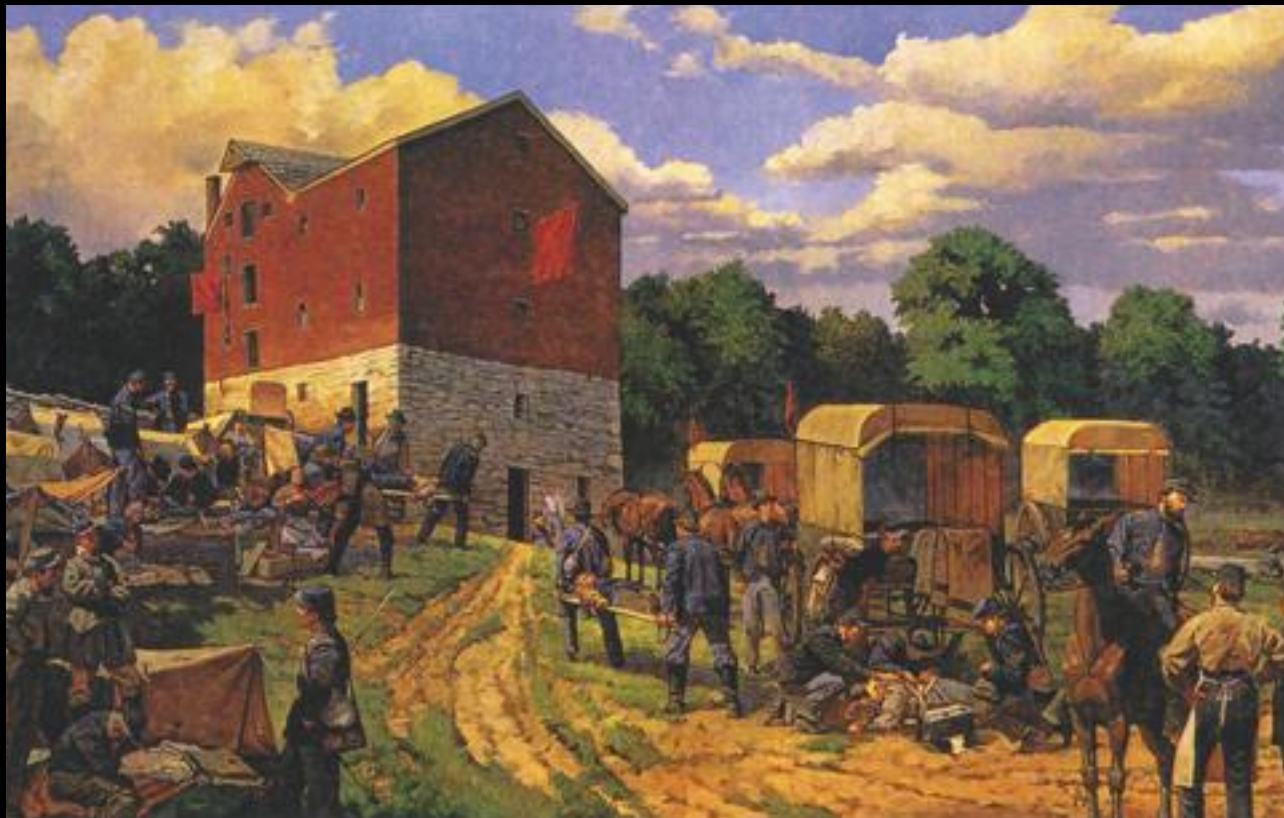


Civil Wa



Julius Bonello, MD

EMERGENCY

The Union generals stood silently and watched as the long line of wounded made their way back to Washington. Although the morning had started out as glorious for the United States, it had quickly turned into a military debacle. Almost 2,700 Union soldiers had been killed or wounded in a battle fought near a meandering stream known as Bull Run. The generals now knew that this engagement would be a long and costly one. They had greatly underestimated the strength of their enemy. They also realized, at that moment, that they were woefully unprepared for what was to come. Medical supplies that had been sent to the battlefield had never arrived and, according to official reports, not one wounded soldier returned by ambulance after the battle.

From 1861 to 1865, the American Civil War would cause almost 10 million soldiers to need medical assistance. At the beginning of the war, the military had only 113 doctors to meet this demand. Something had to be done and done quickly.

