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THE EMERGENCE OF NEUROLOGY DURING THE AMERICAN CIVIL WAR:  
THE DELAFIELD COMMISSION'S IMPACT ON MILITARY MEDICINE

by

Michaela Ahrenholtz

A Thesis Submitted in Partial Fulfillment  
Of the Requirements for the  
University Honors Program

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Department of History  
The University of South Dakota  
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The members of the Honors Thesis Committee appointed  
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## ABSTRACT

### The Emergence of Neurology During the American Civil War: The Delafield Commission's Impact on Military Medicine

Michaela Ahrenholtz

Director: Kurt Hackemer, Ph.D.

In 1855, three high ranking military officers organized as the Delafield Commission traveled across Europe during the Crimean War. They were tasked to consider, report, and upon their return, implement the advancements they observed from the militaries across the European continent. During their travels, the Delafield Commission evaluated changes in artillery, cavalry, and military medicine. Upon their return, the members of the Delafield Commission published their reports, and a year later the Civil War began. As the war continued, innovations from the Crimean War were implemented, including within the Union Army Medical Department. Major medical reform was facilitated by Dr. William Hammond, the Surgeon General from 1862 to 1864, who was appointed to that position following a recommendation from George McClellan, a member of the Delafield Commission. As advancements from the Crimean War were implemented, the Army Medical Department began to make changes of its own, spearheading the medical revolution that occurred during the Civil War. One of the major products of that revolution was the emergence of neurology, a new specialization within American medicine, and Turner's Lane Hospital, the first neurological hospital in the United States. The Delafield Commission documents and their utilization by American physicians in the Civil War allowed for major medical reform to occur, which in turn accelerated the emergence of neurology within the United States.

**KEYWORDS:** Medicine, Crimean War, Civil War, Neurology, Florence Nightingale, William Hammond, Silas Mitchell, Turner's Lane Hospital

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## **Introduction**

Medicine has not always been as advanced, scientific, or specialized as one sees in today's society. Throughout history, medicine has been crude, painful, and a pseudoscience by modern standards. Nowhere was that truer than on a battlefield. As military tactics and weapons became more effective, brutal, and lethal, medicine was forced to confront its shortcomings and propel the field forward in order to provide the best treatment and save as many soldiers as possible. Wars accelerated innovation by forcing revolutionary change in military medicine, especially during the nineteenth century.

During the formative years of the early republic, the United States military relied heavily on other countries and military departments to understand the demands they might face in both peace and war. The main way that information was gathered and implemented was through military commissions. These commissions each comprised a group of officers within the army who traveled abroad, observed different aspects of foreign militaries, and returned to report and implement the advances they observed. The most influential of those commissions was the Delafield Commission, which traveled throughout Europe in the late 1850s during and after the Crimean War. The men on that commission were tasked to observe different aspects of artillery, cavalry, and military medicine.

Upon their return after a yearlong journey across Europe and extensive observations of multiple militaries, the members of the Delafield Commission wrote and published their reports a year before the outbreak of the Civil War. Their travels have been extensively studied and their reports are well documented within the historical literature.

Yet, the influence that the Delafield Commission had on military medicine during the Civil War is not well understood. Specifically, the influence that those men and their reports had on the major medical reforms that occurred during the Civil War, which in turn facilitated the emergence of neurology in the United States, has not been thoroughly researched.

The Delafield Commission, Crimean War medicine, Civil War medicine, and the emergence of neurology have all been studied and written about separately.<sup>1</sup> This thesis will pull all of the pieces together to observe how the Delafield Commission impacted Civil War medicine, as well as how its work assisted in the emergence of neurology within the United States. Throughout this document, I will explain the state of the United States Army and its medical department in the 1850s, as well as the environment in which the Delafield Commission was sent to Europe. Next, I will discuss the state of the armies fighting in the Crimean War and what new components they implemented as a result of their experiences, focusing on medicine. That discussion will introduce two influential medical personnel from the Crimean War, Florence Nightingale and Nikolay Pirogov. Through their efforts, improvements in sanitation, hospital designs, amputations, and anesthetics began.

After I establish the medical advancements that were made during the Crimean War, I will offer a brief overview of the recommendations made by the Delafield Commission officers in their reports and the extent to which those recommendations were or were not

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<sup>1</sup> Matthew Moten, *The Delafield Commission and the American Military Profession* (College Station: Texas A&M University Press, 2000); Orlando Figes, *The Crimean War* (New York: Henry Holt and Company, 2010); Shauna Devine, *Learning from the Wounded: The Civil War and the Rise of American Medical Science* (Chapel Hill: The University of North Carolina Press, 2014); Silas Mitchell, George Read Morehouse, *Gunshot Wounds, and Other Injuries of Nerves* (Philadelphia: J. B. Lippincott & Co., 1864).

implemented within the United States military, specifically the Union as they began fighting the Civil War. Finally, I will examine the state of military medicine during the Civil War and how American physicians contributed to the medical revolution.

In examining the state of military medicine, I will introduce one of the most influential people within American medicine and neurology, Dr. William Alexander Hammond, who was Surgeon General between 1862 and 1864. The reforms that Dr. Hammond implemented led to an improved ambulance system, increased sanitation and hygienic living conditions, better ventilated hospitals via the design that Nightingale recommended, a system of information distribution between physicians, and the establishment of the Army Medical Museum. While all of those reforms were extremely influential to the improvement of military medicine, one of his most prominent decisions during his time as Surgeon General was the establishment of Turner's Lane Hospital.

Turner's Lane Hospital was the first neurological hospital within the United States and helped influential figures within neurology such as Dr. Silas Mitchell, Dr. William Keen, Dr. George Morehouse, and Dr. William Hammond observe neurological cases, collect data, and make diagnoses within the emerging field. At the conclusion of the Civil War, the hospital was closed, but neurology continued to expand. Professional societies developed and the specialization of neurology became permanent within the United States medical profession.

Without the Delafield Commission and the information it provided to military leaders and medical professionals during the American Civil War, neurology would have developed and emerged in a very different way in the United States. The advancements and information brought back from Europe spearheaded the medical revolution within the



United States, which in turn facilitated the emergence and professionalization of neurology. The connections and prestige the members of the commission held within the military allowed for substantial influence on the evolution of military medicine during the Civil War. This was apparent through the promotion of Dr. Hammond to the role of Surgeon General and the implementation of hospital designs they observed during the Crimean War. Their reports and how American physicians chose to use that information throughout the Civil War allowed for major medical reform to occur, which in turn accelerated the emergence of neurology within the United States.

## Chapter One

The United States has one of the strongest military powers in the world, overpowering older and more experienced militaries worldwide. Throughout nearly 250 years of history, the United States military has evolved and adapted many times, each time gaining knowledge and a better understanding of military operations. These leaps of knowledge did not occur through internal advancements alone. As a young country and military, external factors greatly influenced the evolution of military institutions in the United States. These external factors included the study of more established militaries across the globe and the observation of new innovations. During the nineteenth century, military commissions, generally delegations of American officers sent abroad to study and observe these external factors, wrote reports for wide distribution of knowledge that proved vital influencing the course of change in the United States Army.

One high profile example was the Delafield Commission, which consisted of three respected military officers. Secretary of War Jefferson Davis chose Major Richard Delafield, Major Alfred Mordecai, and Captain George B. McClellan to report on the conduct and outcomes of the Crimean War.<sup>1</sup> As graduates at the top of their class at West Point, they were offered assignments to the Corps of Engineers, and gained exemplary status through their work in this most prestigious branch of the army.<sup>2</sup> Jefferson Davis sent a telegram to this trio on April 3, 1855 with a detailed list of subjects to observe and

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<sup>1</sup> Matthew Moten, *The Delafield Commission and the American Military Profession* (College Station: Texas A&M University Press, 2000), 3.

<sup>2</sup> *Ibid.*, 75.

report on during their time in Europe.<sup>3</sup> They embarked on their journey later that year, a half-decade before the American Civil War in 1861.<sup>4</sup>

Delafield, Mordecai, and McClellan received their education and assignment during a time in which the United States military was heavily focused on enhancing professionalism. After the War of 1812, the army began shifting towards long-term military careers, which created a distinctly different military culture since multiple officers would serve together for numerous years.<sup>5</sup> This extended service length helped to establish a stronger sense of belonging within the military and built a collective identity.<sup>6</sup> These long-term officers contributed to military professionalism by passing down knowledge from their extended service and facilitating long-term reforms.

Military education also saw a change towards professionalism during those years. West Point started to rely less on written works from other countries and militaries, and instead began to publish its own “technical manuals and journals.” These publications were the work of professors and students alike beginning to advance the American military on their own. Also, during this time, branch-specific schools like the Artillery School of Practice, alongside a similar school for the infantry, became active for West Point graduates.<sup>7</sup> When the War of 1812 began, West Point had only graduated 89 officers. By the beginning of the Civil War, 1,887 officers had graduated from West

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<sup>3</sup> Richard Delafield, *Report on the Art of War in Europe in 1854, 1855, and 1856: United States Military Commission to Europe* (Washington: G.W. Bowman, 1861), v, <https://archive.org/details/reportonartofwar01unit/page/n6/mode/2up>.

<sup>4</sup> Moten, *The Delafield Commission*, 3.

<sup>5</sup> William B. Skelton, *An American Profession of Arms: The Army Officer Corps, 1784-1861* (Lawrence: University Press of Kansas, 1992), 181.

<sup>6</sup> Skelton, *An American Profession of Arms*, 182.

<sup>7</sup> Edward M. Coffman, *The Old Army: A Portrait of the American Army In Peacetime, 1784-1898* (New York: Oxford University Press, 1986), 96.

Point.<sup>8</sup> These graduates had the opportunity to continue their education at these branch-specific schools and publish military manuals, which created a more educated and professional junior officer corps. These junior officers would go on to provide outstanding service in the Mexican-American and Civil Wars, as well as continuing to propel the professionalism of the American military forward.<sup>9</sup>

This antebellum-era advancement in military education played a crucial role in the development of American military professionalism. Officers who were extraordinarily ambitious and wanted to pursue advanced professional training beyond the branch schools looked to France since the American military was not yet equipped to teach this. Napoleon Bonaparte's reputation and brilliant military mind attracted young officers who wanted to learn from his legacy. Some American officers traveled to France or other countries in Europe on private trips, while others were sent on official duty to observe different aspects of military practice.<sup>10</sup> Between the War of 1812 and the American Civil War, military officials authorized more than 150 commissions to Europe for this purpose.<sup>11</sup>

These military commissions were possible due to a time of peace in both Europe and North America after the War of 1812, encouraging the United States military to send their officers abroad for education. This practice began in 1815 when Winfield Scott traveled to Europe to tour military schools and battlefields, and conducted interviews

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<sup>8</sup> Ibid., 45.

<sup>9</sup> Ibid., 96.

<sup>10</sup> Ibid., 97.

<sup>11</sup> Earl J. Hess, *Field Armies & Fortifications in the Civil War: The Eastern Campaigns, 1861-1864* (Chapel Hill: The University of North Carolina Press, 2015), 2.

<https://books.google.com/books?id=k96hzmOJX6sC&pg=PA2&lpg=PA2&dp=thayer+181517+europe&source=bl&ots=MNNBiEyBuG&sig=ACfU3U1Vytmz7Wyl3ZfoQZ5r1gavgSkQ&hl=en&sa=X&ved=2ahUKewj0383r48XpAhUJac0KHZLWCBkO6AEwFHoECA0QAQ#v=onepage&q&f=false>.

with military officers from opposing sides of the Napoleonic Wars.<sup>12</sup> Scott and similar military observers were some of the brightest men in the military, and their travels directly influenced American military thought and education. This direct influence made these commissions “the most exciting intellectual trend in the antebellum army.”<sup>13</sup>

Decades before the Delafield Commission, there was another highly influential commission that directly impacted education at West Point. This commission was led by Major Sylvanus Thayer, who was a member of the Corps of Engineers and served during the War of 1812. After his exemplary service, he was sent to France to study multiple components of military operations.<sup>14</sup> Thayer and his partner Lieutenant Colonel McRee were abroad from 1815 to 1817, where they spent most of their time at the Engineering and Artillery School at Metz.<sup>15</sup> This sojourn at a French military school allowed Thayer to delve deeply into Napoleon’s campaigns and other French military operations.<sup>16</sup> Due to these valuable experiences in France, the men were able to profoundly influence the American military education system.<sup>17</sup>

When Thayer returned to the United States in 1817, he was appointed superintendent at West Point and began to make changes.<sup>18</sup> Through Thayer’s reforms and the experiences he brought back from his time in France, West Point began offering one of the most thorough and comprehensive military educations in the world.<sup>19</sup> Thayer’s commission provided West Point with approximately 1200 books from France, making

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<sup>12</sup> Moten, *The Delafield Commission*, 84.

<sup>13</sup> *Ibid.*, 85.

<sup>14</sup> "Sylvanus Thayer," *Professional Memoirs, Corps of Engineers, United States Army, and Engineer Department at Large* 4, no. 18 (1912):772, [www.jstor.org/stable/44534367](http://www.jstor.org/stable/44534367).

<sup>15</sup> Moten, *The Delafield Commission*, 31.

<sup>16</sup> "Sylvanus Thayer," 772.

<sup>17</sup> Moten, *The Delafield Commission*, 31.

<sup>18</sup> *Ibid.*, 31.

<sup>19</sup> "Sylvanus Thayer," 773.

up more than half the library at the school.<sup>20</sup> These books and other educational reforms Thayer implemented impacted future graduates of West Point, including the three men of the Delafield Commission.<sup>21</sup> However, Thayer's experience abroad was not complete. Thayer traveled to Europe on his second commission from 1844-1846 to inspect military schools and purchase more books for West Point and the Corps of Engineers.<sup>22</sup> Thayer understood the importance of military education and learning from other militaries, and multiple generations of West Point graduates benefited from his travels.

European militaries had a deep understanding of military operations, the functioning of war, and how military decisions were made. While these militaries were able to learn from previous years of military engagement, the American military lacked this understanding due to the lack of exposure to modern European-style wars. American military leaders relied on older and more refined European military systems to influence their decisions. Commissions were able to learn from these older institutions and influence future decisions the United States would presumably have to make. European wars were excellent opportunities for American officers to gain a better understanding of military operations and the new innovations that the militaries were implementing. This reasoning led to the Delafield Commission trip to Europe to observe the Crimean War, which was fought between Russia and a European alliance of Britain, France, Turkey, and Sardinia. The three men left in 1855 and returned in 1856, just over a year later, in what was regarded as "the most ambitious military mission of the antebellum era."<sup>23</sup> The

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<sup>20</sup> Moten, *The Delafield Commission*, 31; Coffman, *The Old Army*, 97.

<sup>21</sup> Moten, *The Delafield Commission*, 31.

<sup>22</sup> Skelton, *An American Profession of Arms*, 240.

<sup>23</sup> David Welker, "How the Delafield Commission Influenced the Civil War," *Civil War Times* 55, no. 3, (2016): 38-39,

primary purpose of their mission was to observe the different military operations and support services from various militaries that were fighting in the Crimean War.<sup>24</sup>

Secretary of War Jefferson Davis specifically hoped the Delafield Commission would be in Crimea “for the purpose of observing active operations in that quarter.”<sup>25</sup> This hope of observing active combat and comparing different militaries facilitated the reports the Delafield Commission wrote upon its return to the United States. These reports would then be published and distributed to military officials to learn from as they continued to improve multiple aspects of the American military profession.

The Crimean War began when Russia invaded the Danubian Principalities, or present-day Romania, in July 1853. The war had multiple fronts, including Armenia, the Baltic Sea, and Crimea.<sup>26</sup> The Allies saw victory in early September of 1855 with the battles of Malakoff and Redan.<sup>27</sup> The war ended in 1856 with the Treaty of Paris, and Russia subsequently retreated from the Danubian Principalities.<sup>28</sup> The Crimean War had a significant impact on the countries and militaries involved and indirectly influenced militaries worldwide, including the American military. Many parts of the world were

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<http://search.ebscohost.com.usd.idm.oclc.org/login.aspx?direct=true&db=aph&AN=113742856&site=ehost-live&scope=site>; Skelton, *An American Profession of Arms*, 241

<sup>24</sup> Skelton, *An American Profession of Arms*, 241.

<sup>25</sup> Moten, *The Delafield Commission*, 111.

<sup>26</sup> “Crimean War,” National Army Museum, accessed on May 23, 2020, <https://www.nam.ac.uk/explore/crimean-war>.

<sup>27</sup> Arthur Gilman, *First Steps in General History*, (A.S. Barnes and Company: New York, Chicago, 1870), 203, <https://quod.lib.umich.edu/m/moa?ALLSELECTED=1%3Bc>.

