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WELCOME to issue #35 of the *AMEDD Historian*! Our intent is to present the history of the AMEDD, and also provide information for strategic problem solving. Recent issues of the newsletter have touched upon the Army's focus on Large Scale Combat Operations (LSCO). We will continue this focus by starting a series on the readiness of the AMEDD for the first battles in World War II.

While there is great information throughout the issue, the first two articles reinforce the importance of planning and the necessity of forward thinking. "Preparing for the Next War" examines how the AMEDD learned from its experiences in World War I, making corrections and training, but still not envisioning warfare of the 1940s. Without knowing of the future battlefield, how should leaders in the AMEDD prepare and plan?

In "Buna: Medical Problems in Jungle Warfare," the description of rushed battle support demonstrates altered medical preparedness and presents evacuation issues in deep jungle fighting. There were no helicopters, ground evacuation was uncertain, and air support was minimal. The tropical climate and diseases add to casualties, and the piece also examines the inability to provide replacements in a remote location.

Please let us know your thoughts. We would like to hear your comments and are always seeking new articles for publication.

In addition to this publication, please visit our website and follow us on social media. Peruse our documents online, exploring valorous awards and medical advances as well as interesting biographical information.

Preparing for the Next War

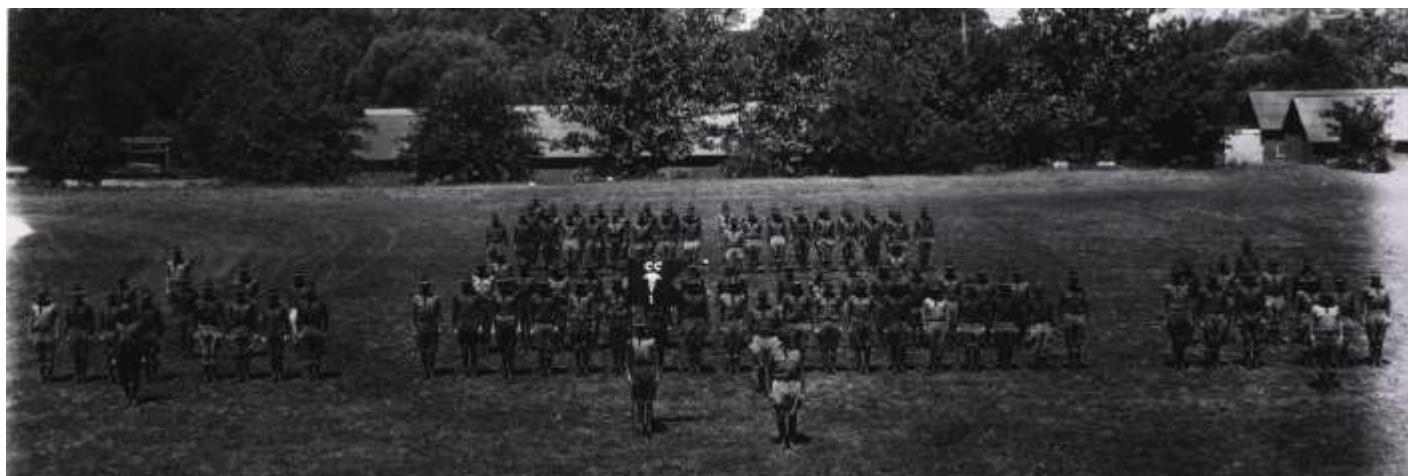
The mission was to be ready for a large war. New technologies changed both day-to-day Army activities and created new operational problems. There were separate and distinct threats from Europe and Asia. If that sounds familiar, welcome to the 1930s. The military could not get the resources to fully prepare for war, and the lower-priority parts of the Army could do little but plan and hope they were right about future doctrine, equipment, and forces.

AMEDD leaders had to develop doctrine for medical support, win support for force structure, and modify both of these as the understanding of clinical medicine changed or the Army changed its operational concepts. They had come out of WWI painfully aware of their problems; Merrite Ireland, Surgeon General from 1918 to 1930, had been the Chief Surgeon of the American Expeditionary Force in France. His problems started at the humble first aid kit (it was not waterproof) and grew more complex from there. The AMEDD got a school in 1920, the Medical Field Service School, and started developing equipment, units, and doctrine. This was very deliberate, starting with a new bandage (in a waterproof tin), moving back to battalion aid stations, divisional medical units, and then tackling what hospitals would be needed in the combat zone. (The rear-area hospitals that did not need to make tactical moves were not a major concern.) The school's motto, "To Conserve Fighting Strength," showed the AMEDD's focus on winning wars was not about saving every

life but keeping soldiers healthy (force health protection) and returning as many as possible to duty.

Army-wide doctrine was, in a nutshell, to be ready for World War 1.1, not World War 2. Warfare would be linear and lethal, with heavy casualties close to the front but rapidly declining in depth. The AMEDD organized and equipped units to support that operating concept, for instance hospitals that could leapfrog forward behind one division, but were not intended to operate behind a wider front. The doctors also grappled with new domains of combat: this was the first time to really consider air warfare (which led to questions like how to select pilots, and how useful aircraft could be in evacuating patients); how to prepare for chemical warfare; and how mechanized forces would be supported.

By the late 30s there was an echeloned medical support plan, intended to have the right person in the right place, with the right skills and equipment. They knew the limits: training time was limited in peacetime, and would be even more limited during a wartime expansion. The first aid kit was limited, but the range of medicines and useful equipment was very limited. Combat was expected to be prolonged, with battles lasting days and evacuation delayed by enemy fires, both direct and indirect. The Army set its own standard because there was no civilian standard, no expectation of quick evacuation with a paramedic in radio contact to a trauma center. Instead of 84% of Americans living within an hour of a Level I or II trauma center, people went to the local country doctor for broken bones and hunting accidents.



A regimental medical company on parade, c.1933. Image courtesy National Library of Medicine.

That echeloned system had a medic forward, his formal training about the same as Red Cross first aid classes, but with as much on-the-job training as the battalion surgeon could provide. The Battalion Aid Station had more experienced medics, and doctors. Each three-battalion regiment had a medical company to collect the wounded, check bandages and medications, then evacuate by ground ambulance to a division clearing company that could do minimal surgery and hold patients who would return to duty in a few days. Nearby was a Surgical Hospital for the seriously wounded, and a few miles further back there should be an Evacuation Hospital for the sick and the moderately wounded, those likely to return to duty in a week or two. The goal was to get a wounded soldier to a hospital in 6-8 hours, and new medical technology (plasma and sulfa drugs that stopped the spread of bacteria) looked like they could lengthen that time, maybe to a day, maybe more.