"Island of Mercy," by Keith Rocco. Courtesy of the National Museum of Civil War Medicine, Frederick, Maryland

BACKGROUND

The Army Medical Department entered the war unprepared. Its chief, Colonel Tom Lawson, who was more than 80 years old, considered the purchase of medical books an extravagance and was reported to have flown into a rage upon hearing that one post had two sets of surgical instruments. In January 1861, the United States Army numbered 16,000 soldiers and had a medical staff of 113 surgeons. Soon after the war started, 24 surgeons left for the South leaving 89 surgeons to administer the Union army. Although nearly all doctors of this period had received their medical education on an apprentice-

only six weeks of formal learning before their students began an apprenticeship. Since many states had laws that prevented medical students from dissecting cadavers, graduates often did not see internal organs or any major trauma until their first experience in battle.

After the bombardment at Fort Sumter, southern students left the northern schools to attend southern medical schools. However, by 1863, because of the manpower shortage in the South, these medical schools closed, thereby adding to the woes of the southern medical department toward the end of the war.

Once they received their diploma, whether they liked it or not, the doctor of the day was a surgeon. Civilian doctors had little experience. At that time, civilian surgery involved what we would consider minor procedures, ie tooth extractions, laceration repair, drainage of abscesses, foreign body removal and similar conditions. Orthopedic practice was limited to splinting, and a joint space was never entered. True surgery was confined to a few obstetrical and gynecological procedures. No one was prepared for the carnage that was coming.

Because of these changes in medical school requirements and apprenticeships, the northern states were able to field almost 12,000 doctors during the Civil War. The Confederacy probably utilized a total of 8,000 doctors during the same time. Surgeons usually carried a rank of major and assistant surgeons were captains. Depending upon their length of service, a surgeon was paid between \$162 and \$200 per month.

In June 1861, two men met in New York with a group of devoted women, including Dr Elizabeth Blackwell, the first female physician in the United States. They formed the Women's Central Association of Relief for the Sick and Wounded. On May 16, delegates of this group descended on



The Surgeon at Work at the Rear During an Engagement by Winslow Homer. National Library of Medicine #A21094

ship basis, younger ones usually had a medical school diploma. Because medical schools had no standardized testing and licensing requirements, and testing varied state by state, the medical knowledge of a doctor of the 1860s varied in education, skill and experience. (Table 1)

At the time of the Civil War, there were 100 medical schools in the United States. School consisted of two years, the second year being a complete repetition of the first year. At the beginning of the war; some schools reduced their requirement to one year and counted a year on the battlefield as a year of apprenticeship. Some schools required

Washington, DC, demanding the creation of a sanitary commission. Lincoln, the Secretary of War and the medical department opposed the idea. Fortunately, General Lawson was at home sick, and his replacement, Dr Robert Wood, saw the logic of this proposal. On June 9, 1861, the United States Sanitary Commission was formed. In theory, the commission was to investigate and advise in matters of sanitation and hygiene; in practice, it effected a purging and cleansing of the medical department; monitored camps, hospital food, clothing, medical supplies, ambulance services and recruitment; sent workers into the fields and hospitals to nurse and nourish; and provided everything from chloroform to tobacco. By war's end, the commission had distributed almost \$15 million worth of supplies, wholly provided by the citizens of the United States. (Table 2)

The most significant act produced by the commission was the White Paper of 1861. The commission reorganized itself, created new posts and, best of all, removed Lawson from the position of Surgeon General, replacing him with William Hammond. Hammond was an intelligent, able man with unbound energy and vision. His first move was an order that proper records be kept for all the sick, wounded and killed. This record is available today in a six-volume work found in most urban libraries. Hammond introduced a meaningful system for classifying disease, wrote and edited medical journals, accelerated the procurement of supplies and constantly fought to improve medical care. He recommended an ambulance corps, an army medical school and an army museum. He also proposed that the men, who drove ambulances and nursed the sick, be trained by the medical department. In May 1863, Hammond issued a decree restricting calomel (mercurous chloride), a powerful laxative, which had been used to treat diarrhea. The medical thinking of the 1800s focused on the bowels and bladder. If a good bowel movement or a good stream of urine could be produced, a patient was considered healthy. However, Hammond saw the high rate of mortality among patients with

diarrhea and wanted calomel's use restricted. Most medical doctors considered this directive heresy, and they brought their complaint to Washington. Forcing a trial while Hammond was on tour, they found him guilty of conduct unbecoming an officer and relieved him of duty. Joseph K Barnes replaced him, but continued all of Hammond's proposals.

Until the Civil War, nurses in the United States were either veterans of earlier wars or the handicapped and mentally retarded. During the war, some nursing was performed by hospital stewards who were non-commissioned officers. Their duties were fully described by Joseph Woodward, a leading physician of his day. Woodward's manual for stewards outlined, in today's terms, the responsibilities of a registered nurse. During battles, the musical band that accompanied every regiment provided nursing care. Although almost every major engagement attracted local women who wanted to help administer medical care, their assistance was generally discouraged. The prospect of young women taking care of young men concerned the conservative faction of the nation.