<sup>28</sup> John Cannon and Robert Crowcroft, “Crimean War,” *A Dictionary of British History*, 2015, <https://www-oxfordreference-com.usd.idm.oclc.org/view/10.1093/acref/9780191758027.001.0001/acref-9780191758027-e-958?print>.

closely watching the conflict in Crimea, and as one New York newspaper said, the Crimean War was "of course, the principal political topic of the day."<sup>29</sup>

One of the reasons the Crimean War became a hot topic was due to the introduction of new military innovations. Both sides in this conflict used this war to experiment with inventions, making the Crimean War a laboratory for new technology.<sup>30</sup> For example, the Crimean War was one of the first environments to test the telegraph. This invention allowed the military to transmit information quicker than ever before. Military officers were able to communicate with their commanders faster and receive orders without their commanding officers present.<sup>31</sup> Another considerable advancement facilitated by the Crimean War was the military's use of railroads. The British military approved the construction of a ten-mile railway that stretched from the Allied base camp at the harbor of Balaclava to the frontlines of the conflict.<sup>32</sup> This railway was essential for the movement of men and supplies to the war's frontlines, especially during the rainy season.<sup>33</sup> These were just two of the many technological innovations experimented with during the war, but their successful implementation showed how essential they would become for future warfare all over the world and how big a role they would play in the American Civil War. The Delafield Commission was able to observe these technological advancements and report them alongside other military operations. The observations

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<sup>29</sup>Frederick Adolph Herman Leuchs, *The Early German Theatre in New York, 1849-1872*, (Columbia Press: New York, November 21, 1853), <https://quod.lib.umich.edu/m/moa/1191050.0001.001?g=moagr%3Brgn>.

<sup>30</sup> Yakup Bektas, "The Crimean War as a technological enterprise." *The Royal Society Journal of the History of Science* 71, no. 3 (2017):233 <http://doi.org/10.1098/rsnr.2016.0007>.

<sup>31</sup> Bektas, "The Crimean War," 247.

<sup>32</sup> Ibid, 235.

<sup>33</sup> Ibid, 236-237.



printed in their reports led to the commission's significant impact on military operations, fortifications, and other support services for the American military.

One area where the Delafield Commission's report would have a major impact on the Civil War was military medicine. The Crimean War facilitated significant changes within the military medical system, beginning a transformation that eventually facilitated the birth of a new area of medicine, neurology, during the American Civil War. Major Richard Delafield's report on military medicine became essential for medical officers during the Civil War.<sup>34</sup>

War and medicine have always had a complex history.<sup>35</sup> Military medical training did not exist before the American Revolutionary War, and many soldiers died from the rampant spread of diseases in the wars that followed.<sup>36</sup> The Crimean War was no exception. Even though the militaries involved in the Crimean War had small established military medical systems, 80% of the nearly 500,000 deaths during the conflict were from disease and a lack of proper sanitation.<sup>37</sup> This high mortality rate sparked an outcry in Britain. Public dissent facilitated many reforms in military medicine, and those reforms were transferred to the American military during the Civil War due to Delafield's report.

Cholera was one scourge soldiers fighting in the Crimean War faced while living in military camps. William Howard Russel, a reporter for the *London Times* and the first

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<sup>34</sup> Moten, *The Delafield Commission*, 196.

<sup>35</sup> James D. Watson, "War and Medicine," *The Oxford Encyclopedia of the History of American Science, Medicine, and Technology* (2015): 567, <https://www.oxfordreference.com/view/10.1093/acref/9780199766666.001.0001/acref-9780199766666-e-496?mediaType=Article>.

<sup>36</sup> Watson, "War and Medicine," 568.

<sup>37</sup> Alexis S. Troubetzkoy, *A Brief History of the Crimean War: The causes and consequences of a medieval conflict fought in a modern age* (New York: Carroll & Graf Publishers, 2006), 32; Bektas, 249.

war-reporter to be fully employed by a newspaper, wrote about the cholera outbreak.<sup>38</sup> According to Russell, French military officers were hesitant to continue with military operations because they were “terrified by the losses of [their] troops, which the cholera was devastating by hundreds in their camps...”<sup>39</sup> Cholera spread at such a rapid pace that officers would return to their previously healthy camps to find them functioning as makeshift hospitals lacking food, medicine, and enough men to bury the dead.<sup>40</sup> Even proper hospitals in larger cities like Varna had to turn soldiers away because there was no room for them.<sup>41</sup>

British military officers also wrote about their living conditions in letters to the *London Times*. Colonel George Bell wrote on November 28, 1854, that “All the elements of destruction are against us, sickness & death, & nakedness, & uncertain ration of salt meat.”<sup>42</sup> In his letter, Colonel Bell mentioned how the hospital systems were not functional and lacked in every department. An October 12<sup>th</sup> report from *Times* correspondent Thomas Chenery sparked a significant public response in Britain. Chenery wrote “that no sufficient medical preparations have been made for the proper care of the wounded” and worried that one day there would be “not even linen to make bandages for the wounded.” These words began movements toward reform for the soldiers in Crimea.<sup>43</sup>

Conditions in Crimea only got worse once winter hit. Between cholera, poor sanitation, a lack of supplies, and the cold, soldiers were left on their own as they died.

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<sup>38</sup> William F. Liebler, “The United States and the Crimean War, 1853-1856,” (Doctoral Dissertation, University of Massachusetts Amherst, 1972), 108, [https://scholarworks.umass.edu/dissertations\\_1/1319](https://scholarworks.umass.edu/dissertations_1/1319).

<sup>39</sup> William Howard Russel, *Russell's Despatches from the Crimea 1854-1856*, ed. Nicolas Bentley (New York: Hill and Wang, 1966), 50.

<sup>40</sup> Russell, *Russell's Despatches*, 50-51.

<sup>41</sup> *Ibid.*, 53.

<sup>42</sup> Orlando Figes, *The Crimean War* (New York: Henry Holt and Company, 2010), 291.

<sup>43</sup> *Ibid.*, 292.

Russell said, "...all the pictures ever drawn of plague and pestilence... fall short of individual 'bits' of disease and death." The hospitals had no supplies to treat the dying soldiers, and sanitation was nonexistent.<sup>44</sup> As 1854 came to a close, seven to eight thousand men were being transported to hospitals, which exhausted the horses and created more loss.<sup>45</sup> Fortunately, these conditions were not permanent, and reform was on the horizon. The October 12 *London Times* news report caused significant outcry due to the lack of nurses available for wounded and sick soldiers. This outcry led to public action, including women stepping up and volunteering as nurses for the British army. These volunteers included one individual who would change nursing and facilitate major medical reform.<sup>46</sup>

Florence Nightingale changed both the profession and composition of nursing, paving the way for female nurses into what was then a predominantly male vocation.<sup>47</sup> She was one of the nurses the British military sent, along with other physicians, to the Crimean War's front lines. Nightingale spent most of her time at Scutari, near Constantinople.<sup>48</sup> Russell wrote about Scutari in some of his dispatches, describing it as "a place about to acquire a sad notoriety as the headquarters of death and sickness..." Fleas and other disease-carrying insects covered every surface at its makeshift hospital. Still, Scutari would soon be positively impacted by the "immortal interest as the principal scene of the devoted labours of Florence Nightingale."<sup>49</sup>

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<sup>44</sup> Russell, *Russell's Despatches*, 154.

<sup>45</sup> *Ibid.*, 157-158.

<sup>46</sup> Figes, *The Crimean War*, 292.

<sup>47</sup> James Sullivan, *History of New York State, 1523-1927, [Vol. 5]* (Ann Arbor, Michigan: University of Michigan Library, 2007) 2102, <https://quod.lib.umich.edu/m/moa/1262471.0005.001?c=moa%3Bc>.

<sup>48</sup> "Crimean War."

<sup>49</sup> Russell, *Russell's Despatches*, 34.

One of the reasons Scutari became known as the "headquarters of death and sickness" was because the British military decided to transport the majority of their sick and injured soldiers there from all over Crimea, no matter how challenging the trek would be. This arrangement would not change, despite protests from military officers and medical personnel. Men were transported to Scutari on ships at twice, if not more, their holding capacity. This high capacity of sick soldiers in such close quarters led to unnecessary deaths during transport, and those who survived often arrived at Scutari in a worse condition than before their journey.<sup>50</sup>

The hospital at Scutari had high mortality rates, with most deaths occurring from infections rather than bullets.<sup>51</sup> Florence Nightingale arrived on November 4, 1854 with 38 other nurses to help treat the soldiers at the military hospital there.<sup>52</sup> The conditions that Nightingale found when she first arrived were dreadful, and she described in one of her letters how she had to pick maggots out of wounds.<sup>53</sup> Nightingale and her nurses were doing everything possible to keep the hospital clean and combat these awful conditions. Through their efforts, the mortality rate at Scutari dropped drastically. In February of 1855, fifty percent of the soldiers admitted into the hospital died. Only a month later, the mortality rate had dropped to twenty percent.<sup>54</sup> Nightingale's reforms were so effective that the British Secretary of War appointed her superintendent of the Female Nursing

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<sup>50</sup> Figes, *The Crimean War*, 294.

<sup>51</sup> Christopher J. Gill and Gillian C. Gill, "Nightingale in Scutari: Her Legacy Reexamined," *Clinical Infectious Diseases* 40, no.12 (2005), <https://academic.oup.com/cid/article/40/12/1799/314039>.

<sup>52</sup> Royal College of Physicians, *Report upon the State of the Hospitals of the British Army in the Crimea and Scutari, Together with an Appendix* (London: Royal College of Physicians, 1970), 330, <https://wellcomelibrary.org/item/b24749734#?c=0&m=0&m=0&s=0&cv=0&z=-0.3536%2C0.6825%2C0.707486%2Co.6438>.

<sup>53</sup> Royal College of Physicians, *Report upon the State of the Hospitals*, 331.

<sup>54</sup> Catherine Reef, *Florence Nightingale: The Courageous Life of the Legendary Nurse* (Boston, New York: Clarion Books, 2016), 102.

Establishment of the English General Hospitals in Turkey. This role let her report on the failures of military medicine and allowed her to fight for female nurses' rights.<sup>55</sup> Her efforts and reforms in medicine were known all around the world. Through her work in Crimea, Nightingale “revolutionized the treatment of the common soldier.”<sup>56</sup>

While the arrival of nurses and physicians greatly improved medical conditions in Crimea, the British public did not stop there. The *London Times* established the “Crimean Fund for the Relief of the Sick and Wounded.”<sup>57</sup> The goal of this fund was to provide necessities for the sick and dying soldiers fighting in the Crimean War.<sup>58</sup> Nightingale and other medical professionals used these funds to increase sanitation in field hospitals and the quality of care in Scutari. This included buying new clothes and leasing a building to do laundry so that soldiers could enjoy clean sheets and clothing.<sup>59</sup>

Nightingale wrote two books that were printed and distributed worldwide in which she described the reforms she implemented after witnessing the conditions in the British field hospitals throughout Crimea. These two books would reach the United States and become resources for medical professionals in field hospitals during the American Civil War. In New York and Boston, her two reports even became best sellers.<sup>60</sup>

Her most influential book was titled *Notes on Hospitals*, where Nightingale went into detail about how hospitals could help treat, but also facilitate, the spread of diseases. She proposed different structural components that would make hospitals better equipped for

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<sup>55</sup> Figes, *The Crimean War*, 302.

<sup>56</sup> Troubetzkoy, *A Brief History of the Crimean War*, 38.

<sup>57</sup> Figes, *The Crimean War*, 292.

<sup>58</sup> Reef, *Florence Nightingale*, 98.

<sup>59</sup> *Ibid.*, 98.

<sup>60</sup> William T. Campbell, “Pavilion-Style Hospitals of the American Civil War and Florence Nightingale,” *Surgeon’s Call* 23, no. 1 (2018), <https://www.civilwarmed.org/surgeons-call/pavilionhospitals/>.

treatment and create a better environment for patients.<sup>61</sup> She finalized these plans by recommending the ideal hospital, deemed the pavilion design. This specific design improved ventilation in hospitals, provided more space for each patient, and allowed the doctors to work. As the American Civil War began, the North and the South realized how vital field hospitals would be, beginning a large movement of hospital construction. The pavilion design recommended by Nightingale dominated the structures seen at most hospitals constructed during the war.<sup>62</sup>

Florence Nightingale's revolutionary work in sanitation and hospital design were not the only medical advancements during the Crimean War. Russian military surgeon Nikolai Pirogov transformed Russian field hospitals, making him equal to Nightingale in medical reform at the time.<sup>63</sup> While the Delafield Commission never interacted with Pirogov, they were able to see his medical reforms in practice at the St. Petersburg hospital. In 1845, Pirogov was assigned chairman for the department of surgery at the army hospital in St. Petersburg. When he arrived, he found that the patients were suffering greatly from the conditions in the hospital. Poor hygiene was rampant, and patients were overcrowded into hospital wings. These conditions made their illness or injuries worse, as many had gangrene or sepsis.<sup>64</sup> When the Delafield Commission visited the St. Petersburg hospital a decade later, they found it completely changed. According to Delafield's report, he found the St. Petersburg hospital the most impressive of all military

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<sup>61</sup> Florence Nightingale, *Notes on Hospitals* (Mineola, New York: Dover Publications, Inc, 2015).

<sup>62</sup> Campbell, "Pavilion-Style Hospitals".

<sup>63</sup> Figes, *The Crimean War*, 295.

<sup>64</sup> Konstantinos Koustouflianiotis, George Paraskevas, Eleni Zagelidou, Katerina Dimakopoulou, and George Noussios, "The Life and Work of Nikolai Ivanovich Pirogov (1810-1881): An Outstanding Anatomist and Surgeon." *Cureus* 10, no.10 (2018):4, doi:10.7759/cureus.3424.

hospitals observed during his travels and urged American physicians to utilize its designs and procedures.<sup>65</sup>

Pirogov was also the Russian surgeon general during the Crimean War, where many of his revolutionary reforms were implemented.<sup>66</sup> When Pirogov arrived in Sevastopol in 1854 as surgeon general, he saw first-hand how appalling hospital conditions were. He vowed to change the chaos and inhumane treatment of the soldiers in these hospitals.<sup>67</sup> Pirogov introduced the first “triage” system for the Russian army, sorting wounded soldiers based on the severity of injuries and chances of survival.<sup>68</sup> This system allowed surgeons to attend to the seriously injured faster, rather than treating them as they entered the hospital.

This triage system also allowed for better outcomes from amputations and surgeries that physicians performed after a battle. The triage system, along with the use of anesthesia and Pirogov's amputation methods, led to a significantly higher survival rate for amputees than British and French physicians saw. Through Pirogov’s method, amputations of the arm saw a 65% survival rate within the Russian army.<sup>69</sup> Thigh amputations, which were much more difficult and dangerous, saw a 25% survival rate in Russian hospitals, whereas the British and French only saw 10% survival rates.<sup>70</sup> Pirogov’s leg amputation cut much less of the leg off, which made a prosthesis

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<sup>65</sup> Delafield, *Report on the Art of War*, 264.

<sup>66</sup> Koustouflianiotis et. al, “The Life and Work of Nikolai Ivanovich Pirogov,” 5.

<sup>67</sup> Figes, *The Crimean War*, 296.

<sup>68</sup> Koustouflianiotis et. al, “The Life and Work of Nikolai Ivanovich Pirogov,” 5.

<sup>69</sup> Figes, *The Crimean War*, 298.

<sup>70</sup> *Ibid.*, 299.

unnecessary.<sup>71</sup> This new form of amputation minimized trauma and blood loss, later understood as a threat to survival and recovery.<sup>72</sup>

Anesthesia also played a significant role in military medicine during the Crimean War, and Pirogov was a leading advocate for its use. Pirogov had previous experience with anesthesia and started using chloroform in 1847, where he recorded the influence of anesthesia on the patient, side effects, and the rate of anesthesia-related mortality.<sup>73</sup> His research led him to the conclusion that administering chloroform did not increase mortality rates.<sup>74</sup> This gave him the confidence to use chloroform as anesthesia during the Crimean War, and he concluded that zero soldiers died from anesthesia administration during that conflict.<sup>75</sup>

Anaesthesia during the Crimean War was not as effective as it is today. Lev Nikolayevich Tolstoy, famous for his book *War and Peace* and other Russian literature, was a Russian officer during the Crimean War.<sup>76</sup> Tolstoy wrote about his experience during the war and mentioned what it was like to observe an amputation with the administration of anesthesia. Tolstoy wrote:

There you will see surgeons with pale, gloomy, physiognomies, their arms soaked in blood up to the elbows, deep in concentration over a bed on which a wounded man in lying under the influence of chloroform, open-eyed as in delirium, and uttering meaningless words which are occasionally simple and affecting. The surgeons are going about the repugnant but beneficial task of amputation. You will see the sharp,

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<sup>71</sup> Koustouflianiotis et. al, "The Life and Work of Nikolai Ivanovich Pirogov," 5.

<sup>72</sup> Figes, *The Crimean War*, 298.

<sup>73</sup> F. Hendriks, J. Bovil, F. Boer, E. Houwaart, and P. Hogendoorn, "Nikolay Ivanovich Pirogov: A Surgeon's Contribution to Military and Civilian Anaesthesia," *Anaesthesia* 70, no.2 (2015): 223, [doi.org/10.1111/anae.12916](https://doi.org/10.1111/anae.12916).

<sup>74</sup> Hendriks et. al, "Nikolay Ivanovich Pirogov," 223.

<sup>75</sup> *Ibid.*, 224.

