Medicine Through War

A Dynamic Approach to Investigating the First World Wars Medical Landscape

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Introduction

War has often driven some of the most significant advancements in medicine. This unsettling paradox evokes various emotions: despair in the humanist, perplexity in the ethicist, and irony in the pragmatist. For some, it even brings hope through the belief that a deeper understanding of conflict might reduce future risks of war.

Taking place during a time of rapid technological advancement, the First World War forged unprecedented challenges and opportunities in the realm of medical sciences and practice. During the conflict, the need for innovative medical solutions became paramount, revolutionizing approaches to care and shaping the trajectory of healthcare systems for generations to come.

The medical landscape during World War I was marked by its complex and often changing nature. Diagnosis and treatment protocols varied significantly based on elements such as geographical location, climate conditions, public and parliamentary interests, severity of injuries or illnesses, the volume of military personnel requiring care, the expertise of medical practitioners, logistical challenges in transportation, and the availability of medical supplies and equipment[1].

Trench warfare, a new form of land warfare involving occupied lines primarily made up of military trenches, where soldiers are well-protected from enemy fire and significantly shielded from artillery, became prominent. To combat the relative safety of the trenches[2], new forms of

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[1] Pelz, W. A. (2016). Protest and Mutiny Confront Mass Slaughter: Europeans in World War I. In *A People's History of Modern Europe* (pp. 103–114). Pluto Press. http://www.jstor.org/stable/j.ctt1c2crfj.12

[2] Ashworth, A. E. (1968). The Sociology of Trench Warfare 1914-18. *The British Journal of Sociology*, *19*(4), 407–423. https://doi.org/10.2307/588181

weapons were created and the need for effective and timely pre-hospital care became a matter of life or death. This need to provide medical care to wounded soldiers in the field led to the development of new techniques and innovations in medical care.

World War I saw the most significant advances in prehospital care throughout the U.S. and Europe[3], with the practical development of the mobile ambulance, allowing for transportation of wounded soldiers from battlefields to field hospitals. Other aspects such as triage, the act of sorting patients based on severity of their injuries, blood transfusions and the use of anesthesia for surgery were also developed during this period. This war brought to attention the significance of effective pre-hospital care, as well as a need to explore the other types of afflictions, such as the emotional toll on soldiers[4].

Throughout the war years, the tension between medical ethics and military imperatives played out in various ways, with military necessity often prevailing. Improved medical care enabled battles to be fought with greater manpower and endurance, ultimately strengthening the war effort. However, this same medical care, while saving lives, also exacted a toll, as battles prolonged and casualties increased due to the new styles of warfare[5]. Thus, the intersection of medical and military needs in World War I underscored the complex interplay between the preservation of life and the cost of warfare.

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[3] Goniewicz, Mariusz MD. "Effect of Military Conflicts on the Formation of Emergency Medical Services Systems Worldwide." *Academic Emergency Medicine*, (2013). https://doi.org/10.1111/acem.12129.

[4] Pearn, J. (2004). Civilian Legacies of Army Health. *Health and History*, *6*(2), 4–17. https://doi.org/10.2307/40111480

[5] Seal, G. (2013). “We’re Here Because We’re Here”: Trench Culture of the Great War. *Folklore*, *124*(2), 178–199. http://www.jstor.org/stable/43297688

However, beneath these diverse factors, certain overarching trends persisted on both sides of the conflict. The wartime environment served as a testing ground for novel treatments and pharmaceuticals, through often morally dubious medical experiments[6]. Specialists seized the opportunity to elevate the status of their respective fields by showcasing their contributions to the war effort. The exigencies of war also bolstered social ideologies among some physicians, who prioritized the health of the military, nation, or race over individual welfare. Many medical professionals focused on preserving manpower and morale, with diagnoses often influenced by the aim of reducing the state's burden of war pensions.

The relationship between medicine and the military, as well as the role of the state in medical provision, can provide significant insights into societal organization, priorities, and historical context. Within the broader context of World War I, Britain and Germany emerge as key points for analysis. While being on opposite ends of the conflict, these nations experienced distinct trajectories in medical innovation and societal adaptation. By investigating the similarities and differences between the medical landscapes of Britain and Germany during this period, a variety of differences in how soldiers on the front lines, and returning from war are treated.

This project serves as a comprehensive exploration of the relationship between war and medicine, unraveling the impact of the First World War on healthcare systems and societal structures. By shedding light on the experiences of Britain and Germany, this project aims to illuminate the complex dynamics that shaped medical innovation amidst the turmoil of conflict,

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[6] Fara, P. (2015). WOMEN, SCIENCE AND SUFFRAGE IN WORLD WAR I. *Notes and Records of the Royal Society of London*, *69*(1), 11–24. http://www.jstor.org/stable/26312890

underscoring the enduring legacy of the Great War on the practice of medicine and the fabric of society.

Chapter 1 discusses the experiences of soldiers on the front lines. The front lines consisted of the grim reality of trench warfare and the toll it took on soldiers and medical personnel alike. Trenches were typically 6 feet in depth, and 6 feet in width, limiting mobility and keeping soldiers huddled together for protection[7]. With technological advancements rapidly growing, new forms of weaponry were constantly being deployed. Quick-thinking and resourcefulness was often the only way to survive in a dynamic field where the threat of injury was always looming.

Chapter 2 focuses on medical advancements. Faced with an unprecedented scale of injuries and illnesses, physicians were compelled to innovate new treatment methods for patients, navigating a landscape of both medical and ethical challenges; serve the military or the patient[8]. The sheer volume and severity of wartime casualties demanded rapid advancements in surgical techniques, infection control, and rehabilitation practices. Physicians grappled with ethical dilemmas, such as prioritizing care under resource constraints, making life-and-death decisions on the battlefield, and addressing the long-term psychological impact on soldiers[9]. This era of medical crisis thus became a catalyst for significant progress in both clinical practices and medical ethics.

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[7] Ashworth, A. E. (1968). The Sociology of Trench Warfare 1914-18. *The British Journal of Sociology*, *19*(4), 407–423. https://doi.org/10.2307/588181

[8] van Bergen, L. (2012). For soldier and state: dual loyalty and World War One. *Medicine, Conflict and Survival*, *28*(4), 317–334. https://www.jstor.org/stable/27018294

[9] ROPER, M. (2011). NOSTALGIA AS AN EMOTIONAL EXPERIENCE IN THE GREAT WAR. *The Historical Journal*, *54*(2), 421–451. http://www.jstor.org/stable/23017979

Chapter 3 focuses on another topic that made its way to the forefront of war, shell shock, or as known now, PTSD. Manifesting in multiple ways, returning soldiers baffled medical providers and civilians alike with an array of symptoms. During a time where mental health was often overlooked, society had to grapple with the after effects of war and understanding the human psyche[10]. This chapter also touches upon the differences between Germany and Britain in understanding and treating "shell shock" and how these may differ on the side of the victor and the defeated.

