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Course number and title of course for which project was completed (if applicable):

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Title of Project: "A Kind of Terror and Dispair": Problems in Civil War Medicine

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Signature: Jeremy Reardon Date: 1/30/15
Title of Project: "A Kind of Terror and Dispair": Problems in Civil War Medicine
This statement of faculty support must be submitted in conjunction with each research project.

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Title of Project: "A Kind of Terror and Despair: Problems in Civil War Medicine"

Student Name(s): Jeremy Reardon

Course Number and Title (if applicable): HIS 495 - Senior Research Seminar

Semester Course Was Taught (if applicable): Fall 2014

If this project was not developed for a class assignment, please explain your familiarity with the student(s) and research:

________________________________________________________________________

Signature: John Thomas Scott Date: 1-28-15

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“Terror and Despair”: Problems in Civil War Medicine

The principle objective of this paper is to examine the origins and extent of medical failures during the Civil War. The conflict being a bloody and costly engagement for the United States is general knowledge, however few people understand the reasons for so much suffering and loss of life in regard to medical practices. Two out of three Civil War deaths resulted from medical complications instead of fatal combat injuries. Examining Civil War medical problems required researching mid 1800’s medical education, the impact of disease and infection, and the medical institutions of both Union and Confederate Armies. My research involved investigation of Union and Confederate physician’s memoirs, medical statistics, and reports by contemporary medical experts.
“Terror and Despair”: Problems in Civil War Medicine

Jack Tarver library proved essential for the quality and completion of my senior historical research. The assignment required an article length submission of a student chosen topic that is supported by factual evidence and research. My assignment took place during the fall semester of 2014.

My research strategies included a combination of techniques learned through the History department as well as strategies provided by Jack Tarver librarians. After narrowing my topic options, I visited Jack Tarver to search for pertinent resources available for each topic. Once I located the Union and Confederate surgeon memoirs, along with other sources, I chose to begin my research of problems in Civil War medicine. I began collecting source information through a process taught by Dr. Scott that included evaluating the validity and pertinence of each resource. He explained to me that just because a source has been located and may seem useful, does not mean it will be essential to the research. Through these techniques I learned to craft my research as opposed to merely collecting information. Along the research process I completed a Prospectus Précis, a working bibliography of potential resources, an essay outline, followed by two rough drafts. This process required keeping detailed information and constant communication with Jack Tarver librarians to help ensure accuracy for the quality of my research.

Applying library resources became a crucial element to the quality of my research. I utilized short classes offered by Jack Tarver librarians, including Laura Bott’s course using Zotero for citation help. Mrs. Botts explained that having correct and supportive citations help increase the validity of my research. Mrs. Botts assisted me by narrowing database searches and evaluating the quality of resources. The librarians working the reference desk also played a major role by helping me locate specific microfilms and Harper’s Weekly documents through Jack Tarver’s ejournal resource. I visited special collections to investigate any references to the Civil War by Mercer students. I was excited to succeed in locating some correspondence, but decided not to include the information for the sake of pertinence to Civil War medical issues. Furthermore, I included medical photographs from microfilm in my presentation and defense of my research before the History department and other interested guests. The photos from the microfilm documents helped the professors and guests visualize my descriptions of hospital design, disease stricken soldiers, and other medical prints. Every source included in my final essay except for one dissertation came from the Jack Tarver library or database.

Through my research and working with both the History department and Jack Tarver librarians, I have gained research experience that I plan to utilize in medical school. I have learned the importance of patience in searching for documents and not to sacrifice quality information for the sake of time. I greatly appreciate the guidance of the librarians in order to maintain a disciplined plan to ensure the efficiency and completion of a semester long research submission. The Jack Tarver library and staff helped me craft my final essay and successfully complete my research on the problems of Civil War medicine.
“A Kind of Terror and Despair”: Problems in Civil War Medicine

The Civil War revealed problems in American medicine with poor sanitation and epidemiology that challenged medical professionals to reform their education and practice. Students and Civil War enthusiasts commonly study death statistics by focusing on battle fatalities without fully comprehending the extent of infection and disease-related mortality. Soldiers presented with necrotic infections after minor surgeries and amputating limbs, while others experienced contagious diseases contracted from hospital wards and campsites. Investigating the influence of infection and disease required Union and Confederate medical professionals to evaluate U.S. medical education from 1850-1862, medical institutions, and outdated epidemiology. Infection and disease caused more death and suffering than combat fatalities. Thousands of soldiers contracted diseases before entering any battlefield engagement. In a letter to a physician’s club, Union surgeon S.W. Mitchell described, “A kind of terror and despair that is not found in any account of hard fought battles.”¹ The epidemic situations resulted from a combination of medical staff ill preparedness and a lack of sufficient medical education during the mid 1800s.² Confusion and poor education in regard to sanitation and contagions also contributed to the failures of Civil War medicine.