<sup>76</sup> Victor Verney, "Tolstoy's Introduction to War," HistoryNet, November 15, 2018, <https://www.historynet.com/tolstoys-introduction-war.htm>.



curved knife enter the white, healthy body; you will see the wounded man suddenly regain consciousness with a terrible harrowing shrieked cursing; you will see the apothecary assistant fling the severed arm into the corner...<sup>77</sup>

Even with experiences like this, chloroform was better anesthesia than previously used ether, which was flammable and harder to administer. Pirogov understood both ether and chloroform and advocated for the widespread use of chloroform during the Crimean War. Pirogov provided surgeons with guidelines for proper administration to minimize adverse effects. These guidelines included positioning patients in a prone position, gradual administration of chloroform, and continuous monitoring of the pulse.<sup>78</sup> By the end of his time as a surgeon in the Crimean War, Pirogov used chloroform in approximately 10,000 procedures.<sup>79</sup>

British and French surgeons did not use anesthesia to the same extent, nor saw as much success with it. Medical professionals all over Europe had differing opinions on anesthesia, so surgeons on the Crimean War's frontlines were receiving mixed information. Right before British surgeons were sent to Crimea, their principal medical officer cautioned “against the use of chloroform in the severe shock of serious gunshot wounds” but still supplied British military surgeons with an abundant supply of the drug.<sup>80</sup> However, the surgeons did not use it as freely as their Russian counterparts. These surgeons believed that “‘chloroform [was] a powerful depressant of vital action,' which made it more likely that many patients would never rally...”<sup>81</sup> The two opposing sides treated amputations and anesthesia differently and saw different results. This shows the

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<sup>77</sup> Troubetzkoy, *A Brief History of the Crimean War*, 280.

<sup>78</sup> Hendriks et. al, “Nikolay Ivanovich Pirogov,” 224.

<sup>79</sup> *Ibid.*, 225.

<sup>80</sup> Figes, *The Crimean War*, 299; Henry Connor, “The use of Chloroform by the British Army Surgeons during the Crimean War,” *Medical History* 42, no.2 (1998):168, doi:10.1017/s0025727300063663.

<sup>81</sup> Conner, “The use of Chloroform,” 184.

divide in medicine on this topic, making the Crimean War the perfect laboratory for this experimental anesthesia. When the Civil War began a decade after the Crimean War, chloroform was accepted and used as the primary anesthetic by military surgeons, much like Pirogov advocated for.<sup>82</sup> The success of chloroform, based on Pirogov's research, allowed for the use of the anesthetic in other areas of military operations during the medical revolution of the Civil War.

For these new surgical techniques to be successful, the wounded soldiers first needed to be transported from the battlefield to the hospitals. That is where the role of ambulances came into play, although each army approached and utilized ambulances differently. The British arrived in Crimea unprepared for the demand that ambulances would encounter. British troops arrived with only a few ambulances, and many became unavailable for transport due to their animals dying of hunger.<sup>83</sup> Each regiment was assigned one surgeon, three assistants, and an animal to carry their supplies. These regiments did not have an assigned ambulance at first because British ambulances did not arrive with the troops. When the ambulances eventually arrived, they were in pieces without directions for assembly, leaving the regiments without that support service.<sup>84</sup> By the time the Delafield Commission arrived, the British troops had received ambulances and greatly improved their performance.<sup>85</sup> The French were much more prepared than

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<sup>82</sup> Terry Reimer, "Anesthesia in the Civil War," National Museum of Civil War Medicine, January 22, 2017, <https://www.civilwarmed.org/anestheisa/>.

<sup>83</sup> "Crimean War."

<sup>84</sup> John S. Haller, *Battlefield Medicine: A History of the Military Ambulance from the Napoleonic Wars through World War I* (SIU Press, 2011), 18, <https://books.google.com/books?id=LFSVx098ugAC>.

<sup>85</sup> Delafield, *Report on the Art of War*, 70.

their allies. Each division of the French infantry had an assigned ambulance staffed with six surgeons, twenty nurses, and an apothecary to treat any ailment.<sup>86</sup>

There were two types of ambulances used by the French since the beginning of the Napoleonic era, and the French utilized both during the Crimean War. The ordinary ambulance contained an extensive supply of medicine and bandages to treat soldiers upon returning from the battlefield. The other type was a flying ambulance. The flying ambulance was a smaller cart that positioned itself close to active combat and allowed quick treatment and evacuation of wounded soldiers. Through the use of both types of ambulances in the Crimean War, this medical service demonstrated its value during military operations.<sup>87</sup>

The French also used a “pack-saddle litter” to transport wounded soldiers. A chair was connected to a saddle so that soldiers could be transported via mule when ambulance wagons could not get to their location. These, along with the French ambulance system, impressed Delafield. In his report, he mentions observing nearly 200 transports via the pack-saddle litter. He described this system as “so favorable as to recommend it for trial in our service.”<sup>88</sup> Delafield seemed to favor the construction of the French ambulances and mule transportation and recommended a similar system in the American military.

The Delafield Commission was able to observe these, and more, medical advancements during their travels throughout Europe, despite setbacks during their year abroad. The group hoped to arrive in Crimea and observe operations while the war was still being fought, but due to delays during the first months of their trip, they did not

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<sup>86</sup> Haller, *Battlefield Medicine*, 17.

<sup>87</sup> *Ibid.*, 17.

<sup>88</sup> Delafield, *Report on the Art of War*, 75.

arrive in Crimea until October 1855, nearly a month after they had received word that the major fighting was over.<sup>89</sup> Even though the commission was unable to reach Crimea as early as they wanted, the three men were still able to learn a lot during their stops prior to Crimea.

In order for the commission to gain access and observe military operations in Crimea, they first needed to procure permission from the diplomats in each country. Secretary of War Jefferson Davis provided the commission with the proper paperwork which explained the purpose of their observations.<sup>90</sup> This diplomatic component proved to be more difficult than expected, as certain governments were less helpful than others. Following their departure from the United States, the Delafield Commission arrived in London on April 27, 1855 and obtained approval and the proper paperwork to observe British military operations in Crimea.<sup>91</sup> After a triumphant time in Britain, the commission left for France on May 6<sup>th</sup> with the same agenda.<sup>92</sup> The commission's time in France was not as fruitful. The foreign minister they were supposed to meet with had resigned, and no other French officials were willing to help them.<sup>93</sup> While this stalemate proved adverse for their original mission, it allowed the officers to explore Paris and immerse themselves in French culture.<sup>94</sup>

On May 24<sup>th</sup>, the Delafield Commission met with the new foreign minister, Count Alexandre Walewsky.<sup>95</sup> During this meeting, the commission encountered another

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<sup>89</sup> Moten, *The Delafield Commission*, 146, 136.

<sup>90</sup> *Ibid.*, 108.

<sup>91</sup> Delafield, *Report on the Art of War*, vii.

<sup>92</sup> Moten, *The Delafield Commission*, 119.

<sup>93</sup> *Ibid.*, 120.

<sup>94</sup> *Ibid.*, 121.

<sup>95</sup> *Ibid.*, 122.

setback, as they were informed the French had a rule stating no foreign officers would be allowed into French military camps if they planned to go anywhere else in Crimea.<sup>96</sup>

Walewsky would only allow the commission into French camps if they changed their travel plans and did not observe other countries military operations after departing from French camps. The commissioners did not want to limit their travels, so they declined Walewsky's offer to observe French operations in Crimea, and instead requested access to French establishments in-country. Count Walewsky approved this request since it did not jeopardize active military operations.<sup>97</sup>

During their time immersed in French military culture, the commission began to challenge the Francophilia that characterized the American military up to that point. Major Richard Delafield mentioned in his report, "...we have almost blindly adopted her ideas in fortification, while not a single nation in Europe, whose defenses I had the opportunity of examining, does so."<sup>98</sup> He said the American military should "not confine [their] study to the Metz school alone," and instead encouraged comparing multiple systems, basing the American system off the best one, or a combination of systems.<sup>99</sup> Delafield concluded by begging all areas of military operations to look to militaries other than the French because "officers of equal science, tact, and genius are to be found in other European armies."<sup>100</sup> All three men devoted pages of their reports to every European military they observed during their year of travel rather than having France at the forefront of their reports.

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<sup>96</sup> Delafield, *Report on the Art of War*, vii.

<sup>97</sup> Moten, *The Delafield Commission*, 122; Delafield, *Report on the Art of War*, viii.

<sup>98</sup> Delafield, *Report on the Art of War*, 19.

<sup>99</sup> *Ibid.*, 20.

<sup>100</sup> *Ibid.*, 277.

Following their time in France, the commission traveled to Berlin to seek permission from the Russian minister in that city.<sup>101</sup> The commission met with the minister and received permission to observe and visit any places that they saw fit. This permission extended to the Crimean frontlines, Warsaw, and St. Petersburg.<sup>102</sup> This encounter with Russian officials impressed the Delafield Commission and the men began to look at the Russian military with new eyes.<sup>103</sup>

The Delafield Commission left Berlin and traveled to Warsaw, where they met with Marshal Paskievich, one of the most important Russian officials.<sup>104</sup> Paskievich provided the commission with an escort during their time in Warsaw, where they were able to observe the Cossack cavalry and military hospital before their diplomatic meeting.<sup>105</sup> During this meeting, Paskievich informed them that their time in Berlin was less successful than initially thought, and they had not received permission to go to Crimea.<sup>106</sup> The commission traveled to St. Petersburg to try and gain access, but “the wheels of the Russian government ground slowly.”<sup>107</sup> The commission used their extra time in St. Petersburg to visit arsenals, military schools, and hospitals. These observations greatly impressed the trio, and they began to understand the effectiveness of the Russian military.<sup>108</sup> Even though the commission was ultimately denied access to the Russian lines, their time in Russia was not wasted.<sup>109</sup>

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<sup>101</sup> Moten, *The Delafield Commission*, 123.

<sup>102</sup> Delafield, *Report on the Art of War*, viii.

<sup>103</sup> Moten, *The Delafield Commission*, 123.

<sup>104</sup> *Ibid.*, 124.

<sup>105</sup> Delafield, *Report on the Art of War*, ix.; Moten, *The Delafield Commission*, 125.

<sup>106</sup> Delafield, *Report on the Art of War*, ix.

<sup>107</sup> Moten, *The Delafield Commission*, 128.

<sup>108</sup> *Ibid.*, 128-129.

<sup>109</sup> *Ibid.*, 139.

After months of intense diplomatic work, the commission finally arrived at Constantinople on September 16<sup>th</sup>, where they met with allied officers and were briefed on the situation in Crimea. They remained at Constantinople for a couple of weeks before boarding a steamer heading towards Balaklava on October 8<sup>th</sup>.<sup>110</sup> The commission remained in Balaklava for approximately a month, during which they examined “camps, depots, parks, workshops, &c., of the English, Sardinian, and Turkish armies...” After they concluded observations in Balaklava, the trio traveled to Scutari and observed more allied depots and hospitals. The Delafield Commission spent less than two weeks at Scutari before commencing their travels back to the United States.<sup>111</sup> The three officers arrived home in New York Harbor on April 28, 1856, just over a year after their departure.<sup>112</sup>

Upon their arrival home, all three men faced the daunting task of reporting their observations from their year in Europe. Each man reported on his area of military expertise. Delafield wrote about military operations involving engineering, including fortifications, transportation of troops and supplies, the use of telegraphs, and harbor defenses.<sup>113</sup> Mordecai focused his writing on artillery, but also reported on military organization, arsenals, and the educational material they gathered.<sup>114</sup> Finally, McClellan

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<sup>110</sup> Delafield, *Report on the Art of War*, xi.

<sup>111</sup> Delafield, *Report on the Art of War*, xiii.

<sup>112</sup> Moten, *The Delafield Commission*, 166.

<sup>113</sup> Moten, *The Delafield Commission*, 172; Delafield, *Report on the Art of War*, 18, 97, 110, 122.

<sup>114</sup> Moten, *The Delafield Commission*, 172; Alfred Mordecai, *Military Commission to Europe in 1855 and 1856. Report of Major Alfred Mordecai, of the Ordnance Department: United States Military Commission to Europe* (Washington: G. W. Bowman, 1861), iii-vii, <https://archive.org/details/militarycommiss00goog>.

reported on cavalry, with a special focus on the Russian army. He also wrote about the causes and battles of the Crimean War.<sup>115</sup>

The men of the Delafield Commission understood how influential their reports would be and how they would impact the future of the American military. Their importance was first observed in 1857, when Secretary of War Jefferson Davis included excerpts from the commission's incomplete reports in his annual report to President James Buchanan.<sup>116</sup> While each report contained specified topics, the overarching theme of all three reports was the same. The Delafield Commission urged the United States of America to prepare for a war with a European power.<sup>117</sup> Major Delafield wrote in a letter to Jefferson Davis, "We must for a long time to come look to this continued preparation in the art of war as an established fact."<sup>118</sup>

The other men's reports emphasized Delafield's words and provided multiple areas of military preparations that could be advanced in the United States to be prepared for a European-style war. One of the most important aspects was the use of coastal fortifications. During his time in the Corps of Engineers, Major Delafield inspected harbor defenses and understood the protection they provided to the United States.<sup>119</sup> Delafield, along with McClellan, reported on the use of coastal fortifications in Europe, and how to upgrade current fortifications to protect against the threat Britain and France posed.<sup>120</sup> Delafield wrote in his report, "...the reliance upon fortifications, both for the

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<sup>115</sup> Moten, *The Delafield Commission*, 172; George Brinton McClellan, *The Armies of Europe: United States Military Commission to Europe, 1855-1856* (Washington: G.W. Bowman, 1860), 7, <https://archive.org/details/reportonartofwar01unit/page/n6/mode/2up>.

<sup>116</sup> Moten, *The Delafield Commission*, 175.

<sup>117</sup> *Ibid.*, 194.

<sup>118</sup> Delafield, *Report on the Art of War*, 2.

<sup>119</sup> Moten, *The Delafield Commission*, 50.

<sup>120</sup> *Ibid.*, 176.



defense of harbors and roadsteads against fleets, and of depots, arsenals, and strategic points on frontiers, appears greater and their value more appreciated at the present time than ever.”<sup>121</sup> McClellan focused on the creation and maintenance of these fortifications, and advocated for "a sufficient number of volunteer companies with the means of instruction in heavy artillery" to implement the improvements the commission observed.<sup>122</sup>

Major Mordecai’s report strongly advocated for a new French development he observed during the war. The French had developed a new version of the twelve-pounder gun that provided more mobility for their artillery.<sup>123</sup> This new ordnance, termed “gun-howitzer,” was created in response to an increased need to simplify artillery and fulfilled those wishes in a multitude of ways. The new “gun-howitzer” used several types of projectiles, which simplified the logistics of ammunition production and allowed for the easy adaptation of ammunition obtained from the enemy. It was also lighter than the previously used twelve-pounder gun by about 175 pounds, which made it easier to transport and maneuver.<sup>124</sup> Mordecai understood how vital a weapon like this would be for the United States military and made sure to include a detailed description of the weapon in his report.<sup>125</sup>

All three officers also mentioned medicine in their reports. Captain McClellan reported on transportation, including trains and wagons that transported medicine to troops.<sup>126</sup> Major Mordecai dedicated one page of his report on the supplies observed at a

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<sup>121</sup> Delafield, *Report on the Art of War*, 18.

<sup>122</sup> McClellan, *The Armies of Europe*, 35.

<sup>123</sup> Moten, *The Delafield Commission*, 180.

<sup>124</sup> Mordecai, *Military Commission to Europe*, 141.

<sup>125</sup> *Ibid.*, 142.

<sup>126</sup> McClellan, *The Armies of Europe*, 74.

military hospital at Constantinople.<sup>127</sup> Major Delafield dedicated the last pages, as well as random pages throughout his report, specifically to medicine and the advancements he observed during their travels in Europe. These pages in his report were in response to a letter he received before their departure from an army surgeon in New York, in which he requested information about how each European army approached and managed military medicine.<sup>128</sup>

Delafield approached this topic by listing and describing what he observed. Following each description, he mentioned any recommendations for the American medical system based on the information he provided. His major recommendations for the American military medical system were the improvements of permanent and temporary hospital structures, cleanliness and sanitation practices, amputation practices, ambulance structure, and medical professionalism. Delafield's report started by comparing the military hospitals he observed throughout his travels. He focused on describing the construction of hospitals and how that translated into the best functionality for both patients and doctors. Delafield started with the military hospital in St. Petersburg, Russia. He was so impressed with the structure and function of this military hospital that he requested a copy of the plans so that American architects would be able to duplicate this structure upon his return to the United States.<sup>129</sup> Delafield wrote, "I can present nothing to the medical staff of our army superior to this, as an example of the European military hospitals."<sup>130</sup>

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<sup>127</sup> Mordecai, *Military Commission to Europe*, 83.

<sup>128</sup> Moten, *The Delafield Commission*, 114.

<sup>129</sup> Delafield, *Report on the Art of War*, 264.

<sup>130</sup> *Ibid.*, 265.

The design of the St. Petersburg hospital was based on an Austrian design that was developed over a century before Delafield's observations.<sup>131</sup> The main benefit Delafield mentioned was its ventilation system, which was not seen in other hospitals he toured. Delafield said, "So perfect is the ventilation and discipline, that in my walk through the many corridors... not the least offensive smell was perceptible, everything and place being as neat, clean, and systematically arranged, as could possibly be desired."<sup>132</sup> Delafield spent a significant part of his report on the placement and number of windows in every ward that provided proper ventilation.<sup>133</sup>

Delafield was also impressed with how St. Petersburg divided patients based on disease and their approach to cleanliness. Patients bathed upon arrival, and all of their personal items were not permitted in the hospital for fear they carried a disease. After the patients were clean, nurses escorted them to an appropriate ward of the hospital based on their sickness.<sup>134</sup> The St. Petersburg hospital practiced extreme hygiene by moving patients into temporary buildings once a year so that the hospital could be deep cleaned. This practice was observed in all Russian medical facilities according to Delafield.<sup>135</sup> Delafield urged American medical professionals to adopt those cleanliness practices to improve quality of care of patients.