Yet at the same time, the Army was adding vehicles, changing unit organization to emphasize mobility over slugging power, and adding armored and mechanized units. These changes would spread out the combat units, broadening the front and moving the combat troops further from the hospitals. With limited resources, there was little the AMEDD could do.

The gradual mobilization of 1939-41 helped the AMEDD less than the rest of the Army. The AMEDD was absorbed with patient care, getting men fit for service after the low incomes and deferred medical care of the Great Depression, then treating injuries and sickness. As the Army expanded, it prioritized combat units: by December 1941, there were 29 infantry divisions, 5 armor divisions, and only 7 forward hospitals. The large maneuvers that tested equipment and seasoned units and commanders had very limited medical involvement: hospitals treated the sick and injured, and evacuation was a problem even without enemy action. With myriad

priorities, the AMEDD did not redesign units during the period, although some new organizations were designed to fill capability gaps, such as medical gas treatment battalions, and medical air evacuation squadrons.

The opening campaigns of WWII showed the Army's strengths and weaknesses. Training was often weak, some equipment was obsolete, and some doctrine unrealistic. But troops were dogged, leaders adaptive, and the enemy was not the superior beings their propaganda proclaimed. The Army fought two opening battles, in radically different physical environments, causing different problems for the line and the AMEDD. However different the climate and terrain, there were strong similarities in the operational problems, and similar problems for forward medical support.



By the late 30s there were experiments with motorized field equipment. This is a surgical truck with trailer and tent in 1938. Image courtesy National Library of Medicine.

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Buna: Medical Problems in Jungle Warfare

The Japanese attack in December 1941 had pushed in many directions, including toward Australia. Their plans included bases in the Solomon Islands, to threaten the shipping lane between the U.S. and Australia, and in New Guinea to pressure Australia from the north. U.S. forces would counterattack the Solomons, leading to fighting at Guadalcanal from August 1942 to February 1943. The initial Japanese amphibious move on New Guinea was checked by the Navy in the Battle of the Coral Sea, but the Japanese shifted to an overland approach, landing at Buna on the north coast of New Guinea. From July, overmatched Australian forces had to give ground, but Allied countermoves from the east and south turned the tide. The Japanese had to withdraw to Buna, but the Allies would have a struggle to clear them out.

The operation was rushed, and medical planning was also. There was no medical intelligence except knowing the area (400 miles south of the equator) had tropical diseases, yet that knowledge seems to have had no impact on preventive medicine efforts. Jeeps would have to be used for tactical evacuation since roads were known to be too narrow for ambulances. To evacuate patients out of the area, sea transport was the preferred method because there were few airfields, no air ambulances, and the risk of enemy air attack. Empty cargo aircraft were recognized as a possibility, but the lack of medical attendants seems to have been the main concern – although there were no attendants for sea evacuation either. There was no expectation of sending many hospitals in; there were few available, and the G2 had seriously underestimated the size and determination of the Japanese forces.

Operations

From September 1942 to January 1943 the 32d Infantry Division fought alongside Australian troops (and under Australian command) to take the Japanese base at Buna. The area was heavily jungled, with mangrove swamps, dirt roads only around the few ports – and the campaign would be during the rainy season, with some days having 8-10" of rain. Rain filled the streams and turned the attack into narrow head-on struggles against pillboxes. Supply lines were tenuous, with the only land route a roughly 200-mile foot-trail over the Owen Stanley Mountains. 2/126th Infantry crossed those mountains in six weeks, but suffered so many losses to disease that the ground route was abandoned. The sea lane was through initially uncharted waters, was subject to Japanese air and sea interdiction, and after losing several craft (including a load of hospital equipment), the small boats only moved at night. Airfields were the main way to move personnel, but needed the bulldozers and other heavy equipment that came by sea; only very gradually did the Allied supply situation improve. Vehicles were indeed largely useless in the jungle, and transportation and supply of artillery and heavy weapons was problematic: only one 105mm howitzer was deployed to the battle, along with a handful of Australian field pieces. Air strikes were supposed to replace the artillery but they were visually aimed at bunkers hidden in jungle, and were ineffective, although they briefed well as "flying artillery." Much of the fighting was a



With roads like this, it is little wonder that native bearers were a main method of moving patients, at least outside enemy artillery range.

Images in ACHH collection.

close-range infantry battle in the jungles.

Up front, medics could do more for wounds than the skin diseases the troops aggregated as “jungle rot.” Malaria was rife, especially because it was so humid (averaging 85% humidity) that anti-malaria pills dissolved before they could be swallowed; most men were sick but could not be evacuated because there were no replacements. The simple training on bandaging was sufficient in most cases; a bigger problem was the bandages, being white, drew fire and wounded men sometimes removed them. Medics were determined. Day after day PVT Hymie Y. Epstein of 3/126 Infantry treated his comrades, crawling under Japanese fire, simply saying “I have to take care of him” about each wounded man, until one day a sniper’s bullet killed him as he bandaged yet another buddy. He received the Silver Star. Sometimes the medics had to improvise litters from bamboo, telephone wire, and clothing to get patients back to doctors.

Vehicles could not get forward to the wounded, so evacuation was the speed the medics could squelch through mud, sometimes waist-deep. Thus, treatment had to be pushed forward. Battalion aid stations, regimental medical companies, and elements of the divisional main medical company were all pushed forward, even to small-arms range of the front. Even with BAS a few hundred yards behind the firing line, it could be 1-3 hours before a casualty was there. Casualties among men on patrol might be stuck behind Japanese lines for days, and their comrades could hear them calling for help.

A new type of unit, the portable surgical hospital (PSH), was also used. PSH were improvised in theater, from men and equipment detached from other hospitals, and had only four doctors and 25 enlisted men to staff 25 cots; personnel were supposed to be picked for youth and stamina as well as MOS. All equipment had to be man-portable, so it lacked many things like X-ray machines. Instead of OR tables they made stands from bamboo and put the litter on top; suction apparatus was improvised from tubing and tin cans, blood transfusion was sometimes done by drawing syringes of blood from one soldier and injecting it into another, and night-time surgery was done by flashlight. At least one PSH worked in small-arms range of the front (made possible only by the enemy’s lack of indirect fire weapons), and walking wounded kept their weapons to guard against Japanese infiltrators. They accepted the vile conditions, the risks of infection, the lack of basic supplies and equipment, because surgery was better than delay: they could not buy more time to move the patient to surgery, so rough-and-ready surgery came to the patient. PSH might receive 30 patients a day, and be holding 75 while staffed for 25. While called surgical hospitals, PSH were used at any point in the medical system, at the BAS, at the regimental level, augmenting the single field hospital platoon that was flown in, or as a holding unit at the airfield as patients were flown back. Despite their limited capabilities, and the environment, they performed well, with only 2.5-3.6% of patients dying from their wounds in what surgeons recognized as only “as aseptic an environment as could be obtained in a tent operating room.” Eleven PSH were deployed alongside the single field hospital platoon. Designed for 100 beds, the platoon routinely operated 200. Still, with 160 battle casualties expected daily (and having hundreds of cases of malaria and other tropical diseases) it was not enough.