Civil War doctors saw a complete foundering of medical practice and application. Surgeons extensively studied medical disasters of the British army in the Crimean conflict of 1853 to help prepare for the Civil War. Twenty-nine percent of British Forces died of disease

² Ibid. 15.
during the six-month engagement, and ten percent in a single month.³ U.S. newspapers reported the mass amounts of mortality, stimulating concern for American medical practitioners. Both French and British armies had three times as many deaths from disease as from combat injuries.⁴ Primitive and unreliable pharmaceuticals required doctors to administer care until the patient’s situation visibly improved. If a soldier suffered from chills or fever, the doctor removed blood from an extremity until the chills ceased or fever reduced.⁵ Even though the doctors reached visible improvements in the patient’s condition, they caused more harm than good by removing extensive amounts of blood from the patient.⁶ Medical complications occurred even though Europe established the world’s most accredited and prestigious medical schools.⁷ If well-trained and educated European doctors faced difficulties in the recent Crimean War, the Civil War would certainly bring immense problems for the disorganized and sub-par American medical field.

Standard medical education curriculums in the mid 19th century included one and a half years of lectures. The schools employed a board of physicians that sold tickets to their lectures for fees ranging from ten to twenty-five dollars a course.⁸ Following medical school, physicians tried to obtain apprenticeships but could not always able to find positions. The best medical practitioners believed they could only receive an adequate education from European schools.⁹ European medical educations lasted four years including clinical exposure, while American

⁴ Ibid. 7.
⁷ Ibid. 8.
⁸ Rutkow, Bleeding Blue and Gray, 30.
⁹ Freemon, Gangrene and Glory, 24.
schools lasted less than two without any clinical experience. The developments and rise in demand for doctors during the Civil War led to an increase in medical schools. In 1850, forty-two medical schools educated students in the U.S.; by 1865 the amount of schools increased to at least eighty-seven. Medical personnel established American medical schools primarily in northern states, which created a divide between northern and southern students. Southern students criticized medical curriculums for focusing on diseases prevalent to colder climates in the north while ignoring southern medical issues. A doctor’s physical location usually determined the types of diseases he encountered. For example, soldiers stationed in the north rarely presented with symptoms of malaria, while in the south the humid climate provided ample areas for mosquitoes to breed and spread the disease. A total of twenty-three U.S. Army medical officers resigned and enlisted in the Confederate army, all previously receiving their medical education in the north. Southern medical schools had been inferior to northern schools; secession created an even larger disparity between the two. In an effort to increase the proficiency of American medicine and resolve issues in the Surgeon General’s office, the Union created the U.S. Sanitary Commission.

Beginning in April 15, 1861 the founders of the U.S. Sanitary Commission intended to help resolve "the appalling incompetence and inexperience in the army’s Commissary, Quartermaster, and Medical Department." President Abraham Lincoln did not see the value in

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11 Bollet, Challenges and Triumphs, 58.
12 Ibid. 21.
14 Bollet, Challenges and Triumphs, 458.
creating such an organization and described it as, “the fifth wheel of a coach wagon.” Medical leaders in the North joined the Commission in an attempt to help avoid similar failures of British wartime medicine in the Crimean conflict. After setting up a central office in Louisville, Kentucky, the organization established branches in Chicago, Columbus, Cleveland, and Cincinnati. The Commission created two divisions titled Inquiry and Advice. The Committee of Inquiry examined preventative measures, inspected hospitals, and answered health-related questions sent to the Commission. The second committee worked to obtain approval from the Medical Bureau concerning opinions and conclusions derived by the Commission. Over the course of the war, the Commission generated great changes in military sanitation and policies regarding medical care. On August 3, 1861, the Commission added ten additional surgeons, twenty assistant surgeons, and a corps of medical cadets. Even though the U.S. Sanitary Commission reformed American medicine, the first year of the war caused insurmountable medical issues. The Surgeon General’s office exacerbated many of the problems and weaknesses of the Union’s medical department.