Overall, this project delves into the profound impact of World War I on medical advancements, societal structures, and the intricate interplay between military necessity and medical ethics. Centering on the transformative effects of the First World War on medicine and understanding how the exigencies of conflict spurred monumental advancements in medical technology and care practices is key.

This examination is inspired to uncover the intricate web of factors that influenced medical innovation during this period, ranging from the unique challenges of trench warfare to the blurring boundaries between military and civilian spheres. Moreover, it delves into the enduring ethical dilemmas faced by medical professionals, navigating the delicate balance between preserving life and serving military imperatives.

[10] Stagner, A. C. (2014). Healing the Soldier, Restoring the Nation: Representations of Shell Shock in the USA During and After the First World War. *Journal of Contemporary History*, *49*(2), 255–274. http://www.jstor.org/stable/43697299

Front Lines

Destruction and despair stretched for hundreds of miles across the European continent, as opposing armies entrenched themselves along the Western Front. This formed an intricate network of trenches, bunkers, and barbed wire entanglements that defined the boundaries of the conflict. In these compacted trenches, soldiers huddled close together in squalid dugouts, at night their sight illuminated only by the flickering glow of oil lamps. The walls were lined with sandbags, hastily piled high to provide some layer of protection against the constant barrage of enemy fire[11]. The ground beneath them was a mixture of mud and blood, littered with the detritus of war - spent shell casings, shattered limbs, and the twisted wreckage of tanks and artillery pieces.

To localize the blast and shrapnel effects of mortars and shells that landed in the trench, a series of traverses was constructed at ten-yard intervals. Dugouts or recesses were built into both sides of the trench, offering protection and resting places for soldiers. Barbed wire entanglements in front of the trench provided defense against direct frontal assaults. A system of communication and reserve trenches connected the front line trench to rear military formations[12].

During the day, there was nothing to protect them from the oppressive heat of the sun. Trench warfare emerged as a defensive strategy in response to the deadlock created by modern weaponry and the defensive capabilities of entrenched positions[13]. The introduction of chemical

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[11] Holcombe, A. N. (1931). Trench Warfare. *The American Political Science Review*, *25*(4), 914–925. https://doi.org/10.2307/1946612

[12] Ashworth, A. E. (1968). The Sociology of Trench Warfare 1914-18. *The British Journal of Sociology*, *19*(4), 407–423. https://doi.org/10.2307/588181

[13] Lofgren, S. J. (1992). Unready for War: the Army and World War I. *Army History*, *22*, 11–19. http://www.jstor.org/stable/26302891

weapons added a horrifying dimension to this new form of warfare, presenting unprecedented challenges for medical personnel tasked with treating affected soldiers.

Balloons and airplanes were converted to weapons of war. Flamethrowers, bombs, and submarines left medical personnel to grapple with the gruesome consequences without the benefit of advanced protective gear or protocols. As well as battle injuries inflicted by these new technological advancements, the First World War also saw the first recognition of psychological trauma, initially known as "shell shock"[14].

Soldiers sought refuge from enemy fire by digging into the earth, creating elaborate systems of trenches that snaked their way across the front lines. Front-line trenches, support trenches, and reserve trenches formed interconnected networks, while communication trenches provided vital links between them. Life in the trenches during World War I was generally a harrowing and grueling ordeal, characterized by a relentless cycle of danger, discomfort, and deprivation[15]. Each day brought forth new challenges as soldiers struggled to cope with the harsh realities of trench warfare[16].

Living conditions in the trenches were abysmal, with soldiers enduring overcrowded and unsanitary environments teeming with rats, lice, and other vermin. The trenches themselves were often filled with mud, stagnant water, and filth, posing a constant risk of disease and infection.

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[14] Young, A. (1997). *The harmony of illusions: Inventing post-traumatic stress disorder*. Princeton Univ. Press.

[15] Ashworth, A. E. (1968). The Sociology of Trench Warfare 1914-18. *The British Journal of Sociology*, *19*(4), 407–423. https://doi.org/10.2307/588181

[16] Seal, G. (2013). "We're Here Because We're Here": Trench Culture of the Great War. *Folklore*, *124*(2), 178–199. http://www.jstor.org/stable/43297688

Soldiers struggled to find shelter from the elements, huddling in trench dugouts or crude shelters constructed from sandbags and wooden planks[17]. Meals consisted of rations hastily prepared with limited variety and nutritional value. These trenches became the grim reality of life, subjecting soldiers on either side to constant exposure to the elements, from the mud and waterlogged channels to extreme temperatures, and rapidly spreading disease due to limited hygiene, with the soil encouraging the growth of tetanus and gas gangrene[18].

In addition to the harsh conditions, soldiers faced the constant threat of sniper fire, artillery bombardments, and the ever-present fear of surprise attacks. Beyond the trenches lay no man's land - a desolate expanse of barren earth, pockmarked by craters and littered with the twisted remnants of barbed wire entanglements[19]. Here, the corpses of fallen soldiers lay. No man's land posed immediate danger to any soldier attempting to advance.

The static nature of the front lines stood in stark contrast to the dynamic and lethal nature of modern warfare, creating a surreal environment with constant death and destruction[20].

