed his father he had spent several days in the academy's hospital not because he was hurt but because he wanted to get out of a final exam.[7] As Patton toughed himself, he began to see doctors as obstacles in the path of willing warriors. After he broke his left arm during football practice in his senior year, he explained to Beatrice his doctor would keep him out for all but the final 5 games of the season despite his willingness to play with a cast.[7] He complained, "The coaches are going a good deal for me trying to get me out of this ___damned_ place but Dr. Gandy is a stiff necked old fool and my spirit sinks from week to week."[7] After another 2 weeks he protested, "…these fool Dr's insist that I am still sick, asses they are. I have been trying for the last week to get them to take a large quantity of cement they call a cast off my arm but they refuse to do it. Damn them…"[7] Not until another 2 months passed did the doctor finally allow Patton to play, albeit, on the scrub team and with a crude brace on his arm.

While Patton's wariness of doctors came to a slow boil, the medical professionals of World War II developed a quick and uniformed poor opinion of him. Patton's chief surgeon, Colonel Odom, believed relations were already bad between the general and his Army medical officers. Patton complained in Sicily the performance of the medical headquarters was "far from acceptable."[6] The North African Theater of Operations, US Army (NATOUSA) medical experts had anticipated widespread malarial casualties during the campaign, but failed to send adequate facilities to properly diagnose the illness in theater.[6] In early August, doctors ordered thousands of soldiers experiencing malaria-like chills and fevers transferred to hospitals in Algiers. Soon Patton was losing 25% of his total force, 90% for noncombat reasons, and most of those to diagnoses of malaria.[6] Patton reported between 70%-80% of his losses were in his vital front-line infantry.[9] Yet as Odom personally proved to Patton, the cases diagnosed as malaria were more likely the shorter-lasting Sand Fly Fever.[6] When Patton cancelled the surgeon general's orders to evacuate malarial cases from theater, 7th Army's medical staff became infuriated.[6]

In the eyes of his medical experts, this was just the latest instance of Patton's interference. At the start of the campaign, he had instructed 7th Army's doctors:

> It has come to my attention that a very small number of soldiers are going to the hospital on the pretext that they are nervously incapable of combat. Such men are cowards... You will take measures to see that such men are not sent to the hospital, but are dealt with in their units.[9]

Colonel Odom argued doctors resented such directives. "Being regimented and having to follow military orders went against their grain," he wrote. "They perceived themselves as a higher authority than commanders who orders they were required to follow."[6] In any event, Patton had twice caught his doctors ignoring his orders by keeping soldiers suffering from neurotic injuries among the battle wounded.

Few medical professionals saw through Patton's foul-mouthed persona with the glossy helmet, polished riding boots and ivory-handled pistols crafted to motivate young men raised on dime store novels and comic books. Stenographer Corporal Joe Rosevich watched Patton, clad in slippers and wearing pince-nez glasses, thoughtfully draft a speech before rehearsing it with purple fury. Rosevish remembered:

> He said that the performance we had just watched was exactly that—a performance, a put-up show, a calculated and rehearsed act of bravado. He was convinced, he said, that the young men of America needed such a toughening because they had grown soft... You have to shock them out of their ordinary habits and thinking with the kind of language you've just heard in the speech.[10]

Like Blumenthal, Corporal Rosevich came to understand Patton as 2 men: an efficient, urbane general and the profane, fighting commander. It was this second, public persona that irritated professionals, especially journalists and doctors. When Patton struck Kuhl and Bennett, the professionals would strike back.

The Retaliation: On 11 August 1943, the day after the second slapping incident, Colonel Currier delivered a written report to II Corps Chief of Staff Brigadier General William B. Kean, who carried it to his boss, Corps Commander Lieutenant General Omar Bradley. "After reading it," Bradley later wrote, "I told Kean to put it in a sealed envelope in the safe—only to be opened by Kean or me. I didn't forward the report to Ike because Patton was my army commander—I couldn't go over his head."[3] Bradley's inaction upset his medical officers. At their urging II Corps Surgeon Colonel Richard Arnest sent a copy of Currier's report with his own comments through medical channels to Eisenhower's chief surgeon, Brigadier General Frederick Blesse.

Five days later Blesse took Arnest's report to Eisenhower along with an appendix entitled "Mistreatment of Patients in Receiving Tents of the 15th and 93rd Evacuation Hospitals," written that day by Lieutenant Colonel Perrin H. Long, Consulting Physician to the Headquarters, North African Theater of Operations, US Army (NATOUSA). Perrin had added a conclusion:

> The deleterious effects of such incidents upon the wellbeing of patients, upon the professional morals of hospital staffs and upon the relationship of patient to physician are incalculable. It is imperative that immediate steps be taken to prevent a recurrence of such incidents.[4]

On 17 August, Eisenhower sent Bless to deliver a "personal and secret letter"[11] to Patton addressing reports of his abuse of Kuhl and Bennett. Ike wrote:

> I feel that the personal service you have rendered the United States and the Allied cause during the past weeks are of incalculable value; but nevertheless if there is a very considerable element of truth in the allegations accompanying this letter, I must so seriously question your good judgment and your self discipline as to raise serious doubts in my mind as to your future usefulness.[11]

Eisenhower stressed he was not opening an investigation and the only trace of the letter would remain in his safe, but he also ordered Patton to respond "personally and secretly" to him and to apologize to the "individuals concerned."[11]

Meanwhile, as days passed without any public action against Patton, a nurse in the 93rd Evac Hospital decided to act.[5] She reported the slapping incident to her boyfriend, a captain in public affairs, who quickly passed it to correspondents covering Patton's 7th Army. reporters Demaree Bess of the *Saturday Evening News*, Merrill Mueller of NBC, Al Newman of *Newsweek*, and John Charles Daly of CBS went to the 93rd to investigate.[3] After interviewing Major Etter and some others, they decided to take the matter to Eisenhower. Quentin Reynolds of *Collier's* helped them type their report, signed by 14 witnesses, and joined Bess and Mueller on a flight to Algiers to see Ike's Chief of Staff, Major General Bedell Smith, on 19 August.[12] They demanded Patton be court-martialed for striking an enlisted man.[3] After Eisenhower asked the reporters to sit on their embarrassing story, he thought Patton was "indispensable to the war effort—one of our guarantors of victory," and they agreed to kill the story only if Ike fired Patton.[3]

Coincidentally, Blesse delivered the reprimand to Patton after lunch the next day. That night, Patton wrote in his diary:

> Evidently I acted precipitatly [sic] and on insufficient knowledge. My motive was correct because one cannot permit skulking to exist. It is just like any communicable disease. I admit freely that my method was wrong and I shall make what amends I can... I fell very low.[5]

Patton was left in limbo as 7th Army's units were transferred elsewhere; on 6 September he learned Lieutenant General Mark Clark would lead the invasion of Italy and Bradley would command US troops in the invasion of France.[1] Eisenhower placated the correspondents and his medical professionals by removing Patton's command, issuing a public censure, and ordering him to personally apologize to every soldier in his command.

Lessons & Questions: After this essay was presented to the Interagency Institute for Federal Health Care Executives, the military medical professionals in the audience raised a number of interesting questions regarding the proper role of Army doctors in certifying the fitness of senior officers for high command. To many, Patton's medical history raised disturbing issues of physically-related emotional instability that should have rendered "Old Blood and Guts" medically ineligible for command. On the other hand, it was noted in operations without Patton the Army in Africa and Europe did not perform very well: defeat at Kasserine Pass; stalemate in Sicily and Normandy; defeat in Holland in Operation Market Garden; attritional stalemate on the border at Aachen and the Hüertgen Forrest; the long, bloody slog in Italy; and, initial collapse in the Battle of the Bulge. Time and again, Patton served as Eisenhower's one-man fire brigade to reverse Allied misfortunes, his guarantor of victory. Not having Patton likely would have added months to the war and many more American casualties. It seems the slapping incidents and Patton's medical history teach us the Army needs medical professionals who can identify and mitigate physiological weaknesses in otherwise skilled generals rather then deny them commands altogether.

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J. J. Woodward, the Philadelphia Centennial, and Medical Imaging in 19th Century America

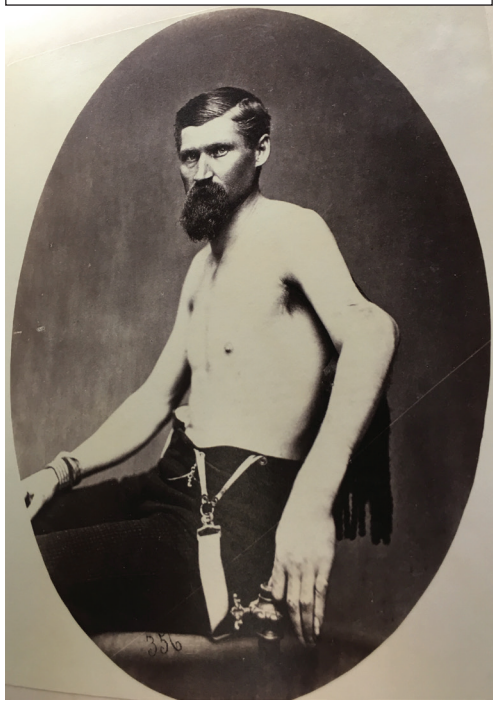
Vanessa Meikle Schulman

In his travelogue of the 1876 Philadelphia Centennial, *What Ben Beverly Saw at the Great Exposition*, James L. Dale described an exhibit that impressed him with both wonder and horror: a set of photographs documenting the outcomes of surgical operations that suggested procedures "of the most fearful character, which would seem impossible to perform, and the poor patient survive."[1] What Dale described was the US Army Medical pavilion, where the displays were designed to convince domestic and international visitors of the professionalism and innovation of American medicine and in particular to highlight the contributions of military medicine. The medical building included a full-size model of an army field hospital and multiple exhibits constituting a representative sampling of collections from the US Army Medical Museum: photographic portraits of famous surgeons; enlarged microphotographs of blood, bone, and tissue samples; images of Civil War wounds and their treatments; artifacts and supplies for surgical procedures; and a painting, Thomas Eakins's *The Gross Clinic*. Together, this collection of artifacts presented viewers with a narrative of the current American medical field, with special focus on the Civil War as a catalyst for new medical discoveries. While Eakins's painting became the most famous image from the pavilion, it was not part of the original display, which was explicitly designed to demonstrate how surgeons and medical researchers used healing knowledge to transcend the devastation of the Civil War. This essay examines the exhibit's roots in wartime medicine and research and studies how Dr. Joseph Janvier Woodward planned and developed the exhibit to communicate with the public about current medical and surgical practice.

The Centennial Exposition was a world's fair held in Philadelphia's Fairmount Park to celebrate the passage of 100 years since the signing of the Declaration of Independence. It was America's first world's fair, to be modeled on London's Crystal Palace Exposition of 1851, and was explicitly intended to showcase innovation and technological dominance as well as America's postwar rise on the global stage. As J. S. Ingram wrote in his review of the fair, the visiting nations "have seen in the crowds of American citizens... a polite, orderly, self-respecting and self-governing people."[2] The centerpiece of the fair was the Corliss engine, a massive steam engine, which generated the power to run the dozens of displays on view in Machinery Hall. The engine symbolized for many visitors both the supreme ascendance of American innovation and humankind's control over the raw power of technology.[3] Moreover, this display of American technological exceptionalism was interpreted as a blessing from God. As Reverend Matthew Simpson stated in an opening prayer to start off the fair: "We thank Thee for social and national prosperity and progress, for valuable discoveries and multiplied inventions, for labor-saving machinery..."[4] Such rhetoric positioned technological ingenuity at the heart of a nation

still rebuilding from the divisive Civil War.

Figure 1. Example of a post-surgical image showing Corporal William Ruddock, 117th New York Infantry. "Successful excision of the shaft of the left humerus."