The plan had been for water evacuation, but the Japanese pressure on shipping caused that to change. Air evacuation became the main mode, with Port Moresby only 45 minutes away instead

of several days. There were only 700 hospital beds at Moresby, eventually augmented to around 2,500, but the 32d Division lost about 10,000 men sick, injured, and wounded. To keep beds available at Port Moresby, patients were flown back to Australia. From there, few returned to duty. When the division was moved to Australia after taking Buna the three regimental combat teams were down to roughly 10% strength, and reconsti-



Wounded on improvised litters await treatment at a portable surgical hospital at Buna.
Image courtesy Library of Congress

tution took months.

One group of casualties got no care. From the front lines the Army had no provision for psychiatric care until the general hospitals hundreds of miles away. Exhausted, traumatized men who were evacuated from Buna to a clean bed in a psychiatric ward in Australia learned that more dramatic symptoms would keep them safe. It would be months before there was any system in the Pacific Theater to treat psychiatric patients and return them to duty.

Results and Lessons

About 14,500 American soldiers fought to liberate Buna, mostly the 32d Division. There were 2,848 battle casualties, but 8,659 sick, mostly malaria although many men were sick with multiple diseases. The 32d Division lost over 9,600 – almost 90% casualties. Several lessons were learned. The Portable Surgical Hospital was judged a useful forward surgical unit, although it was not a hospital in any traditional sense, and most acquired more equipment to be more capable. There was little further talk about PSH being man-packed any distance, although they were often the first surgical unit to land in invasions. Air evacuation was seen to be useful at the operational and strategic levels, and Medical Air Evacuation Squadrons were soon in theater to provide en-route care. Psychiatric care was pushed forward to treat soldiers and return them to duty. But the huge impact of disease was recognized, and at the highest level: the theater commander, General Douglas MacArthur told tropical disease specialist Dr. Paul Russell, “Doctor, this will be a long war if for every division I have facing the enemy I must count on a second division in hospital with malaria and a third division convalescing from this debilitating disease!” The AMEDD would learn from Buna, but the rest of the Army had to as well.



Patient being treated for malaria, near Buna.
Note the tree being used as a tent support.

Courtesy National Museum of Health and Medicine

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Curating America's Premier Medical Museum: The Legacy of John S. Billings to the Professional and Public Understanding of Medicine

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John Shaw Billings is best remembered as the physician-librarian who, during his Washington period from 1865 to 1893, turned the Library of the Surgeon General's Office into what would become the National Library of Medicine. From 1883, Billings also held the post of Curator of the Army Medical Museum. Founded in 1862, the Museum fast became recognized as an unparalleled repository of fluid-preserved and dry specimens, photographs, and case histories. While the Army Medical Museum (now the National Museum of Health and Medicine) would be overshadowed by its library counterpart, it was the museum that helped sustain the library (and Billings) during their formative periods.

The Museum's founding

Traditional medical or anatomical museums were usually formed by a medical society, school, or a private collector, but the Army Medical Museum was designed to be a national institution. In May 1862, Surgeon General William Hammond established it to be the first federal medical research facility. Hammond had been one of a group of like-minded physicians in the Philadelphia Biological Society of the Academy of Natural Sciences just prior to the outbreak of the Civil War. When it became obvious that the AMEDD would have to grow to cope with new demands, Hammond seized the opportunity to create the Museum and staff it with Philadelphians. As a research institution, the Museum was quickly realized. As was common in the 19th Century, it functioned as a reference collection; exhibits were collections of uninterpreted things, and were not driven by a story as they are in modern museums.

The material collected by the Museum during the war would be used to produce the *Medical and Surgical History of the War of the Rebellion*, an undertaking which eventually took twenty-three years and over 6,000 pages to complete and weighed fifty-six pounds. The *History* is a systematic, statistical compilation of the types of injuries and diseases a military doctor could expect to treat. The project was assigned to Museum curators Dr. John Hill Brinton, Dr. J.J. Woodward, and George Otis. The books they purchased to support this research formed the foundation, under Billings' direction, of the Surgeon General's Library. By 1866, less than a year after the war's conclusion, the Museum had expanded its scope of collecting to "embrace the whole field of pathology." Woodward, then Otis, led the Museum until their respective deaths in the early 1880s.

John Shaw Billings era

In 1860, Billings graduated from the Medical College of Ohio at Cincinnati. When the war began, he enrolled as a contract surgeon. Billings was detailed to Washington and Philadelphia hospitals for the first six months of his army career. In March of 1863, he began to serve at the front, including the battles of Chancellorsville and Gettysburg, where he became a skilled surgeon. In 1865, he was transferred to the Surgeon General's Office where he would report for the next thirty years. Billings was affiliated with the library from 1865, and was in charge by 1867. The library held about 2,200 books in 1865; by 1870 it had grown to 10,000 volumes. When Billings retired in 1895, the Library was an internationally-known institution with about 308,000 pieces. Along with the acquisition of books, Billings was concerned with two special projects. He upgraded and expanded the Library's catalogue into the *Index-Catalogue of the Library of the Surgeon General's Office*. At the same time he established *Index Medicus*,



J.S. Billings, from the period he ran the Army Medical Museum.
Courtesy of the author.

which would be a monthly index of current medical articles.



A display case in the Museum, circa early 1880s. Note the lack of explanatory text labels for most specimens, or any larger exhibit text to provide context. Courtesy of the author.

Billings and the Museum

Billings had been mentioned as a candidate for Surgeon General, but was instead placed in charge of the newly-merged Museum and Library Division in December of 1883. Billings inherited an institution which had already enlarged its focus from collecting specimens of military medicine and surgery. Three initial collections (medical, surgical, and microscopical) had grown into sections for pathological (i.e. abnormal due to disease or injury), anatomical (normal specimens), comparative anatomy, miscellaneous (instruments and equipment), and two provisional sections for pathology and anatomy (for items that came in and needed to be tracked but might not be kept). Billings began energetically increasing the Museum's collections. Billings drove collecting, handled exhibitions, and compiled a catalogue. By this time, Civil War research was winding down after twenty years, with only one remaining volume of the *History* scheduled to appear, but other research, especially in anthropology, was undertaken at the Museum.