In 1861, Dorothy Dix, well-known founder of institutions for the mentally insane, offered to pro-

TABLE 1 Sample questions taken from the Illinois Board of Medical Examiners, Examination for Regimental Surgery & Assistant Surgery, 1863.

ANATOMY

- What membranes invest the brain? Describe them.
- What structures are cut in amputating at middle of the leg?
- How many bones are there in the carpus? Name them.

SURGERY

- Give differential diagnosis between shock and chill.
- What are the most essential points in treatment of fractures?
- Describe inflammation.

PHYSIOLOGY

- Give the action of saliva in digestion and its daily amount.
- Give the composition and functions of the blood.
- Describe the portal circulation and its uses.

PATHOLOGY

- Why do we examine the tongue of the sick?
- Give the causes and significance of thirst in fevers.
- What diseases are characterized by special odors?

THERAPEUTICS

- How would you prepare a domestic enema?
- What are the remedial properties of Turpentine?
- In what form would you administer it?
- In what diseases would you employ electricity?

vide trained nurses to staff military hospitals. In June 1861, she became superintendent of female nurses. Such a radical idea created a degree of public outcry; however, the plan was generally well received by the military and the US Sanitary Commission. In mid 1861, thousands of women submitted their applications in response to Dix's

TABLE 2 A partial list of the supplies and goods that the sanitary commission sent to gettysburg after the July 1863 battle.

Drawers, Woolen	5,310 Pairs
Drawers, Cotton	1,833 Pairs
Shirts, Woolen	7,158
Shirts, Cotton	3,266
Pillows	2,114
Blankets	1,007
Sheets	274
Stockings	5,818 Pairs
Shoes	4,000 Pairs
Combs	1500
Soap	250 Pounds
Basins and Cups	7,000
Bandage Linen	110 Barrels
Splinting/Dressing Plaster	16 Rolls
Crutches	1,200 Pairs

TABLE 3 Civil War Casualties

UNION	
Battle	110,070
Disease	224,586
Accidents/suicide	24,872
Total	359,528
CONFEDERACY	
Battle	94,000
Disease	164,000
Total	258,000
TOTAL UNION AND CONFEDERACY	617,528

off the tent floors and fed her patients food sent down from Galesburg. For the duration of the war, Bickerdyke rode with the Western Army setting up hospitals, feeding her boys before they went into battle and working in front-line dressing stations. Not surprisingly, she was less popular with the brass. When the wife of an important colonel sum-

moned her to care for her son's measles, "Mother Bickerdyke" unceremoniously refused stating that she had plenty of soldiers to work for. The colonel complained to General Sherman who replied, "You have picked on the one person around here who outranks me. If you want to lodge your complaint against her, you will have to take it up with President Lincoln." By the end of the war, 3,000 to 4,000 female nurses had worked for the Union. Each candidate had to be "past 30 years of age, healthy, plain, almost to repulsion in dress and devoid of personal attractions." They had to know "how to cook all kinds of low diet" and avoid "colored dresses, hoops, curls, jewelry and flowers on their bonnets." One such woman was Marianne Bickerdyke of Galesburg, Illinois. While on a trip to Cairo, Illinois, to supply the Union soldiers with medical supplies, she found a number of the soldiers hospitalized on beds of filthy straw laid over muddy tent floors, and dying of dysentery and typhoid. Enraged at Army inefficiency and without authorization, she went to work. She washed the casualties in bathtubs, dug the mud

moned her to care for her son's measles, "Mother Bickerdyke" unceremoniously refused stating that she had plenty of soldiers to work for. The colonel complained to General Sherman who replied, "You have picked on the one person around here who outranks me. If you want to lodge your complaint against her, you will have to take it up with President Lincoln." By the end of the war, 3,000 to 4,000 female nurses had worked for the Union.

At the outbreak of the war, the United States was not operating a single general military hospital. The country began a gigantic building program, and by January 1863, the North had built 151 hospitals with 58,000 beds. By 1865, the North operated 204 general military hospitals with 137,000 beds, and by the end of the war, the Confederacy also had 150 hospitals, with one-third centered around Richmond, Virginia. The largest at Chimborazo held 8,000 beds.