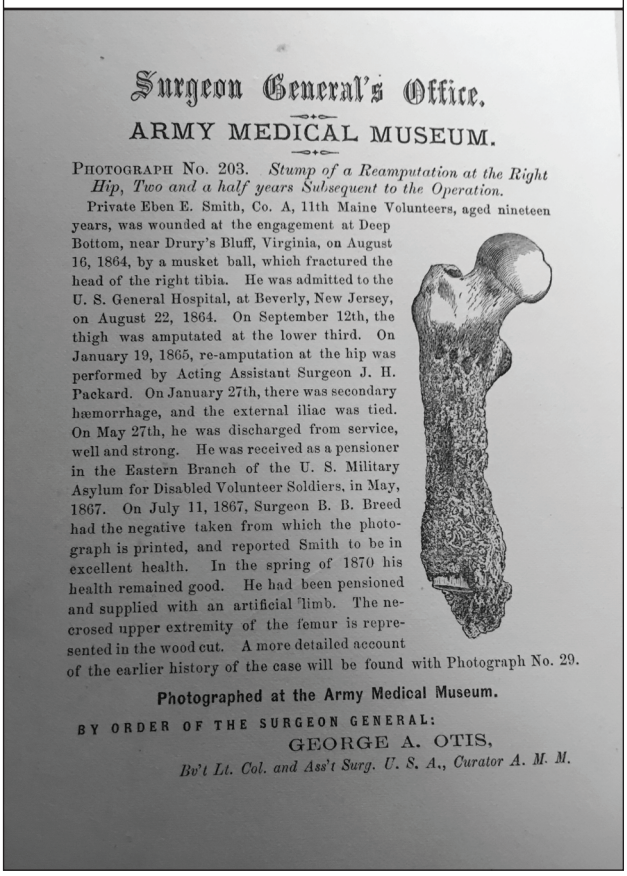
In that context, the medical display created under the auspices of the Surgeon General's office had a crucial role to play in narrating the history of American medicine and in demonstrating how medical progress evolved as a necessary response to the war. The exhibition was curated by J. J. Woodward, a wartime Assistant Surgeon, a specialist in infectious diseases, a pioneer in the technique of microphotography, and a member of the curatorial staff of the US Army Medical Museum (today the National Museum of Health and Medicine or NMHM). Woodward's prior background with the Surgeon General's office and the Medical Museum, as well as his personal investment in the study of pathological specimens through microscopic examination, strongly tilted the exhibit toward these specialties. Though he collaborated with other museum staff to put together the display, Woodward primarily controlled the didactic messages about innovations in American medicine presented to the public at the fair. In addition to Woodward's own personal concerns, the role of the Civil War in the formation of the museum ensured many of the materials on display were linked to the war's impact on medical science. These materials included specimens and photographs collected for dissemination to medical specialists but now available to the general public. This exhibit marks the first direct effort to expose laypeople to crucial developments in the American medical profession. As Julie K. Brown argues, the Centennial displays helped initiate an era dedicated to "communicating directly with the public on issues relating to health and medicine."[5] The origins of this may be found in the Civil War era.

As early as 1862, the Surgeon General's office recognized the potential of the war to advance medical science through the creation of an archive to document wounds, injuries, and diseases, the medical and surgical procedures addressing them, and their outcomes. In an 1862 letter to Secretary of War Edwin Stanton, newly appointed Surgeon General Dr. William A. Hammond wrote asking for increased funding and noted, with an eye toward compiling a "medical and surgical history of the rebellion," he had begun collecting "memoirs and reports of great interest to medical science" that were in the process of being "systematically arranged."[6] The crucial move toward the establishment of "government-funded medical research" had begun just a few months previously when Hammond established the US Army Medical Museum shortly after his appointment in May 1862.[7] Woodward was involved in this project early on, tasked with assembling statistics gathered from regimental surgeons across the Union forces. Consonant with Woodward's own experience in infectious disease, he was at first charged with collecting statistics on fatalities resulting from causes other than battle. In a February 1863 report to Hammond, later circulated before Congress, Woodward noted the historical importance of the project: "no great army actively engaged in hostile operations has ever furnished statistical tables of even approximate accuracy."[8] Woodward's initial statistical results were based upon self-reported numbers from field surgeons, which he argued could be extrapolated to achieve moderately accurate understandings of the prevalence of fatal illness in army life.[8] Woodward's counterpart on the project was Dr. John H. Brinton, whom Hammond assigned to research surgical intervention into wounds received on the battlefield.[9] Statistics and images culled from Woodward's and Brinton's examinations of the war would later be curated into Woodward's 1876 display.

Both Woodward and Brinton relied on photographic documentation to assist with their gathering of information about wartime fatalities. Brinton, who would later become the first curator of the Medical Museum, released a circular in 1863 requesting contributions from surgeons in the field. In this era, belief in the precision and accuracy of photography often stressed its role as an unbiased device for recording objective truth.[10] For instance, in 1867 the Boston-based digest magazine *Littell's Living Age* argued, "In medical and surgical science [photography's] records of malformations or morbid conditions are necessarily of more value than records which might be characterized by the imperfect observation of the recorder." The author continues, "everything, in short, where a minute record untinctured by

the prepossession or the incapacity of the recorder is of importance to the advancement of science, may receive the aid of this unerring and willing adjutor."[11] According to popular and scholarly understandings of photography's chemical and scientific properties, post-Civil War Americans generally accepted the medium as a truthful amanuensis for a variety of scientific disciplines.

Figure 2. Example of case history, for Private Eben E. Smith, 11th Maine Volunteers. "Stump of a reamputation at the right hip."



Surgeon General's Office.

ARMY MEDICAL MUSEUM.

PHOTOGRAPH No. 203. *Stump of a Reamputation at the Right Hip, Two and a half years Subsequent to the Operation.*

Private Eben E. Smith, Co. A, 11th Maine Volunteers, aged nineteen years, was wounded at the engagement at Deep Bottom, near Drury's Bluff, Virginia, on August 16, 1864, by a musket ball, which fractured the head of the right tibia. He was admitted to the U. S. General Hospital, at Beverly, New Jersey, on August 22, 1864. On September 12th, the thigh was amputated at the lower third. On January 19, 1865, re-amputation at the hip was performed by Acting Assistant Surgeon J. H. Packard. On January 27th, there was secondary hæmorrhage, and the external iliac was tied. On May 27th, he was discharged from service, well and strong. He was received as a pensioner in the Eastern Branch of the U. S. Military Asylum for Disabled Volunteer Soldiers, in May, 1867. On July 11, 1867, Surgeon B. B. Breed had the negative taken from which the photograph is printed, and reported Smith to be in excellent health. In the spring of 1870 his health remained good. He had been pensioned and supplied with an artificial limb. The necrosed upper extremity of the femur is represented in the wood cut. A more detailed account of the earlier history of the case will be found with Photograph No. 29.

Photographed at the Army Medical Museum.

BY ORDER OF THE SURGEON GENERAL:

GEORGE A. OTIS,

Bv't Lt. Col. and Ass't Surg. U. S. A., Curator A. M. M.

Recognizing the visual potential of photographic documentation, Woodward and Brinton asked for both written and photographic records of "the collected results of the gunshot injuries of the war, and of the operations performed for their relief." The Surgeon General's office, they continued, "would ask every Physician and Surgeon, who in the course of his practice may be called upon to treat, any officer or soldier previously wounded in service, carefully to note the results of the case."[12] While still under the pressures of wartime, the collection began to grow as medical professionals and government officials recognized the potential usefulness of amassing photographic documents. Just 2 years after the end of the war, librarian and historian Fred B. Perkins described the collection as a "vast mass of reports and documents" that will form "an invaluable contribution to medical and surgical science."[13] Donations of specimens, photographs, and case histories from doctors across the country continued to arrive in the years following the war.[14]

The most well-known result of the collection and analysis of these materials was the 6-volume illustrated work, *The Medical and Surgical History of the War of the Rebellion*, published between 1872 and 1888. A massive undertaking, this compendium included lavish illustrations, statistics, and discussion of the treatments of injuries and diseases specific to war. Former archivist at NMHM, Michael Rhode, has written extensively about the creation and reception of these volumes, whose publication was ongoing even as Woodward was planning the Centennial display.[15] Reviews of the *Medical and Surgical History* reflected directly on the fact the Civil War had provided an unlooked-for opportunity to advance medical science. As the premier British medical journal *The Lancet* wrote in 1873:

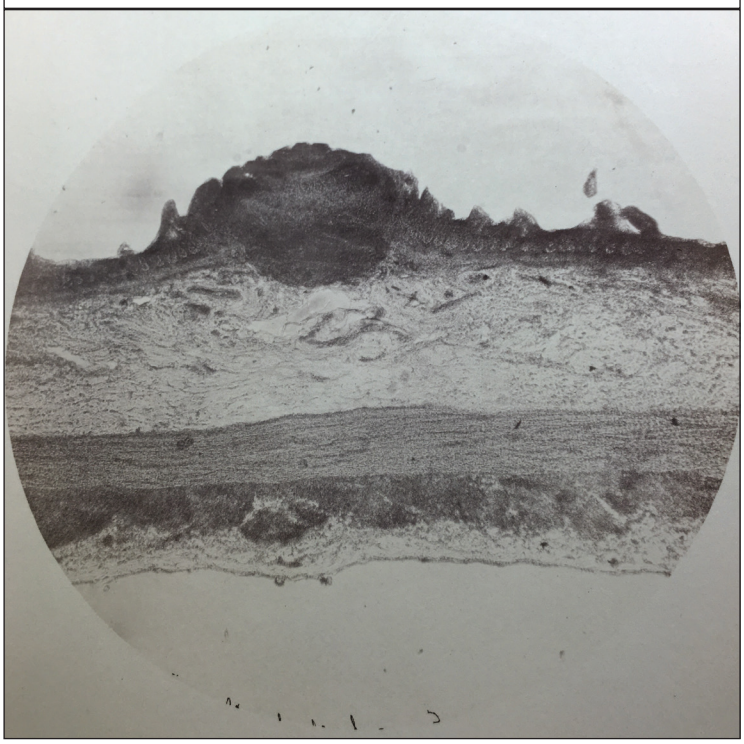
> It is well that no benefit which can be gathered out of the wide-spread suffering caused by the war should be lost. [... If] the experience gained in the hospitals can be utilised for the improvement of medical and surgical knowledge, and thus for the future benefits of mankind, an additional compensation will be made for the calamities which the war occasioned. A study of the first part of the medical and surgical history of the war leads us to hope that we may reasonably expect this advantage will accrue; that [...] the science of healing in general be advanced, and that thus, as so often has occurred before, out of evil good will come.[16]

It is clear the books were a potentially valuable undertaking. However, their high cost was prohibitive, and they would likely only have been seen in the libraries of medical colleges. By contrast with these weighty and inaccessible volumes, the imagery on display at the 1876 Centennial constituted a more vital and accessible form of visual culture celebrating the growth of the medical profession in the US, while remembering the ravages of the war.[17]

In March 1875, Hammond's successor as Surgeon General, Dr. Joseph K. Barnes, selected Woodward for the task of "collecting, arranging and displaying such stores, materials, &c., pertaining to the Medical department as it may be desirable to place on exhibition at the 'International Exhibition.'"[18] Woodward began by planning the hospital building itself, and shortly after a construction bid was accepted in July, he set to work deciding how to fill the space.[19] That summer, he requested from the surgeon general "a complete series of the medical supplies

used in the Army, including medicines, medical and surgical instruments, hospital stores, hospital clothing and furniture, meteorological instruments."[20] In addition to contemporary items, historical artifacts dating back to the Revolutionary War would help create a progressive timeline of American military medicine. The exhibit would ideally be staffed by 8 full-time docents, required to be "persons of intelligence, capable of being instructed in the uses, &c, of the articles exhibited under their charge, so as to be able to explain them to visitors."[21] This vast effort was directed toward proving the idea "[...] science and humanity go hand in hand, that quackery is an immorality—that the defence [sic], support, and encouragement of legitimate organized medicine is essential to the good order of society."[22] Though he sometimes chafed against the "excessive demands on my time made by the Centennial arrangements," it is clear that Woodward took this responsibility very seriously.[23]

Figure 3. Example of a photomicrograph by William Thompson, unknown patient. "Perpendicular section of ileum."



For more than year, Woodward worked with his colleague Dr. George Otis, the chief curator of the museum, putting together the display to chronicle the history of America's medical profession, from the Revolution to the recent conflict.[24] Having both been intimately involved in the publication of the *Medical and Surgical History*, Woodward and Otis were well aware of the impact of visual media as they planned the exhibit at Philadelphia. In January 1876, just months before the fair was set to open, Otis wrote to Woodward estimating his proposed surgical displays at "a selection of from 150 to 200 specimens," supplemented by an extensive image program: "I should think it well to present many photographs and drawings in volume and portfolios and some larger pictures might be hung to the walls if there is adequate space."[25] Working together to select the images and artifacts, Otis and Woodward decided on a visually rich exhibit, which placed great emphasis on the display of photographic materials from the museum's collection.