Not only did Billings' systematic collecting practices develop the museum's comparative and human anatomy collections along with its anthropological ones, but these practices also demonstrate how Billings moved the museum into a more "historical" direction by collecting and exhibiting the material culture of medicine. Under Billings, the Museum's collection policy was influenced by American and European scientific and scholarly trends, yet linked to the research strengths (microscopy and photomicrography) of the Surgeon Gen-

eral's Office. Focus areas included human anatomy and embryology, pathology, numismatics, ethnography and physical anthropology, comparative anatomy, specimen preparation, and the development of the microscope. Towards the end of his tenure, he collected medical instruments and military medicine including equipment and supplies. Research was also conducted on these Museum collections. Museum staff, especially Dr. William Gray, also provided pathological diagnoses for Army physicians, setting the stage for the eventual transformation of the Army Medical Museum into the Army Institute of Pathology and later, the Armed Forces Institute of Pathology.

Billings approached collecting for the Museum much in the same way that he had made the library grow. He used his existing network of European book dealers to acquire items from the United Kingdom and Europe. In the U.S., he had a nationwide network of Army posts. Material from them, mostly dealing with injuries and deaths to soldiers (but also items of anthropological, archeological, or bacteriological interest) arrived at the Museum daily. Material from local Washington doctors also arrived regularly. Donations could be both items and books, helping the Library and Museum.

Instruments and equipment: Although most medical museums have a large collection of instruments, Billings did not collect these aggressively until almost the end of his tenure. He occasionally bought pieces earlier, especially if they were of foreign origin, but he usually preferred to acquire historical pieces by purchase and modern equipment by donation.

Microscope collection: Microscopy had been a key focus of the Museum under Woodward, and Billings continued supporting it. Dr. William Gray was the staff microscopist and his work was displayed in the Museum. In consultation with English microscopist John Mayall, Jr., Billings began to collect "antique" and contemporary microscopes in the 1880s, an initiative that resulted in the Museum's developing the most comprehensive microscope collection anywhere. Mayall initially offered 11 antique microscopes to Billings who purchased them while noting that it would "exhaust the funds which are at my disposal in this direction... It must be something very rare and extraordinary that will induce me to purchase any more microscopes [this fiscal year]." This

shortage of funds continued to curtail Billings' effort to expand the microscope collection during his entire tenure. Billings felt the true value in collecting these instruments lay in illustrating the development of the microscope and advanced \$200 of his own money to buy microscopes recommended by Mayall. By 1888, 141 historic microscopes and 11,000 microscope slides were in the collection. The continually-growing collection at the Museum, now numbering in the thousands, is named in his honor.

Anatomy and embryology: Anatomical preparations, especially pertaining to surgery or pathology, were im-



Examples of the microscope and anatomical collections. The anatomical specimen is the colon of a Civil War soldier who died of peritonitis secondary to typhoid fever. Courtesy of the author.

portant to Billings who devoted a large amount of exhibit space to them in the newly-designed 1886 Museum & Library building. In 1885, he spent one-tenth of his annual appropriation (\$500) for the whole Museum on purchasing “a series of preparations to illustrate the surgical anatomy of the principal regions of the human body”. Foreshadowing the Visible Human project, Billings purchased a band saw in 1887, “to cut skulls and very fine sections of bones and frozen flesh for our museum.” He also bought many new anatomical models, complaining that those in the existing collection were “made 30 or 40 years ago and are cheap exaggerated specimens prepared to illustrate lectures.”

Comparative anatomy: In 1885, Billings came to an agreement to necropsy ‘carcasses of wild animals’ received at the Smithsonian Institution. While Billings continued to collect comparative anatomy throughout his ten years, he became more discriminating in the acquisition of specimens. Eventually he was seeking live specimens, and specific organ systems. A letter to biological supplier Henry Ward reads, “I want more than the skeletons; I want the entire animal... I want him alive.... I want a full series of hearts... I want embryos and foetus of all kinds... I want a series of joints... I want a series of larynxes...” Being exquisitely conscious of avoiding any popular misconceptions of the Museum’s role in collecting either human or animal monstrosities or examples of abnormal development, he repeatedly rejected dead and or previously-stuffed specimens (although he did make exceptions, and his views on this evolved). In reply to an offer of a two-headed calf Billings wrote, “It is the internal structure of such a monstrosity which makes it of interest to this institution; the stuffed specimen is of no special value, unless it is for a Dime Museum.”

Numismatics: The Museum had purchased a private collection in 1882. Billings began slowly adding to this collection, ordering his first material in late 1885. Once he began acquiring medals, he rapidly increased the collection, noting that the Museum had “a very good collection of medical medals and bronzes - between 300 and 400 pieces.” By 1894, he reported that collection now consisted of 944 items that related “principally to medical men, and medical events, such as cholera, pestilence, yellow fever, and to civil and military hospitals, etc.”; thus he had doubled the holdings in ten years.

Ethnography and physical anthropology: The Museum had reached an agreement with the Smithsonian Institution over the collection of American Indian material as early as 1869. The Smithsonian had proposed “an exchange of specimens which are now in possession of the Army Medical Museum, relative to Indian Archaeology and Anthropology, for specimens relative to human and comparative Anatomy in the Smithsonian Institution.” Billings renewed this exchange when he took over the Museum. The Museum thus returned to being the main government collector of human remains, with a corresponding plan for anthropological research. Billings’ interest in, and support of, anthropology research culminated in the Museum’s assumption of the failing Hemenway expedition due to the illness of its leader Frank Cushing. In 1887, Washington Matthews and Museum anatomist Dr. J. L. Wortman took over the excavation and preservation of the human remains found around Tempe, Arizona. Billings had a second motive in attempting to secure these remains. He wrote to Wortman that he was “having urgent requests from European museums for Indian crania and skeletons for which interesting and valuable exchanges are offered, and it would be very advantageous to the Museum if we could accept some of the proposals.”

Military medicine: Billings showed little interest in purchasing military medical and surgical pieces early in his tenure. A typical purchase was a set of stretchers and ambulance equipment from St. John Ambulance Association of London in September 1884, but that was a rare event until the late 1880s. At that time, he began actively seeking equipment and materiel from foreign militaries. By the end of his tenure, he was collecting weapons, which had not been a focus of the Museum. “We have no small arms in the Museum, except a few specimens of broken muskets picked up on the battle-field in 1862-63,” Billings wrote to the Assistant Surgeon General, “and it seems to me that it would be well to obtain, if possible, specimens of the arms now in use.”