Eighty-year-old Thomas Lawson served as the Union Surgeon General at the start of the war. Beginning his career under the John Quincy Adams administration in the 1820s, Lawson spent a majority of his employment during a period without war. During peacetime, the surgeon general’s office spent efforts concerned with budgets and saving the government money. Dr. Lawson even expressed his concern that medical books were “an unnecessary extravagance.” He died of a stroke shortly after the attack on Fort Sumter in 1861. Lawson’s successor, Alexander Finley, also proved unable to carry out his tasks efficiently. President Lincoln
quickly removed Finley from office, after showing equal frugality and Finley refused to order medical supplies until after a battle finished. A newspaper writer named George Strong expressed strong feelings towards Finely. He proclaimed, “He [Finley] is paralyzed by routine habits acquired in long dealing with an army of ten or fifteen thousand and utterly unequal to the present task.” The U.S. Sanitary Commission used political connections to push for the removal of Finley and instated William A. Hammond of the University of Pennsylvania Hospital. The Commission strongly supported Hammond for three reasons. Firstly, he had served as a regular army physician for eleven years during active military service. Secondly, Hammond’s work became well known in the medical academic community through his nutrition research and medical school professorship. Thirdly, his expertise in hospital design made him an excellent candidate in constructing Union hospitals needing ventilation and sanitary waste areas. The presidentially appointed position of Surgeon General required constant support from the President of the U.S. Sanitary Commission, Reverend Henry Bellows. On the morning of April 17, 1862, Bellows urged Hammond’s appointment to which Lincoln responded, “Shouldn’t wonder if he was Surgeon General already.” Surgeon General Hammond instituted progressive changes to the foundation and infrastructure of Union medicine. Effective leadership proved invaluable as Union medical practices improved. Hammond promptly made addressed and reformed weaknesses in Union hospital and field medicine. He enlisted inspectors to visit hospitals and camps for hygiene inspection and

18 Ibid. 14.
19 Ibid. 38.
21 Ibid. 38-40.
created a strict medical examination system tasked with eliminating inept surgeons. He also contacted the executives of major American medical schools requesting students be taught hygiene and military surgery so that following their graduation, newly enlisted doctors were prepared for their duties. Towards the end of his career as Surgeon General, Hammond published a book on sanitation and hygiene focusing on wartime practices and hospital floor plans. Hammond's Surgeon General's office positively influenced Union medical efforts, especially improving sanitation and practice following the unfortunate first year of the war. While Hammond worked to improve Union medical practices, the Confederacy worked simply to create a medical program.

After declaring secession, the Confederate states faced many issues of an infant nation including the absence of any medical bureaus. Confederate President Jefferson Davis needed to find a Surgeon General and create a medical board to prepare hospitals and relief aid for the impending wounded soldiers. On paper, the newly established Confederate medical department consisted of a Surgeon General, four surgeons, and six assistant surgeons. Major additions became necessary for the development of a medical program to provide relief to the Confederacy. President Davis looked to the foundations and practices of Union medicine as a guide to help create Confederate medical institutions. The Confederacy established a Surgeon General's Office, Medical Board, and a Center of Confederate Medicine.

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22 Frank R. Freemon, Medical Care During the Civil War (PhD diss., University of Illinois at Urbana, 1992), 67.
23 Katherine Prescott Womeley, The Other Side of War (Boston: Tickner and Co. 1889), 160.
25 Rutkow, Bleeding Blue and Gray, 104.
New regulations in the Confederacy established officer ranking for medical professionals and arranged for monthly wages. The Surgeon General received a payment of two hundred and fifty dollars; general surgeons earned one hundred and sixty-two dollars, while assistant surgeons received one hundred and ten dollars a month. As a result of serious Confederate financial issues, some surgeons did not receive their payments on time or at all. Despite compensation issues, southern physicians educated and employed in the north quickly resigned and joined the Confederate efforts. Doctors including the later-appointed Surgeon General Davis C. DeLeon even collected any available medical instruments from the North to smuggle into the South. Union surgeon Dr. John H. Brinton explains the loss of his cherished instruments to a Confederate soldier. Brinton laments, “It was a ludicrous sight, to watch him [the C.S.A. soldier] disappear into the woods with my precious instruments, none of which I ever saw again.” Dr. Brinton’s loss of his instruments represents the exhausted resources of the recently established Confederate Medicine.