After the construction of the building itself, costing $11,446, the printing and framing of photographic materials was one of the largest fair-related expenditures, totaling $1,042.[26] In total, 128 photomicrographs, 39 photos of surgeons, wounds, and surgeries, and 246 specimens were on exhibit in the pavilion.[27] Special cases had to be built to house the specimens and instruments, while the upper portions of the walls held framed portraits of surgeons, large-scale photomicrographs, and "photographs of difficult and successful amputations."[28] Woodward also included additional photographs for visitors to look through, printed in large-format bound books of sturdy cardstock (Figure 1). These included one volume of surgical photographs and one of photomicrographs, "handsomely bound for exhibition at our hospital on the Centennial grounds."[30] The book of surgical photographs, selected by Otis, included case histories on the verso of each page, outlining the rank, regiment, battle experience, wound, treatment, and prognosis for each veteran pictured (Figure 2). The book of photomicrographs, taken by Army Assistant Surgeon Dr. William Thomson in 1864, represented a major focus of Woodward's medical career and expertise.

Though photomicrographs had been taken using a solar microscope since the 1840s by European scientific researchers, in 1870 Woodward's experimentation with artificial illumination allowed him to capture specimens at a higher degrees of magnification and with greater consistency than previously: "clearer and better defined than any photographs of similar objects I had hitherto seen produced by sunlight," in Woodward's estimation.[31] These experiments, which Woodward conveyed to Surgeon General Barnes in January 1870, preceded the common use of magnesium-based flash powder for indoor photography. Woodward was well known within the scientific community as a pioneer of photomicrographic research and was cited in American medical

journals as an expert in microscopy.[32-38] It is not surprising, then, he chose to focus his curatorial efforts for the Centennial on this topic.

The photomicrographs on display were taken from Woodward's own experiments, from Army collections, and from pre-war efforts by noted scientists such as John William Draper, who took the first known Daguerreotype images of the moon and was a pioneer in American photomicrography.[39] The bound book of photomicrographs on display at the Centennial contained 12 images taken by Woodward's collaborator and correspondent William Thomson during the war. These included sections of diseased colon and intestine, affected by the common camp diseases typhoid and dysentery, which were objects of Woodward's wartime research. The frontispiece of the volume explained to viewers these images "demonstrate the value of photomicrography and its possibility, with the compound microscope then issued by the Surgeon Generals Office to the general hospitals."[40] Thomson's images combined with Woodward's research chronicle a trajectory of scientific innovation spurred by the war and would benefit the public by helping doctors understand and visualize the inner workings of the human body. However, the images are also among the most abstract and striking on display, not only in the medical pavilion but in the entire Centennial.

In a review in the specialist journal *Medical and Surgical Reporter*, the bound volumes of Thomson's photomicrographs received notice as "the beautiful photomicrographs, now produced at the Army medical museums." The author continued by urging "all visitors to give them the closest attention, as they are unsurpassed by any in art."[41] Indeed, the layered striations of these magnified specimens of diseased colons and bone fragments are marvelous for their ability to aestheticize disease (Figure 3). Clearly created to serve the aims of research and medical exploration, the photomicrographs were also beautiful objects that allowed viewers to push visually into unknown territory: the interior of the human body. The gorgeously framed images even strongly resembled other images of exploration: photographs of western lands recently opened up by the expansion of the railway. Indeed, in the same day a visitor to the exposition might have seen both sets of images: in another quarter of the fairgrounds, the Photographic Hall featured 34 of Carleton Watkins's large-format photographs of Yosemite, as well as landscape works of the west by Charles Leander Weed and Eadweard Muybridge.[42] The parallel may be extended further when we learn some of the photomicrographs rivalled Watkins's in their grand scale: in addition to Thomson's images, Woodward included huge photomicroscopic studies from his own research, noting to a correspondent with evident glee he enlarged his "photo-micrographs to two and three feet in diameter. They bore the enlargement well."[43] Geological survey photography and enlarged microscopic images were located in close spatial proximity on the fairgrounds and possessed evident similarities of composition and scale. But beyond this surface parallel, both types of practitioners also pushed the new medium of photography to reveal unknown spaces.

This pavilion was one of the few places where ordinary visitors from outside the medical profession would have had the opportunity to view such images. However, Woodward had no high opinion of the intelligence of the average fair-goer. In a letter to a fellow micrography enthusiast, John Mayall, Jr., Woodward wrote:

> [...] a tide of Centennial visitors from the West drifts daily to the number of many hundreds... each with his or her linen duster, carpet bag, and lunch in hand—and I assure you they constitute a new, characteristic and laughter-provoking species of the genus homo—well worthy of your appreciative study."[44]

His dismissive attitude fits with other, more intentionally satirical responses to the Centennial's supposed didactic function, such as a guide written by the humorist George G. Small under the pseudonym "Bricktop," illustrated with grotesque caricatures of American rural types on whom the fair's message of progress is lost entirely.[45] And when a Centennial judging panel awarded a medal to "exhibitors of homeopathic medicines and other irregulars," Woodward did not bother to veil his disdain, remarking: "the incompetency of Drs. Thompson and White as medical judges is so notorious."[46] On the whole, the exhibit was deemed a success by medical professionals, including some well-regarded European doctors, but Woodward worried the distinction between serious science and commercial pageantry had been conflated by many visitors. Nevertheless, this was the first, and in many cases the only, opportunity for many lay people to gain firsthand visual knowledge of the state of the medical profession in these years.[47]

In conclusion, the display Woodward curated at the medical pavilion of the Centennial was an important space for civilians and those not affiliated with the medical profession to learn about the innovations in American medicine spurred by the Civil War. Though Dr. J. J. Woodward is remembered more for his work with infectious diseases and for his stewardship of the *Medical and Surgical History*, it is important to study the innovative techniques and images he selected to communicate the goals and achievements of the Medical Museum to the fair's visitors. The US Army Medical Museum's

1876 Centennial exhibit was a culmination of wartime and postwar efforts using medical imagery and artifacts to stress the contributions of military medicine and research to American life.

Acknowledgments

The author would like to thank Laura Cutter at the National Museum of Health and Medicine archives for her assistance with this research. This essay is dedicated to the memory of the author's grandfather, COL Wendell A. "Mike" Meikle. All figures were taken by the author and are from the bound books displayed in the Army Medical exhibit of the 1876 Centennial.

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Military Epidemics, Then and Now: Smallpox and COVID-19

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Abstract

We compared the COVID-19 experience in the first year of the current pandemic in the US with the smallpox experience of the 18th century, focusing on the US military but recognizing civilian and military populations are not separate and distinct. Despite the epidemics being separated by 2½ centuries and with great advancements in technology having occurred over that time, we observed similarities which led us to several conclusions:

- Infectious disease outbreaks will continue to occur and novel agents, naturally occurring or manipulated by humans, will threaten military and civilian populations nationally and globally.
- Infectious disease outbreaks can affect both military and civilian populations, persist for long periods, and be catastrophic to military peacetime and wartime operations.
- Effective surveillance is a prerequisite for early identification and subsequent meaningful responses to novel and reemerging threat agents and diseases.
- Socio-cultural, religious, or political factors may limit the implementation of effective interventions in military or civilian populations. Public health officials must assess impediments to implementation of interventions and develop plans to overcome them.

Introduction

In 2019, the coronavirus SARS-CoV-2 emerged, leading to a pandemic of Coronavirus Disease 2019 (COVID-19). This event provided a grim reminder of the potential for disastrous consequences of epidemic and pandemic diseases in civilian and military populations.[1] In just 12 months, from the end of February 2020 to the end of February 2021, this novel viral respiratory infection became the second largest pandemic in US history, second only to the 1918-1919 Influenza Pandemic, with over 500,000 deaths reported.[2,3] The 1918-1919 Influenza Pandemic has been well documented, including its impact on civilian and military populations worldwide.[4,5] In this study, we compared the military experience with smallpox in the 18th century with the most recent epidemic to confront the US military, COVID-19, focusing on the military but recognizing civilian and military populations overlap. We chose smallpox as the comparative pathogen because it caused a catastrophic epidemic in the newly formed Continental Army in the 18th Century.[6]

Methods

We conducted a qualitative comparison of the military impact and interventions used to fight smallpox in the 18th century and COVID-19 today. The civilian experience was also reviewed to provide appropriate context for the analysis. The National Library of Medicine (NLM), Bethesda, MD, was our primary reference source. Two major NLM resources were PubMed and PubMed Central, covering biomedical and life science research from the 1700s to the present.[7] The lineage of the NLM dates to the formation of the library of the US Army Surgeon General in 1836.[8] The online academic library Journal Storage (JSTOR) was used to locate historical citations, journals, and books in the NLM outside the realm of biomedical references.[9] JSTOR provided access to just under 2,000 academic journals. Two references provided insight into the armies of the 18th century with important historical references: "The Evolution of Preventive Medicine in the United States Army, 1607-1939" and "The Army Medical Department, 1775-1818."[6,10]

Results

18th Century Smallpox—Early History: Smallpox is caused by the variola virus and has no known animal reservoir. This disease was responsible for endemic and epidemic outbreaks and deaths worldwide until 1980 when the World Health Organization (WHO) declared it eradicated.[11] As early as 1911, scientists speculated lesions displayed on Egyptian mummies from approximately 1100-1200 before the common era (BCE), 3100-3200 years ago, were compatible with smallpox infection.[12] Early descriptions of disease compatible with smallpox were written in the 4th Century, common era (CE) in China, in the 7th Century CE in India, and in the 10th Century CE in Asia Minor.[13] Recent DNA studies of skeletal remains indicated variola was spreading in Europe as early as the Viking age.[14]

Table 1. 1721 Smallpox Epidemic, Boston: case fatality rates, natural infection versus inoculation.[16]

Exposure Category	Number (n)	Deaths	Case Fatality Rate (per 100)
Natural Infection	5,759	844	14.7
Inoculation by Physician	248	6	2.4

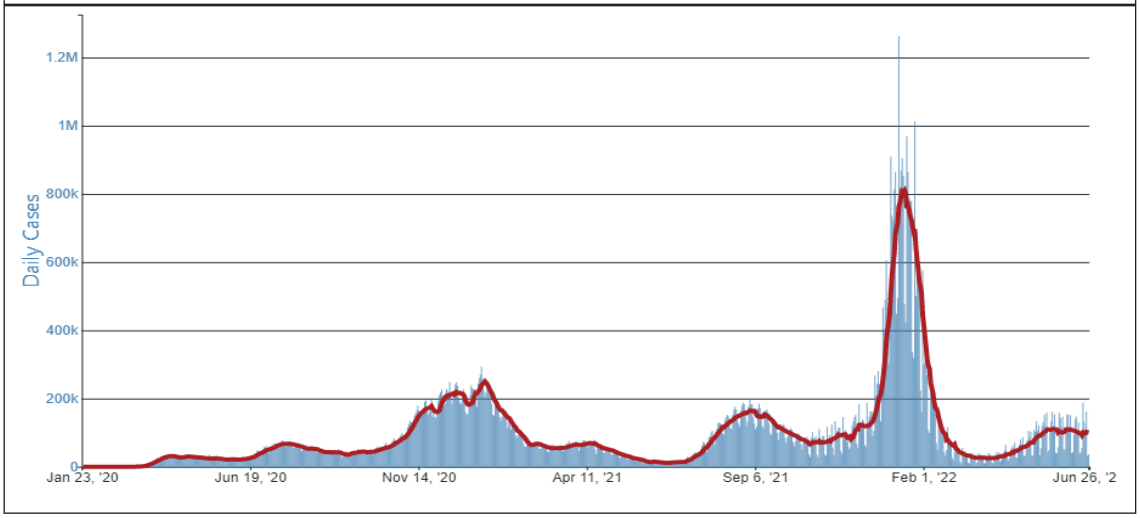
In North America, smallpox was the first disease for which quarantine, disease surveillance, and a procedure referred to first as inoculation and later as variolation, were used in concert.[6] Inoculation was the implantation of infectious material from smallpox lesions into a freshly opened wound of a healthy, uninfected patient. The procedure, like natural infection, provided protection against smallpox, but with risk. The technique is speculated to have come to southeastern Europe from China or India. Knowledge of the practice reached England in the early 18th century through clinical reports from Constantinople and Italy.[15] The family of the British Ambassador to Turkey is credited with introducing inoculation to England in 1717.[16]