Billings rarely collected dental material, but shortly before retiring he worked with the American Dental Association to have the Museum become a repository for dental materials, thus beginning a new collection focus. Oddly enough, Billings was never very interested in portrait or photographic collections. The photographs taken in the Museum of medical and surgical sections were allowed to fade, although he began a ‘New Series’ of pathological pictures. Gray made photomicrographs to be exhibited in the Museum, rather than for publication as Woodward had. Billings did not attempt to buy photograph collections, although donations were placed in the Contributed Photograph collection. Portraits were in both the Library and Museum, especially oil paintings, but he generally preferred to use the money for books. *Materia medica* was also out of the

scope of his interests since the Smithsonian covered it, although pharmaceuticals used by the American and foreign armies were collected. Memorialization, whether of medical men or the common soldier, was an understated role of the Museum – as there was no educational exhibit text as one finds in modern museums, and generally the Museum’s visitors provided their own feelings towards the items on display – one example, however, is Billings’ acceptance of the hat, dress coat and sword of Assistant Surgeon George Lord who was killed at the Battle of Little Big Horn in 1876. Beyond memorializing Lord, there was no reason to have this material in a medical museum devoted to study and learning of medicine and its history.

Billings supervised the move of the Museum & Library to its new building on the National Mall at 7th Street and Independence Avenue SW, where the Hirshhorn Museum currently sits, in 1887. When planning for the move, Billings expected the Library to occupy 160 wagon loads, and the Museum 150 so the two collections were roughly comparable in volume. Billings took the opportunity of the larger space to expand the collection and looked specifically to obtain “specimens to illustrate the methods of work of the best anatomists, physiologist and pathologists of Europe...” He also had the Surgeon General issue Army doctors an extensive want list with twenty-four categories including “abnormities and deformities.” With Washington Matthews, he also designed a new classification and exhibition system for the Museum, based largely on Billings’ work in designing a system for the Library. He planned a new catalogue for the Museum, replacing the obsolete set of three from the 1860s. “This Museum contains 26800 specimens including the results of all forms of disease and injury, and what is probably the largest and most valuable collection of Indian crania in existence,” he wrote to the Surgeon General in 1887. Billings, probably drawing on his experience with the *Index-Catalogue*, stated confidently, “Such a catalogue will much increase the value of the collection, and will be the means of bringing great accessions to it; it will be of great interest to scientific men and physicians, and will, it is hoped, be a useful contribution to the science and practice of medicine in all parts of the world.” The projected cost for illustrations alone for the three volume set was \$40,000. Congress never funded this project, but they continued to fund Library’s *Index-Catalogue*.

In 1888, halfway through his tenure as curator, Billings gave an address outlining his vision of the “National Medical Museum” which built on the preceding quarter century, yet also looked to his colleagues in America, and abroad, especially England for their experience. “The necessities of modern progress in anatomy, physiology and pathology, have led to the creation of medical museums in all parts of the civilized world,” Billings stated confidently, having written dozens of letters to colleagues around the globe asking for a survey of their collections. Excluding microscope slides, Billings noted that the collection held over 15,000 specimens, and was “not an anatomical museum, but a medical museum.” Billings detailed his ideas of what a medical museum should be at some length. Borrowing the Smithsonian’s motto, he stated,

the objects of a medical museum are to preserve, to diffuse and to increase knowledge. Its



Army Medical School students using the museum for training, circa late 1890s.
Courtesy of the author.

conservative function is to form a permanent record of what has been demonstrated and to fix the meanings of terms. ... A large proportion of the pathological specimens in this museum illustrate conditions which now rarely occur, forming a group which it is safe to say will never be duplicated. It is not only that they were gathered during a great war, but that they illustrate the results obtained when antiseptic surgery, as now understood and practiced, was unknown. Never again, I hope, will there be brought together such a collection of the effects of pyogenic microorganisms on gunshot wounds, especially of bone, as may be seen in its cases.

Billings was correct in this assumption, and the bones from the Civil War are still used today for such research. Billings also foresaw the downfall of independent medical museums, although he did not actually predict it:

A medical museum is really used, for purposes of study, by very few persons; but through the teaching of those few its lessons are made known to the whole profession. American physicians in investigating



The main floor of the AMM in the building on the National Mall, circa 1890s. Courtesy of the author.

subject do not, as a rule, think of inquiring as to what museums can show with regard to it, simply because they have not had convenient access to large collections and are not accustomed to make use of them.

Billings expected other medical collections to form, as medical libraries had. To a certain extent he was correct, but they became very specialized collections, usually associated with university departments. Billings wanted both a Museum and a Library, but his budgets showed his priorities: in 1889, he requested \$5,000 for the Museum, but \$10,000 for the Library, \$12,000 for its catalogue, and \$10,000 for bookbinding or six times more for the library.

Billings oversaw the Museum's exhibits for the World Columbian Exposition of 1892, and wrote two new small catalogues, one on the history of the microscope and one on selected specimens, thus continuing a tradition of World's Fair exhibitions by the Museum. Including microscope slides, there were 29,486 pieces in the collection, with one-third of those being pathological specimens. In the five years between his 1888 address, and his 1893 catalogue, over 2000 items had been added.

By late 1893, Billings, now assisted by curator Walter Reed, remained in charge of the Museum and Library Division and continued to make decisions on additions to the collection. In 1895, at his own request and after more than 30 years of service, Billings retired from the Army. The Museum, although open to the public and popular with them, remained a research institution. He moved northwards to manage the New York Public Library. Ten years later, in 1913, Billings died of pneumonia. Perhaps because his eulogy was written by Fielding Garrison (a colleague from the Library), Billings' role as curator of the Museum was not mentioned. This seems to have shaped understanding of Billings as a great librarian who did something with a museum. However, the fate of medical museums in the twentieth century has also been largely a repudiation of Billings' theories and practice. For the Army Medical Museum, WWI led to its concentration on pathology; as a 'modern' medical research institution, little value was seen in some of the earlier collections, and staff began discarding material, especially from the Civil War. A concurrent rise of the role of museums as 'popular' institutions also changed the focus, and perhaps the value, of the collection. Changes in medical education and the rise of laboratory medicine, made the Museum's professional relevancy diminish. One offshoot of this is that the historical component of the Museum's collection became more of an antiquarian collection, rather than a documentary or reference one. This 'antiquarian' function was elucidated in 1934 by College of Physicians of Philadelphia's librarian W.B. McDaniel. Ignoring his own institution's Mutter Museum, McDaniel would write of a museum being primarily an adjunct to a medical library, a "shrine" essentially devoted to the hagiographic worship of the saints of medicine. Billings helped build the Army Medical Museum, but it was educational and productive in his tenure was already of limited utility at the time of his death when World War I was on the horizon, and pathology and histology would become the institution's reason for existing.