President Davis completed his first task of locating a Surgeon General by appointing the University of Pennsylvania-educated David C. DeLeon. Dr. DeLeon started his work on the Confederate Medical board before it was even created. The new Surgeon General officially resigned from his position in the United States military and immediately focused efforts on the improvement of medical Confederate education and application. He firmly believed that southern physicians required a southern medical education. President Davis granted DeLeon a one-year budget of 350,000 dollars to begin projects for building hospitals and hiring medical professionals. He quickly organized the largest Confederate hospitals after purchasing several

26 Ibid. 45.
sizable buildings in Richmond, Virginia. Furthermore, DeLeon established the Center of Confederate Medicine at the University of Virginia campus. He maintained the position until his more experienced University of Pennsylvania classmate, Samuel P. Moore, succeeded him as Surgeon General.

Dr. Moore was intent on improving the education and proficiency of Confederate doctors. Like Union Surgeon General Hammond, he established an examination-screening program to reduce the number unqualified doctors. The only difference in the two programs called for the failed Confederate examinee to become part of a hospital staff as an attendant until he studied enough to pass the examination a second time. The lack of medical professionals required leniency of first-time failed exams. Civil War historian and author Frank R. Freemon opined, “Even with this leniency, more physicians were discharged from the Confederate army in 1862 than in any other year because of this winnowing process.” After establishing a successful examination process, Dr. Moore switched focus to increase the availability of medical supplies and improvement of nutrition among soldiers. Moore wanted to assure a reliable source of medical supplies by sending agents to France and England to acquire drugs and surgical instruments. Eventually a major issue surfaced for Dr. Moore in the form of Union blockades, creating a necessity for smuggling and the use of southern flora to help produce pharmaceutical medicine.

28 Freemon, Gangrene and Glory, 29.
31 Freemon, Gangrene and Glory, 32.
32 Ibid. 33.
With little to no medical production in the South, the Confederacy relied almost entirely on shipments containing medical supplies from Europe and Latin America. Soon after declaring war with the Southern states, the Union established a blockade of the Atlantic Ocean creating major complications in obtaining medicine. Confederate doctors and southern citizens began trafficking supplies through Union lines. Smuggling increased as confederate sympathizers hid bottles of medicine in racks under large dresses or even stuffed dead animal carcasses with instruments and containers of medicine. 33 These strategies provided little relief to the major lack of pharmaceuticals and supplies. Finally, the Confederate Medical Board started using agriculture to help resolve the issue of limited medicine.

Surgeon General Moore requested help from a South Carolinian botanist named Francis P. Porcher to collect data concerning the medicinal potential of southern agriculture and flora. Dr. Porcher had spent time studying and surveying Confederate territory while he produced his *Resources of Southern Fields and Forests, Medical, Economical, and Agricultural*. The book covered a wealth of topics ranging from extracting acetic acid from pine trees to producing alcohol from agave plants. 34 Dr. Porcher taught as a professor of material medica, also known as pharmacology, at the Medical School of Charleston, and produced Confederate medicine from regional flora. His most productive laboratory was located in Columbia, South Carolina. 35 Porcher found over two hundred useful plants and developed a tea from the cottonseed that effectively replaced Quinine. Quinine was the most effective drug in treating the symptoms of malaria, one of the most prevalent diseases in the south. If consumed daily, the tea prevented

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33 Ibid. 126.
35 Ibid. 127.
malaria when the quinine grain was not available.\(^{36}\) In his *Resources of Southern Fields and Plants*, Dr. Porcher states, “Many people will doubtless laugh at this simple remedy, but I have tried it effectively, and unhesitatingly say it [cottonseed tea] is better than quinine.”\(^{37}\) He also successfully derived morphine from the poppy plant. However, Dr. Porcher explained the realities of his tasks stating, “[The Confederacy] could not expect to compete with the highly organized and lavishly supplied medical and surgical departments of the United States.”\(^{38}\) With the help of Dr. Porcher, Surgeon General Moore alleviated a portion of medicinal strains on the Confederacy yet proved incapable of matching the drug production of the Union.