MEDICAL CARE

Medical care during the mid-1800s was still quite primitive. Although the stethoscope was discovered in 1838, Harvard Medical School did not have one until three years after the war. The thermometer, which had been employed in Europe for almost 200 years, was almost nonexistent in the United States. Just 20 thermometers were available in northern hospitals during the war. Only a handful of surgeons knew about laryngoscopes and hypodermic needles or how to use them. Because medical thinking of the 1800s was centered on the bowels and bladder, many of the medications were diuretics or laxatives. Quinine had been used for malaria for many years. Opium, which was dusted into wounds or taken by mouth, was prescribed often for pain. Chloroform, which had been discovered as an anesthetic agent just 15 years earlier, was used throughout the war. Digitalis, colchicine, and belladonna were widely used throughout the war. The most commonly used medication, however, was whiskey. Whiskey was the number one analgesic administered after an operation. The dose was one ounce every 15 min-

utes for pain. Products were also used initially to clear or cover the stench in the air of busy and cramped hospitals. Many of these products contained chlorine, bromine, iodine or potassium permanganate and were known to have antiseptic qualities. Toward the end of the war, they were used for dressings or poured into superficial wounds. One product was Labarraques solution, which is 10 times stronger than our present-day Dakin's solution. Initially used as a deodorant, it was poured into wounds during the war.

MORBIDITY AND MORTALITY DURING THE WAR

Traditional ideas of Civil War medicine are more similar to a Hollywood movie scene than reality: A tired and harried surgeon, his surgical frock covered with blood standing over a screaming patient, held down by his fellow soldiers. In reality, of the 600,000 soldiers who died during the conflict, two-thirds died from disease and only one-third on the battlefield or from wounds sustained in battle. (Table 3). The number one cause of death was the fluxes, now known as diarrhea or dysentery. Over three million cases were diagnosed during the Civil War, killing 400,000 soldiers. One entire volume of the six-volume *Medical History of the War of the Rebellion* is dedicated to soldiers suffering from diarrhea.

Of the injuries during the war, 94 percent were due to gunshot wounds, 6 percent to artillery, and less than 1 percent were secondary to bayonet or saber. According to official records, 33 percent of all wounds involved the arms, 35.7 percent involved the legs, 18 percent involved the trunk and 10 percent involved the head. The mortality of gunshot wounds were as follows:

- Penetrating wounds of the abdomen and head: approximately 90 percent were fatal.
- 100 percent were fatal when the small bowel was injured; 59 percent when the colon was injured; and 100 percent when the stomach was injured.
- A penetrating wound to the chest carried a 60 percent mortality rate.

Once the abdominal cavity had been entered, the surgeon had no recourse other than to give opium, whiskey or tobacco for comfort. No surgical interventions were available.

Three-quarters of all the operations performed during the Civil War were amputations. All limbs with open fractures were amputated, usually within the first 24 to 48 hours. The importance of early, prompt and swift surgical intervention was appreciated by the surgeons of this period. Samuel Gross, a surgeon during the war, wrote, "the success of amputations was very fair when they were performed early but most unfortunate when they were put off for any length of time." He warned that the surgeon "must be careful to guard against procrastination. The case must be met promptly and courageously; delay of even a few hours may be fatal or at all events, place limb and life in eminent jeopardy." John Chisolm, a Confederate surgeon, echoed this testament with the dictum, "the rule in military surgery is absolute viz;

that the amputating knife should immediately follow the condemnation of the limb." Approximately 80,000 amputations were performed under chloroform or ether anesthesia. Most were the flap type—the arteries and veins were tied with silk suture. Of 174,000 Union army wounds of the extremities, almost 30,000 soldiers underwent amputation with an overall mortality rate of 26 percent.

The high mortality from injuries is secondary to injuries from the bullet that was used. The Minie ball, named after the French captain who first developed it, was a slow, heavy, soft-lead projectile, which penetrated a body at a velocity of



Wounded men transported by cacolets. National Library of Medicine #A22304

950 feet per second (slow compared to today's weapons). In addition to the tumbling effect of the projectile, this bullet would cause extensive bleeding, resulting in severe and often lethal shock.

There were 494 thoracotomies attempted, with 200 deaths, resulting in a mortality of approximately 40 percent. In 900 cases, the skull was opened with a mortality of approximately 67 percent. Of 2,818 soldiers diagnosed with sepsis, only 71 lived. Osteomyelitis, erysipelas, gangrene and septicemia were common after surgery. Once gangrene had set in, almost 50 percent of the soldiers died.

veterans' homes were killed by the later stages of venereal disease.