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Tiger Force Medic SP5 Lonnie R. Butts, Distinguished Service Cross

Scott C. Woodard, ACHH



SP5 Lonnie R. Butts.
Photo courtesy of Mary Jo Baker.

Lonnie Butts was born on 27 July 1945 and had 9 siblings, two of whom also served in Vietnam. From Oneonta, Blount County, Alabama, he was an Eagle Scout and played high school football. When he joined the Army, he was trained as a medical specialist – combat medic – at Fort Sam Houston. Following Airborne School, he arrived in Vietnam on 12 October 1966 and was assigned to the 1st Battalion (Airborne), 327th Infantry Regiment, 101st Airborne Division. He was 21 years old.

Late in April 1967 the 1st Brigade, 101st Infantry Division was air-assaulted into the Duc Pho district. The brigade commander, BG Salve H. Matheson, allowed his commanders to operate in a decentralized manner. The junior officers and noncommissioned officers were experienced. Unlike other units, many of these NCOs had volunteered to remain for extended tours. The brigade had been in Vietnam for two years and morale was high. A brigade of the 25th Infantry Division had been in the area, opposed mainly by the Viet Cong guerrillas. The 1st Brigade troopers soon encountered much better armed enemy, North Vietnamese regulars. From 11 May to 2 August 1967, the brigade suffered its highest casualties to date in the war. Yet the 101st pushed through, clearing mountainous areas of the enemy. This neutralized the threat in the region, enabling greater security along the coast.

Tiger Force was established by Colonel David Hackworth in 1965 as a reconnaissance patrol unit for the 1/327 Infantry to “out guerilla the guerillas.” It is recognized as one of the more highly decorated small units in the war - two Medals of Honor (1LT James A. Gardner, 1966, and SSG John Gertch, 1969); a Distinguished Service Cross (SP5 Lonnie Butts, 1967); and two Silver Stars (SPC Gary Loduha, 1968 and PFC Henry Ortega, 1968). The battalion’s Presidential Unit Citation in October 1968 specifically mentions the platoon-level Tiger Force for its critical action at Dak To in June 1966 during Operation Hawthorne.

On 15 May 1967, the 1st Brigade, 101st Airborne Division launched an search and destroy mission in the vicinity of Duc Pho. Unknown then, a battalion-sized enemy force was on the ridgeline. The enemy fought from the 1,500-foot high ridge supported by tunnels and bunkers peered down to the approximately 80 troopers in a dry riverbed. Specialist Fifth Class Lonnie R. Butts was serving as a senior aidman. After the lead element was pinned down from raking machine gun fire from the enemy, Butts flanked the enemy gun emplacement and killed the two VC. He kept advancing and displacing every enemy position in front of him with grenades and bullets. An enemy threw a grenade between Butts and his platoon sergeant. Without a second of hesitation, Lonnie threw himself in front his sergeant shielding him from the grenade blast and taking the brunt of hot steel to his legs. Although wounded himself, he continued traversing the fire-swept terrain to treat other casualties and direct others. He delayed heading to a medevac helicopter until he had overseen the treatment of every other wounded man in the vicinity. While moving toward a helicopter for evacuation from the field, he was mortally wounded. For his actions that day, he was awarded the Distinguished Service Cross, the second highest military decoration in the U.S. Army.

Sources

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Evacuation by Glider

At the beginning of March 1945 the Rhine River was broad, deep, and flowing fast from the melting winter snow. It was the last major geographical obstacle to the Western Allies breaking into Hitler's Reich. The Germans hoped to hold the Rhine for weeks or even months, while the Allies were preparing multiple thrusts (including an airborne drop) to continue the advance.

And then on March 7, troops from the 9th Armored Division captured a bridge over the Rhine at Remagen, damaged but functional. The two lanes were needed for troops flowing forward, and the pontoon bridges across the Rhine were also packed with troops and vehicles moving forward.

The Germans launched counterattacks, trying to clear the bridgehead, and some of the wounded could be evacuated by boat, and when some vehicles were sent back. With 125,000 American soldiers across the river, packed into a small bridgehead, there was not space for a hospital nor for a landing strip for medical evacuation aircraft. Then on March 17th the bridge collapsed. All the capacity of the pontoon bridges was needed for vehicles going forward. Fighting continued, and patients were accumulating in the bridgehead who needed evacuation, while the forward aid stations needed resupply.

Gliders could be used to fly supplies in, towed by the 442d Troop Carrier Group, and two were loaded with medical supplies (one ton per glider) for the flight forward. The 440th also had experience in snagging landed gliders for flights back; they had practiced it in England, before D-Day, and done it to recover gliders from France for re-use. The 816th Medical Air Evacuation Squadron was stationed at the same airfield as the 442d, and the squadron commander, MAJ Albert Hoag MC volunteered to go in one. One of the squadron's nurses, 1LT Suella Bernard, volunteered to fly in the other.



One of the gliders readied for takeoff, with a photographer to document the action. Courtesy National Museum of the USAF.

The flight in was straightforward, and the supplies were unloaded. The C-47s wheeled in holding patterns. On the ground, the gliders were quickly rigged with three-high litter stands, twelve per glider, and MAJ Hoag checked that the patients could withstand the acceleration when the C-47s lifted the gliders back into the air. One walking wounded was also aboard each glider. Honoring the Geneva Convention to treat patients equally, some of the glider evacuees were German wounded. With 1.5G acceleration, they were back up in the air. Unstrapping, they checked on the patients, and Bernard had to fix a strap where litter had pulled out of the stand. A field next to the 44th Evacuation Hospital had been smoothed, and in half an hour the gliders had smoothly landed. Ambulances drove the patients to the 44th, and the mission was over.

Two days later, Operation VARSITY had another major bridgehead across the Rhine, and the pressure at Remagen slackened, while more bridges were established and the wounded could be evacuated by more traditional means. The first airfield established in the Remagen bridgehead was mainly used for air evacuation,

with flight nurses. The two gliders at Remagen are the only known glider-borne evacuation of wounded in Europe (some were done in Burma), and Hoag and Bernard are the only medical personnel who accompanied the wounded in gliders.

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WWII Glider Pilot Association website, <https://ww2gp.org/remagen>



1LT Delp checking patients before takeoff. Courtesy National Museum of the USAF.