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[17] German Methods of Trench Warfare. (1917). Professional Memoirs, Corps of Engineers, United States Army, and Engineer Department at Large, 9(47), 542–553. http://www.jstor.org/stable/44535087

[18] Stafford, J. (1939). Medicine Goes to War. *The Science News-Letter*, *36*(20), 314–316. https://doi.org/10.2307/3915376

[19] Ashworth, A. E. (1968). The Sociology of Trench Warfare 1914-18. *The British Journal of Sociology*, *19*(4), 407–423. https://doi.org/10.2307/588181

[20] Watson, A. (2006). Self-Deception and Survival: Mental Coping Strategies on the Western Front, 1914-18. *Journal of Contemporary History*, *41*(2), 247–268. http://www.jstor.org/stable/30036385

> *"In the end you could see all these poor chaps laying on the Menin Road, gasping for breath. And the thing was there were no gas masks then, you see, and a lot of these chaps just had to wet their handkerchiefs and put it over their mouth or do what they could, you see. Well, we had a sergeant major with us called Bright who served in the South African war. And he thought to himself, 'Well, I don't know, I must try and relieve them somehow.' So he got two or three big jars of Vaseline and he put it in the throats of these poor chaps to try to relieve them a bit, you see. There was no treatment for them but that's what he did to try to stop them from gasping with this gas you see."* [21]

On April 22, 1915, the nature of fighting in World War I changed dramatically when the Germans released a cloud of chlorine gas from their forward trenches at Ypres, Belgium[22]. With this first attack, nearly five thousand men died by asphyxiation; the soldiers literally drowned in their lungs' own fluid, released in reaction to the damaging effects of the chlorine. Other gasses began being implemented, with phosgene gas inflicting catastrophic injuries to the lungs[23]. Mustard gas instilled terror among soldiers, causing painful burns and blistering. As the war progressed, the use of poison gas became normal on both sides, with the British launching the Allies' first gas retaliation using poison gas. They justified it by emphasizing Germany's first attack, which had made poison gas a reality for both sides.

With a new form of warfare emerging, the states were caught unprepared. In the First Hague Peace Conference of 1899, the signatories agreed to abstain from the use of asphyxiating

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[21] Bert Newman of the Royal Army Medical Corps, *Imperial War Museum Podcast*
[22] Slotten, H. R. (1990). Humane Chemistry or Scientific Barbarism? American Responses to World War I Poison Gas, 1915-1930. *The Journal of American History*, *77*(2), 476–498. https://doi.org/10.2307/2079180
[23] Trumpener, U. (1975). The Road to Ypres: The Beginnings of Gas Warfare in World War I. *The Journal of Modern History*, *47*(3), 460–480. http://www.jstor.org/stable/1876002

gas[24]. Germany had violated this unexpectedly. Unlike conventional weapons and projectiles like guns with their bullets and shrapnel that inflict immediate damage to vital organs, poisonous gasses incapacitate and kill by assaulting the sensory organs. Chlorine gas inflicted severe irritation upon the nose, mouth, eyes and lungs often leading to pulmonary edema and eventual death by drowning. Following the success of this deadly weapon, the French developed the more potent phosgene gas, prompting the Germans to devise an effective combination of chlorine and phosgene, known as 'white star'[25].

Subsequently, the Germans introduced mustard gas, a corrosive liquid causing blistering of the skin, burns, and profound lung damage. By the war's conclusion, gas warfare had resulted in a staggering toll, with approximately 88,000 fatalities and 1,200,000 wounded, predominantly among Russian forces[26]. A new era had dawned, wherein gas masks became the primary defensive tool against this insidious threat.

As the threat of poisonous gasses became increasingly prevalent on the battlefield, militaries around the world raced to develop effective protective gear to shield their troops from the deadly effects of toxic gas. Both frontline medics and soldiers resorted to quick-thinking and resourcefulness to aid themselves and their comrades. Frontline medics, equipped with limited resources, scrambled to administer makeshift treatments such as wet cloths over the face to decrease inhalation, or hastily improvised bandages to cover exposed skin.

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[24] Moshenska, G. (2010). Gas masks: material culture, memory, and the senses. *The Journal of the Royal Anthropological Institute*, *16*(3), 609–628. http://www.jstor.org/stable/40926125
[25] Everts, Sarah. "When Chemicals Became Weapons of War." 100 Years of Chemical Weapons. 25 April 2017. http://chemicalweapons.cenmag.org/when-chemicals-became-weapons-of-war/
[26] Moshenska, G. (2010). Gas masks: material culture, memory, and the senses. *The Journal of the Royal Anthropological Institute*, *16*(3), 609–628. http://www.jstor.org/stable/40926125

Oftentimes, in facing this new warfare, treatments were being rendered such as using Vaseline, not knowing if it would work or not, but just in order to do something to help. Gas masks emerged as a crucial line of defense, designed to safeguard the respiratory system and sensory organs from the effects of these chemical attacks. The first by a British Army Medic, using a cloth bag to cover the head, with a mica window to see through[27]. As trial and error persisted, the more widely used masks also consisted of a facepiece and filtration system, and were distributed to front line soldiers, becoming a common sight within the trenches.

Their adoption revolutionized battlefield tactics, empowering troops to withstand gas attacks and continue fighting amidst the ever-present threat of chemical warfare. Additionally, the widespread use of gas masks underscored the imperative nature of technological innovation and adaptation in the face of evolving threats.

The nature of trench warfare meant that soldiers spent prolonged periods exposed to enemy fire, often with only their heads above the parapet or trench line. This made the face a vulnerable target for snipers, shrapnel from artillery shells, and the deadly effects of chemical weapons[28]. Facial injuries inflicted during trench warfare were often severe and disfiguring, with soldiers suffering from a range of injuries including lacerations, fractures, and traumatic brain injuries. Shrapnel from exploding shells could cause devastating wounds to the face, leaving soldiers with extensive soft tissue damage, loss of vision, and facial deformities. In addition to conventional weapons, the introduction of chemical weapons such as chlorine and mustard gas added a new dimension of horror to facial injuries, causing burns and blistering.

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[27] Trumpener, U. (1975). The Road to Ypres: The Beginnings of Gas Warfare in World War I. *The Journal of Modern History*, *47*(3), 460–480. http://www.jstor.org/stable/1876002

[28] Lubin, D. M. (2008). Masks, Mutilation, and Modernity: Anna Coleman Ladd and the First World War. *Archives of American Art Journal*, *47*(3/4), 4–15. http://www.jstor.org/stable/25435155

British nurse Vera Brittain, writing a letter home about her duties at the front, reported, "I have seen [survivors] without faces, without eyes, without limbs, men almost disemboweled, men with hideous truncated stumps of bodies"[29]. As soldiers grappled with the devastating reality of injuries and daily life in the trenches, they had to find ways to cope and share camaraderie. Oftentimes, soldiers used drawings and sketches as well as sharing jokes, songs and poetry with one another as a means to remain grounded[30]. During this period, soldiers on either side of battle used emotional attachments to home in order to keep themselves going. British soldiers on the Western Front often used postcards and letters as a direct means to stay in touch with those at home[31].