The Confederate Surgeon General’s Office employed further unorthodox methods of obtaining necessary medical supplies. Desperate surgeons utilized drinking alcohol as a local anesthetic in the absence of ether during medical procedures. As alcohol became scarce, the Confederate Medical Department opened its own distilleries, while purchasing products from private distillers. Confederate Congress ordered the purchase of two hundred thousand gallons of alcohol for medical use at three dollars per gallon. Coffee was also a limited product used to provide energy to recovering soldiers. Midway through the first year of war, Surgeon General Moore instructed doctors not to consume coffee. He declared, “[coffee] should be used solely for its medicinal effects for the sick and wounded.”\(^{39}\) The Surgeon General’s desperate measures exemplify the exhausted resources of Confederate medical institutions. As institutional professionals on both sides spent their efforts on logistic-related medical problems, doctors on the battlefront had their hands full with field surgery and infection.


\(^{37}\) Porcher, "Resources of Southern Fields," 95-96.


\(^{39}\) Ibid. 127.
Infection was the most common cause of death from battlefield wounds. Different types of infection originated in open and closed wounds depending on the climate, location of the wound on the body, and treatment after surgery had taken place. Poor sanitation played a major role in the occurrence of infection. Physicians noted that foreign materials in the body complicated the healing process. Foreign bodies drastically slowed the formation of clots, activity of antibodies, and regeneration of tissue. They worked diligently to remove bullets, wadding, shrapnel, clothing, and dirt from wounds. However, the doctors did not comprehend the science behind their actions. The limited understanding of epidemiology and bacteria exacerbated issues with medical ward uncleanliness and poor hygiene. Even though medical leaders tried to implement rudimentary sanitary teachings and practices, the realities of battlefield treatment prevented doctors from following protocol.

Soldiers suffering from gunshot wounds or other open injuries often contracted infection, resulting in the amputation of limbs. One contributor to amputation was the minie ball. Unlike other musket loading lead balls, the minie ball’s shape resembled a pointed cylinder (reminiscent of a modern day bullet). The minie ball’s erratic flight pattern traveled through the air end over end after exiting a non-bored musket. This characteristic of the ball contributed to immense bone, tissue, and muscular damage making repair of extremities almost impossible. After the first four battles of the war, statistical reports of amputation caused the public to question surgeons, accusing them of operating solely to gain surgical experience.

Approximately 175,000 Federal troops presented with wounds to the extremities and resulted in

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41 Bollet, Challenges and Triumphs, 198.
42 Ibid. 201.
44 Bollet, Challenges and Triumphs, 7.
almost 30,000 amputations. Military hospitals often lacked sufficient ventilation and
sanitation necessary to prevent infection. The absence of water also prohibited surgeons from
washing their tools and hands for days at a time. Several types of infection wreaked havoc in
both Union and Confederate military hospitals.

Gangrene and Erysipelas are infections caused by bacteria entering the body through an
open wound. The common streptococcal bacteria spread quickly throughout a wounded
soldier’s bloodstream. Confederate Dr. Joseph Jones illustrates, “A fulminating infection with
marked destruction of soft tissues accompanied by discoloration of the affected parts spread
over the infected.” Gangrene struck fear in hospitalized soldiers because, after the infection
spread to the lymph nodes, death followed quickly. Gangrene became the most common and
deadly type of infection. It destroyed tissue by causing blood clotting in small arteries
containing blood and nutrients. In a letter to his sister, Dr. John Vance Lauderdale laments,
“The wounds into which gangrene was making its fearful ravages day by day- the suffering is
past all healing.” Forty-six percent of patients died of gangrene. Treatment of gangrene
involved amputation and direct symptomatic relief. Dr. J. Jones further reports, “Even after the
gangrene had been completely removed by local treatment, it would frequently return and
destroy the patient.” Today, even with antibiotic treatment available, up to twenty percent of
worldwide patients still die. Dr. Lauderdale further described an extensive gangrene case:

45 Lein, “Projectile Wounds,” 47.
46 Bollet, Challenges and Triumphs, 203.
47 Ibid. 203.
48 John Vance Lauderdale, and Peter Josyph, Wounded River: the Civil War Letters of John
49 Frank R. Freemon, Medical Care During the Civil War (PhD diss. University of Illinois at
Urbana, 1992).
50 Bollet, Challenges and Triumphs, 206.
51 Ibid. 207.
"The surfaces were raw and oozing, the sight was a horrible one, and one which I have never forgotten."\(^{52}\) A third infection terrified soldiers as a result of the painful death and high mortality rates.