The next major component of military medicine Delafield reported on involved the amputation table used by medical staff. He only saw this amputation table in a hospital in Verona but was so impressed he made special note of it in his report. This table was

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<sup>131</sup> Delafield, *Report on the Art of War*, 264.

<sup>132</sup> *Ibid.*, 265.

<sup>133</sup> *Ibid.*, 264.

<sup>134</sup> *Ibid.*, 265.

<sup>135</sup> *Ibid.*, 267.

composed of three separate pieces which were connected via hinges so that every part of it could be adjusted depending on the patient. The table was constructed to turn on its center, allowing surgeons easy access to all sides of the patient. Delafield was impressed with the model and included a detailed description that “is sufficiently correct to give any skillful mechanic the requisites for constructing it.”<sup>136</sup>

After devoting a significant amount of time to observations and recommendations of permanent structures within military medicine, Delafield turned to temporary hospitals closer to active combat.<sup>137</sup> He first described the hospital at Scutari, which had struggled in the years before the commission arrived in Crimea. When Delafield visited in the fall of 1855, he described the hospital as a place where “certainly no soldiers from the field of battle were ever better cared for or provided for, than the sick and wounded of the English army...” Delafield praised the architecture of the building, and stated its organization was “to equal most of the permanent hospitals of the continent.”<sup>138</sup> During his discussion on the hospital in Scutari, Delafield made sure to mention Nightingale and her profound influence on the conditions there.<sup>139</sup> Overall, Delafield was highly impressed with the structure of military hospitals in Europe and offered American medical professionals blueprints for construction and plans for how the hospitals should function when they are operational. These blueprints were incorporated during the construction of hospitals during the Civil War, most notably in the first neurological hospital in the United States.

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<sup>136</sup> Ibid., 270.

<sup>137</sup> Ibid., 271.

<sup>138</sup> Ibid., 272.

<sup>139</sup> Ibid., 273.

Another vital aspect of military medicine near active combat was the use of ambulances. Allied ambulances were situated close to the “columns of attack” to be accessible to soldiers but also able to escape from the action quickly in order to transport patients to the hospital. Stretchers in the ambulance were essential. These stretchers were composed of two wooden frames, with one side stuffed to form a pillow for the wounded. They were used to transport soldiers from the battlefield and could be used as a table to treat minor injuries.<sup>140</sup> When connected to the back of the ambulance wagon via an iron support, the stretcher also served as an operating table for amputations that needed to happen before transferring to the hospital.<sup>141</sup>

The ambulance wagons opened up and revealed four compartments that the stretchers fit into. Some ambulances contained rollers in the four compartments to make loading patients easier. Wire netting enclosed the wagon to combat the issue of claustrophobia for these patients and provide proper ventilation, especially during the hot summer months.<sup>142</sup> In some advanced ambulances, the cart's body was constructed with drawers that contained medical supplies, bandages, and instruments for surgeons to use. Other ambulances had water tanks attached to the sides that provided quick access to water when physicians cleaned wounds and provided proper sanitation.<sup>143</sup> In Delafield's report, he provided a detailed description, along with easily understood diagrams.<sup>144</sup> These diagrams portrayed multiple types of ambulances and Delafield emphasized the benefits of each one.

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<sup>140</sup> Ibid., 68.

<sup>141</sup> Ibid., 69.

<sup>142</sup> Ibid., 69.

<sup>143</sup> Ibid., 70.

<sup>144</sup> Ibid., 70-72.

Delafield also reported on the transportation of medical supplies and surgical instruments.<sup>145</sup> The English created a “brigade for hospital conveyance” for this specific purpose. This brigade consisted of “twenty carts, five store wagons, one forge cart, and one cart for stores and portable forge.”<sup>146</sup> The store wagons contained specific supplies that military surgeons familiarized themselves with so they could respond to injured soldiers quickly.<sup>147</sup> Delafield reported on the specific supplies, but limited his list because he hoped American surgeons would adapt the list based on the environment in the United States.<sup>148</sup> The staff surgeon was in charge of this division and had complete authority over it, which made the division an individual branch of service, which Delafield stated, “is a provision worthy of our attention.”<sup>149</sup> This slight change shifted how military medicine functioned within the entire military, and was the basis for the beginning of the professionalism of military medicine in the United States.

The innovations described in the Delafield Commission’s report were the beginning of a new era of medicine, especially within the military. As Delafield wrote, “The practices of armies, until lately, has been to bestow little study or attention to the wounded immediately after the close of an action. The surgeons of an army constitute a very small minority.”<sup>150</sup> This started to change during the Crimean War, with Delafield attributing much of the transformation to the work of Florence Nightingale. He wrote, “As an American soldier I thanked her for the beneficial influence she had awakened on

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<sup>145</sup> Ibid., 75.

<sup>146</sup> Ibid., 75-76.

<sup>147</sup> Ibid., 76.

<sup>148</sup> Ibid., 77.

<sup>149</sup> Ibid., 76.

<sup>150</sup> Ibid., 61.

behalf of the medical branch of my profession."<sup>151</sup> The Crimean War had acted as a living laboratory for the medical profession and facilitated an environmental shift in medical thinking and professionalism. The officers of the Delafield Commission were able to observe and capture the beginning of this shift in military medicine and communicate these changes through their reports.

The Delafield Commission's reports were published and distributed to military personnel in every area of military operations in 1860, with the United States Senate printing ten thousand copies. The following year, the House of Representatives printed another twenty thousand. Upon their publication, the three reports "became the most current and useful text in its field of military science." The Union understood this and even tried to limit their distribution to Confederate states.<sup>152</sup>

When the American Civil War began, these texts became highly influential in both the Union and Confederate armies. Officers on both sides read and had access to these texts, and their operations changed and advanced because of them. During this time, military medicine underwent drastic changes, joining the trend towards professionalism within the American military. Medical professionals were able to take the Delafield Commission's recommendations and observations, along with other essential medical texts from the Crimean War, and apply them to American medicine. The Delafield Commission's reports would change how medicine evolved during the Civil War and influenced the role medicine played within the American military system. These results would also pave the way for the new specialization of neurology to emerge within the United States.

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<sup>151</sup> Ibid., 75.

<sup>152</sup> Moten, *The Delafield Commission*, 202.

## Chapter Two

On April 12, 1861, Confederate troops fired on Fort Sumter, beginning the American Civil War.<sup>1</sup> This would become the deadliest war the United States has ever fought, with an estimated 750,000 soldiers losing their lives during those four years.<sup>2</sup> This estimate includes combat deaths but also accounts for the men who lost their lives to diseases and infections caused by wounds sustained in battle or by the unsanitary conditions of their daily lives.<sup>3</sup> The intensity and brutality of combat throughout the war, along with the conditions under which armies lived and operated, ensured that military medicine was a crucial part of military operations during the Civil War.

Fortunately, military medicine was in a position to undergo major change. This revolution was due to the Delafield Commission's reports and other influential medical literature from personnel in Europe, like Florence Nightingale and Nikolai Pirogov. The Delafield Commission reports were accessible to military officials at all levels, including Richard Satterlee, who had written to the Delafield Commission requesting information on military medicine, and General Ulysses Grant, who required a copy of George McClellan's *The Armies of Europe* so "he could read about managing large formations in battle."<sup>4</sup> Florence Nightingale's books were also in circulation within the United States, and military surgeons were able to take what she learned during the Crimean War and

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<sup>1</sup> "Civil War Begins," United States Senate, accessed February 19, 2020, [https://www.senate.gov/artandhistory/history/minute/Civil\\_War\\_Begins.htm](https://www.senate.gov/artandhistory/history/minute/Civil_War_Begins.htm).

<sup>2</sup> David J. Hacker, "A Census-Based Count of the Civil War Dead," *Civil War History* 57, no. 4 (2011): 307, doi:10.1353/cwh.2011.0061.

<sup>3</sup> Shauna Devine, *Learning from the Wounded: The Civil War and the Rise of American Medical Science*, (Chapel Hill: The University of North Carolina Press, 2014), 1.

<sup>4</sup> Matthew Moten, *The Delafield Commission and the American Military Profession* (College Station: Texas A&M University Press, 2000), 174; David Welker, "How the Delafield Commission Influenced the Civil War," *Civil War Times* 55, no. 3 (2016): 3.



apply her teachings to the conditions of the Civil War.<sup>5</sup> Even with these references, medical professionals were unprepared to handle the devastation that the Civil War brought to military medicine. Physicians were unprepared to treat soldiers due to the limitations of medical knowledge of the human body at the time, as well as being overwhelmed by the sheer scale of the four-year war. These surgeons also lacked the proper supplies and hospitals to meet the demand they faced. These medical lapses stemmed from the failure of medical professionals and the military to advance the profession during the antebellum period and prepare for its role in a major conflict.

In the years between the War of 1812 and the American Civil War, while the United States military was undergoing major professional and educational reform, the Army Medical Department experienced changes of its own. While educational and professional reform brought positive improvements to the military, these years “were in many ways the darkest in the history of medicine in the United States,” as many American physicians were uncertain about many of the new transformations in the medical community.<sup>6</sup> The scientific process was becoming more sound and trusted, meaning medicine was advancing and leaving behind many of the unscientific methods that had been used for centuries.<sup>7</sup> These modifications in the scientific method led to the creation of better medical equipment, new medicines, and the smallpox vaccine.<sup>8</sup> Yet, due to the novelty of

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<sup>5</sup> Melanie Kiechle, “Fighting Disease with Smell: “Disinfection” during the Civil War,” National Museum of Civil War Medicine, 2019, <https://www.civilwarmed.org/disinfection/>.

<sup>6</sup> Mary C. Gillett, *The Army Medical Department: 1818-1865*, (Washington, D.C.: Center of Military History United States Army, 1987), 3, [https://history.army.mil/html/books/030/30-8-1/CMH\\_Pub\\_30-8-1\\_b.pdf](https://history.army.mil/html/books/030/30-8-1/CMH_Pub_30-8-1_b.pdf).

<sup>7</sup> *Ibid.*, 25.

<sup>8</sup> *Ibid.*, 5, 6, 16.

these medical advancements, United States Army physicians were not confident in their understanding and practical application of medicine as the Civil War began.

In addition to the novelty of medical enhancements, physicians at the time were not practically trained. Theoretical anatomy, with the limited knowledge of certain systems in the body, was the basis of all physicians' education during the antebellum period, as medical schools at the time did not have physicians practice their skills on human cadavers. Religious practices at the time frowned upon the viewing of a dead body. For medical schools to remain in good graces with the church, the practice of medicine on cadavers was prohibited. This deficiency within their professional training made even the most educated and experienced physicians unprepared for the surgical and clinical challenges they would experience on the battlefields of the Civil War.<sup>9</sup> The damages caused by injuries and diseases they encountered during the four years of the Civil War would push American military medicine to the brink of its skills. Still, American medicine would thrive under the pressure. Military physicians used the experiences they gained during the war, as well as the writings of Nightingale and the Delafield Commission, to guide the emergence of neurology and propel medicine into the modern era.<sup>10</sup>

For this medical revolution to begin, the Medical Bureau of the United States Army needed to play a more dominant role during the Civil War than in previous years. At the outbreak of the war in 1861, the Medical Bureau was unprepared to handle the intensity of the war, despite having a leader who experienced the dangers of having an

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<sup>9</sup> Devine, *Learning from the Wounded*, 3.

<sup>10</sup> *Ibid.*, 2.

incompetent medical department.<sup>11</sup> Colonel Thomas Lawson began in his role as Surgeon General in 1836, and a decade later faced the challenge of preparing the military medical department for the Mexican-American War. Prior to this war, the medical department was used to aiding soldiers fighting small Native attacks, leaving the department ill-prepared for organizing itself and operating in more conventional combat situations.<sup>12</sup> The experience during the Mexican-American War made the Medical Bureau realize that there were not enough surgeons within the Army Medical Department to successfully function or meet “the supply and evacuation problems of a major conflict, or for systematically providing the physicians and hospitals needed to care for masses of casualties.”<sup>13</sup> Yet, Colonel Lawson made no changes to the department following the conclusion of the Mexican-American War, and “had no plans for meeting the supply and evacuation problems of a major conflict, or for systematically providing the physicians and hospitals needed to care for masses of casualties.” This lapse resulted in an insufficient supply of medical professionals and medical supplies in 1861, putting the Army Medical Department in a position to “be overwhelmed in the earliest months of the Civil War”.<sup>14</sup>

In the decade between the conclusion of the Mexican-American War and the American Civil War, the Delafield Commission’s reports were published and distributed around the United States. Captain McClellan’s report detailing coastal fortifications and advancements in the cavalry was published in 1857, Major Mordecai’s information on

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<sup>11</sup> Frank R. Freemon, “Lincoln Find a Surgeon General: William A. Hammond and the Transformation of the Union Army Medical Bureau,” *Civil War History* 33, no. 1 (1987): 5, <https://doi.org/10.1353/cwh.1987.0023>.

<sup>12</sup> Gillett, *The Army Medical Department*, 94.

<sup>13</sup> *Ibid.*, 148.

<sup>14</sup> *Ibid.*, 149.

artillery was published in 1858, and Major Delafield's report that included improvements in military medicine was published in 1860.<sup>15</sup> The information within these reports also found its way to senior civilian and military officials, as Secretary of War Jefferson Davis requested a brief summary of the major conclusions of each of the reports to include in his 1857 annual report.<sup>16</sup> This recognition by Secretary Davis years before the last report was finalized emphasized the impact that the reports would have in the following years, and it was anticipated that "likely readership ranged from the president and members of Congress to officials and men of the regular army and the militia."<sup>17</sup> Still, due to these reports being published right before the outbreak of the Civil War, it is unclear how impactful these reports were, as many of the advancements recommended would have taken years to implement.<sup>18</sup> According to reports during the 36<sup>th</sup> Congress, which met in December 1859, the Delafield Commission reports were "referred to the Committee of Military Affairs and the Militia" whose role was to "take into consideration all subjects relating to the military establishment and public defense."<sup>19</sup> While many military officers must have known that these reports existed and were available to them, it can be surmised that few officers read the reports before the outbreak of the Civil War.<sup>20</sup>

While high ranking officials within the military had some sense of the information that the Delafield Commission's reports offered before they were plunged into the

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<sup>15</sup> Jesse Lee Harden, "The First United States Army Observers of Military Conflicts in Post Napoleonic Europe (1855-1871)" (master's thesis, United States Military Academy West Point, 2004), 17.

<sup>16</sup> Moten, *The Delafield Commission*, 175.

<sup>17</sup> *Ibid.*, 176.

<sup>18</sup> *Ibid.*, 203.

<sup>19</sup> U.S. Congress Senate, "Journal of the Senate of the United States of America, being the first session of the Thirty-sixth Congress; begun and held at the City of Washington, December 5, 1859, in the eighty-fourth year of the independence of the United States" (Congressional Journals, Washington D.C., 1860), 56, <https://tinyurl.com/yh35f9mg>; "Committee on Military Affairs, 1822-1946," Committee History, House Armed Services Committee, accessed December 2020, <https://tinyurl.com/gzyqrgt7>.

<sup>20</sup> Moten, *The Delafield Commission*, 203.

combat of the Civil War, there was not enough time to see those recommendations being put into place, especially within military medicine. The reports offered information on ambulance structure and organization, hospital design, and amputation procedures, yet the United States military department did not have the ability to implement these advancements before April 1861, forcing them to execute those changes during wartime. The combination of poor leadership, ill-trained physicians, and the inability to implement many of the recommendations in the Delafield report led to a very unprepared United States Medical Bureau at the outbreak of the Civil War.

With the ill-prepared Army Medical Bureau struggling to provide basic medical treatments, a focus on the issue of sanitation and proper hygiene was nonexistent within the Medical Department. To account for this lapse, civilian organizations from all around the United States collaborated to form two organizations: the Western Sanitary Commission (WSC) and the United States Sanitary Commission (USSC).<sup>21</sup> The WSC was based out of St. Louis, Missouri and focused its efforts on the armies and hospitals that resided in the west.<sup>22</sup> In the aftermath of battles that occurred in Missouri in the summer of 1861, many hospitals were overrun by the sheer number of wounded soldiers.<sup>23</sup> Hospitals soon ran out of beds and dressings, leaving wounded men laying on the ground in dirty bandages.<sup>24</sup> In response to those conditions, and with the support of Major General John C. Fremont, the commander in that region, the WSC was created to

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<sup>21</sup> William Y. Thompson, "The U.S. Sanitary Commission," *Civil War History* 2, no. 2 (1956): 42, <https://doi.org/10.1353/cwh.1956.0032>.

<sup>22</sup> Jacob Gilbert Forman, *The Western Sanitary Commission: A Sketch of Its Origin, History, Labors for the Sick and Wounded of the Western Armies, and Aid Given to Freedmen and Union Refugees, with Incidents of Hospital Life* (Mississippi Valley Sanitary Fair, 1864), <https://tinyurl.com/4tct1qak>, 3.

<sup>23</sup> Forman, *The Western Sanitary Commission*, 5.

<sup>24</sup> *Ibid.*, 6.

implement regulations and reforms based on proper sanitary practices.<sup>25</sup> In the east, the USSC received the support of then acting Union Surgeon General Dr. Robert C. Wood, which led to further support from the Army Medical Bureau and their acceptance of whatever support the organization could offer.<sup>26</sup> While the WSC and USSC had similar stories of emergence and implementation of practices, the USSC was much larger and more influential.