Inoculation was introduced in Boston in 1721. In April of that year, smallpox likely arrived in Boston with the crew of the HMS Seahorse, a Royal Navy vessel sailing from the West Indies. The Seahorse disregarded quarantine inspection outside Boston harbor and arrived at a central pier in Boston with at least 2 sailors ill with smallpox and an unknown number of the crew incubating the virus.[17] Reverend Cotton Mather was a Boston Puritan clergyman who served at the Second or Old North Church and had an interest in the biological sciences as well as religion. This led to his elevation to Fellow of the Royal Society of England, 1 of only 8 North Americans receiving this honor. Reverend Mather was interested in communications from England and Italy about smallpox inoculation.[6] The 1721 smallpox outbreak prompted him to enlist the services of a physician to explore the efficacy of inoculation as described in European dispatches and first-person accounts of several African slaves who were inoculated in their home country as children.[18] After being turned away by several prominent Boston physicians, he partnered with Doctor Zabdiel Boylston, a local surgeon. Dr. Boylston attempted the procedure on his son Thomas (age 6), and two African Americans in his household without their consent (ages 36 and 2½).[17] All 3 survived as the first people known to be inoculated with smallpox in North America.[16] The reverend and the doctor documented the results of their joint effort by systematically recording the outcomes of those inoculated versus those naturally infected. Even without modern statistical tools, a dramatic reduction in deaths with inoculation was apparent (Table 1). Meticulous record keeping of affected citizens of Boston revealed a 6-fold reduction of the smallpox case fatality rate.[15,16,17,18]

The colonists did not widely accept the protection provided by smallpox inoculation due to both politics in the medical community and for religious reasons. As a result, many English colonists, particularly in rural New England and the southern colonies, were not protected against smallpox before the French and Indian War (1756-1763) and the American Revolutionary War (starting in 1775). British soldiers were thought to be more protected, either from inoculation or from natural infection in Europe where smallpox was endemic. The British Army inoculated soldiers who did not show scarring from previous natural infection. Both natural infection and inoculation were thought to confer long lasting immunity.[6]

18th Century Smallpox—Biological Warfare? British and French forces engaged in conflicts that included colonists and Native Americans from 1689 through the European Seven Years War (1756-1763), known here as the French and Indian War and into the 19th century.[19] An interesting episode of the French and Indian War was the alleged use of smallpox as a biological agent against Native Americans around Fort Pitt (current location of Pittsburgh) in a conflict called Pontiac's Rebellion.[20] American historian Francis Parkman first studied a "gift" to Native Americans consisting of smallpox-contaminated blankets and handkerchiefs in the 1800s. Letters between the Fort Pitt garrison commander, his superior in Philadelphia, and the Commander in Chief of British forces in North America (Sir Jeffrey Amherst) were identified in the British Museum in London in the 1800s. The letters documented the presence of smallpox patients at Fort Pitt and the distribution of supply

Figure 1. Daily trends in the number of COVID-19 cases in the US, from January 23, 2000 through June 26, 2022, as reported to the Centers for Disease Control and Prevention (CDC).[29] The blue bars show daily cases. The red line is the 7-day moving average of cases.



vouchers for the transfer of blankets and handkerchiefs to local Native Americans during a ceasefire.[21] The majority of Native Americans were not immune to smallpox, and General Amherst communicated his support for the potential use of smallpox as a weapon. Historians have debated the veracity of this episode and the impact of the purported use of a biological weapon; how many, if any, infections resulted remains unknown.[20,21] Regardless, the incident documents biological warfare was in the minds of commanders as early as 1763.

18th Century Smallpox—The Revolutionary War: Many military leaders and medical personnel returned from the French and Indian War with experiences which served as the foundation for the Colonial Army and its medical department.[6,17] The Revolutionary War began at Lexington and Concord in April 1775, and the Colonial Army, Navy, and Marines were formed between June to November 1775.

General Washington assumed command of the colonial forces in the summer of 1775.[22] He was aware of smallpox cases in the Boston area, where the colonial forces had laid siege. At age 19, Washington and his brother both reportedly contracted smallpox during a voyage to the Caribbean. His severe infection left him with scarring and the memory of the suffering of the 2 brothers. Washington insisted that his stepson Jack, in 1771, and his wife Martha, in 1776, undergo inoculation.[23] One of the first General Orders General Washington published on July 4, 1775, assigned his line officers the responsibility for the health of their troops:

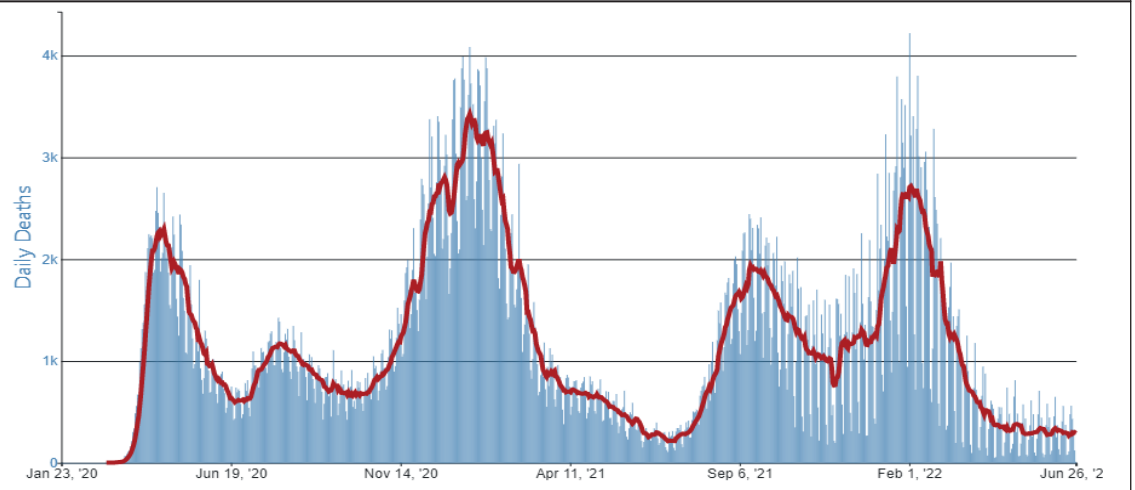
> All officers are required and expected to pay diligent attention to keep their men neat and clean; to visit them often at their quarters, inculcate upon them the necessity of cleanliness as essential to their health and service.[6]

The largely nonimmune colonial forces in 1775 were anxious about exposure to the potentially infectious citizens and British soldiers in Boston. A hospital dedicated to the isolation and care of smallpox cases in soldiers was opened in Cambridge, near Boston, in June 1775. By July 1775, all troops were inspected daily, with immediate quarantine for any demonstrating skin lesions compatible with smallpox.[23] On December 4, 1775, four British "deserters" attempted to cross through the colonial siege lines encircling Boston. The 4 reported they had been deliberately inoculated with smallpox before being directed towards the American forces. People infected both naturally and by inoculation were potentially infectious to non-immune individuals. During his inoculation work in Boston in 1721, Dr. Boylston required quarantine for both naturally infected cases and those inoculated.[15,17]

As another preventive strategy, the Colonial Army allowed only soldiers with smallpox scars (and presumed immunity) to enter areas where smallpox cases were occurring. This strategy was employed when the Colonial Army entered Boston after the British forces evacuated the city in March 1776. Additionally, General Washington ordered one colonial regiment to be inoculated prior to entering Boston in 1776, with 1 death from smallpox occurring among the 500 inoculated soldiers.[23]

The Colonial Army's relative success in controlling

Figure 2. Daily trends in the number of COVID-19 deaths in the US, from January 23, 2000 through June 26, 2022, as reported to the Centers for Disease Control and Prevention (CDC).[29] The blue bars show daily cases. The red line is the 7-day moving average of cases.



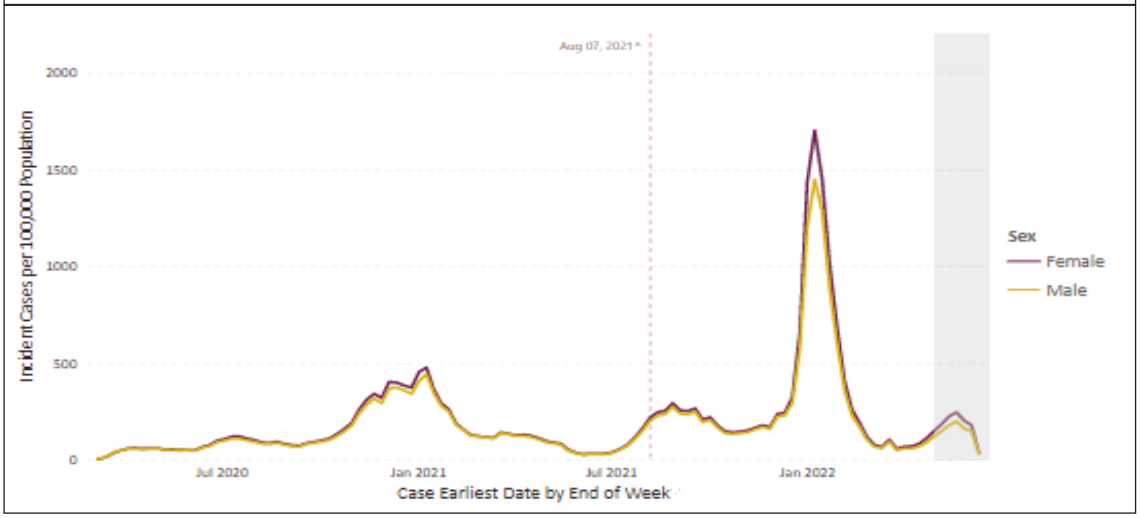
smallpox around Boston contrasted with their earlier ill-fated invasion of Quebec in 1775. After an initial victory in Montreal in November 1775, the British defeated the Colonial Army in the invasion of Quebec in December 1775. American forces laid siege to Quebec for the next 6 months with several commanders enjoying no success. One commander, Major General John Thomas, began his military career as a physician in the French and Indian War. He later transferred to a line position and returned to fight in the Colonial Army at the onset of the Revolutionary War. Despite his medical training, he was unable to contain the epidemic of smallpox thought to be from contact with ill citizens in the Quebec area. Whether this contact was an intentional strategy of British Commander Sir Guy Carleton is unclear. American troops were infected by the hundreds by the spring of 1776 and by the thousands when they retreated to New York in June. Many American soldiers abandoned their positions out of fear of exposure. Some performed self-inoculation using material from the smallpox lesions of infected comrades without subsequently quarantining. These medically unsupervised practices led to epidemic spread through the ranks, including to General Thomas who died of smallpox in June, 1776.[24]

During the disastrous retreat from Quebec, General Washington observed firsthand how smallpox diminished the strength of his Army and negatively impacted recruiting and retention. He issued a General Order directing universal inoculation of all soldiers on January 6, 1777 to Dr. William Shippen, Jr., the Physician in Chief and Director of Hospitals for the Colonial Army.[10,25] In this guidance, he described smallpox as, "the greatest enemy of the Continental Army."[26] By 1778, smallpox was under much better control and remained so until the final major conflict at Yorktown in 1781, when the British sent smallpox-infected slaves to infiltrate colonial lines as a form of biological and psychological warfare, with minimal success.[10,26]

In the 1790s, Edward Jenner developed a smallpox vaccine derived from cowpox.[10] This vaccine was safer than inoculation. The US Army adopted the cowpox vaccine by 1808.[10] Immunization against smallpox continued widely in the US civilian population until 1972 and the US military until 1989.[27]

COVID-19 Pandemic—21st Century Civilian Experience: A 2020 study of blood donation specimens collected among residents of 9 states between 13 December and 17 January 2020 found antibodies to SARS-CoV-2 in the US as early as mid-December 2019.[28] In early March 2020, both the US, through a National Emergency Declaration, and the WHO declared a global pandemic. Within 12 months, by mid-March 2021, over 28 million civilian and military Americans had a documented COVID-19 infection, the largest number of infections in any country in the world.[3] The US recorded over half a million pandemic deaths during this period.[2,3] The pandemic dramatically affected the US population in 3 peaks in the first year, based on 7-day moving averages. The US Centers for Disease Control and Prevention (CDC) reported the first morbidity peak (Figure 1) on April 22, 2020, a second peak in early August 2020, and the highest peak in early January 2021, just before wide administration of COVID-19 immunizations. US mortality peaked for the first year of the epidemic in January 2021 (Figure 2).[29]

Figure 3. COVID-19 weekly cases per 100,000 population by sex in the US, from March 1, 2020 through July 2, 2022, as reported to the Centers for Disease Control and Prevention (CDC).[29]



Younger individuals sustained greater numbers of mild or asymptomatic infections with lower numbers of hospitalizations and deaths.[30] Both US morbidity and mortality began to decline in early 2021 with increasing availability of 3 COVID-19 vaccines. By April 1, 2021, 154 million doses were administered in the US with 56 million people having completed the appropriate 1 or 2 vaccine regimens.[30] The US crude mortality rate of documented COVID-19 infections was just under 2% as of early April 2021.[29] Morbidity did not differ based on sex (Figure 3) or age (Figure 4). During the second year, a significant peak occurred in early 2022, related to the emergence of the Omicron COVID-19 Variant (Figure 1).