Tetanus occurred from exposure to animal feces and often resulted from livestock barns converted into field hospitals. The infection caused painful muscle spasms that originated in the head and jaw resulting in constricted breathing and swallowing, earning the nickname, "lockjaw." Although tetanus infected a lower number of soldiers, the infection resulted in a higher mortality rate than both gangrene and erysipelas. Union forces recorded 509 cases; 89 percent of the men died.\(^{53}\) Confederate surgeon Dr. Samuel Gross reported the death of a tetanus-infected soldier. He stated, "the teeth are firmly clenched; the eyes are fixed in their sockets, and have a wild unnatural expression until respiration is laborious and hurried, resulting in death."\(^{54}\) Infected soldiers expressed desires rather to die on the field from fatal wounds as opposed to the imposing suffering or death of infection. Union and Confederate soldiers feared the horror stories of tetanus infecting healthy men and quickly ending their lives. While surgeons were tasked with improving surgical methods to reduce infection, medical staff and soldiers worked to limit spread of disease and contagions.

During the Civil War, medical professionals possessed little understanding of microbiology and the spread of epidemic diseases. Doctors commonly thought "miasmas" or invisible poisons that traveled through the air caused the spread of disease.\(^{55}\) As large collections of deceased soldiers accumulated and decayed, physicians believed the stench

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\(^{52}\) Lauderdale, *Wounded River*, 75.
\(^{53}\) Ibid. 214.
\(^{55}\) Ibid. 24.
omitted from the bodies could spread disease. This belief caused rapid and unceremonious burial of soldiers killed in combat. Dr. Frank Hamilton explained, "There is no time for a proper burial for diseased corpses that may infect the still living wounded men." The quality of the air became a major issue when considering the design of new hospitals. Medical executives believed good circulation and ventilation would limit the spread of disease. However, Freemon states, "If the efforts to obtain good ventilation had gone into cleanliness, much death and disability would have been avoided." Civilians often carried handkerchiefs with perfume for protection from the offensive and "poisonous odors" that they thought carried diseases. Both Surgeon General Moore and Hammond stressed the importance of cleanliness in the ranks of soldiers in the fight against disease. However, Dr. Lauderdale related that an "army on the march could be smelled before it could be seen." Poor sanitation resulted in surgeons referring to the emanating campsite stench as "patriotic odors." The filth of campsites and soldiers contributed to the spread of major infectious contagions and bacteria.

The bacteria *Salmonella typhi* causing Typhoid Fever entered soldiers’ bodies through contaminated water and food, causing serious gastrointestinal damage. For lucky soldiers, the intestinal irritation caused diarrhea and vacated the bacteria. If the disease entered the bloodstream, the soldiers suffered from chronic fever and pulmonary issues. Typhoid fever became difficult to diagnose as a result of multiple diseases having similar feverish symptoms.

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56 Bollet, *Challenges and Triumphs*, 55.
60 Ibid. 120.
One-quarter of non-combatant deaths resulted from typhoid fever.\textsuperscript{62} Approximately one in four soldiers Union and Confederate died from the disease.\textsuperscript{63} Hospital directors often quarantined soldiers diagnosed with similar diseases together. However, the lack of knowledge regarding epidemiology and contagions resulted in contamination of medical staff and the massive spread of disease. During the first year of the war when medical efforts were at its lowest point, 5.9 percent of Union soldiers were diagnosed with typhoid fever resulting in 2 percent death of the entire army.\textsuperscript{64}

Tuberculosis and malaria also ravaged the ranks of both Union and Confederate armies. Tuberculosis, known as consumption, resulted in 20,403 white soldiers and 592 black soldiers being discharged from duty.\textsuperscript{65} The absence of antibiotics resulted in the quick transmission of the incurable disease. Doctors actively screened enlistees for coughing with blood, weight loss, and an examination of the chest to help prevent infected soldiers from joining. However, many soldiers in the early stages of the diseases passed rudimentary examinations, thus contaminating their fellow soldiers. After a soldier with TB joined, his symptoms became more apparent with exposure to stress, inclement weather, malnutrition, and common disease like measles. Doctors knew little about the disease and did not think TB was transmitted through the air. Medical staff failed to isolate infected soldiers, leading to more exposure throughout hospitals and camps. Aside from TB, malaria also presented a problematic type of sickness. Primarily affecting armies in the south, malaria infected a total of one million cases in the

\textsuperscript{62} Ibid. 206.
\textsuperscript{64} Bollet, \textit{Challenges and Triumphs}, 272.
\textsuperscript{65} Ibid. 288.
Confederate army through all four years of engagement. 66 Soldiers infected with the disease suffered from violent chills. Surgeon Dr. John H. Brinton wryly observed, “if the Confederate forces could synchronize their chills, they could shake the Yankees into submission.” 67 Cases of malaria totaled 838,619 white soldiers, and 78,866 black soldiers. 68 Doctors failed to associate the spread of malaria with mosquitoes, but they realized hot and marshy areas produced more of the disease. Different from epidemic contagious diseases, dietetic illnesses resulted from malnutrition and contaminated water or food.