The United States Sanitary Commission and Western Sanitary Commission adopted the lessons the British army learned during the Crimean War. American civilians learned about the poor living conditions of British soldiers and how those conditions facilitated the spread of disease within military camps from newspaper reports. As the Civil War began, similar conditions were arising in American military camps, leading to civilians organizing themselves to manage and combat the same issues the British military faced.<sup>27</sup> The aid that the USSC and WSC offered to the Medical Bureau was greatly welcomed, as the medical department on both fronts of the war was overwhelmed by the brutality and morbidity of the war. While the medical department was worried about performing surgeries and treating wounded soldiers, the USSC and WSC were able to focus on sanitary procedures and keeping soldiers healthy.

The founders of the United States Sanitary Commission quoted Florence Nightingale stating the successes and disasters that militaries faced during active combat could be attributed to the sanitary and health conditions of the troops.<sup>28</sup> The original plan of the

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<sup>25</sup> *Ibid.*, 7.

<sup>26</sup> Thompson, "The U.S. Sanitary Commission," 43.

<sup>27</sup> Devine, *Learning from the Wounded*, 14.

<sup>28</sup> North American Review, *The United States Sanitary Commission* (Boston: Crosby and Nichols, 1864), <https://jstor.org/stable.10.2307/60200793>, 3.

USSC in 1861 was divided into three parts. First, they were going to gather and train volunteers. After there were enough personnel for their mission, the next goal of the USSC was prevention.<sup>29</sup> This step involved using science in the areas of “diet, cooking, cooks, clothing, tents, camping-grounds, transports...” and more, as these areas of military functioning were essential to the health and success of soldiers. The final goal of the USSC was dedicated to their relief branch. This branch focused on the medical needs of the military and aided in organizing and supplying military hospitals to support surgeons.<sup>30</sup>

Additionally, the USSC played a major role in medical reform following some of the major medical disasters during the first year of the war. Army physicians were unprepared and overwhelmed in major engagements like the battle of First Bull Run, where it was discovered that, “a group of village practitioners, gathered together to help wounded soldiers, does not make a military medical organization.”<sup>31</sup> Following the conclusion of the battle, “wounded soldiers were left unattended for days on the Bull Run battlefield.”<sup>32</sup> A *New York Times* article printed mere days after the battle described the hysterical state soldiers arrived at hospitals following the battle and the endless stream of wounded and injured soldiers being transported into town via ambulances.<sup>33</sup> Another *New*

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<sup>29</sup> North American Review, *The United States Sanitary Commission*, 7.

<sup>30</sup> *Ibid.*, 8.

<sup>31</sup> Freemon, “Lincoln Finds a Surgeon General,” 6.

<sup>32</sup> Jack E. Riggs, “Hammond, Lincoln, and the Emergence of American Neurology,” *Hektoen International Journal: A Journal of Medical Humanities*, Hektoen Institute of Medicine, 2019, <https://hekinto.org/2019/04/17/hammond-lincoln-and-the-emergence-of-american-neurology/>.

<sup>33</sup> “Notes of the Greatest Battle.; How the Affair was Regarded in Washington and Elsewhere Facts and Incidents Causes of the Disaster The Conduct of the Troops Rebel Accounts, &c. The Repulse at Manassas. The News in Washington Scenes in Public Places the Stragglers in Town the Wounded Here Gen. Mansfield and his Visitors Scene at his Office Arrival of the Fire Zouaves One of their Yarns Lieut. Knox’s Statement Terrific Charge Brutalities of the Enemy,” *The New York Times*, (1861), <https://www.nytimes.com/1861/07/26/archives/notes-of-the-great-battle-how-the-affair-was-regarded-in-washington.html?searchResultPosition=4>.

*York Times* article published on August 1, 1861 titled “Health in the Army” discussed the poor conditions that the soldiers were living in and how that was leading to physical symptoms such as diarrhea.<sup>34</sup> These symptoms of disease appeared after a mere four months of the war. The role of the media in the Civil War did not allow for the shortcomings of the military medical system to hide and played a huge role in creating support for civilian organizations like the USSC and WSC.

Following disasters such as First Bull Run, a movement had begun calling to replace leadership within the Medical Bureau and for reform of medical services within the military.<sup>35</sup> The United States Sanitary Commission, along with high-ranking military officials, knew that the Medical Bureau’s leadership during the first months of the Civil War was inadequate and hindering the success of the Union Army and the medical department. The United States Sanitary Commission collaborated with Major General George B. McClellan, a member of the Delafield Commission, to spearhead the search for a new surgeon general who would reform military medicine. During the Crimean War, then-Captain McClellan had observed the revolutionary changes Florence Nightingale implemented in the British Army that the United States Sanitary Commission was trying to replicate, which facilitated McClellan’s trust in the USSC. After the battle of First Bull Run, McClellan was appointed commander of the Army of the Potomac, the Union’s largest field army, making his experience and status in the army highly influential.<sup>36</sup> Together, McClellan and members of the USSC advocated for a military surgeon with experience and expertise who would change military medicine and the

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<sup>34</sup> “The Health of the Army,” *The New York Times*, (1861), <https://www.nytimes.com/1861/08/01/archives/the-health-of-the-army.html?searchResultPosition=31>.

<sup>35</sup> Freemon, “Lincoln Finds a Surgeon General,” 6.

<sup>36</sup> *Ibid.*, 7.



specializations of medicine in general. This was a key decision in the history of Civil War medicine, as the person appointed Surgeon General became one of the most influential people in Civil War medicine and completely revolutionized how medicine functioned within the scope of the Union Army.

The physician these leaders chose and advocated for was Dr. William Hammond. Dr. Hammond had served in the United States military for eleven years prior to the Civil War and was a successful physician.<sup>37</sup> Dr. Hammond was also an established researcher, with a special focus on scurvy and how specific foods could prevent the problem within military camps.<sup>38</sup> Another aspect of Hammond's background that attracted McClellan and the leaders of the USSC was his experience in hospital design. In 1858, two years after the Delafield Commission returned home, Hammond spent a year in Europe learning all he could about military hospitals and how they were built.<sup>39</sup> This experience made him an expert in that area of military medicine, and Dr. Hammond knew more about that topic than anyone else on the continent.<sup>40</sup>

The expertise Dr. Hammond brought to the Medical Corps was delayed by his leave of absence from the army between 1859 and 1861, during which he pursued an educational career within medicine at the University of Maryland in Baltimore.<sup>41</sup> His time teaching cost Dr. Hammond his rank within the military, forcing him to work back towards his seniority before he was considered for surgeon general. During this year rising through the ranks, Dr. Hammond inspected military hospitals and became

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<sup>37</sup> Ibid., 9.

<sup>38</sup> Ibid., 8.

<sup>39</sup> Gregory E. Scott and James F. Toole, "1860-Neurology Was There," *Arch Neurology* 55, no. 12 (1998): 1584-1585, doi: 10.1001/archneur.55.12.1584; Freemon, "Lincoln Finds a Surgeon General," 8.

<sup>40</sup> Freemon, "Lincoln Finds a Surgeon General," 9.

<sup>41</sup> Ibid., 8.

acquainted with members of the United States Sanitary Commission and Major General McClellan.<sup>42</sup> The year Dr. Hammond spent working his way back up within military medicine allowed him to network with the very people who helped him achieve the position of Surgeon General.

Dr. Hammond still needed approval as surgeon general before he could use his experience and knowledge to reform the Union Army's medical system. This approval came from President Abraham Lincoln on April 14, 1862, and Dr. William Hammond was officially appointed the 11<sup>th</sup> Surgeon General of the Medical Bureau of the United States.<sup>43</sup>

Even before his appointment as surgeon general, Dr. Hammond was improving military medicine by helping reform the ambulance system. When the Civil War began, Hammond was appointed to work with Dr. Jonathan Letterman, who would later be known as the "Father of Modern Battlefield Medicine."<sup>44</sup> Together, Hammond and Letterman started to transform the army's temporary and inadequate ambulance system into a more permanent and competent one.<sup>45</sup> One of the first things Hammond did after his appointment to surgeon general was to provide more support for Letterman to continue his work in support of the Union Army, which had a tremendous number of sick and injured soldiers that left many regiments short-handed. Major General McClellan appreciated the importance of a solid and working ambulance system from his time in Europe during the travels of the Delafield Commission. Based on Hammond's

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<sup>42</sup> Ibid., 8-9.

<sup>43</sup> "Dr. William A. Hammond," American Battlefield Trust, History, 2020, <https://www.battlefields.org/learn/biographies/dr-william-hammond>.

<sup>44</sup> "Johnathan Letterman," American Battlefield Trust, History, 2018, <https://www.battlefields.org/learn/biographies/johnathan-letterman>.

<sup>45</sup> "Dr. William A. Hammond."

recommendation, McClellan recruited Dr. Letterman to be Medical Director of the Army of the Potomac in June 1862 with the main focus on providing a better system to attend to the sick and wounded soldiers.<sup>46</sup> The new system under Dr. Letterman would become the “most significant operational innovation” during the Civil War.<sup>47</sup>

Letterman’s work redefined battlefield medicine by introducing advancements observed by the Delafield Commission during the Crimean War such as improved ambulances and a better triage system. But, before Letterman could focus on soldier transportation to hospitals or the surgeries that occurred once the soldiers arrived, he needed to confront the issue of sanitation and hygiene that worsened the overall health of soldiers.<sup>48</sup> The first piece to Letterman’s reforms in military medicine as medical director was to order soldiers to bathe weekly, at the minimum.<sup>49</sup> As Nightingale had discovered and shared in her two books, sanitation and proper hygiene greatly decreased mortality rates, and Letterman was trying to do the same. Disease was the deadliest challenge Civil War soldiers faced, and the lack of proper hygiene, in combination with a poor diet were the biggest reasons for disease outbreaks and weakened soldiers. Even with Letterman’s reforms, by the end of the war two soldiers had died from disease for every one soldier

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<sup>46</sup> Jonathan D. Hood, “Jonathan Letterman and the Development of a Battlefield Evacuation System” (Ph.D. dissertation, Texas Tech University, 2004), iii; Ronald Wolf, “Techniques of Civil War medical innovator Jonathan Letterman still used today,” U.S. Army, 2019, [https://www.army.mil/article/216935/techniques\\_of\\_civil\\_war\\_medical\\_innovator\\_jonathan\\_letterman\\_stil\\_l\\_used\\_today](https://www.army.mil/article/216935/techniques_of_civil_war_medical_innovator_jonathan_letterman_stil_l_used_today).

<sup>47</sup> James D. Watson, “War and Medicine,” edited by Hugh Richard Sloten, Oxford Reference, Oxford University Press, 2015.

<sup>48</sup> Hood. “Jonathan Letterman,” 3.

<sup>49</sup> Wolf, “Techniques of Civil War”.

killed on the battlefield.<sup>50</sup> If the soldiers were healthier before entering combat, they had a better chance of surviving if they were injured on the battlefield.

Dr. Letterman's reforms were not the only influence on hygiene and sanitation throughout the Union Army. The United States Sanitary Commission and the Western Sanitary Commission also traveled to military camps and hospitals throughout the Union to inspect and offer improvements to aid in the hygiene and prevention of diseases of the soldiers residing there. Their main goal was to provide a stricter regimen of hygienic practices that they expected all the men to follow, which included taking baths, washing their clothes, brushing their teeth, and eating a proper diet.<sup>51</sup> The advice that members of the Sanitary Commission provided was not always met with agreement and a big part of their mission was to educate and convince military officials and soldiers alike that hygiene and the environment they lived in had an impact on their health and performance in battle. Leaders within the military, such as Surgeon General William Hammond and Major General McClellan, recognized that the message the USSC was delivering was essential and based on science.<sup>52</sup> This support from leadership accelerated acceptance of their message and a movement towards an increase in hygiene.

The United States Sanitary Commission also raised money to assist in the necessary changes that were needed to make military camps and hospitals a healthier environment for soldiers. The funds that the Sanitary Commission gathered provided the resources to

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<sup>50</sup> Jenny Goellnitz, "Civil War Medicine: An Overview of Medicine," eHISTORY. The Ohio State University, accessed November 6, 2020.

<https://ehistory.osu.edu/exhibitions/cwsurgeon/cswurgeon/introduction>.

<sup>51</sup> Margaret Humphreys, *Marrow of Tragedy: The Health Crisis of the American Civil War* (Baltimore: Johns Hopkins University Press, 2013), 132, <https://muse.jhu.edu/book/23993>.

<sup>52</sup> Margaret Humphreys, "This Place of Death: Environment as Weapon in the American Civil War," *The Southern Quarterly* 53, no.3/4 (2016): 16, <https://muse.jhu.edu/article/630228>.

build more hospitals, supply those hospitals, transport wounded soldiers, and provide nutritious foods and proper clothing to military camps all across the Union.<sup>53</sup> The impact that the Sanitary Commission had on reducing the mortality rate caused by disease and hygiene issues that are normally seen in war is apparent. When compared to the Mexican War that occurred just over a decade before the Civil War, the mortality rate was “less than one-third the percentage of mortality from sickness in... volunteer forces in the Mexican war.”<sup>54</sup> Overall, the impact that the United States Sanitary Commission had on the lives of Civil War soldiers was extremely positive and began the educational movement for better hygiene throughout the entire United States.

Once these sanitation reforms were in place, Dr. Letterman and his fellow military medical professionals were able to focus on creating a transportation system that safely and efficiently delivered wounded soldiers from the battlegrounds to the hospitals. During the Crimean War, the British ambulance system was unprepared for both the terrain and demand they faced.<sup>55</sup> By the end of the war, as discussed in Delafield’s report, the ambulance system had greatly improved and eventually became its own branch of service.<sup>56</sup> Between 1862 when Letterman was appointed medical director, and 1864, the American ambulance system would undergo similar changes and become just as successful.

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<sup>53</sup> Humphreys, *Marrow of Tragedy*, 107-108.

<sup>54</sup> *Ibid.*, 130.

<sup>55</sup> “Crimean War.” National Army Museum. Accessed on May 23, 2020.  
<https://www.nam.ac.uk/explore/crimean-war>.

<sup>56</sup> Richard, Delafield, *Report on the Art of War in Europe in 1854, 1855, and 1856: United States Military Commission to Europe*. Washington: G.W. Bowman, 1861, 76,  
<https://archive.org/details/reportonartofwar01unit/page/n6/mode/2up>.

Jonathan Letterman's system combined ambulances and triage that efficiently got soldiers from the battlefield to the hospital and organized the wounded so they could be treated as efficiently as possible.<sup>57</sup> The first aspect of this system was the transportation of soldiers to the hospital, with the most important component being wagons. At this moment in the Civil War, there were no wagons specifically designed for transporting wounded soldiers,<sup>58</sup> but this changed once Letterman established the Ambulance Corps,<sup>59</sup> which included training soldiers and physicians to operate wagons that would pick up wounded soldiers from the battlegrounds and take them to the appropriate station depending on the severity of their wounds and the medical treatment necessary.<sup>60</sup>

The military personnel operating the ambulance wagons delivered the wounded soldiers to a field dressing station, which was either on or next to the battlefield. There, medical professionals were available "to apply initial dressings and tourniquets to wounds,"<sup>61</sup> assess the soldiers, and direct them to their next destination of either a field hospital or a permanent hospital. Under Letterman's system, temporary field hospitals were close to the battleground and were often located in homes or barns. While these field hospitals were not ideal conditions for surgeons to work in, they were utilized for emergency surgeries and to provide treatment to soldiers who would not survive transport to a larger, permanent hospital.<sup>62</sup>

Letterman was appointed medical director of the Army of the Potomac in June of 1862, and his ambulance system was implemented a few months later. The Ambulance

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<sup>57</sup> Wolf, "Techniques of Civil War."

<sup>58</sup> Ibid.

<sup>59</sup> Ibid.

<sup>60</sup> "Johnathan Letterman."

<sup>61</sup> Ibid.

<sup>62</sup> Ibid.

Corps debuted following the Battle of Antietam on September 17, 1862, which resulted in 23,000 casualties and is known as the deadliest one-day battle in American history.<sup>63</sup> Still, Letterman's system was successful, and within 24 hours, all Union soldiers had been cleared from the battlefield and were being treated by medical professionals.<sup>64</sup> Letterman's new ambulance system provided the groundwork for the plethora of advancements and changes that would occur during the Civil War. Now that soldiers could be retrieved and safely moved from the battlefield, improvements in hospitals, medical techniques, and the administration of medications could start to take effect.

While Letterman's reforms are most attributed to advancements in the ambulance system, his reforms also impacted field hospitals. In the first months of the war, before Letterman's reforms, field hospitals were a place for soldiers to die and were an appalling scene even to those in the medical profession. The famous poet Walt Whitman was a hospital volunteer during the Civil War and wrote poems about the horrors of field hospitals.<sup>65</sup> In his poem, "A March in the Ranks Hard-Prest, and the Road Unknown," Whitman wrote:

Faces, varieties, postures beyond description, most in obscurity, some of them dead,  
Surgeons operating, attendants holding lights, the smell of ether, the odor of blood,  
The crowd, O the crowd of the bloody forms, the yard outside also fill'd...<sup>66</sup>

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<sup>63</sup> History.com Editors, "Battle of Antietam," History, A&E Television Networks, October 2009, <https://www.history.com/topics/american-civil-war/battle-of-antietam>.

<sup>64</sup> "Jonathan Letterman"

<sup>65</sup> Garrett Peck, "Walt Whitman in Washington," National Museum of Civil War Medicine, 2016, <https://www.civilwarmed.org/whitman/>.