Trench warfare not only exacted a physical and psychological toll on soldiers but also presented significant challenges for medical personnel. Evacuating and treating the wounded amidst the chaos of battle was a daunting task, further complicated by the intricate trench systems[32]. Providing timely and effective pre-hospital care became a critical mission for medical teams operating in the midst of the carnage.

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[29] Vera Brittain, Testament of Youth: An Autobiographical Study of the Years 1910-1925 (New York: Seaview Books, (1933), 33
[30] Seal, G. (2013). “We’re Here Because We’re Here”: Trench Culture of the Great War. *Folklore*, *124*(2), 178–199. http://www.jstor.org/stable/43297688
[31] ROPER, M. (2011). NOSTALGIA AS AN EMOTIONAL EXPERIENCE IN THE GREAT WAR. *The Historical Journal*, *54*(2), 421–451. http://www.jstor.org/stable/23017979 6
[32] Seal, G. (2013). “We’re Here Because We’re Here”: Trench Culture of the Great War. *Folklore*, *124*(2), 178–199. http://www.jstor.org/stable/43297688

Medical Revolution

The time between injury and treatment made the difference between life and death. The First World War led to amputations on a scale never seen before, or since[33] due to advancing machinery created specifically to mutilate or destroy the human body. With the unprecedented scale of injuries, physicians had to pioneer new forms of treatments for patients, while also facing ethical dilemmas. During the entire course of World War I, more than 600,000 soldiers were permanently disabled, and as many as two thousand with partial or complete facial disfigurement[34].

In past conflicts, individuals with severe facial wounds had little hope of survival. However, thanks to advancements in battlefield medicine and the implementation of motorized ambulance transport, a significant number of those previously deemed beyond saving were rescued. Additionally, amidst trench warfare, the face became the most perilously exposed part of the body[35], susceptible to the relentless threats of snipers, shrapnel, and machine-gun fire.

To address the immediate needs of wounded soldiers, improvised field dressing stations were hastily set up near the frontlines. These stations, staffed by medical personnel and equipped with basic supplies, provided initial care to stabilize patients before they could be evacuated to more advanced medical facilities. The sheer volume of casualties required a system to prioritize treatment based on the severity of injuries. Triage systems were developed, ensuring that those

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[33] Bourke, J. (2009). *Dismembering the male men's bodies, Britain and the Great War*. Reaktion. 34

[34] Lubin, D. M. (2008). Masks, Mutilation, and Modernity: Anna Coleman Ladd and the First World War. *Archives of American Art Journal*, *104*

[35] Lubin, D. M. (2008). Masks, Mutilation, and Modernity: Anna Coleman Ladd and the First World War. *Archives of American Art Journal*, *47*(3/4), 4–15. http://www.jstor.org/stable/25435155

with life-threatening wounds received immediate attention. This approach helped maximize the efficiency of medical personnel and resources, saving countless lives in the process.

Across different armies, the setup of medical services followed a similar pattern. At the forefront, there were first aid stations, closely followed by advanced dressing stations, and then field hospitals or casualty clearing stations nearby. During quieter times, they'd prioritize treating the most severely injured, sticking to established medical protocols. However, during intense battles when there was a pressing need for fresh troops, the military's priorities sometimes shifted. They might administer morphine to the seriously wounded, if available, and focus more on getting the less severely injured soldiers back into action quickly.

For nurses, doctors and combat medics, preserving life in a situation where others need to kill is unusual. Physicians had to choose between honoring their oath to help people, or honoring their countries. Many were considered to have “dual loyalty” where they were to prevent the wounded from dying, but also make them fit for battle again, combining the interests of the patient, as well as the state.[36] Oftentimes, these physicians found themselves confronting situations where military protocol or orders required them to contradict their medical ethics in civilian and peacetime practices.

Having sworn the hippocratic oath, physicians were obligated to serve the patient, but military physicians also swore to serve their country. This meant preparing men to be deployed into war zones that can result in mass deaths[37]. In a deployed setting, the military mission is the

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[36] van Bergen, L. (2012). For soldier and state: dual loyalty and World War One. *Medicine, Conflict and Survival*, *28*(4), 317–334. https://www.jstor.org/stable/27018294

[37] Eagan, S.M., Lederman, Z. (2022). The Physician at War. In: Gallin, S., Bedzow, I. (eds) Bioethics and the Holocaust. The International Library of Bioethics, vol 96. Springer, Cham. https://doi.org/10.1007/978-3-031-01987-6_6

primary concern, which may limit patient care. Psychiatrists themselves also adopted authoritarian roles, being a doctor and a military superior to their soldiers.

In addition to physical injuries, soldiers also faced the threat of infectious diseases. The harsh environmental conditions and close quarters made the trenches breeding grounds for infectious diseases, posing significant challenges to the health and well-being of military personnel. Soldiers were afflicted with multiple conditions, such as trench foot, a condition caused by prolonged exposure to damp and unsanitary conditions[38].

Soldiers standing in waterlogged trenches for extended periods without proper protection developed painful swelling, numbness, and even gangrene in severe cases[39]. Respiratory infections due to cramped and poorly ventilated conditions were also common as was trench fever, a bacterial infection transmitted by body lice that infested the clothing and bedding of soldiers in the trenches, trench mouth, and so forth.

Medical personnel were confronted with the challenge of combating these diseases while tending to the wounded. Some doctors even resorted to self-experimentation to better understand and treat these new forms of illness. In Germany, between 1914 and 1918, approximately two-thirds of doctors were in the field, with the one-third remaining within Germany. These doctors tended to nearly 6 million cases of wounded soldiers, and 21.5 million cases of illness that the war produced.

Many German doctors welcomed the war for opportunities to advance medical knowledge, through analyzing the outbreak and development of various diseases in new

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[38] Todd, F. P. (1938). The Knife and Club in Trench Warfare, 1914-1918. *The Journal of the American Military Foundation*, *2*(3), 139–153. https://doi.org/10.2307/3038757
[39] Stafford, J. (1939). Medicine Goes to War. *The Science News-Letter*, *36*(20), 314–316. https://doi.org/10.2307/3915376

conditions, using a field of human experimentation that would have been unthinkable under normal circumstances. War was a great teacher and seen as a massive experiment, and was looked at as being good for men, by exercising their nerves[40]. All military recruits were also screened, providing a good experimental sample of a homogenous, healthy population that could be studied, categorized, and analyzed indefinitely. Most of these celebrating doctors, however, believed this war would be quick and that Germany's soldiers would soon return victorious. With the first months of fighting, observations from the field confirmed the belief that war improved the health and spirit of participants[41].