US mortality peaked early in the spring of 2020, the winter months of 2020-2021 and 2021-2022, and the fall of 2021 (Figure 2). However, mortality varied greatly by age (Figure 5), with the highest concentration of deaths in those 75 years and older, followed by those 65 to 74 years old.[29] The CDC published an early national alert in the *Morbidity and Mortality Weekly Report*. By May 2020, COVID-19 was associated with increased risk with age and comorbidities such as cardiovascular

Figure 4. COVID-19 weekly cases per 100,000 population by age group in the US, from March 1, 2020 through July 2, 2022, as reported to the Centers for Disease Control and Prevention (CDC).[29]

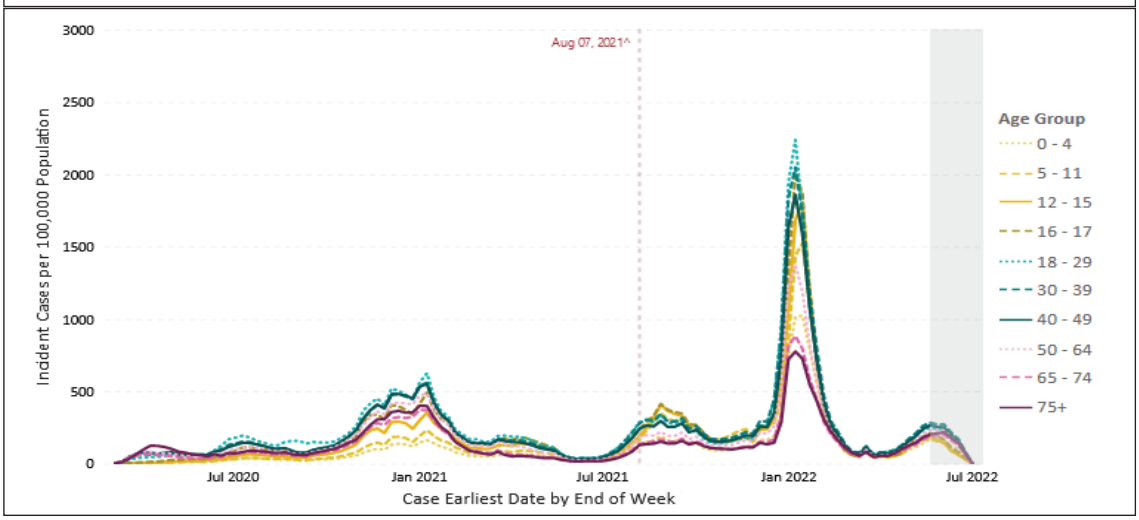
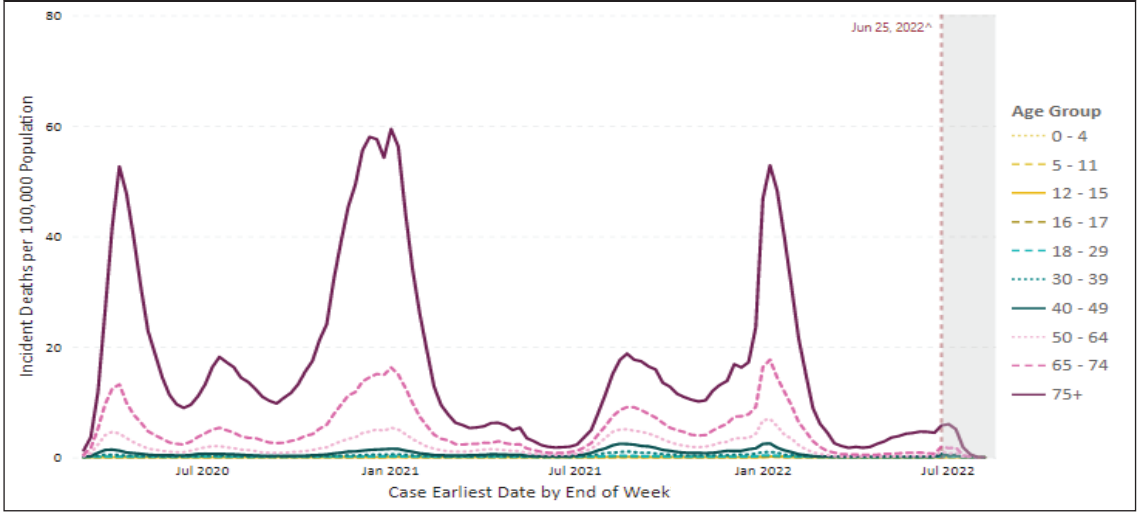


Figure 5. COVID-19 weekly deaths per 100,000 population by age group in the US, from March 1, 2020 through July 30, 2022, as reported to the Centers for Disease Control and Prevention (CDC).[29]



disease, diabetes, and chronic obstructive pulmonary disease. Additionally, disease, hospitalization, and deaths disproportionately impacted non-Caucasian racial and ethnic groups.[29,31]

COVID-19 Pandemic—21st Century Military Experience: Within 1 month of the March 2020 pandemic declaration, the Under Secretary of Defense for Personnel and Readiness issued a Force Health Protection Guidance document that applied to all Department of Defense (DoD) military, civilian, and contractor personnel. This document accepted CDC guidance as the DoD standard for control measures. These control measures included restrictions on workplace access and reporting of disease, use of personal protective equipment, social distancing, use of telework, self-quarantine for respiratory symptoms, and other surveillance data. A list of Occupational Safety and Health Frequently Asked Questions with pertinent CDC guidance links was included as an attachment to this DoD document.[32] As of March 15, 2021, the DoD reported 232,652 COVID-19 cases and 295 COVID-19 deaths among military and support personnel, not counting dependents (Table 2).[33] Importantly, COVID-19 infections caused hospitalization of the then-President of the United States (the US military Commander-in-Chief), a senior Coast Guard Admiral with resultant isolation of the Joint Chiefs of Staff, and the removal of the commanding officer of the carrier USS Theodore Roosevelt (CVN-71).[34,35]

The COVID-19 outbreak on the CVN-71 presented a major national security concern. This US Navy aircraft carrier deployed routinely to the Western Pacific Ocean in early 2020. During that deployment, a COVID-19 outbreak infected 28% of the crew (1,339 infected of 4,779 total crew members) and led to the death of 1 senior enlisted crewmember. The ship remained quarantined in Guam for 2 months until the outbreak was controlled.[36] This extended duration of reduced maritime capability due to a disease outbreak was unprecedented. With only 11 US Navy aircraft carriers of this size and capability, only 1 or 2 are routinely deployed in the Western Pacific region.[37] The commanding officer of this key warship was relieved from command due to his chain of command's lack of confidence in his leadership.[35] Other shipborne outbreaks were reported during this time. A French Navy aircraft carrier in the spring of 2020 identified 1,279 of 1,688 (76%) of the crew with COVID-19. This diagnosis was made by a positive Reverse Transcriptase–Polymerase Chain Reaction (RT-PCR) test. An additional

Table 2. Department of Defense (DoD) COVID-19 cumulative data as of March 15, 2021.[33]

Category	Cases	Hospitalized	Recovered	Deaths
Military	168,031	1,536	154,012	24
Civilian	47,405	1,350	38,632	202
Dependent	25,625	364	23,719	11
Contractor	17,216	491	14,698	69
Total	258,277	3,741	231,061	306

These presumptive figures will be updated weekly and are refined as the Joint Staff Crisis Management Team receives updated/corrected reporting on case numbers.

241 sailors were identified as suspected COVID-19 infections by their symptoms with a negative RT-PCR test.[38] The CDC COVID-19 Response Team identified positive COVID-19 shipboard infections in 89 cruise ship voyages with US citizens as passengers from January 19 to April 16, 2020; 1,669 passengers were identified as positive by RT-PCR testing with 29 deaths before a CDC Stop Sail Order for cruise ships was fully implemented in mid-April 2020.[39]

Table 3. Department of Defense COVID-19 cumulative data as of July 1, 2022.[33]

Category	Cases	Hospitalized	Recovered	Deaths
Military	421,807	2621	411,317	95
Civilian	143,656	2,385	125,236	417
Dependent	65,699	556	63,756	36
Contractor	41,280	772	37,468	141
Total	672,442	6,334	637,777	689

These presumptive figures will be updated weekly and are refined as the Joint Staff Crisis Management Team receives updated/corrected reporting on case numbers.

US military staffing relies on a predictable stream of newly trained personnel graduating from a wide variety of schools, ranging from initial entry training for recruits to advanced technical and professional programs. The training cadre for these schools developed and implemented testing and quarantine measures aimed at quickly identifying infected students and limiting spread and devised innovative training methods to minimize class disruptions and maintain the personnel pipeline. Investigators from the Navy Medical Research Center, Silver Spring, MD, collaborating with other civilian and military medical institutions, tracked COVID-19 infections among 1,848 US Marines in recruit training. Using rRT-PCR testing for SARS-CoV-2, they found 2% of those with negative tests at the beginning of supervised quarantine later tested positive by day 14. Genomic analyses revealed 6 transmission clusters with shared rooms and specific platoons being risk factors.[40] Study of military trainees at Joint Base San Antonio-Lackland, TX, documented arrival quarantine to be an effective non-pharmaceutical intervention.[41]

The COVID-19 pandemic challenged the military medical community to assess its capabilities for testing and caring for patients in operational units. A review of the US Army experience with COVID-19 prevention, risk mitigation, and laboratory testing strategies, published in the January-March 2021 edition of *The Medical Journal* of the US Army Center of Excellence, documented the development of a standardized scoring system for diagnosis and a threshold for transfer to a higher echelon of care within the US Central Command area as important milestones.[42] The COVID-19 Army Rapid Assessment Tool (CARAT) allowed for rapid tracking of morbidity and mortality data in a potential disease epidemic in a deployed setting.[43] Adams et al described the monitoring of the recovery of active-duty personnel in the Western Pacific and their readiness to return to either full duty or light duty.[44]

The Republic of Korea (ROK) was one of the first countries to report COVID-19 cases outside the People's Republic of China in early 2020. The US Army's 1st Area Medical Laboratory (AML) subsequently deployed to the ROK from mid-March 2020 until June 2020. The AML had unique capabilities to validate chemical, biological, radiological, and other health hazards. In this case, the AML personnel supplemented organic medical units in diagnosis, treatment, laboratory confirmation, contact tracing, and public health messaging.[45]

The industrial base for the US military is also critical to national security because it must provide the materiel support necessary to keep our military equipped to execute their missions. The largely civilian workforce maintaining the industrial base was vulnerable to the pandemic coronavirus. Krahl et al noted chronic medical conditions and age increased the susceptibility of the civilian workforce to COVID-19 complications at a major Navy shipyard and led to an unplanned large call up of Naval Reservists to backfill the absent, vulnerable civilian workers.[46]

The continued impact of COVID-19 on the Department of Defense can be seen in Table 2 at the 1-year point in early 2021 and at a later comparison time in late June 2022, at the time of the publication submission of this manuscript (Table 3).