PRISON CAMPS

Nineteen thousand Confederates died in Union prisons during the war, while 26,000 Federal soldiers died in southern prisons during the war. The most famous of which was in Andersonville, Georgia. This prison was built to house 10,000 soldiers but, at its height, confined over 33,000 prisoners, making it the fifth largest city in the Confederacy. Prisoners were allowed no means to build shelter. Their daily ration was one cup of

cornmeal, three teaspoons of beans and a teaspoon of salt. For every 1,000 soldiers imprisoned there, 793 died. Stating it another way, one prisoner died every 11 minutes. This was almost twice the mortality rate seen in the most infamous northern prison camp, Elmira, New York, where 441 of every 1,000 soldiers died.

SUMMARY

"If one wants to learn surgery, one must go to war," Hippocrates wrote. The number of deaths surrounding the Civil War is staggering. Of the nearly three million soldiers who participated in the conflict, approximately 618,000 died—two-thirds by disease, one-third in battle. The total mortality of the war represents the loss of 2 percent of the entire United States population at that time. Union statistics document the treatment of almost one-half million injuries and six million cases of illness. Nearly 500,000 men came out of the war permanently disabled. In Mississippi, in 1866, one-fifth of the state's revenue was spent on artificial limbs. Of the 12,344 surgeons in the Union medical corp, 336 were killed in the line of duty or died while in service. In his manual for military surgeons, Chisolm wrote, "the surgeon on the battlefield must participate in the dangers."



*First aid station.
National Library of
Medicine #A22371.*

Documented pneumonia took the lives of almost 20,000 federal and 19,000 Confederate soldiers; while smallpox killed 1,000 soldiers in three months in one Virginia hospital. Scarlet fever and measles occasionally caused a death. Gonorrhea and syphilis were treated fairly commonly in the North and South. There are no statistics on the number of women and subsequent children infected with venereal disease; however, considering the fact that Union physicians treated 170,000 cases of venereal disease, the figures must be staggering. One Civil War researcher estimated that one-third of the men who died in Union and Confederate

America has never again witnessed pain and death in such magnitude as the Civil War. More Americans died in that conflict than in all other US wars combined. The battle at Shiloh, Tennessee, caused 24,000 casualties. This number of casualties easily surpasses the combined number of Americans who died in the Revolutionary War, the War of 1812 and the Mexican War. The battle at Antietam, Maryland, on September 17, 1863, took 23,000 casualties, making it the bloodiest day in American history. Between July 1-3, 1863, 51,000 people were killed, wounded or missing at Gettysburg, Pennsylvania. The number of casualties is almost as many as were killed during the 15-year Vietnam War conflict. On June 3, 1864, at Coldharbor, Virginia, in a frontal assault led by General Ulysses S Grant, the Union army lost more than 12,000 men; 7,000 of them dead in the first seven minutes. General Robert E Lee lost 2,500 men.

The American Civil War was the last great conflagration before the discovery of bacteria. Although Louis Pasteur's work was carried out during the 1850s, it was not available for general knowledge until 10 to 15 years after the war. In 1867, Joseph Lister published his landmark work on surgical antisepsis, *Antiseptic Principle*. His principles met wide resistance, especially by American physicians, but were finally accepted and put into effect by World War I. In 1878, Robert Koch discovered the role that bacteria play in causing disease. It would take another war, World War II, and the discovery of antibiotics to bring this chapter to a close.

ABOUT THE COVER PAINTING

"Island of Mercy: The Pry Mill at Antietam" was painted by Keith Rocco, who is a member of the Society of American Historical Artists. Gordon E Dammann, MD, commissioned the painting to benefit the National Museum of Civil War Medicine in Frederick, Maryland.

On September 17, 1862, Samuel Pry's grist mill near Antietam Creek's upper bridge served as a

field hospital for the men wounded in the Miller Cornfield, the East and West Woods, and the Bloody Lane. At the time, surgeon Jonathan Letterman served as the new medical director of the Army of the Potomac and was reorganizing the medical corps.

This was the bloodiest single day of the conflict, yet the mill where approximately 200 seriously wounded soldiers are being treated seems almost tranquil. A red flag is apparent rather than the more common yellow hospital flag which was finally standardized in 1864. The four-wheeled Rosecrans ambulances are preferred, but the two-wheeled vehicles are still in use. Dr Letterman, who is constantly moving during and after the battle, gives instructions to surgeons in the foreground. Clara Barton and her assistant Cornelius Welles dispense blankets and other supplies that she has personally brought to the soldiers.

Wounded from both sides receive care and medical personnel from the Union Second Corps who wear the green hat bands and half chevrons assist the surgeon in triage before each wounded soldier is carried into the mill on a Satterlee stretcher.

For additional information about the painting or to order a print, please contact the National Museum of Civil War Medicine.

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