Due to the influx of disease and injury, significant advancements in medical science emerged rapidly, revolutionizing the treatment of wounded soldiers on the battlefield. Among these breakthroughs, the Carrel-Dakin chlorine-based antiseptic, developed by French surgeon Alexis Carrel and English chemist Henry Drysdale Dakin, stood out, proving highly effective in disinfecting traumatic wounds, offering a vital tool in combating infections amidst the harsh conditions of war. Additionally, techniques were made to disinfect wounds through using diluted bleach, further enhancing the arsenal of antiseptic measures available to medical personnel[42].

The widespread implementation of generalized vaccination against contagious diseases marked another significant advancement during the First World War. Prior to the development and deployment of vaccines, epidemics, along with gangrene and typhus, posed substantial threats to soldiers' lives on the battlefield. Recognizing the urgent need for preventative

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[40] Fara, P. (2015). WOMEN, SCIENCE AND SUFFRAGE IN WORLD WAR I. *Notes and Records of the Royal Society of London*, *69*(1), 11–24. http://www.jstor.org/stable/26312890
[41] Paul Frederick Lerner: Hysterical Men: War, Psychiatry and the Politics of Trauma in Germany, 1890 - 1930
[42] Stafford, J. (1939). Medicine Goes to War. *The Science News-Letter*, *36*(20), 314–316. https://doi.org/10.2307/3915376

measures, the French government passed a law on March 28, 1914, mandating the administration of the typhoid vaccine to the entire French army. This measure proved crucial, as evidenced by the staggering statistics: within the first 14 months of the war, over 100,000 cases of typhoid fever were reported, with a mortality rate exceeding 20 percent[43]. Soldiers were also routinely given tetanus toxoid while in the trenches. These vaccines not only saved countless lives but also helped to mitigate the impact of infectious diseases on the battlefield, highlighting the transformative power of medical innovation during times of conflict.

Despite advancements in treating known illnesses and injuries, new challenges emerged, like gas gangrene, trench foot, and trench fever[44]. These issues often stemmed from the harsh living conditions soldiers endured: freezing cold, waterlogged trenches filled with gas, and surrounded by pests and decaying bodies.

The impact of frontline medicine extended beyond the battlefield to influence local healthcare systems. The improvised practices and resourceful adaptations made by frontline medics underscored the importance of swift intervention in medical practice. Innovations born out of the necessity to treat battlefield injuries, such as the development of triage systems, mobile ambulance units, and surgical techniques, proved to be invaluable assets in civilian healthcare settings[45]. These advancements not only improved the efficiency and efficacy of medical care on the battlefield but also revolutionized emergency medical services and trauma care in civilian contexts.

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[43] Medicine, a Determining Factor in War. (1919). *Science*, *50*(1279), 8–11. http://www.jstor.org/stable/1643750

[44] Trumpener, U. (1975). The Road to Ypres: The Beginnings of Gas Warfare in World War I. *The Journal of Modern History*, *47*(3), 460–480. http://www.jstor.org/stable/1876002

[45] Pearn, J. (2004). Civilian Legacies of Army Health. *Health and History*, *6*(2), 4–17. https://doi.org/10.2307/40111480

The war also brought about a greater awareness of public health and hygiene practices. The experiences of dealing with mass casualties and infectious diseases on the battlefield underscored the importance of preventive measures and sanitation in preserving public health. As a result, governments and public health authorities implemented various public health campaigns and initiatives aimed at promoting hygiene, vaccination, and disease prevention within civilian populations.

While advancements in medical treatment increased survival rates on the field and back at home, many soldiers still bore the physical and psychological scars of war. The demand for artificial limbs soared as wounded returning veterans sought to regain mobility and independence. Facial prosthetics began being produced at various workshops through Paris and London, custom made by sculptors to compensate for soldiers missing eyes, ears, noses, jaws and lips, or to hide the disfigurations that were not relieved by plastic surgery[46]. However, initially these prosthetics were often expensive and inaccessible to many, highlighting the stark inequalities faced by disabled individuals[47].

In response to the influx of mutilated veterans, large surgical infrastructures were established to accommodate their needs. Orthopedic surgeons faced overwhelming demand for their expertise in tasks ranging from nerve suturing to limb transplantation. The social status of disabled civilians deteriorated post-war, as increased callousness and neglect towards the weak pervaded society, even towards returning heroes from the battlefields. Notions began to spread

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[46] Katherine Feo. (2007). Invisibility: Memory, Masks and Masculinities in the Great War. *Journal of Design History*, *20*(1), 17–27. http://www.jstor.org/stable/4540334

[47] Lubin, D. M. (2008). Masks, Mutilation, and Modernity: Anna Coleman Ladd and the First World War. *Archives of American Art Journal*, *47*(3/4), 4–15.

that surgery transformed dependant crippled into real Englishmen[48]. Aesthetic considerations were paramount, with the chief aim being to make these poor chaps, almost, "good as new".

Efforts to improve anesthesia methods also played a pivotal role in advancing medical care during the war. Success in this endeavor enabled previously unthinkable surgical procedures to be performed, thanks to the development of less toxic, morphine-derived anesthetic agents and the introduction of new devices that streamlined and enhanced the anesthesia process[49]. The Camus and Ombredanne ether inhalers, prominent in Europe during this period, became important tools in the field of anesthesiology, facilitating safer and more reliable anesthesia administration for surgical procedures.

The less visible diseases that disabled many servicemen grappled with could not compete with limblessness. From the first months of war, injured men were accorded greater respect than those who were ill. Compared with the mutilated man, because his body did not display the "signs" of injury, he was at a disadvantage[50]. This caused some dissent between civilians towards returning soldiers whom were receiving benefits for their injuries.

Bitterness was directed from those "naturally unnatural", born disfigured or injured in work, against those who were "unnaturally unnatural", which is referred to as ex-servicemen. With the cost of artificial limbs being almost 10x the weekly salary of a working man, it was difficult for those injured out of war to acquire new limbs that meet the criteria of aesthetically

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[48] Bourke, J. (2009). *Dismembering the male men's bodies, Britain and the Great War*. Reaktion. 51

[49] Harold Gillies, The Development and Scope of Plastic Surgery, Charles H. Mayo lectures for 1934 (Chicago)

[50] Bourke, J. (2009). *Dismembering the male men's bodies, Britain and the Great War*. Reaktion. 59

pleasing, lightweight and durable[51]. Many wrote letters and journaled along the same lines of, 'Had I been disabled in the war I should not only have had artificial limbs provided but I would have had a good pension too'.[52] The social status of disabled civilians deteriorated after the war partly because of the increased callousness and neglect towards the weak in general, even the heroes back from the battlefields[53].