<sup>66</sup> Walt Whitman, "A March in the Ranks Hard-Prest, and the Road Unknown," Poetry Foundation, accessed December 24, 2020, <https://www.poetryfoundation.org/poems/52828/a-march-in-the-ranks-hard-prest-and-the-road-unknown>.

The field hospitals described in Whitman's poem often lacked enough room and supplies for the demand the physicians faced following a battle. Overall, field hospitals were rough places for a soldier to be treated after battle. As the war continued, field hospitals improved slightly, as they were in place before battles, allowing for them to be stocked with the proper amount and type of supplies.<sup>67</sup> This change resulted in faster treatment and better outcomes for soldiers before they were transported to permanent hospitals.

At the beginning of the Civil War, the existing permanent hospitals were inadequate to meet the demands they suddenly faced, and there were serious improvements to be made. Recent advancements in weapons and military tactics inflicted more damage than anticipated, making the hospital systems that were reliable in previous wars inadequate for the Civil War.<sup>68</sup> That is where Florence Nightingale's hospital pavilion design, as well as Surgeon General Hammond's expertise, came into play. Dr. Hammond understood the recommendations that Florence Nightingale wrote about after her experience during the Crimean War, and advocated for the implementation of her designs. Hammond "believed that the goal of hospital design should be to provide ventilation so that the exhalation and secretions of the ill would be rapidly dissipated," which aligns with Nightingale's advice and pavilion design.<sup>69</sup> This understanding was at the forefront of hospital designs during that era. Dr. Hammond was able to use this information to organize hospitals in preexisting buildings, as every city saw the implementation of this design.<sup>70</sup> The Union

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<sup>67</sup> Devine, *Learning from the Wounded*, 55.

<sup>68</sup> Stanley B. Burns, "Civil War-Era Hospitals," Behind the Lens: A History in Pictures, Public Broadcasting Service, accessed December 24, 2020, [www.pbs.org/mercy-street/uncover-history/behind-lens/hospitals-civil-war/](http://www.pbs.org/mercy-street/uncover-history/behind-lens/hospitals-civil-war/).

<sup>69</sup> Frank R. Freeman, *Gangrene and Glory: Medical Care during the American Civil War* (Urbana and Chicago: University of Illinois Press, 2001), 89.

<sup>70</sup> *Ibid.*, 89.



Army constructed the first pavilion-style hospital in June of 1862 in Philadelphia, Pennsylvania. This hospital was rapidly constructed and is “said to be a pet project of General Hammond and was quickly built.”<sup>71</sup> On November 24, 1862, Dr. Hammond officially required that all hospitals in the Union Army allocate “twelve hundred cubic feet of space per hospital bed,” as well as for the creation of several wooden buildings to be built to replace some hospital buildings throughout the Union.<sup>72</sup> This “focus on hospital design... probably saved lives wherever the hospital plans could be implemented.”<sup>73</sup>

The introduction of these hospital designs made an impact that may explain the statistical difference in the effectiveness of healthcare between the Crimean War and the Civil War.<sup>74</sup> The major difference between military medicine from the two wars was the early implementation of hospital designs during the Civil War that allowed for better ventilation as well as having better sanitation procedures in place. These two changes to Union hospitals allowed for the better treatment of soldiers, both through medical treatment and basic treatment such as receiving proper food and drink.<sup>75</sup> Together, the pavilion hospital design, Letterman's ambulance corps, and an increase in sanitation transformed the American military healthcare experience.

Once the initial improvements were implemented to maintain the health of troops and deliver wounded soldiers from the battlegrounds to the pavilion-style hospitals,

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<sup>71</sup> William T. Campbell, “The Innovative Design of Civil War Pavilion Hospitals,” National Museum of Civil War Medicine, 2018, <https://www.civilwarmed.org/pavilion-hospitals/>.

<sup>72</sup> Freemon, *Gangrene and Glory*, 214; Ira Rutkow, *Bleeding Blue and Gray: Civil War Surgery and the Evolution of American Medicine* (Mechanicsburg, PA: Stackpole Books, 2005), 112.

<sup>73</sup> Humphreys, *Marrow of Tragedy*, 10.

<sup>74</sup> *Ibid.*, 9.

<sup>75</sup> *Ibid.*, 9.

advancements in physicians' techniques began to appear. One of the most prominent of these improved techniques affected amputations. During the Crimean War, Dr. Nikolai Pirogov utilized a new form of amputation to increase the chances of survival and mobility of the patient.<sup>76</sup> This procedure was also a significant part of Civil War medicine and was the most radical technique used for soldiers with gunshot wounds on the extremities. 23% of soldiers who suffered from a gunshot wound during their service would have had an amputation because of their wound.<sup>77</sup>

At the beginning of the war, the standard procedure used for amputations was gruesome.<sup>78</sup> Soldiers described the procedure as “butchery, sheer butchery,” as they observed other soldiers have the surgery performed on them.<sup>79</sup> The physician would first anesthetize the patient with either chloroform or ether, then make a deep incision down to the bone above the damage. The bone was then sawed through, the stump was covered with skin and the incision was sewn closed.<sup>80</sup> Following the procedure, all the physicians could do was pray no infection would develop, as there were no antibiotics during the Civil War era and disinfectants were not fully trusted or used extensively.<sup>81</sup> The rudimentary procedure, along with physicians that were inexperienced in executing it, led to unnecessary deaths and phantom pain.<sup>82</sup> Fortunately, this trend did not continue throughout the four years of the Civil War.

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<sup>76</sup> Konstantinos Koustouflianiotis, George Paraskevas, Eleni Zagelidou, Katerina Dimakopoulou, and George Noussios, "The Life and Work of Nikolai Ivanovich Pirogov (1810-1881): An Outstanding Anatomist and Surgeon," *Cureus* 10, no.10 (2018):5, doi:10.7759/cureus.3424.

<sup>77</sup> Alan J. Hawk, "ArtiFacts: Richard Satterlee's Bone Saw," *Clinical Orthopaedics and Related Research* 475, (2017): 2192, doi:10.1007/s11999-017-5431-5.

<sup>78</sup> Glenna R. Schroeder-Lein, *The Encyclopedia of Civil War Medicine* (Armonk: M. E. Sharpe, 2008), 15.

<sup>79</sup> Freemon, *Gangrene and Glory*, 46-47.

<sup>80</sup> *Ibid.*, 48-49.

<sup>81</sup> Rutkow, *Bleeding Blue and Gray*, 174; Kiechle.

<sup>82</sup> Devine, *Learning from the Wounded*, 40.

Through the Letterman ambulance system, wounded soldiers that may have required an amputation arrived at the hospital to receive treatment much faster than before. This decrease in transportation time increased the survivability of amputations since surgeons could perform them sooner. Primary amputations occurred within the first 48 hours after an injury or gunshot wound, and patients who received a primary amputation often saw significantly better outcomes.<sup>83</sup> After the mark of 48 hours, “there was enough bacterial growth that any cutting would spread the germs through the bloodstream. The result was blood poisoning, which ... was almost invariably fatal.”<sup>84</sup> Intermediate amputations, which were on the timeline of three days to a month after injury, or secondary amputations, which occurred after one month, had a significantly lower survivability rate.<sup>85</sup> The efficiency of the Letterman system, combined with surgical techniques, aided in the higher survivability rate for soldiers following an amputation.

While amputations may have seemed gruesome and excessively used, physicians at the time agreed that the procedure saved more lives than it took. Absent the availability of antibiotics, soldiers who refused an amputation often suffered more pain and had a higher risk of fatality.<sup>86</sup> Soldiers who refused or had to wait a couple of days before receiving an amputation often lost their lives. As one physician recounts, "...had his leg only been amputated at first he would without doubt have recovered – but in trying to save the leg we lost they [*sic*] Boy..."<sup>87</sup> Johnathan Letterman admitted in correspondence to Dr. Hammond "that if any fault was committed, it was that the knife was not used

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<sup>83</sup> Rutkow, *Bleeding Blue and Gray*, 160.

<sup>84</sup> *Ibid.*, 160.

<sup>85</sup> Schroeder-Lein, *The Encyclopedia*, 16.

<sup>86</sup> Rutkow, *Bleeding Blue and Gray*, 159.

<sup>87</sup> James Fulton, *Civil War Medicine: A Surgeon's Diary*, ed. Robert D. Hicks (Bloomington, Indiana: Indiana University Press, 2019), 73.

enough."<sup>88</sup> This belief was widely held among physicians in the Union army, and they learned to trust the procedure and the advancements that made it safer and more effective.

As the war continued, the procedure and necessity of amputations changed. Following increased effectiveness in ambulances, Dr. Letterman turned his focus to amputations. One of his first initiatives was that amputations would only be performed by the top three surgeons in each division, and those surgeons were chosen based on experience.<sup>89</sup> This distinction made physician and surgeon no longer synonyms and created better outcomes for surgeries and amputations. Letterman's initiative became the first time in the United States that there was a specialization in surgery earned through skill and proficiency, and this initiative would expand to other areas of medicine as the war continued. As one scholar put it, this "decision was groundbreaking" and "it should be viewed as one of the most momentous medical reforms to come out of the Civil War."<sup>90</sup> This specialized care, along with the sense of urgency necessary for this procedure saved countless lives.

One of the advancements that assisted in the success of amputations was the increased effectiveness of and trust in anesthesia. Physicians relied on military literature from the Crimean War to enhance their knowledge of anesthesia in a wartime environment. This increased their confidence in how to administer and use it in surgery. While anesthesia could not be administered in all situations, it was used in 95% of surgeries conducted during the Civil War.<sup>91</sup> Specifically, out of the over 80,000 surgeries

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<sup>88</sup> Rutkow, *Bleeding Blue and Gray*, 174.

<sup>89</sup> *Ibid.*, 148.

<sup>90</sup> *Ibid.*, 149.

<sup>91</sup> Terry Reimer, "Anesthesia in the Civil War," National Museum of Civil War Medicine, 2017, <https://www.civilwarmed.or/anesthesia/>.

performed during the Civil War, only 254 were conducted without the use of an anesthetic.<sup>92</sup> The two main anesthetics used were ether, which had been introduced in 1842, and chloroform, which arrived in the medical community in 1847.<sup>93</sup> These two anesthetics played different roles in military medicine throughout the Civil War.

Ether was used in permanent hospitals and more controlled environments. This anesthetic, which had been around longer and was better understood, was highly flammable and unsafe to use in environments such as field hospitals. In field hospitals, chloroform was predominantly used, as it was a more stable option in the less controlled environment. One of the dangers of using chloroform was that it was easier for patients to overdose if they took too deep of a breath, which is why chloroform was not utilized universally. Fortunately, the overdose rate was extremely low, and chloroform increasingly gained the trust of military surgeons as the war continued.<sup>94</sup>

To administer chloroform, physicians placed the anesthetic on a sponge or cloth, then placed the cloth over a cone. That cone was situated over the mouth of the patient, which allowed the chloroform to be gradually and steadily inhaled.<sup>95</sup> This method of administration was effective, and elevated the trust of anesthesia, specifically chloroform, in a multitude of military medical settings.

The extensive use of anesthesia in the wake of combat operations, combined with the significant success rate observed, was a large accomplishment in military medicine.

Chloroform and ether were able to “triumph over pain and suffering” and aid in a swifter

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<sup>92</sup> Devine, *Learning from the Wounded*, 165.

<sup>93</sup> *Ibid.*, 165.

<sup>94</sup> Schroeder-Lein, *The Encyclopedia*, 21.

<sup>95</sup> Reimer, “Anesthesia.”

recovery of patients.<sup>96</sup> By allowing patients to be free of the pain these procedures caused, the trauma from the amputation decreased, recovery was easier, and the overall outcome for the patient was better. Overall, the use of anesthetics during the Civil War was a very positive experience and helped the United States Medical Department continue to advance during that period of medical enlightenment.

While the Delafield Commission failed to report on amputation procedures and how to administer anesthesia, Civil War physicians were able to rely on other literature from the Crimean War to guide them. The Delafield Commission's recommendations about hospital design and ambulance systems spearheaded the beginning of medical reform in the United States. This trend continued with changes in amputation techniques and anesthetic use. The medical revolution that was occurring, combined with knowledge from the Crimean War, continued the movement of military medicine forward.

In order for all of the advancements and information gathered during the Civil War to truly make a difference within military medicine and to cause the medical revolution, it needed to be able to be distributed and available to physicians at the time. During his time as Surgeon General, Dr. William Hammond started to compile medical knowledge into what would be used to establish the Army Medical Museum in Washington D.C.<sup>97</sup> To gather this information, he "expanded reporting requirements of surgeons and medical inspectors during the war," where physicians reported on "surgical procedures for

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<sup>96</sup> Maurice S. Albin, "In praise of anesthesia: Two case studies of pain and suffering during major surgical procedures with and without anesthesia in the United States Civil War – 1861-65," *Scandinavian Journal of Pain* 4, no. 4 (2013):246, <https://www-clinicalkey-com.usd.idm.oclc.org/#!/content/playContent/1-s2.0-S1877886013001006?returnurl=null&referrer=null>.

<sup>97</sup> Jessica M. Shiepkko, "William Alexander Hammond's Transformation of the Army Medical Department during the American Civil War" (master's thesis, Sam Houston State University, 2018), 103.

fractures, gunshot wounds, amputations, and other surgical procedures.”<sup>98</sup> In addition to detailing the wounds they encountered, physicians also reported on “medicines and treatments for fevers, diarrhea, dysentery, scurvy, and respiratory ailments including the specific symptoms and treatments...”<sup>99</sup> By gathering and requiring physicians at the time to scientifically report on their practices and treatments, the Civil War resulted in an intensive multi-volume collection deemed *Medical and Surgical History of the War of Rebellion*.<sup>100</sup> Dr. Hammond’s contribution to building a centralized location of medical knowledge is one of his longest lasting legacies within military medicine.

By having access to military medical literature from the Crimean War, requiring scientific reports to be submitted to the Surgeon General’s office, and fostering an environment for physicians to steadily learn and apply medical techniques to a wide range of patients, the military medical department in the United States Army was in the perfect position to undergo revolutionary changes. Physicians were hyperaware of everything around them and constantly learned from the soldiers they were treating. Before the Civil War, physicians lacked actual bodies to practice medicine on, which led to some major deficits in training and understanding of the human body. Now, physicians had a plethora of live patients with an extensive list of diseases and injuries. These injuries led some physicians, including Dr. William Hammond to realize some symptoms and phenomena occurred that they were previously unaware of.

As a result of his advocacy for military medical reform, Dr. Hammond gained enemies throughout the ranks of the military, as some officers found him arrogant.<sup>101</sup>

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<sup>98</sup> Shiepkov, “William Alexander Hammon,” 102-103.

<sup>99</sup> *Ibid.*, 103.

<sup>100</sup> *Ibid.*, 103.

<sup>101</sup> Freeman, *Gangrene and Glory*, 12.

Secretary of War Edwin Stanton was Dr. Hammond's greatest enemy and disliked how Dr. Hammond was appointed Surgeon General and how he facilitated reforms during his time in that position.<sup>102</sup> Dr. Hammond was also disliked by fellow physicians who did not wish to follow his reforms. In response to the multitude of changes that Dr. Hammond implemented, a significant number of Union physicians wrote to Washington complaining about his leadership. The negative bombardments from physicians and important military officials led to Dr. Hammond's dishonorable discharge in November 1863, with his official dismissal from the role of Surgeon General arriving one year later in August 1864.<sup>103</sup> One of his final acts as Surgeon General was to approve a proposal from a colleague in Philadelphia, Dr. Silas Mitchell, that asked for a hospital to be designated for the study of "nerve injuries and disorders."<sup>104</sup> This act as Surgeon General affirmed his support and interest in this new area of medicine, which was solidified during his work in the following years. Following Dr. Hammond's dismissal, he returned to New York City, where "he specialized in diseases of the nervous system, founded the American Neurological Association..." and advanced the science of study of the nervous system, thus facilitating the emergence of neurology as a new branch of medicine in the United States.<sup>105</sup>

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<sup>102</sup> Freemon, *Gangrene and Glory*, 13.

<sup>103</sup> Alexander Eben Jr. "After the Calomel Rebellion: what happened to Surgeon General William A. Hammond?" *Southern Medical Journal* 89, no. 12 (1996):1223, doi:10.1097/00007611-199612000-00020; Rutkow, *Bleeding Blue and Gray*, 215.

<sup>104</sup> Freemon, "Lincoln Finds a Surgeon General," 9; William S. Middleton, "Turner's Lane Hospital," *Bulletin of the History of Medicine* 40, no. 1 (1966): 15, <https://www.jstor.org/stable/44447124>.

<sup>105</sup> Freemon, "Lincoln Finds a Surgeon General," 14.



## Chapter Three

In correspondence with the medical revolution happening within military medicine that included such advancements as ambulances, sanitation procedures, amputations, and the use of anesthetics, a new specialization in medicine was emerging as a result of specific injuries caused by the brutality of the Civil War. Injuries that pierced nerves in the body left the soldiers in terrible burning pain, or limbs that had been amputated still ached, and physicians had no explanations for these occurrences.<sup>1</sup>

The brain and the nervous system have always been of interest to scientists, dating back to the ancient Greeks in the third century B.C.<sup>2</sup> Yet, the academic pursuit of understanding this area of medicine did not originate until the mid 1800s. The emergence of the specialization of neurology and the title of “Father of Neurology” arose in two separate parts of the world, Europe and the United States. Jean-Martin Charcot, born and raised in Paris, France, finished medical school in 1848. Following his beginning years as a physician at the Hospital de la Salpêtrière, he was appointed “physician to the hospitals of Paris in 1856.”<sup>3</sup> During his time as a prestigious surgeon there, Dr. Charcot transformed the hospital into “a state-of-the-art neurological center for its time.”<sup>4</sup> Charcot did this by utilizing the improved scientific method through his use of “laboratory analyses, photographs, electrostimulation, drawings, casts, [and] histological sections” to

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<sup>1</sup> Aura Satz, “The Conviction of its Existence: Silas Weir Mitchell, Phantom Limbs and Phantom Bodies in Neurology and Spiritualism,” *Neurology and Modernity*, (2010): 113-114, 113, <https://link.springer.com/chapter/10.1057/9780230278004>.