The DoD published guidance on the use of the new COVID-19 vaccines on December 7, 2020, allowing for the distribution and voluntary administration of the first of 3 COVID-19 vaccines under a Food and Drug Administration (FDA) Emergency Use Authorization (EUA).[47] Based on a 2003 federal court ruling, military personnel can be offered an immunization that has received only an EUA but not full FDA approval. They cannot be ordered to submit to immunization under an EUA without a waiver directed by the President of the United States.[48] An extensive analysis by Lang et al looked at the first 3 months of COVID-19 vaccine administration in the

DoD (mid-December 2020 to mid-March 2021). The total population of active-duty service members (ADSMs) numbered 1,331,523. Only 27% of ADSMs had initiated a COVID-19 vaccination regimen. Increasing age, higher education levels, higher rank, and Asian/Pacific Islander race/ethnicity were associated with increasing incidence of initiation after adjustment for potential confounders. Among the services, the Navy had the highest percentage (35.0%); the Air Force and Marine Corps had similar numbers, and the Army was lowest with 21.9% (Table 4).[49]

Table 4. Initiation of COVID-19 vaccine (Pfizer or Moderna), active component service members, December 11, 2020 through March 12, 2021.[49]

Service	End Strength	Immunizations	Percentage with at least one dose
Army	478,191	104,667	21.9%
Navy	342,059	119,655	35.0%
Air Force	330,244	87,927	26.6%
Marine Corps	181,029	49,289	27.2%

Discussion

Humankind's knowledge of new and ever-changing microbes is limited. The microbial threat may be further complicated intentionally by biological warfare, using existing pathogens or intentionally created new pathogens, or by the accidental release of dangerous pathogens from laboratories. Therefore, humility acknowledges our limited knowledge and should underlie our approach to endemic or pandemic threats. Smallpox in the Revolutionary War, influenza in World War I, and our current experience with COVID-19 demonstrate the mortality, morbidity and disruption resulting from epidemics and pandemics. Microbes, whether naturally occurring or manipulated by scientists, will continue to threaten military and civilian populations nationally and globally in the future.[50] Failure to adequately recognize and prepare for future threats could be catastrophic.[51]

The impact of the current pandemic on the US military was not as catastrophic as the 18th Century smallpox epidemic or the 1918-1919 influenza pandemic. The primarily young, healthy military population generally lacked the risk factors for severe and fatal illness.[50] The military quickly implemented available interventions but had only limited success with voluntary vaccine administration. The current pandemic has taken a toll on the US military, it is not over, and future epidemics and pandemics can be expected. An organized, objective, critical review of the US military's preparedness for the COVID-19 Pandemic and its response to the pandemic is indicated to better deal with future epidemics and pandemics.

Infectious disease outbreaks can have a substantial impact on military operations as shown in both smallpox and COVID-19 histories. In the Revolutionary War, General Washington considered smallpox to be a greater enemy than the British Army. The COVID-19 pandemic caused the shutdown of a US Navy aircraft carrier, the hospitalization and isolation of high level national and military leaders, and disruption of military personnel training pipelines. This led to requirements for testing, quarantining, distancing, and caused the activation of reserve service members to replace at-risk civilians in the industrial base. The COVID-19 pandemic disruptions affecting military and civilian populations have continued well beyond a year. This has placed a heavy and persistent burden on those working to maintain stability of multiple services in the civilian community and a state of readiness in the military.

Surveillance for threatening microbial agents and the diseases they cause must be effective for early identification and meaningful response to occur. General Washington did not have highly trained epidemiologists and sophisticated laboratory support, but his forces practiced surveillance by tracking smallpox in populations his vulnerable soldiers might encounter and taking actions to reduce the threat.

In November 2020, Dr. Nelson Michael pointed out in the *New England Journal of Medicine* military studies of confined spaces such as ships, barracks, and military transportation could provide insight into the infectivity of novel pathogens.[52] Many articles have been published on efforts in the US military to deal with the COVID-19 epidemic, but only a small number are laboratory-supported, epidemiologic investigations that provide data describing the impact of the virus on military people, assessing the impact of interventions, or provide data and information potentially to be used to inform future policies.[32,33,36,40,49]

Almost 25 years ago, the DoD initiated the DoD Global Emerging Infections Surveillance and Response System (DoD-GEIS). Working closely with the CDC, the WHO and other health agencies, the DoD-GEIS supported a global, laboratory-based surveillance system for known, re-emerging, and emerging microbial threats.[53] The priority microbe for the DoD-GEIS and the model for global, laboratory-based surveillance, collaboration and response was influenza.[54] During the latter half of the 20th Century, a global network of military laboratories with epidemiologists quickly responded to allegations of unusual disease occurrence by launching field investigations to obtain clinical data and specimens for laboratory

study. This capability has diminished, as resource priorities have shifted. For example, the Army Epidemiology Consultant Service (EPICON) at the Walter Reed Army Institute of Research (WRAIR), Washington DC, was supported by the public health laboratories of the WRAIR and the Preventive Medicine Residency at the WRAIR. Over a period of almost 30 years, EPICON teams conducted over 150 investigations. The mission emphasis of the WRAIR changed with the loss of public health laboratory support; the EPICON was modified to focus on surveillance using databases and relocated in 1994. The residency later closed.[55]

Important early objectives of the DoD-GEIS were rapid identification of threatening microbes and to provide information quickly to decision makers to inform policies and prevent or mitigate morbidity and mortality. A review of the US military's response to the current pandemic should address the questions of what the military could have done to improve early warning of the pandemic and communicate useful information to planners and commanders. Could the removal of a US aircraft carrier from the line for a period of months have been prevented?

Interventions may not be easily or widely implemented in military or civilian populations for socio-cultural, religious, or political reasons. As an organization, the US military accepted and enforced masking, distancing, testing, and quarantine, but many civilians rejected these interventions. The interface between uniformed members of the military and civilian family members, government employees and contractors could be, and may have been, a vulnerability in the military's efforts to prevent SARS-CoV-2 infections.

One of the most difficult challenges in the COVID-19 pandemic has been the widespread reluctance to accept new immunizations after their remarkably fast rollout.[56] The refusal to accept a new strategy to increase immunity parallels the concerns of colonists in New England in 1621, which led to less general smallpox immunity among the colonists when compared to the British Army. Offering a COVID-19 vaccine under an FDA Emergency Use Authorization met with resistance by many in both the civilian and military populations. General George Washington issued a General Order in 1777 for universal inoculation in the military forces. However, the Secretary of Defense requirement for COVID-19 vaccine administration in the military had to be delayed until after the first mRNA vaccine attained full FDA licensure approximately 9 months after the EUA. The reluctance of US service members to accept the vaccine deserves study. An April 2021 estimate was approximately 40% of active-duty Marines were declining the COVID-19 immunization, which is a serious concern for military medical readiness.[56]

Hesitance or resistance to preventive immunizations in the uniformed ranks could pose future readiness problems and deserves attention. Effective response to large scale disease outbreaks requires resources and leadership support for advance planning, meaningful surveillance for early warning and ongoing monitoring, and organizational bridge-building to facilitate rapid communication and coordinated surveillance and response. Surveillance must be near real time with rapid assessments and timely delivery of information to informed decision makers, who can act on sound advice in consultation with trusted medical advisors. Prevention and mitigation efforts must be identified and implemented quickly. A robust logistical chain with an educational strategy for recipients must support the implementation of interventions as they are developed. The lessons of the COVID-19 pandemic must be used to better prepare the US military for the next epidemic or pandemic, which will inevitably emerge in the future.

Conclusion

Objective review of the US military response to the current pandemic, including both positive and negative elements, is a key and necessary action toward process improvement and preparation for future infectious outbreaks. We identified 2 key areas for improvement through our review. First, military disease surveillance capabilities have diminished recently, which represents a vulnerability since effective surveillance is a prerequisite for early identification and subsequent meaningful responses to novel and reemerging threat agents and diseases. Second, awareness of socio-cultural, religious, or political factors that may limit the implementation of effective interventions is a critical component of public health planning.

Those who cannot remember the past are condemned to repeat it. George Santayana (1863-1952)[57]

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History of US Army Whole Blood on the Battlefield

Scott C. Woodard, MA

Brigadier General Douglas Kendrick warned in his seminal work on the blood program of the Second World War,

> It was only by the strictest attention to such matters that blood was able to achieve its miracles, and, equally important, was prevented from becoming a deadly agent. It must never be forgotten that without proper care, blood can be lethal.[1]

His point lay in the details offered. It was only by adherence to attention to detail in procurement, storage, and delivery the miraculous powers of blood can be achieved. Throughout his historical documentation, the requirement for special training of personnel handling blood was emphasized and documented. Deviating from prescribed storage temperatures, rough handling, exceeding shelf life, improperly matching blood types, and contaminating the blood are some of the various improper care that produce a negative patient outcome. Bacterial infection, toxicity, hypoxemia, and antibodies in the blood are just a few examples and could ultimately lead to death. This article focuses on the means of this miracle in briefly telling the story of whole blood on the battlefield by the US Army.

Early 20th Century

Independent from one another at the turn of the century, researchers across the globe developed varying methods of obtaining blood from donors and administering it to patients. In the First World War, the benefits of whole blood were understood to prevent shock and replenish blood loss during surgery. Additionally, experience in the warzone showed how blood transfusion aided in combating carbon monoxide poisoning and wound infection. Because of clotting and limited shelf life, challenges lay in the collection and subsequent storage of blood. One leading proponent of transfusion was Captain Oswald H. Robertson, Medical Corps, United States Reserves. While consulting with the British upon the US entry into World War I, Robertson developed his own system of blood banking and cold storage with group O blood (universal donor compatible with all other blood types, and therefore, alleviating the need for blood typing) using glass bottles containing citrate and dextrose effectively used by fellow researchers and cold-storage boxes he developed. This banking process enabled a ready stockage of blood and freed the donor from being present during surgery.[2,3]

In the immediate years prior to the US joining active combat in World War II, the advantageous use of whole blood was demonstrated successfully during the Spanish Civil War, 1936-1939. Additionally, much was learned from Great Britain's first use of whole blood from combat in North Africa in 1940 before the US even entered the war.[1]

World War II

This timeline begins in North Africa, but in this short Second World War review, the preponderance of the story of whole blood will focus on the European Theater of Operations (ETO). Plasma was viewed positively for its easy transport; however, it did not contain red blood cells and was incorrectly labeled as a blood substitute. From the Allied invasion of North Africa in November 1942, it became clear plasma could not take the place of whole blood.[1] Freeze-dried plasma's use on the battlefield helped restore blood pressure but did not correct hemorrhagic shock. This inability to deliver oxygen, combined with increased hepatitis cases associated with plasma usage, added to the clinical preference for whole blood on the battlefield. Dried plasma was used primarily by frontline hospitals and was created by pooling blood from many donors. This pooling increased the opportunities for hepatitis infection. However, the direct link to infected plasma was not clinically proven until the Korean War.[1,3]

Figure 1. Supply sergeants check and record whole blood being shipped to field hospitals somewhere in France, 12 June 1944. The containers also contain dry ice to keep the blood at a proper temperature. Unlike other commodities, temperature control and expiration date monitoring were crucial in product efficacy. The time sensitive delivery of blood, like other medical items, was critical because of the short shelf-life and unavailability of any substitute for sustaining life. In addition to whole blood, penicillin, biologicals, sutures, intravenous solution, and plasma were to reach the front by special channels through the theater blood service.[5].