Diarrhea developed into a prominent characteristic in the daily life of a Civil War soldier. Both Union and Confederate soldiers suffered from acute and chronic forms of the illness. Dr. Brinton of the Union army explained, “Soldiers often drank, cooked, bathed, washed clothes, and utensils, and flushed excrement with the same water for months at a time.” 69 Contaminated water resulted in the spread of disease and miserable symptoms of diarrhea. Soldiers experienced symptomatic diarrhea from multiple diseases including malaria, scurvy, and typhoid fever. The fluid loss associated with chronic diarrhea led to dehydration, resulting in death. Physicians prescribed Calomel to relieve diarrhea; however the drug only increased salivation and dehydration. 70 Malnutrition and lack of fruits or vegetables in a soldier’s diet worsened diarrhea. Since folic acid and Vitamin C are in many of the same types of produce, people who were deficient in one vitamin were often deficient in others. 71 Soldiers found that consuming blackberries alleviated the symptoms, because of the high levels of ascorbic and folic acid. A U.S. Sanitary Commission officer stated, “Diarrhea has persistently

66 Ibid. 289.
67 Brinton, Personal Memoirs, 37.
68 Bollet, Challenges and Triumphs, 290.
69 Brinton, Personal Memoirs, 127.
70 Freemon, Gangrene and Glory, 205.
71 Bollet, Challenges and Triumphs, 370.
followed us, and has disqualified more men from active duty than all other diseases put together. The lack of medical knowledge concerning infection and disease resulted in thousands of soldiers dying from illnesses easily prevented with cleanliness or even fresh fruits and vegetables.

Infection and disease struck fear in both Union and Confederate soldiers because they did not understand how to prevent sickness or how to survive once contaminated. The first year of the war revealed major problems in Pre-Civil War medical education. 71 percent of Union and 66 percent of Confederate deaths resulted from illness. As a result, the establishment of Union and Confederate medical institutions increased concern for medical education and practice. By 1865, Union and Confederate medical bureaus managed a total of 400 hospitals containing almost 400,000 beds, including specific architectural design to promote ventilation and sanitation. Union medical executive Jonathon Letterman expressed, “The true function of medicine is to strengthen the hands of the Commanding General by keeping his army in vigorous health, efficient for enduring fatigue and fighting.” Although the urgency of medical aid increased, the lack of specific knowledge of epidemiology resulted in widespread disease and infection killing more soldiers than actual battle conflict. Two out of three Civil War deaths from 1861 to 1865 resulted from infection or disease rather than fatal combat injuries. The grotesque suffering associated with most infections and diseases also trumped suffering from battle wounds. Firsthand accounts from surgeons and assistants offer descriptive narrations as

72 Ibid. 370.
73 Freemon, Gangrene and Glory, 220.
74 Ibid. 4.
75 Freemon, Gangrene and Glory, 216.
gangrene slowly deteriorated tissue while soldiers lay helpless in their beds. Malaria caused chronic diarrhea and weight loss. A soldier with tetanus awaited imminent death along with painful muscular contractions of his entire body. At the beginning of the war, the Union consisted of ninety-eight doctors and the Confederacy employed twenty-four.\(^77\) The medical developments resulting from the Civil War improved post-war medical institutions. By the end of the conflict, the Union army utilized thirteen thousand doctors, while Confederate forces enlisted a lesser amount of four thousand.\(^78\) However, the years during the conflict saw unforgettable scenes of suffering. The catastrophic medical experiences of Union and Confederate soldiers resulted from insoluble deficiencies in Civil War medicine.

\(^{77}\) Inisitar Hamidullah, "The Impact of Disease on the Civil War," (10.06.02:. Accessed November 7, 2014)
\(^{78}\) Ibid.
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