<sup>2</sup> Konstantine Panegyres and Peter Panegyres, “The Ancient Greek discovery of the nervous system: Alcmæon, Praxagoras and Herophilus,” *Journal of clinical neuroscience: Official Journal of the Neurosurgical Society of Australasia* 29, no. 1 (2016): 22, doi: 10.1016/j.jocn.2015.10.047.

<sup>3</sup> David R. Kumar, Florence Aslinia, Steven Yale, and Joseph Mazza, “Jean-Martin Charcot: The Father of Neurology,” *Clinical Medicine & Research* 9, no. 1 (2011): 46-49, doi: 10.3121/cmr.2009.883. 46.

<sup>4</sup> Kumar et al., “Jean-Martin Charcot,” 47.

observe the symptoms of the psychiatric patients.<sup>5</sup> Following his conclusions from these observations, he used the training he received as a pathologist to find the anatomical structures that corresponded with the neurological symptoms he was observing.<sup>6</sup> This methodology paved the way for future neurologists and provided the foundation for the specialization of neurology within medicine.<sup>7</sup>

While the emergence of neurology was happening in France, the beginnings of this specialization almost simultaneously occurred through a different path in the United States, as physicians were not able to focus solely on the neurological symptoms arising among patients, but on maintaining the health and saving the lives of wounded soldiers fighting in the Civil War. While the Civil War took some attention away from neurology, it also facilitated its emergence within the United States, and “was incontestably the primary local historical event pivotal to the development of neurology...”<sup>8</sup> The increase in number and seriousness of the damages caused by wartime wounds to the peripheral and central nervous system sparked an interest for this specialized area of medicine and a yearning for deeper understanding of those phenomenon.

As the Civil War continued, physicians throughout the Union Army started to treat a plethora of patients struggling with neurological injuries. Pain with no apparent source, paralysis, atrophy of muscles due to spinal lesions, a perception of burning

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<sup>5</sup> Christian Régnier, “Gunpowder, madness, and hysteria: the birth of neurology in France Vignettes of five great neurologists who made history at the Salpêtrière Hospital in Paris: Jean-Martin Charcot (1825-1893), Pierre Marie (1853-1940), Joseph Babinski (1857-1932), Jean Lhermitte (1877-1959), Paul Castaigne (1916-1988),” *Medicographia* 32, (2010): 310-318, <https://www.medicographia.com/2011/01/gunpowder-madness-and-hysteria-the-birth-of-neurology-in-france-vignettes-of-five-great-neurologists-who-made-history-at-the-salpetriere-hospital-in-paris-jean-martin-charcot-1825-1893-pierre-m/>.

<sup>6</sup> Kumar et al., “Jean-Martin Charcot,” 47.

<sup>7</sup> Régnier, “Gunpowder.”

<sup>8</sup> Christopher Goetz, Teresa Chmura, and Douglas Lanska, “Part 1: The History of 19<sup>th</sup> Century Neurology and the American Neurological Association,” *Annals of Neurology* 53, no. 4 (2003): S3, doi: 10.1002/ana.888.

following the treatment of a wound, and sensations in a limb that was no longer there were not understood, nor had a treatment plan in place, left physicians helpless against many of the neurological cases that they saw in their hospitals.<sup>9</sup> While some physicians struggled to treat these patients and had no desire to understand the neurological underpinnings of those injuries, others took a new interest in these disorders, such as Dr. Silas Mitchell and Dr. William Hammond. They tried to understand what was happening on the neurological level to treat the disorders, rather than revert to treatments that had no efficacy. Dr. Silas Mitchell, later deemed the “Father of American Neurology,”<sup>10</sup> utilized his work of understanding nervous system injuries in combination with the medical revolution occurring with the United States Army Medical Department to facilitate the emergence of neurology. This time period was critical for the specialization’s emergence, as “the years from 1862 to 1880 may be regarded as the cradling period of American neurology, which was born during the Civil War.”<sup>11</sup>

Silas Weir Mitchell was born and raised in Philadelphia and later attended the University of Pennsylvania in 1844. Unfortunately, Mitchell did not complete his college degree, as he dropped out before graduation due to illness. At that time, a college degree was not a requirement for medical school. So, in 1850, he graduated from Jefferson Medical College, a college that “showcased some of Philadelphia’s brightest medical minds.”<sup>12</sup> Following his graduation, Dr. Mitchell took a lot of interest in research and

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<sup>9</sup> Devine, *Learning from the Wounded*, 139.

<sup>10</sup> Abraham Kalikstein, Noah Rosen, “S. Weir Mitchell, Successes and Failures of the Father of the American Neurology,” *Neurology* 92, no. 15 (2019): P4.9-061, [https://n.neurology.org/content/92/15\\_Supplement/P4.9-061](https://n.neurology.org/content/92/15_Supplement/P4.9-061).

<sup>11</sup> Pearce Bailey, “The past, present, and future of neurology in the United States,” *Neurology* 76, no. 1 (2011): 18-22, doi: 10.1212/WNL.0b013e3182068bf1.

<sup>12</sup> Freemon, *Gangrene and Glory*, 89; Fulton, *Civil War Medicine*, 23.

studied “various aspects of blood, poisons, medicinal plants, and physiology” in the years leading to the Civil War.<sup>13</sup> Mitchell also traveled to Paris for a year, during which he studied medicine in “the epicenter of medical innovation.”<sup>14</sup> Together, those experiences prepared him for the plethora of patients he would treat during the Civil War with neurological injuries that baffled other physicians.

As a civilian physician, Dr. Mitchell was hesitant to serve as a military physician for the Union Army, as he preferred to stay out of politics. Still, he was contracted by the Union Army and was able to remain in Philadelphia, where his interest in neurological cases first began.<sup>15</sup> As he began to study and treat soldiers suffering from injuries to the nervous system and his interest grew, he began to reach out to other military physicians to see if they had patients of similar nature. This networking led him to trade patients in order to have more access to injuries of the nervous system.<sup>16</sup> As there was no treatment for these soldiers, “most doctors were only too happy to send them to Mitchell in exchange for one of his patients with a different disease.”<sup>17</sup> Mitchell soon gathered many patients, and “the number of patients with nerve injury exceeded the size of the ward” he had access to.<sup>18</sup> Dr. Mitchell knew that he needed more space and assistance to study, understand, and treat those soldiers, so he reached out to an old colleague and man of power within the United States Army, Surgeon General William Hammond.

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<sup>13</sup> Schroeder-Lein, *The Encyclopedia*, 215.

<sup>14</sup> Dillon Carroll, “Silas Weir Mitchell,” National Museum of Civil War Medicine, 2017, <https://www.civilwarmed.org/mitchell/>.

<sup>15</sup> *Ibid.*

<sup>16</sup> Freemon, *Gangrene and Glory*, 89.

<sup>17</sup> Schroeder-Lein, *The Encyclopedia*, 215.

<sup>18</sup> *Ibid.*, 308.

In 1863, Dr. Mitchell wrote to Surgeon General Hammond. He described the types of patients and injuries he was observing and treating and advocated for the creation of a special hospital with the appropriate space and personnel to treat and study the injuries of the nervous system. When Hammond heard of his friend and colleague's interest and need, he established a special hospital that solely focused on the injuries of the nervous system.<sup>19</sup> In August of 1863, a pavilion style hospital named Turner's Lane Hospital, or the U.S. Army Hospital for Diseases and Injuries of the Nervous System, was established with the ability to treat 275-400 patients at a time.<sup>20</sup> Additionally, Turner's Lane had a wing dedicated to cardiac patients, another emerging specialization in the United States. That wing was headed by Dr. Jacob Da Costa, who studied soldiers' heart and irritable heart syndromes, with symptoms including "palpitations, rapid heartbeat, and lightheadedness... related to severe mental or emotional stress."<sup>21</sup> Dr. Mitchell, along with two other esteemed physicians with an interest in neurological cases, Dr. George Morehouse and Dr. William Keen, a classmate from Jefferson Medical College, were placed in charge of the hospital and spearheaded the research that was to be conducted.<sup>22</sup>

The establishment of a hospital that specialized in neural issues was a revolutionary decision in the emergence of neurology. As Mitchell and his colleagues wrote, "Never before in medical history has there been collected for study and treatment

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<sup>19</sup> Freemon, *Gangrene and Glory*, 89.

<sup>20</sup> Devine, *Learning from the Wounded*, 139; Freemon, *Gangrene and Glory*, 89; Schroeder-Lein, *The Encyclopedia*, 215.

<sup>21</sup> Schroeder-Lein, *The Encyclopedia*, 128.

<sup>22</sup> Rutkow, *Bleeding Blue and Gray*, 184; Freemon, *Gangrene and Glory*, 89.

so remarkable of series of nerve injuries.”<sup>23</sup> The patients that Mitchell had gathered for this hospital were suffering from very painful injuries or epileptic seizures caused by those injuries.<sup>24</sup> Additionally, they studied “contracted limbs, burning sensations in the hands and feet, phantom pain in amputated limbs and other crippling problems.”<sup>25</sup> Eventually, Turner’s Lane Hospital treated those patients, assisted the military in discovering which civilians were lying about physical ailments that would limit their ability to serve in the war, published articles and books on what was discovered, and advocated for the further engagement and specialization of neurology within medicine.

Mitchell, Keen, and Morehouse dedicated a lot of time to Turner’s Lane Hospital in order to best understand and treat their patients, with Mitchell becoming a mentor for Keen and Morehouse. During that mentorship, Mitchell demanded effective and properly conducted research and reporting, and taught them the importance of being able to diagnosis the patients based on their observations.<sup>26</sup> All of their observations were done without the assistance of clerks or other physicians, and each would spend approximately ten hours a day studying and treating patients at Turner’s Lane. This dedication and hours spent were in addition to the regular practices that those men kept throughout the Civil War.<sup>27</sup> Many days, Mitchell, Keen, and Morehouse were burning the midnight oil and would not leave until one or two in the morning, only to arrive back at Turner’s Lane at seven the next day.<sup>28</sup> This dedication to the study of neurology propelled that

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<sup>23</sup> Charles Stewart Roberts, “Weir Mitchell of Philadelphia,” *Clinical Methods: The History, Physical, and Laboratory Examinations*. 3<sup>rd</sup> edition, (1990), <https://www.ncbi.nlm.nih.gov/books/NBK715/>.

<sup>24</sup> Freemon, *Gangrene and Glory*, 89.

<sup>25</sup> Schroeder-Lein, *The Encyclopedia*, 215.

<sup>26</sup> Devine, *Learning from the Wounded*, 140.

<sup>27</sup> Schroeder-Lein, *The Encyclopedia*, 308.

<sup>28</sup> *Ibid.*, 309.

specialization forward by facilitating future publications within neurology and providing the foundation for future professionalization of the specialty.

The injuries that physicians at Turner's Lane Hospital studied and treated were caused by the brutality of the Civil War, and were the result of "gunshots, artillery shells, sabre swipes, falls and accidents."<sup>29</sup> These injuries caused different forms of paralysis, burning pain where an injury had healed, muscle spasms, and phantom limb pain.<sup>30</sup> To treat the variety of injuries and disorders seen at Turner's Lane, Mitchell, Keen, and Morehouse used a variety of possible treatments. These included, "wet dressings, poultices, blisters, cold compresses, leeches, counterirritants, bandages and splints for support, hydrotherapy, physical therapy, mild electric shock, massages, and certain kinds of gymnastics."<sup>31</sup> The electric shock therapy was used mainly by Dr. Mitchell and was used to stimulate the nerves and muscles to determine if neural reconnections could be made.<sup>32</sup> While a lot of these treatments have been debunked and are no longer used in the field of neurology, the techniques were groundbreaking during the Civil War era and taught physicians a lot about the nervous system.

One of the most common ailments that Mitchell, Keen, and Morehouse studied and treated at Turner's Lane was causalgia, characterized as the intense burning painful stimuli following an injury to a nerve.<sup>33</sup> Dr. Mitchell wrote that causalgia was "the most terrible of all the tortures which a nerve wound may inflict."<sup>34</sup> One of the only ways that causalgia could be treated and the pain relieved was through subcutaneous morphine

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<sup>29</sup> Carroll, "Silas Weir Mitchell."

<sup>30</sup> Schroeder-Lein, *The Encyclopedia*, 308.

<sup>31</sup> *Ibid.*, 308.

<sup>32</sup> Carroll, "Silas Weir Mitchell."

<sup>33</sup> Freemon, *Gangrene and Glory*, 192.

<sup>34</sup> Roberts, "Weir Mitchell of Philadelphia."

injections.<sup>35</sup> During the Civil War era, morphine could be administered in three ways: a pill, a powder placed directly onto the wound, or via a subcutaneous injection.<sup>36</sup> One of the reasons that many causalgia patients were transferred to Turner's Lane Hospital was because it was one of the few places in the United States that had the capability to administer morphine via subcutaneous injections.<sup>37</sup> For many soldiers injured during the Civil War, morphine injections were the only relief they had from their injuries, as was the case of David Schively.

Schively was a young private in the 114<sup>th</sup> Pennsylvania Volunteer Infantry.<sup>38</sup> During the Battle of Gettysburg, he was shot in the left arm and lost all feeling in it. In the same battle, Schively was also shot in the face.<sup>39</sup> The injury to his face resulted in the loss of his right eye, but the wound healed nicely. Physicians at Camp Letterman, where Schively was taken after he was injured, were not able to treat his left arm, as even the slightest pressure resulted in excruciating pain. As physicians at Camp Letterman were unsure how to treat him, he was moved to Turner's Lane for further treatment.<sup>40</sup> There, he was able to receive morphine injections for the pain, in addition to covering his arm with loose, wet, cotton gloves. As time continued to pass, "the pain had made him so 'nervous and hysterical' that his 'relatives supposed him to be partially insane.'"<sup>41</sup>

Private Schively arrived at Turner's Lane Hospital in 1863. Two years later he was still a patient and still experiencing pain, as he was diagnosed with causalgia. He was

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<sup>35</sup> Freemon, *Gangrene and Glory*, 89.

<sup>36</sup> Schroeder-Lein, *The Encyclopedia*, 218.

<sup>37</sup> Freemon, *Gangrene and Glory*, 89.

<sup>38</sup> Carroll, "Silas Weir Mitchell."

<sup>39</sup> Freemon, *Gangrene and Glory*, 109.

<sup>40</sup> *Ibid.*, 114.

<sup>41</sup> Carroll, "Silas Weir Mitchell."



not alone in his suffering and diagnosis, and “many thousands of morphine injections were given at Turner’s Lane Hospital” to treat the pain.<sup>42</sup> Eventually, David Schively and other wounded soldiers learned to live with the pain, as it never left.<sup>43</sup>

In 1863, Mitchell, Keen, and Morehouse had the opportunity to treat Surgeon General William Hammond himself. Dr. Hammond traveled to Nashville, Tennessee to inspect military medical facilities and provide instructions for improvements. During his time in Nashville, Dr. Hammond tripped and fell down some stairs, after which he could barely move his legs. Following the incident, he traveled to Turner’s Lane to be treated by Dr. Mitchell, who noted some weakness and loss of sensation in Dr. Hammond’s legs. Eventually, the slight leg paralysis healed itself, and the physicians at Turner’s Lane never uncovered the reason for Dr. Hammond’s paralysis.<sup>44</sup> Throughout the rest of his life, Dr. Hammond experience relapses of the partial paralysis, which played a role in his dismissal as surgeon general.<sup>45</sup>

While causalgia, epilepsy, and paralysis were major components of Mitchell, Keen, and Morehouse’s studies, phantom limb pain was also a main neurological concern for them. During Dr. Mitchell’s work at Turner’s Lane Hospital, he interviewed soldiers who had a limb amputated and were struggling with phantom limb syndrome.<sup>46</sup> Phantom limb syndrome is “the ability to feel sensations and even pain in a limb or limbs that no longer exist,” and can be categorized as either painful or nonpainful sensations. Examples of these sensations include “touch, temperature, pressure, vibration, itch, burning,

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<sup>42</sup> Freemon, *Gangrene and Glory*, 192.

<sup>43</sup> *Ibid.*, 196.

<sup>44</sup> *Ibid.*, 143.

<sup>45</sup> Rutkow, *Bleeding Blue and Gray*, 212.

<sup>46</sup> Freemon, *Gangrene and Glory*, 192.

shooting pain, and tingling ‘pins and needles.’” This syndrome was most commonly seen in amputees but could also be seen in people who suffered a stroke and no longer had feeling or function in that part of their body.<sup>47</sup> Dr. Mitchell became fascinated by this phenomenon and began to write more about phantom pain.