Pioneering techniques were developed to address the extensive facial mutilations inflicted by this unprecedented warfare. Skin grafts and bone grafts emerged as primary methods for reconstructing disfigured faces, with procedures such as osteoporosis grafts, Dufourmentel grafts (involving tissue transfer), and the Italian graft procedure being practiced to restore facial integrity and functionality. These innovative surgical approaches represented a significant stride forward in reconstructive surgery, offering hope and healing to those profoundly affected by the ravages of war. The demand for orthopedic surgeons to perform delicate, highly skilled tasks such as suturing nerves, transplanting tendons, treating fractures and making artificial limbs became so overwhelming that American orthopedic soldiers had to be imported[54].

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[51] Nelson, D. M. (2001). Phantom Limbs and Invisible Hands: Bodies, Prosthetics, and Late Capitalist Identifications. *Cultural Anthropology*, *16*(3), 303–313. http://www.jstor.org/stable/656678

[52] Bourke, J. (2009). *Dismembering the male men's bodies, Britain and the Great War*. Reaktion. 46 - 49

[53] Bourke, J. (2009). *Dismembering the male men's bodies, Britain and the Great War*. Reaktion. 56

[54] Lubin, D. M. (2008). Masks, Mutilation, and Modernity: Anna Coleman Ladd and the First World War. *Archives of American Art Journal*, *47*(3/4), 4–15. http://www.jstor.org/stable/25435155

Shell Shock

The utilization of mechanized warfare, employing high-explosive and rapidly firing heavy artillery targeted at confined soldiers without avenues of retreat, created conditions of destruction and oppression unparalleled in previous military engagements. The brutality of war along with the constant bombardment, and unsanitary conditions not only inflicted physical injury, but also mental scars on soldiers, leading to the creation of the term "shell shock" to cover the unprecedented scale of individuals exhibiting a broad spectrum of psychological symptoms.

Shell shock manifested in various ways, including symptoms such as tremors, nightmares, anxiety, fatigue, and memory loss. These symptoms also ranged from anxiety and insomnia to debilitating distress due to prolonged exposure to stressors. Initially, shell shock was characterized by three features: exposure to an etiological event sufficient to cause neurological damage, symptoms indicating the loss or impairment of functions of the central nervous system, and the presumption of organic changes that would be sufficient to connect such events to such symptoms[55]. It was widely believed that shell shock resulted from being exposed to the explosion of artillery shells. However, this changed as the war continued on as The Royal Army Medical Corps divided war neuroses into four categories: shell shock, hysteria, neurasthenia, and disordered action of the heart. However, the conditions the war was fought in played a role[56].

Within a few months of the outbreak of war, the first cases of disturbed soldiers were reported as "shuffling men tormented by nightmares and hallucinations, often paralyzed,

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[55] Young, A. (1997). *The harmony of illusions: Inventing post-traumatic stress disorder*. Princeton Univ. Press.

[56] Watson, A. (2006). Self-Deception and Survival: Mental Coping Strategies on the Western Front, 1914-18. *Journal of Contemporary History*, *41*(2), 247–268. http://www.jstor.org/stable/30036385

amnestic, or mute". Most of these men were diagnosed as insane and sent back to civilian hospitals in Britain. Within months, there was an avalanche of cases arriving particularly at The Royal Victoria Hospital in Netley, due to its proximity to the front lines and capacity to treat thousands of patients at a time. Moreover, it had specialized facilities and expertise in treating neurological and psychiatric conditions, which made it particularly suitable for treating cases of shell shock. By early 1915, there was a shortage of hospital beds leading to the requisition of many country "lunatic asylums," private medical institutions, spas and hotels for the treatment of war neurosis. The stream of affected soldiers became a flood and the War office and military establishment became desperate to treat the soldiers and return them to the front as quickly as possible[57].

Soldiers grappling with shell shock faced significant obstacles in receiving proper recognition and treatment. Many encountered skepticism and stigma, with their symptoms often misunderstood or dismissed as signs of weakness or cowardice. The prevailing militaristic ethos, particularly in countries like Germany, emphasized stoicism and resilience, further marginalizing affected individuals and hindering their access to support. Men were well aware prior to joining the army that they were putting themselves at risk of disfigurement and due to this, military attempts to sustain morale was greatly reduced to insignificant[58]. With reality setting in, soldiers were almost expected to try to get out of serving their duty.

The prevailing attitude in many military circles during the war, including Germany, was that soldiers should exhibit unwavering toughness and resilience in the face of adversity[59].

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[57] Raphael D. Howard, Robin S. Howard; Shell Shock: The Response of UK Neurology. *Eur Neurol* 1 April 2022; 85 (2): 162–168.
[58] Joanna Burke: Dismembering the Male. pg. 31
[59] Paul Frederick Lerner: Hysterical Men: War, Psychiatry and the Politics of Trauma in Germany, 1890 - 1930

Consequently, soldiers who exhibited symptoms of shell shock were often misunderstood or stigmatized. The concept and treatment of shell shock was also dependent on the country, as it was understood slightly differently between areas such as Germany and Britain, especially post-war.

In cities like Berlin, where patriotism and loyalty to the state were highly valued, soldiers suffering from shell shock were also being perceived as weak or cowardly. There was a societal expectation that soldiers should endure the hardships of war without complaint, and those who failed to meet this expectation were often marginalized or accused of betraying the cause[60]. As a result, many soldiers suffering from shell shock faced significant social stigma, and their condition was often trivialized or dismissed by military authorities. Some were even subjected to punishment or ostracism, further exacerbating their suffering and isolation.

The aftermath of World War I left profound social and psychological scars on Germany[61]. The country's defeat in the war and the punitive Treaty of Versailles, which imposed harsh reparations and territorial losses, fueled a sense of humiliation and resentment among many Germans, along with feelings that they had been unfairly punished for their involvement in the war[62]. This collective disillusionment deeply affected attitudes towards shell shock and the treatment of returning veterans, distinguishing Germany's approach from that of Britain.