The first military blood bank was established at Walter Reed General Hospital in 1942. In the ETO, the US Army blood bank collected whole blood for usage in Europe from soldiers stationed in theater. However, by 1944, it was unable to meet the daily requirement of 1,000 pints of Type O whole blood. The resources of the American Red Cross were needed because the Army was unable to meet the demand alone. It was determined blood could be safely used up to 21 days after collection, but 18 days was a standard practice.[3,4]

The antibody level, or titer, in blood tells whether the donor has antibodies to other major blood groups. Studies done in the Naples, Italy blood bank in April 1944, determined a high anti-A and/or anti-B antibody titer (reacting with or binding Type A or B blood) should be avoided because of critical adverse reactions when given to non-Type O recipients. It was determined low titer was preferred for all recipients and a high titer designation should be reserved for Type O recipients only.[1]

In December 1944, Chief Surgeon, US Army ETO, General Paul R. Hawley announced the revised planning factor estimation of 1 pint of blood for every 2 wounded personnel. To meet this goal of increased contributions, Red Cross centers on the East and West Coast collected Type O blood. Upon receipt, the Army flew the blood reaching the ETO within 24-hours and flew to the Pacific delivering blood within 72-hours (Figure 1).[3,6]

Earlier in July 1943, General Hawley directed to provide blood to forward hospitals in the Combat Zone (CZ). A committee was formed and developed planning factors for the blood mission. Whole blood, except in emergencies, would be reserved for medical units in the CZ. This blood would be made available as far forward in the CZ as platoons of field hospitals attached to clearing stations of divisions (loosely equivalent to today's forward resuscitative and surgical detachment attached to a brigade support or area support medical company). The blood would be obtained from volunteer donors from services of supply (SOS) units (think in terms of today's Theater Sustainment Command), who would be organized into a theater blood panel using only Type O. It would be preserved by the glucose-citrate solution devised by the Medical Research Council of Great Britain, would be kept under constant refrigeration, and have an expiration period of 21 days from the date of

Figure 2. Operations chart, Whole Blood Service, European Theater of Operations US Army, Operations Division, Office of Chief Surgeon, 1943.[1]

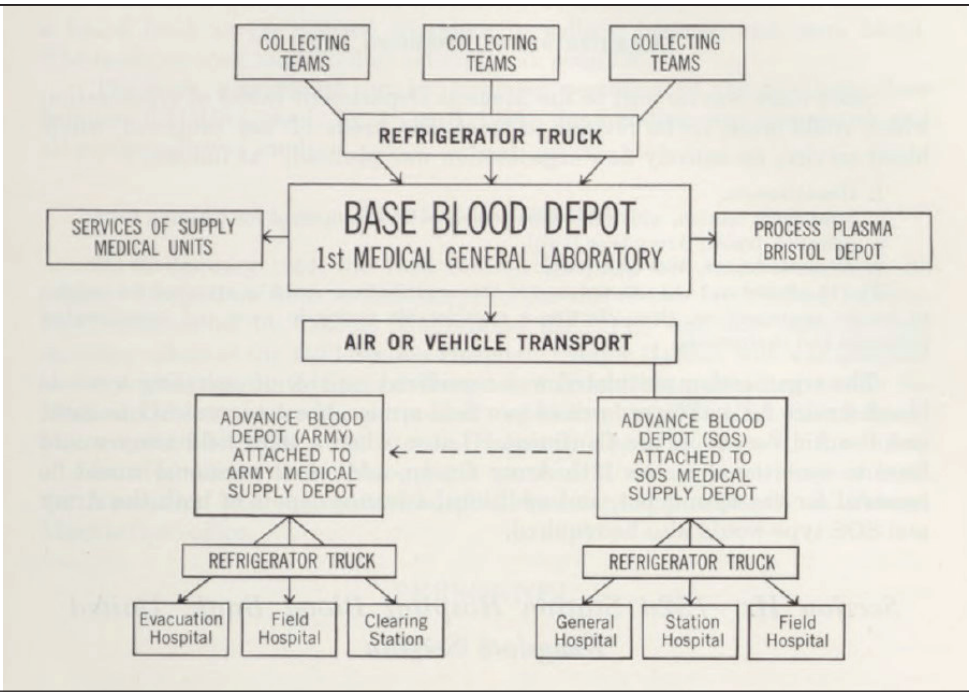
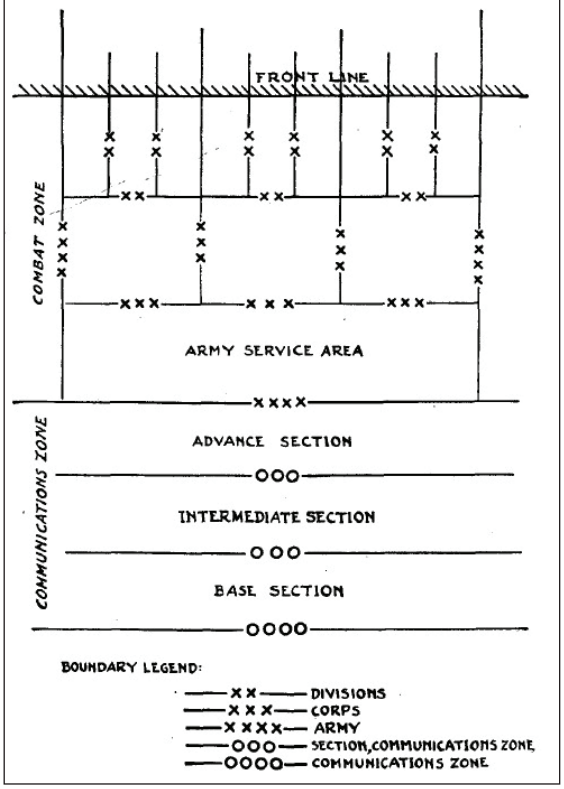


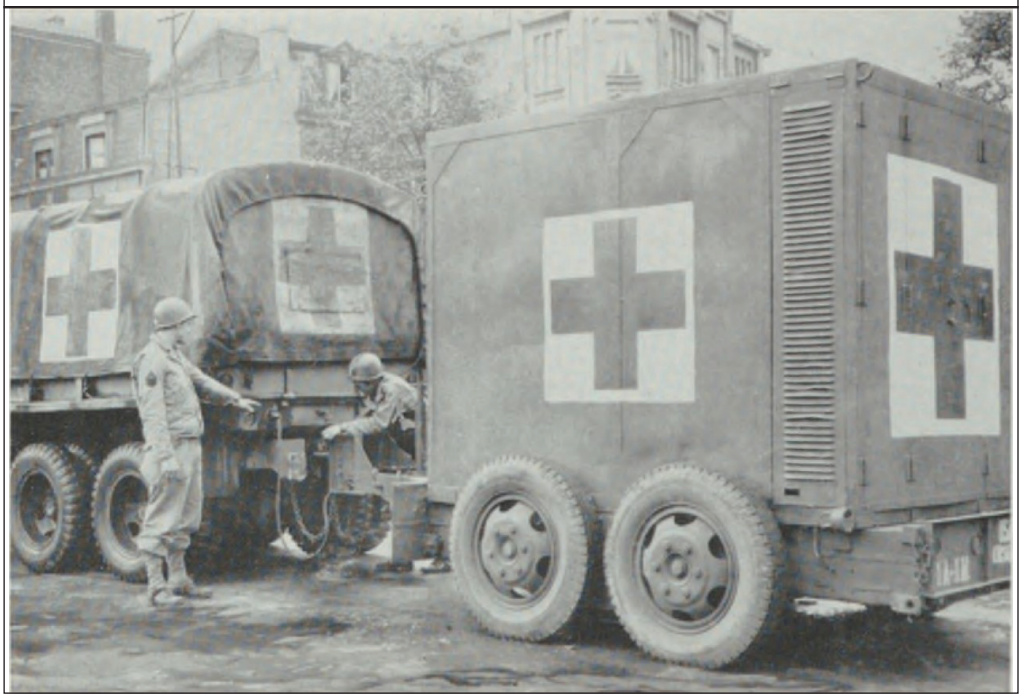
Figure 3. Typical organization of a theater of operations for World War II.[7]



collection. The commanding general of SOS directed, and the Theater commander confirmed whole blood be given the highest priority for transportation. And finally, the blood service would be operated by a theater unit, with sub-elements attached, as required, to major commands for operations.[1]

By August 1943, procedures for whole blood collection, shipping, and distribution in the ETO provided the framework for a system on the mainland of Europe (Figure 2). Collection teams shipped via refrigerator trucks to the blood base depot where the blood would ship on air or truck assets to the Advance Blood Depot attached to the SOS Medical Supply Depot. Initially located in Salisbury, England, the blood banks moved to Paris, France, supporting the field armies moving across Europe from the Advance Section of the Communications Zone (COMMZ) (Figure 3). From there, the cargo was transported in refrigerator trucks to general, station, or field hospitals. It is worth noting this change from the original guidance of early July 1943 to issue whole blood only to the CZ hospitals. From the SOS Medical Supply Depot, blood was shipped through the Advance Blood Depot (Army) attached to the Field Army Medical Supply Depot with dedicated refrigeration trucks

Figure 4. A 2 1/2-ton truck carries an 80-pint refrigerator in the truck body. Towed is a 1,000-pint mobile refrigeration trailer from Detachment A, 152nd Station Hospital, 1st US Army in Belgium, October 1944. Both assets are clearly marked with red crosses.[1]



to the evacuation, field, and clearing stations. The field army blood depot was attached to the CZ medical depots, organic to each field army.

These blood units (SOS banks and field army banks) were responsible for the handling and shipping of blood on the continent. When trucks with mounted refrigeration units were received at the ETO Blood Bank by May 1944, they were instructed to classify the vehicles as surgical trucks, mark them permanently with Red Crosses, and mark "ETO Blood Bank" on the cab visors, and use them for blood purposes only (Figure 4).[1] The field army blood depot normally operated under the direction of the field army surgeon and located with evacuation hospitals, the largest consumer of medical supplies. Unlike the other supply depots, which opened only when the location was suitable for the next demand or when troops remained in the area for some time, by doctrine medical supply depots established operations as soon as evacuation hospitals opened.[7,8]

The European Theater leaders incorporated the experiences of earlier combat. The Mediterranean Theater of Operations Chief Surgeon supporting the invasion of Italy, remarked the greatest need for blood was in the forward army area. The normal shipment of blood to field hospital platoons was 34 pints per day, while evacuation hospitals received 66 pints daily. At this time, the field hospital was a 400-bed hospital in the COMMZ intended for definitive surgical and medical treatment where fixed facilities did not exist. Highly flexible, it could further break down and serve in 3 separate 100-bed units and increase capacity with augmentation from surgical teams. The field hospital platoons could also move forward into the CZ and collocate with division clearing stations. Primarily intended to care for the seriously wounded or sick for further evacuation to the rear, there were 2 types of evacuation hospitals. Both the 750-bed fixed evacuation hospital and the 400-bed semi-mobile evacuation hospital were in the CZ. Between the invasion of Salerno, Italy, in September 1943, and the end of the Monte Cassino campaign in May 1944, 4,600 transfusions were administered in the field army area CZ compared to the 300 in the base area (rear of the COMMZ). Therefore, according to the Theater Surgeon, the emphasis should be on supplying blood to the field

Figure 5. After blood arrived in Japan from the United States, it was secured in the blood storage section of the 406th Medical General Laboratory. When needed for distribution, the blood was shipped to Tokyo, where it was then flown to Korea. From Seoul Airfield, it was transshipped to the 11th Evacuation Hospital, February 1952.[1]

army rather than base installations. Transfusions were normally given in field and evacuation hospitals. However, occasionally shipped whole blood was transfused at the battalion aid station when their rapid advance created distance too far from the field hospitals as seen in the breakout at Anzio, Italy, at the end of May 1944 and in the US 6th Army in the Pacific Theater.[1,9,10]

After the war, European medical planners concluded when planning for future fights like the ETO, a safe calculation of 1 pint of blood for each casualty was required. For a field army, this would mean 500-pints daily.[1]

Korean War

The experience in World War II showed the importance of a functioning blood bank to replace blood lost on the battlefield. However, the Army did not possess an operational system with the required supplies, equipment, and training with detailed plans for collecting, processing, and distributing even 5 years after the war.[1] The preface of *Blood Program in World War II* subtitled, *Supplemented by Experiences in the Korean War*, published in 1964 states:

> When the Korean War began, the concept of the essentiality of whole blood in the management of shock was firmly established in the minds of both clinical and administrative personnel and had been accepted by statisticians. The fly in the ointment was that administrative personnel had not yet learned that whole blood is best handled out of supply channels, as a separate supporting service.[1]

From the previous war, the Army Medical Department understood the importance of specialized technical training required for the entire system of blood banking—collection, distribution, and storage. Clinicians contended blood should be managed as a specialty item. The US Army found itself still debating whether blood could be handled as a supply commodity equitable to munitions. The Director of Military Supply and the Acting Chief, Requirements Coordination, Munitions Board argued the Munitions Board was legally responsible for policies involving military supplies. They viewed blood and blood derivatives as a supply commodity or munition, and the blood program was no different than any other military supply program. Despite their efforts, the Secretary of Defense gave the blood program to the Directorate, Armed Services Medical Procurement Agency and charged the Director of Medical Services, Department of Defense, power to implement policy and standards in August 1950.[1]