In July of 1866, Dr. Mitchell published an anonymous short story titled “The Case of George Dedlow” in the *Atlantic Monthly*.<sup>48</sup> In this story, the narrator was a physician in the Civil War who had lost both of his arms and both of his legs. Even without his arms or legs, Dedlow experienced “clenching and burning in those vanished limbs that cannot be soothed.” While this story was based on the sensations and interviews that Mitchell conducted with amputees, “The Case of George Dedlow” was fiction. Yet, many civilians and other physicians believed the story to be real, which brought a lot of attention to the U.S. Army Hospital for Injuries and Diseases of the Nervous System, where Dr. Mitchell had set the tale. It also brought a lot of public attention to how the Civil War had impacted the soldiers and the consequences that those soldiers were still facing. This short story was poignant during the time and is “remembered today as a vivid early description of “phantom limb” pain.”<sup>49</sup>

While the emergence of neurology and advancements in the field arose from an abundance of neurological patients, not all of the patients that arrived at Turner’s Lane Hospital were actually suffering from injuries or diseases of the nervous system. One of the roles of Turner’s Lane Hospital played for the United States military was to identify

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<sup>47</sup> Michael Rugnetta, “Phantom limb syndrome,” *Neurophysiology*, Encyclopedia Britannica, September 2020, <https://www.britannica.com/science/phantom-limb-syndrome>.

<sup>48</sup> Freemon, *Gangrene and Glory*, 192.

<sup>49</sup> Alicia Puglionesi, “The Civil War Doctor Who Proved Phantom Limb Pain Was Real,” *History Stories*, History, August 2018, <https://www.history.com/news/the-civil-war-doctor-who-proved-phantom-limb-pain-was-real>.

when a civilian was faking a malady to avoid serving in the army. A lot of the false claims included “blindness, deafness, paralysis, and epilepsy.”<sup>50</sup> These cases were mostly taken on by Dr. Mitchell and Dr. Keen, as “the feigning of paralysis and other neuroinjuries that was of special interest to them.”<sup>51</sup> Turner’s Lane Hospital was the only place in the Union that was able to administer special methods to identify which patients were faking their maladies. The main method utilized was anesthesia. The patient would be put under the influence of anesthesia, and as the patient regained consciousness, they often forgot about their dysfunction, and would reveal that they were feigning the dysfunction of the nervous system.<sup>52</sup>

For example, if a civilian was avoiding military service by claiming they were blind, the patient was put under anesthesia. During the time that they were unconscious, the physician would cover the eye that the patient claimed was “not blind” and leave the “blind” eye uncovered. As the patient was regaining consciousness, the physician would offer them water, and the patient would still be able to reach and grab it. This trick confirmed that the person was faking their nervous system dysfunction and allowed the military to require their service.<sup>53</sup> The physicians at Turner’s Lane Hospital were instructed by military officials that if those methods were inconclusive, they were to declare the person was faking it, as “the need of their armies for manpower overrode the need of their patients for medical protection.”<sup>54</sup> Turner’s Lane Hospital was crucial for

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<sup>50</sup> Freemon, *Gangrene and Glory*, 165.

<sup>51</sup> Rutkow, *Bleeding Blue and Gray*, 185.

<sup>52</sup> Freemon, *Gangrene and Glory*, 165.

<sup>53</sup> Rutkow, *Bleeding Blue and Gray*, 185.

<sup>54</sup> Freemon, *Gangrene and Glory*, 165.

identifying soldiers fit for combat for the Union Army, in addition to its role as the headquarters for the emergence of neurology in the United States.

The work conducted at Turner's Lane Hospital resulted in a book, *Gunshot Wounds and Other Injuries of Nerves*, which was published in 1864, eighteen months after the hospital opened. This book was based on over two thousand pages of notes that had been gathered by Mitchell, Keen, and Morehouse, and contained "the first detailed study of traumatic neuroses and introduced the concept of causalgia, a burning sensation caused by inflamed nerves."<sup>55</sup> *Gunshot Wounds and Other Injuries of Nerves* was later said to be "the foundation of the whole modern surgery of the nervous system," by Dr. Keen.<sup>56</sup> Additionally, Dr. Mitchell decided to maintain one of the most detailed set of case books that organized and maintained information regarding neurology in the United States, and contained the observations and discoveries made at Turner's Lane Hospital. This extensive set of information contained diagnoses such as "locomotor ataxia, hemiplegia, chorea, local palsies, convulsive disorders, neuralgia, and encephalitis."<sup>57</sup>

The published works completed by these members set Civil War physicians apart from their predecessors from all across the globe. According to previous military medical literature, "military physicians in the Crimea or other wars of the period often commented on the existence of these types of nervous cases, but they were not described at length or in helpful detail in the existing textbooks. There was thus no guide for treating nervous cases during the Civil War."<sup>58</sup> Mitchell, Morehouse, and Keen began the process of documenting, describing, and diagnosing neurological cases, and distributed this

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<sup>55</sup> Devine, *Learning from the Wounded*, 140; Rutkow, *Bleeding Blue and Gray*, 185.

<sup>56</sup> Devine, *Learning from the Wounded*, 257.

<sup>57</sup> Goetz, "Part 1," S23.

<sup>58</sup> Devine, *Learning from the Wounded*, 140-141.

information in a way that had never been previously done within military or civilian medicine.

The American Civil War brought about many changes in military medicine, and neurology was one of the specializations that benefitted the most from it. As the war ended, the work and emergence of neurology continued, despite the closing of Turner's Lane Hospital in June of 1865.<sup>59</sup> Specializations within medicine was a new concept, but the war propelled the idea forward and "specialties in orthopedics and neurology began soon after the war."<sup>60</sup> The specialization in neurology arose from two movements within medicine. The first was the exponential understanding and knowledge of neurology. Additionally, there was a movement toward furthering the subdivisions within medicine, and by the time the movement arrived in the United States, specializations in Europe were already in full development.<sup>61</sup> When the movement did arrive in the United States, it was highly resisted.<sup>62</sup> Still, the idea of specialist clinics and physicians continued to develop. This movement received a lot of aid from the growing wealthy class of the industrial revolution through the turn of the century, ensuring that it was funded and supported.<sup>63</sup>

After Turner's Lane Hospital closed, the physicians who worked there and had established neurology continued to further the specialization. Following the Civil War, Dr. Mitchell continued to dedicate and limit his practice to neurological diseases, working at the Philadelphia Orthopaedic Hospital and Infirmary for Nervous Diseases for

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<sup>59</sup> Schroeder-Lein, *The Encyclopedia*, 309.

<sup>60</sup> *Ibid.*, 209.

<sup>61</sup> Goetz, "Part 1," S3.

<sup>62</sup> *Ibid.*, S3.

<sup>63</sup> *Ibid.*, S3.

over forty years.<sup>64</sup> Additionally, he wrote more than 170 medical papers and several neurology books.<sup>65</sup> Dr. Keen continued his work within neurology and became the first neurosurgeon in the United States.<sup>66</sup> Physicians working at Turner's Lane, as well as those in field hospitals, wrote and published more articles on neurological cases such as "peripheral nerve injuries, posttraumatic epilepsy, neurasthenia." These articles written by American physicians "brought international attention to American neurologists in the postwar era." This continued during the Reconstruction era and work especially done by Hammond and Mitchell helped affirm and further establish American neurology on the international level."<sup>67</sup> Additionally, neurology continued to develop to help soldiers continue to recover through the use and advancements of prosthetics.

Following the conclusion of the Civil War, the use of prosthetic limbs increased significantly, with corresponding growth in production demand. Between 1861 and 1873, nearly 150 patents were issued for prosthetic devices, along with other devices produced to aid soldiers disabled by the war, such as "combination forks, knives, and spoons for arm amputees to hand-powered tricycles for those missing a leg." This industry made millions of dollars in the years following the Civil War. One of the men who benefited off of the brutality of the war was B. Franklin Palmer, who was an amputee himself.<sup>68</sup> He patented his own artificial limb and advocated for its excellence to Dr. William Hammond to try and propel his patent for the usage in the Union military. His design, which included "detachable ball-and-socket joints meant to perform for months without need of oil or

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<sup>64</sup> Roberts, "Weir Mitchell of Philadelphia"; Schroeder-Lein, *The Encyclopedia*, 215.

<sup>65</sup> Schroeder-Lein, *The Encyclopedia*, 216.

<sup>66</sup> *Ibid.*, 125.

<sup>67</sup> Goetz, "Part 1," S3.

<sup>68</sup> Rutkow, *Bleeding Blue and Gray*, 186.

attention, was one of the most important medical advances of the war.” Many physicians agreed that it was the best artificial limb and recommended it to wounded soldiers.<sup>69</sup>

The necessity of prosthetics to assist the plethora of soldiers who had undergone an amputation during the Civil War was so prevalent that every medical journal in 1866 advertised for wooden prosthetics.<sup>70</sup> One military order, General Order No. 40 included an estimate for the funding needed to provide a prosthetic for all soldiers who needed one. The estimate was forty-five thousand dollars, which in retrospect, was highly inadequate for the number that was necessary.<sup>71</sup> Physicians and neurologists advocated for the use and improvements of prosthetics and incorporated those devices into the treatment of neurological diseases.

Dr. William Hammond advocated for the use of prosthetics within neurology as part of his work within the specialization. Following his dismissal as Surgeon General, Dr. Hammond returned to New York and established “an outpatient ‘Nerve’ clinic as part of the Outdoor Department at the Bellevue Hospital.”<sup>72</sup> He dedicated his time to treating patients suffering from injuries and diseases of the nervous system, as well as solidifying neurology within medicine in the United States.<sup>73</sup> In addition to his work at his clinic, Hammond also took up a position of Professor of Diseases of the Mind and Nervous System at Bellevue Medical College in 1867. In that role, Dr. Hammond “delivered a full series of didactic and practical lectures on mental and nervous diseases.<sup>74</sup> Finally, he also wrote and published the first American neurological textbook that integrated basic and

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<sup>69</sup> Rutkow, *Bleeding Blue and Gray*, 187.

<sup>70</sup> Freemon, *Gangrene and Glory*, 196.

<sup>71</sup> Fulton, *Civil War Medicine*, 307.

<sup>72</sup> Goetz, “Part 1,” S6.

<sup>73</sup> Rutkow, *Bleeding Blue and Gray*, 60.

<sup>74</sup> Goetz, “Part 1,” S6.

clinical sciences. This became the first “centralized resources for neurologic information, were influential education tools, and helped foster a growing appreciation of the American neurologic school both nationally and internationally.”<sup>75</sup> His work did not go unnoticed, and Dr. Hammond became “the leading neurologist (a new specialty) in America.”<sup>76</sup> In addition to his work moving neurology forward into modern medicine, he also advocated for further specialization within medicine.

The specialization of neurology was resisted by many American physicians due to its novelty as well as the hesitation to formalize specializations within the American medical system. Dr. Hammond tried to combat that hesitation by “enhancing the public consciousness of neurology and fostering the acceptance of neurology among the general masses of American practitioners.” He did this by being involved in medical legal cases, writing in popular and high impact periodicals such as “*Nation*, *Popular Science Monthly*, and *North American Review*,” and even writing novels with characters displaying symptoms of neurological diseases. Dr. Hammond also founded the American Neurological Association and hosted the first meeting of the society in 1874 in New York, where he “began the strong early tradition within the organization of elaborate social functions at the meeting with a dinner at his home in downtown Manhattan.”<sup>77</sup>

In Europe, the specialization of neurology arose from two models within medicine: internal medicine and based off of anatomical psychiatry. Jean Charcot was an internist, and began his career studying rheumatoid arthritis and tabetic joints, which led to his interest in the peripheral and central nervous system. Another name in neurology,

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<sup>75</sup> Eric Pappert and Christopher Goetz, “Early American neurologic textbooks,” *Neurology* 45, no. 6 (1995):1228-1232, doi: 10.1212/WNL.45.6.1228.

<sup>76</sup> Schroeder-Lein, *The Encyclopedia*, 125.

<sup>77</sup> Goetz, “Part 1,” S6.



Theodor Meynert, aided the emergence of neurology from the anatomical side of psychiatry, which at the time was “the study of general paresis of the insane, epileptic fits, and most encephalopathies.” Both of these areas of neurology were influential in the United States and combined in the United States as well. This combination of internal medicine and psychiatry created some aspects of neurology directly out of the medical department, while others arose from psychiatric asylums.<sup>78</sup>

As the specialization became more prevalent in the United States, the focus turned to professionalism within neurology. In 1875, the first national neurological association in the world was established in the United States, the American Neurological Association. This was a “small body of devotees to “the cultivation of Neurological Science,” and the first meeting was attended by 35 members. This first meeting last two days and “included Hammond’s presentation of his original case of athetosis and a lengthy discussion of myelitis and the topic of spinal cord congestion.”<sup>79</sup> Dr. Silas Mitchell, as one of the first members within the American Neurological Association said, “The constant mingling of men of high medical culture with the less educated had value and the general influence of the war on our art was, in this and other ways, of great service.<sup>80</sup> Associations like this around the country and throughout the world continued to advance the professionalism of neurology in the years after the Civil War.

Throughout the history of neurology and the emergence of it within the United States, Turner’s Lane Hospital was the “most renowned of the Civil War clinical research hospitals.<sup>81</sup> Even after the beginnings of neurology within Turner’s Lane Hospital,

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<sup>78</sup> Goetz, “Part 1,” S2-S3.

<sup>79</sup> Ibid., S7.

<sup>80</sup> Goetz, “Part 1,” S5; Rutkow, *Bleeding Blue and Gray*, 232.

<sup>81</sup> Rutkow, *Bleeding Blue and Gray*, 184.

research continued, ensuring that new hospitals would be dedicated to neurology, just as Turner's Lane Hospital had. Dr. Hammond made that happen after his retirement from practicing medicine in 1887. Following his retirement, he moved to Washington D.C. and established another specialty hospital for neurology, keeping the tradition of Turner's Lane Hospital alive.

The influence of European medicine, the American Civil War, and the movement towards specializations in medicine all influenced the emergence of neurology within the United States. This emergence in the United States centralized in Philadelphia, Boston, and New York, and physicians in the United States started to focus on more local work rather than traveling to Europe. This continued as students were able to learn and enhance those specialties in the United States rather than in Europe and attracted Europeans to travel to America for the first time in medical education history.<sup>82</sup>

As neurology continued to develop all across the globe, Civil War physicians spearheaded a lot of advancements and these physicians became some of the most successful and influential people in medicine.<sup>83</sup> They were able to use the quick modernization of medicine that the Civil War facilitated to focus and advance neurology. The reports written by the Delafield Commission and the application of their recommendations, along with improvements made by important military medical personnel such as Surgeon General William Hammond changed the face of medicine. The overall impact of the Civil War "was not measured by ingenious innovations or engrossing surgical victories. Instead, it derived from physicians' day-to-day caring for sick and injured human being in the face of scientific ignorance, superstition, and

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<sup>82</sup> Goetz, "Part 1," S2.

<sup>83</sup> Schroeder-Lein, *The Encyclopedia*, 125.

political interference.”<sup>84</sup> Civilians and soldiers alike benefited from the betterment that the medical revolution during the American Civil War brought about, including the emergence of neurology within the United States.

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<sup>84</sup> Rutkow, *Bleeding Blue and Gray*, 232.

## **Conclusion**

The American Civil War was the culmination of an era of major change throughout the United States military, with the U.S. Army's Medical Department experiencing some of the biggest and most influential reforms introduced by the war. The medical revolution that facilitated the emergence of the new specialization of neurology began a decade before the conclusion of the Civil War with the Delafield Commission's visit to Europe. During their travels, Delafield, McClellan, and Mordecai observed and reported on many components of military operations from multiple armies. Their observations included the strides that were occurring within military medicine, especially advancements spearheaded by Florence Nightingale and Nikolay Pirogov. Upon their return to the United States, the three men published their reports, which recommended improvements in sanitation, ambulance structures, hospital designs, amputation procedures, and the administration of anesthesia. The reports, published in 1860, along with medical literature from Europe, documented the changes that were underway within military medicine at the outbreak of the Civil War.

However, the United States Army Medical Department failed to implement those advancements before it was overwhelmed by the brutality of the war. Still, over the course of the war, the department managed to introduce influential changes, advancing the profession as it did so. Significant change in military medicine was facilitated primarily by Surgeon General Hammond. George McClellan, a member of the Delafield Commission, was influential in the decision to appoint Hammond to the position. His recommendation and decision were well founded, as Hammond became one of the most important people within military medicine at the time. Through his drastic and radical

reforms, military medicine was able to better treat soldiers while also advancing surgical practices and gathering scientific information that would later establish the Army Medical Museum and propel medicine into the modern era.

The process of gathering scientific information also facilitated the emergence of a new specialization within medicine, neurology. Through the establishment of Turner's Lane Hospital and its treatment of soldiers with nerve injuries due to the brutality of the war, neurology was in an environment to thrive and expand. Doctors Mitchell, Keen, Morehouse, and Hammond were given proper support by other military physicians and the Medical Bureau to research neurological cases and advance the field. As a result of the Civil War, neurology emerged as a new professional specialization in the United States.

The emergence of neurology would not have been possible without the influence of the Delafield Commission in sparking the medical revolution in the United States. The influence of their reports and prestige within the United States Army allowed for the medical revolution to take hold among physicians resulting in an entirely new branch of medicine. This emergence would not have been possible without the travels of the Delafield Commission across Europe during and after the Crimean War. The influence of the commission on military medicine and in the medical revolution that occurred during the Civil War, as well as its role in the emergence of neurology, has never been examined in this direct manner. Yet, as I have described through this thesis, the information gathered by the Delafield Commission did not extend only to artillery or cavalry, but all the way to the emergence of a new area of medicine.

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