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[60] Jay Winter, Jean-Louis Robert; capital Cities at War pg 356

[61] Horne, J. (2020). Reconstruction, Reform and Peace in Europe after the First World War. In L. Verpoest, L. Engelen, R. Heynickx, J. Schmidt, P. Uyttenhove, & P. Verstraete (Eds.), *Revival After the Great War: Rebuild, Remember, Repair, Reform* (pp. 297–316). Leuven University Press. https://doi.org/10.2307/j.ctv1b0fvbf.20

[62] Hill, D. J. (1919). Germany after the War. *The Scientific Monthly*, *8*(4), 311–320. http://www.jstor.org/stable/7072

Through the beginnings of the war, German doctors continued to gloat about the superior nervous and mental health of their nation's troops. Many were excited about the medical knowledge that could be gained from war. But, by Christmas of 1914, reports began to spread of widespread psychological breakdown among soldiers in the field. Early reports of the rising nervous casualties left Germany's medical corps unprepared and concerned, quickly coming up with different theories and settling on it being cowardice.

Resources were scarce, and the economic hardships and social upheaval in post-war Germany placed additional strain on individuals and communities. There was little capacity to provide comprehensive medical or psychological care for veterans suffering from PTSD. Many soldiers returned to communities struggling to rebuild, where their psychological wounds were often overlooked or ignored. This, along with increased political instability, further complicated efforts to address the needs of veterans suffering from PTSD. German psychiatrists themselves became an increasing target for returning angry soldiers due to the human experimentation and "torture" being done on returning veterans[63].

The Weimar Republic, the government of Germany established after the war from 1919 to 1933, faced numerous challenges, including political extremism, economic crises, and social unrest. Amidst these challenges, the plight of veterans often took a backseat to broader political and economic priorities[64]. While there were some efforts to provide support and treatment for veterans suffering from psychological trauma, the prevailing sense of militarism and nationalism often led to a stigma surrounding mental health issues.

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[63] Paul Frederick Lerner: Hysterical Men: War, Psychiatry and the Politics of Trauma in Germany, 1890 - 1930 pg 42

[64] Linden, S. C., & Jones, E. (2013). German battle casualties: the treatment of functional somatic disorders during World War I. *Journal of the history of medicine and allied sciences*, *68*(4), 627–658. https://doi.org/10.1093/jhmas/jrs024

While Germany was caught unprepared, treatments began soon with the plights of returning soldiers. Suggestive hypnosis was one of the innovative treatments used by some German medical professionals to address shell shock symptoms. Psychiatrists believed that hypnosis could access and alleviate subconscious trauma, offering relief from symptoms such as anxiety, nightmares, and tremors[65]. Patients undergoing hypnosis sessions would be guided into a trance-like state, where they could explore and potentially resolve underlying psychological issues related to their wartime experiences. The majority of German psychiatrists believed that hysteria developed in individuals with a psychopathic predisposition secondary to weaknesses and inferiority.

Other experimental treatments were more controversial, such as the use of the electric shocks, accompanied by the power of auto-suggestion (using shocks given haphazardly in a specially decorated medieval Gothic room)[66] to induce seizures, with the goal of resetting abnormal brain activity and relieving symptoms of mental illness. In addition to these experimental therapies, German medical practitioners also utilized more conventional approaches to treating shell shock, including rest, psychotherapy, and occupational therapy. Patients would often be removed from the front lines and placed in specialized hospitals or convalescent centers where they could receive comprehensive care and support.

However, not all German doctors embraced progressive approaches to treating shell shock. Some medical professionals continued to adhere to traditional beliefs about mental illness and viewed shell shock as a sign of weakness or moral failing rather than a legitimate medical

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[65] Paul Frederick Lerner: Hysterical Men: War, Psychiatry and the Politics of Trauma in Germany, 1890 - 1930 pgs 90-102

[66] Raphael D. Howard, Robin S. Howard; Shell Shock: The Response of UK Neurology. *Eur Neurol* 1 April 2022; 85 (2): 162–168.

condition. In extreme cases, disciplinary measures such as punishment or ostracism were employed to compel soldiers to return to active duty, further exacerbating their suffering and isolation.

The initial understanding of shell shock in Britain, known there as "war neurosis" was similar to Germany's, which was a general misunderstanding of the condition. Neurosis in both countries was thought to be a physical complication due to lesions on the brain and nervous system[67]. Oppenheim was a big proponent of this, but as the war progressed and more cases emerged, medical professionals began to recognize shell shock as more of a mixed model of psychological and somatic factors[68]. Specialized hospitals, such as the Craiglockhart War Hospital in Scotland[69], were established to treat soldiers suffering from shell shock, conveniently located near warzones. Other treatment methods included rest, psychotherapy, and occupational therapy. Soldiers suffering from shell shock were often removed from the front lines. Prior to this, it was believed that soldiers enjoyed killing as it was a way to cleanse their souls and get out pent up aggression[70].

A period of recuperation was seen as a way to allow affected individuals to recover from the immediate impact of the trauma. Some medical professionals experimented with early forms of talking therapies, recognizing the importance of allowing soldiers to express their experiences.

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[67] Raphael D. Howard, Robin S. Howard; Shell Shock: The Response of UK Neurology. *Eur Neurol* 1 April 2022; 166

[68] Holdorff, Bernd. "The fight for 'traumatic neurosis', 1889-1916: Hermann Oppenheim and his opponents in Berlin." *History of psychiatry* vol. 22,88 Pt 4 (2011): 465-76. doi:10.1177/0957154X10390495

[69] Young, A. (1997). *The harmony of illusions: Inventing post-traumatic stress disorder*. Princeton Univ. Press.

[70] Jones, E. (2006). The Psychology of Killing: The Combat Experience of British Soldiers during the First World War. *Journal of Contemporary History*, *41*(2), 229–246. http://www.jstor.org/stable/30036384

Conversations and discussions were used as a means of helping individuals process their traumatic memories.

Art and music therapy were also utilized as a way for soldiers to express their emotions and experiences. Creating art or music also provided an outlet for individuals to communicate their feelings when verbal expression might be difficult. Soldiers who were able to recover returned to active duty after treatment, while others were discharged from service and able to continue treatment. In certain treatment hospitals, such as in Maghull, they described their processes as embracing suggestion, persuasion, therapeutic conversion, re-education and exercise of the functionally paralyzed limbs[71]. The treatment that soldiers received at Maghull Hospital was considered the most unique in regards to showing sympathy and understanding to the soldiers.