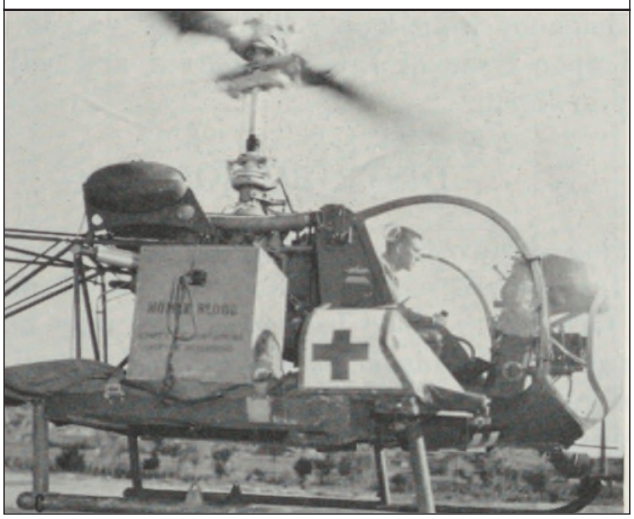
Early on in the police action on the Korean Peninsula, blood was collected and delivered by the 406th Medical General Laboratory in Tokyo, Japan. The lab controlled distribution to the hospitals stationed in Japan, as well as mobile hospitals in the Pacific. Quality assurance checks ensured only Type O blood was shipped to Korea because most Type O blood used, as in World War II, was not crossmatched before use. The medical depot in Korea received shipments overnight from Japan and received Type O whole blood labeled as high or low titer from the US and Japan via air delivery (Figure 5).[1,3]

Like the Second World War, whole blood was distributed down to the evacuation hospital and the newly formed mobile surgical hospital, an outgrowth of the far-forward field hospital platoon concept, in the vicinity of a division rear area. Blood delivered to Korea early in the war was stored in 2 southern depots, but as the front stabilized, additional depots were established north closer to the front. By the end of 1951, there were 3 depots in close support of the front and 2 in the rear.[1]

For blood banking purposes, the distribution chain ended in the division rear area. However, front-line customers could request blood from a higher echelon of medical care. There are examples of whole blood being

Figure 6. Studied in Korea by the Walter Reed Army Medical Center Research Team, rapid blood administration at a forward aid station is performed on a seriously wounded casualty just arrived from the area around Hill 266, Old Baldy, August 1952.[1]

Figure 7. Helicopter ready for takeoff with whole blood, June 1953. All blood was transported by plane or helicopter. Rotary wing aircraft proved to be the best means of distributing blood in far-forward locations since they could evacuate casualties upon their return.[1]



administered forward of the evacuation and mobile army surgical hospitals (Figure 6).[1] Before the Battle of Chipyong-ni, the regimental surgeon coordinated a request and had the regimental commander secure Type O whole blood from the division collecting station. Additional resupply came as medical evacuation helicopters delivered blood when arriving to pick up wounded patients on the third day of the battle.[11]

Helicopters provided the most efficient means of distributing blood to the forward units with the bonus of rapidly evacuating patients on their return trip (Figure 7).[1] Its proven reduction of travel time in the air, avoiding the horrible roads, caught the eye of the US 8th Army Surgeon, Colonel Chauncey E. Dovell, who advocated and got dedicated rotary wing aircraft for patient transport early in the war.[12]

Even though blood distribution on the Peninsula was deemed successful, clinicians were not satisfied with whole blood handling and distribution in the Korean Theater. From their perspective, the operation of a blood bank system, including its distribution, "is not a supply problem but a professional logistic project requiring the highest degree of coordination on the part of skilled professional personnel."[1] In other words, physicians thought it should be managed by physicians. They believed the unique requirements of moving and maintaining blood safely required the oversight of physicians, whose sole concern was ensuring continuous, effective management and protection of the blood supply.

The medical supply officers within the medical depot system were officers of the newly formed Medical Service Corps. Many of them rose from the noncommissioned officer ranks during World War II. During the Second World War, these officers handled administrative actions as Medical Administrative Corps officers freeing Medical Corps officers from the burden of paperwork in an organization already short of doctors. The young corps, established in 1947 combining the Medical Administrative, Pharmacy, and Sanitary Corps, faced institutional bias and legitimate concerns.[12] Apprehensions had surfaced in World War II about similar issues with non-physicians handling blood. In Italy, whole blood program personnel took exception to normal medical supply channels distributing the blood. Some examples given were whole blood was deemed highly perishable, medical supply depots were not specialized

to handle blood, and blood becomes useless and dangerous with age where standard practice was to always issue out oldest products first.[1] From the perspective of transfusion officers, it was feared the multiple supply points were inefficient and wasteful because of the blood aging in storage (Figure 8). An investigating officer in 1953 concurred with their assessment. He recommended a separate medical unit commanded by a medical officer with the sole responsibility to procure, store, and distribute blood and blood substitutes. The report recommended this officer would serve under the theater surgeon with the total responsibility of the blood program in theater.[1,12]

Figure 8. Personnel at the 6th Medical Depot, Taegu, South Korea receive blood. The Whole Blood Processing Laboratory at Travis Air Force Base was still shipping blood in World War II insulated cardboard boxes originally used for airlift up to the spring of 1951. Note the boxes are showing signs of deterioration.[1]

Vietnam War

The knowledge gained from whole blood in Korea was used again in Vietnam. The Office of the Surgeon General established the Military Blood Program Agency (renamed Military Blood Program Office in 1972), responsible for coordinating all blood programs for the Department of Defense. In 1962, it was fully operational with the mission of collecting, processing, and transporting blood products at the joint level.[3,13]

Blood was processed and shipped from Japan to troop concentrations along the coast of Vietnam. Irregularly scheduled aircraft and poor communication proved unsatisfactory for this vital mission. Medical planners were deeply aware blood should not be handled as a routine supply item even if it was distributed within the medical supply system. Saigon, South Vietnam was designated as the location for a central blood bank with several blood storage subdepots collocated with hospitals or medical units throughout the country. These collocated blood banks marked a major change from the usage of pure medical supply depots in the past. In 1965, the 406th Medical Laboratory in Japan flew whole blood and fresh frozen plasma into Saigon with their 406th Mobile Medical Laboratory, distributing whole blood to US troops. Unlike the Korean War where medical depots distributed blood once delivered in country, the 406th Medical Laboratory, their satellite units, and subsequent laboratories ran the central blood depot and were charged with distributing whole blood throughout Vietnam. By 1967, this blood distribution system was serving all Free World Forces in Vietnam. The Republic of Vietnam still provided blood for their military forces. Once the central blood depot was moved and established at Cam Ranh Bay in 1969, the 9th Medical Laboratory ran the blood depot and distributed to the subdepots throughout the country. All blood types and fresh frozen plasma were transported from these subdepots by fixed or rotary wing aircraft or ground ambulance to field, evacuation, or surgical hospitals. However, low titer O positive blood was shipped from these subdepots to division clearing stations by helicopter.[13]

Low titer type O whole blood was used because of its emergency universal donor qualities or when blood type was unknown. But as the war continued, type specific whole blood was incorporated into theater.[3] Hospital facilities were stable and, in general, did not move during the Vietnam War. Whole blood was administered at the hospital level, but there were occasions of administration before helicopter medical evacuation. In anticipation of casualties, Styrofoam containers (Collins boxes) holding blood for 48 to 72 hours were positioned in forward areas. The blood supply from the Pacific Command and later, the continental US, was always sufficient. When blood was transfused before reaching a facility that could crossmatch blood, Type O low titer was used. When the patient received more than 4 units, Type O low titer was continued. However, when less than 4 units were used, the blood was cross-matched, and the matching type was administered. Complications of

Figure 9. "Never shall I leave a fallen comrade... third stanza of the Ranger Creed." Example of the 75th Ranger Regiment's Ranger O Low Titer (ROLO) Whole Blood Program administration at the point of injury, August 2019.[17]

bleeding appeared after multiple transfusions. Fresh frozen plasma, or if possible, fresh drawn blood controlled the bleeding. One patient is recorded to have received 92 units of blood. He survived.[3]

Helicopter medical evacuation flights averaged about 35 minutes in Vietnam. As experienced in the 45th Surgical Hospital, most of their patients arrived within 10 minutes of battlefield pickup. Upon the patient's arrival, blood was administered during triage where surgical priorities were established, and x-rays and laboratory requirements were determined.[13] The distribution system was able to keep pace with the increasing requirements for whole blood. Whole blood requirements grew steadily, from less than 100 units per month in 1965 to 8,000 by February 1966. By 1968, more than 30,000 units per month were required. The largest peak came in February 1969 with 38,000 per month. This rapidly declined to less than 15,000 units by mid-1970 as US Forces began to redeploy.[13]

Current Operations

Studying history provides context and examples of solutions from the past, but it is not a guarantee for future events. Planning requires integrating the lessons from history with the requirements and environment of future operations, not just blind repetition. Proximity to current events may not allow for a complete analysis, but they are worth mentioning. After the Vietnam War, crystalloids and blood component therapy replaced whole blood transfusions on the battlefield. This therapy had been questioned and future studies looking at the potential return to whole blood use were encouraged. The US Tactical Combat Casualty Care (TCCC) Committee recommended whole blood for treating hemorrhagic shock in 2014. During the Global War on Terrorism, walking blood banks (Type O blood donors prescreened to donate in the field) at forward operating bases helped mitigate the risk of limited refrigeration storage and were used in Iraq and Afghanistan. The use of Type O whole blood by the US Army Rangers with the Ranger O-Low Titer Whole Blood (ROLO) program reintroduced whole blood administration far-forward in combat at the point of injury (Figure 9).[14,15] The 75th Ranger Regiment's inspiration to use whole blood at the injury location was based upon the Army blood program from World War II and Korea.[16] Later, the ROLO program was expanded and utilized cold-stored Low-Titer Type O Whole Blood (LTOWB). As expressed in one journal, "The conflicts in Iraq, Afghanistan, and Syria have given us the opportunity to relearn the clinical and logistical benefits of whole blood products."[15]

The concern of transfusion taking a priority over evacuation was raised, but the non-medical customer demanded improvement to battlefield care. The 75th Ranger Regiment leadership provided support by giving their medical team the means to create and implement their ROLO program. The command provided time to train,

money for research, supplies and travel, and the latitude to press for new techniques from military medicine instead of waiting for a solution. As the program continues to be implemented throughout the US Army and the Department of Defense, sustainment of technology (refrigeration and warming capabilities at the austere combat medic-level), scientific study, and training are key.[16]

Conclusion

Whole blood has been administered to US Army casualties since the First World War. The challenge today is harnessing the technology required to safely use lifesaving blood at the point of injury. Finally, in an echo of the Army Medical Department's motto, *Experientia et Progressus*, looking back at our past as we progress into the future, military medicine has "come full circle during the recent conflicts, and there has been a "back to the future paradigm shift" in the use of whole blood on the battlefield.[16]

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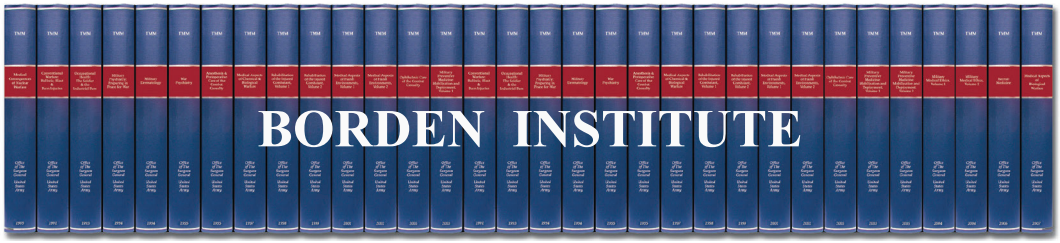

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- **Point of Contact:** Please direct questions about the special call for papers or regular submissions to usarmy.jbsa.medical-coe.list.amedd-journal@army.mil

- **Submission Deadline**: December 31, 2022.

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