Testing a glider for medical evacuation, circa 1942. Presumably simulated patients are used.
Hans Groenhoff Photographic Collection, Smithsonian National Air and Space Museum (NASM 2005-31396)

Graham Athan Cosmas

August 8, 1938 – March 18, 2021

Graham Cosmas, who co-wrote a major volume in AMEDD history, died this past spring.

Born in Weehawken, New Jersey in 1938, he studied at Columbia University, Oberlin College, and the University of Wisconsin. As the Vietnam War was winding down, he taught at the University of Texas and then the University of Guam. In 1969 his book about the Spanish-American War, *An Army for Empire*, looked at both the fighting and the Army as an institution. From 1973 to 1979 he worked for the Marine Corps history office, working on three volumes looking at aviation, Vietnam, and the Dominican Republic. From 1979 to 2001 he worked at the Army's Center for Military History. His major publication in that time was in the Army's WWII history series, the 'Green Books.' Medical Service in the European Theater of Operations, co-authored with Albert Cowdrey. The book received the Society for History in the Federal Government's Henry Adams Prize for an outstanding major publication on the federal government's history. From 2001 to 2017 he was deputy director of the Joint History Office for the Joint Chiefs of Staff, where he returned to examining Vietnam with two volumes about build-up and draw-down. Cosmas was also active for decades in the Society for Military History, where he was a long-serving treasurer (he also was a CPA) and helped restructure it into an international scholarly organization.

Photo courtesy Society for Military History.



New ACHH Archival Donations

Letters, documents, photographs, and ephemera belonging to Arthur Anderson, who served during World War II with the 157th Infantry Regiment, 45th Infantry Division as an enlisted medical aidman.

Photographs from LTC (Ret) Anthony Mello, ANC of his service in Desert Shield/Desert Storm

1950s medical equipment bulletins and publications

20th Field Hospital History, September 1945

Wood-bound scrapbook with a collection of 545th Section, US Army Ambulance Service personal histories of World War I.

Personal papers of 1LT Helen I. Kendall, who served in the Army Nurse Corps during World War II

Three 32d Medical Battalion panoramic photographs taken in the 1940s at the Medical Field Service School at Carlisle Barracks and one panoramic of the Medical Officers Training Camp, Fort Riley Kansas, n.d.

Additions to the AMEDD Museum Archives

Jack G. Fuller Collection consists primarily of documents, diaries, and photographs kept by Jack G. Fuller of his career in the Army from 1917 to 1950.

New to the Research Library

* Jackson, Amy L., Amelia M. Duran-Stanton, Johnny Paul, and, P. Jason E. E. Auchincloss, eds. *US Army Physician Assistant Handbook*. Fort Sam Houston, TX: Borden Institute, US Army MEDCoE, 2021.

***Flight Surgeon: A War Diary, 1941-1945*, by Thurman Shuller and Vernon L. Williams, Editor. Fort Worth, TX: TCU Press, 2021. 441 pp., \$24.95 softcover.**

Reviewer: G. Alan Knight

Thurman Shuller's diary covers his years of active duty from 1941 to 1945, a period in which his promotions came at a meteoric rate that would be the envy of almost all members of today's AMEDD. Entering on what was supposed to be a year of active duty, Dr. (1LT) Shuller, an Army Reserve medical officer who had just completed a two-year internship, found his tour of duty involuntarily extended when war began. He was initially assigned as a general medical officer at the Air Corps Gunnery School at Las Vegas, NV (now Nellis AFB). After completing flight surgeon training at the Army's School of Aviation Medicine, located at today's Randolph AFB, he progressed from duty as a bomber squadron flight surgeon to group flight surgeon at Wendover Field, UT. He then deployed with the group to England in 1942, and was subsequently assigned as chief flight surgeon of an air division in 8th Air Force. By 1944 he had been promoted to LTC and upon relief from active duty in 1946, found he had been promoted to colonel. Unlike many wartime medical officers, he elected to remain in the reserves, serving until retirement in the late 1960s while pursuing a civilian medical career as a pediatrician.

Flight Surgeon chronicles the experience of a young officer quickly required to assume responsibility far beyond his prior training and experience. More importantly, it is the story of Shuller's role in bringing about several major organizational changes. His duties at squadron and group levels required him to establish rapport with pilots and aircrew members, officer and enlisted, as he constantly assessed the physical, mental, and emotional status of flying personnel and determined who was fit to fly.

With the exception of initial assignments in the U.S. and postwar duty in occupied Germany, Shuller's war was spent at the American air base at Thurleigh, England. He flew frequently and was awarded the Air Medal for one of his participation in one combat mission. Such assessments of personnel became critical in the face of demanding and dangerous operational requirements for crews flying frequent bombing sorties over enemy territory and experiencing incredibly high loss rates. Combat fatigue was ever-present and morale invariably tenuous as surviving crews witnessed the loss of fellow airmen on virtually every mission, whether over France, Germany, or the Low Countries, and sadly, sometimes even on training flights over the British Isles.

Early in 1943, witnessing a staggering casualty rate and declining morale in the face of command "maximum effort" policies, Shuller challenged such policies and forcefully advocated establishment of twenty as the maximum number of combat missions aircrew members would be required to fly – assuming that they lived long enough. His concerns and recommendations, which reached Headquarters, 8th Air Force, succeeded, at least for a while. Ultimately, the required number of missions was raised as loss rates fell.

In a number of other areas, Shuller was also medically proactive, including addressing problems of high altitude frostbite, and the temporary effects of oxygen deprivation on mental alertness, decision-making, and visual acuity. Mundane but significant "ground" issues also required his attention, particularly venereal disease prevention and alcohol abuse. Last but not least, his duty as chief flight surgeon of an air division, now primarily administrative, found him responsible for the professional functioning of 70 flight surgeons scattered throughout numerous 8th Air Force stations in England. His recommendations impacted assignments, reassignments, and reliefs and appear to have usually been accepted.

Flight Surgeon is a sobering read as one witnesses the heroism but also the incredible losses sustained by 8th Air Force flying personnel. It is a tale of loss and life, with the officer and enlisted losses identified by name and rank with the circumstances detailed. It is also the record of a highly competent and proactive Medical Corps officer who was willing to identify problems and propose solutions to his superiors, sometimes at significant professional risk. Shuller is a highly literate diarist and keen observer.

Potential readers are cautioned that inasmuch as the book includes 400 pages of chronological diary entries (with useful chapter introductions by the editor), there is a substantial and unavoidable amount of minutiae within. However the minutiae does provide context and flavor to the daily life of this wartime US Army Air Forces flight surgeon. The book is end-noted, indexed, contains a bibliography and is well-illustrated. While strategic aerial bombardment is no longer an Army mission, *Flight Surgeon* provides an illuminating window into a significant part of U.S. Army history during World War Two.