In contrast with Germany, Britain's experience of World War I was characterized by victory, albeit with significant losses and challenges. While the war brought its own set of social and psychological traumas to Britain, including the loss of a generation of young men and economic hardships, the country did not face the same level of national humiliation and disillusionment as Germany[72]. As a result, attitudes toward shell shock and the treatment of veterans in Britain were often more sympathetic and supportive compared to Germany. Efforts were made to provide medical and psychological care for soldiers suffering from shell shock, and there was a greater recognition of the need for rehabilitation and reintegration programs for returning veterans. Disabled soldiers were often paired with crippled boys to help the soldier

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[71] Raphael D. Howard, Robin S. Howard; Shell Shock: The Response of UK Neurology. *Eur Neurol* 1 April 2022; 85

[72] Bourke, J. (2009). *Dismembering the male men's bodies, Britain and the Great War*. Reaktion.

remember his duty in the face of adversity, to urge them to regain their role as a citizen, breadwinner and member of civilian society[73].

Some clinicians employed psychoanalytic methods pioneered by figures such as Sigmund Freud, who had been concerned with male hysteria since 1885, attributing that hysterical symptoms were attributed to traumatic memories[74]. While these methods were not universally accepted, they represented early attempts to delve into the subconscious and explore the root causes of psychological distress. However, the understanding of mental health issues during World War I was still in its infancy, and treatment methods varied widely.

The aftermath of World War I also brought increased awareness and understanding of shell shock. The experiences of veterans, along with the writings of war poets and memoirists, helped to shed light on the condition. In many British communities, there was a sense of solidarity and support for returning veterans, including those suffering from shell shock. Local initiatives and charities often provided assistance and companionship for veterans, helping them reintegrate into civilian life[75].

The British government recognized the need to provide support and rehabilitation for veterans suffering from shell shock, and implemented policies aimed at supporting veterans, including disability pensions and vocational training programs to help them find employment after the war, and acts such as the War Pensions Act of 1921, providing financial assistance and

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[73] Choi TY. Jeffrey S. Reznick. Healing the Nation: Soldiers and the Culture of Caregiving in Britain during the Great War. Manchester and New York: Manchester University Press, 2004.
[74] Raphael D. Howard, Robin S. Howard; Shell Shock: The Response of UK Neurology. *Eur Neurol* 1 April 2022; 85 (2): 164.
[75] Ira Lee Peterson. (1924). Journal of a World War Veteran. *The Wisconsin Magazine of History*, *8*(2), 199–220. http://www.jstor.org/stable/4630546

medical care for disabled veterans, including those suffering from shell shock[76]. While these measures were not always sufficient, they demonstrated a commitment to addressing the needs of veterans, including those with psychological injuries.

Medical advancements in understanding and treating shell shock gradually evolved as the war progressed. Physicians and military authorities on both sides of the battlefield began to recognize that shell shock was not merely a sign of weakness but a legitimate response to the extreme stresses of warfare. The recognition of shell shock prompted a gradual shift in medical understanding that would finally acknowledge the psychological toll of war, laying groundwork for later developments in psychiatry.

[76] Hynes, S. (2009). Soldiers from the War Returning. *Minnesota History*, *61*(5), 208–217. http://www.jstor.org/stable/40543814

Conclusion

During the First World War, rapid technological progress and the unprecedented scale of injuries necessitated innovative medical solutions, which fundamentally transformed healthcare systems and practices. The complexities of the wartime medical landscape, influenced by various factors including geographical location, severity of injuries, and logistical challenges, emphasized the need for effective and timely care.

War has often accelerated medical advancements out of necessity. The urgent need to treat mass casualties and manage complex injuries during conflicts has historically led to significant innovations in medical techniques and technologies. For instance, the development of mobile ambulances, triage systems, antiseptics, and blood transfusions during World War I revolutionized emergency care and surgical practices. Such advancements have had lasting benefits, improving medical outcomes in both military and civilian contexts.

Trench warfare and the resultant injuries prompted significant advancements in prehospital care, with the development of mobile ambulances, triage systems, blood transfusions, and the use of anesthesia becoming critical[77]. These innovations not only saved countless lives on the battlefield but also laid the groundwork for modern emergency medical services[78]. The conflict highlighted the importance of addressing both physical and emotional wounds, setting the stage for comprehensive prehospital care that continues to evolve today.

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[77] Goniewicz, Mariusz MD. "Effect of Military Conflicts on the Formation of Emergency Medical Services Systems Worldwide." *Academic Emergency Medicine*, (2013). Accessed February 25, 2023. https://doi.org/10.1111/acem.12129.

[78] Ulster, J. "THE EVOLUTION OF PRE-HOSPITAL EMERGENCY CARE: BELFAST AND BEYOND." *National Library of Medicine*, (2018). https://doi.org/978–1–85457–093 –2.

The tension between medical ethics and military imperatives during the war often saw military necessity prevailing. Improved medical care facilitated prolonged battles, demonstrating the complex relationship between preserving life and the costs of warfare. The war environment acted as a catalyst for medical experimentation and specialization, sometimes at the expense of ethical considerations. This dynamic also reinforced social ideologies, with medical professionals prioritizing the health of the military and the nation over individual welfare.

This project highlights the profound legacy of World War I on modern medicine, particularly in innovations made in front line care. The innovations born out of necessity during the Great War have had enduring effects, shaping emergency medical services and societal approaches to healthcare. To this day, emergency medical services rely on many innovations brought through warfare. Triage is a large component, as well as ambulance services and different treatments to stop traumatic injuries from worsening, if possible. Understanding this historical context enriches the appreciation of contemporary medical practices and highlights the ongoing importance of advancing prehospital care to meet the needs of today's and tomorrow's patients.

The relationship between war and medicine can be seen as a double ended sword. On one hand, it has driven many medical breakthroughs that benefit society as a whole. On the other hand, the use of medical advancements to support warfare poses ethical dilemmas and highlights the darker side of this relationship.

Examining the medical landscapes of Britain and Germany during World War I reveals distinct yet interconnected trajectories of medical innovation and societal adaptation. By comparing these nations, differences arise between societies responding to the demands of war and the impact on returning soldiers. Some of these differences may be attributed to being either the victor or the defeated.

Overall, war undeniably accelerates medical advancements, often leading to significant progress in treatment and care. However, these advancements come with ethical complexities and moral costs.

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