The Thomas Splint: Intervention for Femur Fractures

By Charles Franson, Museum Specialist, AMEDD Museum

Although the origins of splinting fractured bones are lost to antiquity, the treatment of fractures has been part of most civilizations' history. The success of these practices is found in the number of fully healed fractures discovered among skeletal remains in Greece, North Africa, Mesopotamia, and elsewhere. One of the most problematic fractures historically has been that of the femur, due to the tendency of the thigh muscles to contract and cause the bone ends to override each other, making the setting of such fractures difficult.

In a military context, femur fractures were commonly treated with primary amputation, with its attendant high mortality rate. Even transporting such cases resulted in secondary trauma due to bone ends shifting and injuring surrounding tissues and blood vessels.

During the early 20th Century, a solution was found in the form of the Thomas Splint. The Thomas splint is designed to stabilize a fractured femur to minimize further damage, pain, and bleeding during transportation to a surgical facility. It was developed in 1875 by the Welsh physician and bone setter Hugh Owen Thomas (1834–1891), to immobilize injured or diseased knees. Originally, the device was fitted with multiple attachments for the foot and ankle to hold longitudinal tension to the limb. The traction allowed the limb to rest in an aligned position during healing.

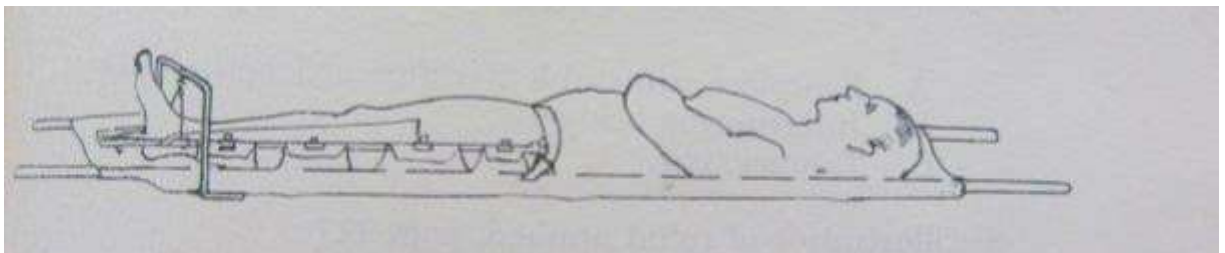


A WWI-era Thomas splint.

Thomas's nephew, Robert Jones, MD (1857–1933), had worked with his uncle and became one of Britain's leading orthopedists. Early in WWI he was commissioned into the Royal Army Medical Corps. There he discovered that the mortality rate for femur fractures was over 80%. This was often due to the fracture being open, or compound, and frequently secondary to gunshot wounds leading to severe hemorrhage from the bone ends damaging the surrounding tissues and blood vessels while in transit. Indeed, routine treatment of femur fractures was primary amputation.

Jones advocated for the use of the Thomas traction splint to stabilize the injury in transit as a solution to the issue of secondary trauma from transportation. There were a number of advantages to the use of the splint, among them the aforementioned stabilization in transport, which alleviates further trauma, as well as pain, during the often rough trip to the clearing station or surgical unit. One truly important advantage to this open-framed splint was that surgeons could have 360 degree access to the wounds, and be able to properly debride and control hemorrhage without releasing traction until an opportune time.

The Thomas splint in use, strapped to a litter. From the 1917 [Manual of Splints and Appliances](#).



Large scale use of the Thomas Splint began around 1916, and by 1918 it was noted that the mortality rate from compound fractures of the femur had been reduced from 87 percent to 8 percent. While this cannot be at-

tributed solely to the use of the splint, its use contributed significantly to this dramatic drop in mortality. Additionally the patients retained their limb rather than becoming an amputee.

The 1917 Manual of Splints and Appliances for the Medical Department of the U.S. Army prescribed the widespread issue of the Thomas Splint as far down as the company level. It has remained part of military battlefield medicine (and civilian emergency medicine) ever since.

The original WWI design consisted of a padded circle of steel which is offset to accommodate placement under the ischium around the groin, hinged to a U-shaped rod that extends along both sides of the leg. At the bottom of the “U” it is bent so that an ankle strap may be fashioned from cloth, and tied or twisted to apply traction. The fractured leg is cradled by the use of cravat bandages spaced at intervals between the sidebars. A modified form was developed with only a half-ring and a strap, for easier application.

Ideally, it takes three people to apply the splint. One medic directs the application, and assists as needed, one person holds traction at the foot, and another places the splint and makes sure that the padded ring is properly placed and the strap (properly padded) is fixed at the groin. The foot and ankle are then secured to the crosspiece with a cravat or harness while maintaining traction. A series of cravat bandages cradle the injured leg beneath, and secure it over the top, holding it in place. The patient is placed on a litter, with the splint secured to the litter to avoid movement. If available, the foot is secured to a foot rest to hold it steady and prevent twisting of the lower leg.

By the Vietnam War, the splint had undergone additional improvements, including telescoping side pieces to tailor the length of the splint to the limb. An improved harness for attaching the foot/ankle to the bottom crossbar, a footrest that also acted as an elevation support, and a litter bracket to fix the splinted limb to the litter in transit were also incorporated into the design.

The AMEDD Museum is fortunate to have in its collection a WWI era Thomas traction splint and a late 20th Century splint.



The Vietnam-era updated Thomas splint, with telescoping side-rods, foot brace, and bracket to firmly attach to the litter. All images from the AMEDD Museum.



July 1944. A wounded G.I. is given blood plasma and oxygen at an aid station of the 79th Division.

There were no ICUs, and these treatments were typically the most that could be done before a hospital.

Image courtesy National Museum of Health and Medicine

Writing for *The AMEDD Historian*

We are seeking contributions! We believe variety is the way to attract a variety of audiences, so we can use:

Photos of historical interest, with an explanatory caption

Photos of artifacts, with an explanation

Documents (either scanned or transcribed), with an explanation to provide context

Articles of varying length (500 word minimum), with sources listed if not footnotes/endnotes

Book reviews and news of books about AMEDD history

Material can be submitted to usarmy.jbsa.medcom.mbx.hq-medcom-office-of-medical-history@mail.mil

Please contact us about technical specifications.

The opinions expressed in *The AMEDD Historian* are those of the authors, not the Department of Defense or its constituent elements. The bulletin's contents do not necessarily reflect official Army positions and do not supersede information in other official Army publications or Army regulations.

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