

Effects of War on Medicine: Pushing the Frontier Forward

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ABSTRACT

Medicine is believed to revolutionize war. However, there is another layer to their relationship that is often overlooked. Contrary to popular belief, the evolution of war, too, propels medicine forward as combat advances and demands more effective treatment. This paper examines this unexplored angle in the context of the twentieth and twenty-first centuries, in which the world faced physical and psychological battles that would leave a lasting impression on the battlefield and the home front. The paper first discusses anesthesia and antiseptic, focusing on their creators' efforts and how World War I inspired them to develop into more effective versions of themselves. The paper then explores how World War II and the coronavirus pandemic yielded improvement in both mental health and vaccination. The paper finally concludes that, considering the previous examples of medical development driven by conflict, war indeed pushes the medical frontier forward at a speed peacetime cannot achieve.

Introduction

Dynamic and progressive, medicine is commonly acknowledged to revolutionize war. After all, the survival rate for the wounded rose from 4% during World War I to 50% during World War II—incredible progress for just three decades (Vergun, 2020). However, the opposite was also true: injuries from battle require medical treatment, and as warfare develops, that treatment must too. This is especially the case during the twentieth century, where war had reached new heights with trench warfare and modern weaponry. With the high demand for more effective treatment, the medical field progressed exponentially, greatly expanding procedures and methodology that had been created before. World War I encouraged the development of antiseptic, the first large-scale use of anesthetics, and the expansion of mental health programs, placing immense pressure on medical professionals to improve these treatments. World War I, along with efforts during World War II and the recent coronavirus pandemic to develop vaccines, affirms that the mutual relationship between war and medicine has revolutionized the modern era, pushing the medical frontier forward.

Effects of War on Medicine

World War I

Anesthesia

Anesthesia was first developed by dentist William T. G. Morton and surgeon John Warren in 1846 when a patient needed to undergo tumor removal. Its creators called this initial anesthetic “Letheon”, named after Greek mythology’s river of forgetfulness and eraser of memories, the Lethe River (Markel, 2013). The contraption Morton used to administer what was really sulfuric ether displayed a glass flask and a wooden mouthpiece, which was opened or closed depending on the patient’s state of consciousness. It was effective in making the removal process painless, but it wore

off fairly quickly, and the patient started regaining feeling towards the end of the procedure (Markel, 2013). Since then, surgeons have been fascinated by this revolutionary creation as it allowed them to perform invasive procedures that they had been unable to do previously. However, this did not see huge improvements until World War I, where it was suddenly needed by millions of injured people. This unprecedented demand for treatment forced Morton's anesthetic to improve faster than its slow, natural development during peacetime. "Letheon" became stronger and its effects became longer-lasting after gas masks, which could maintain a regular supply, replaced Morton's ethel inhaler. Such progress would have taken much longer to accomplish under peaceful conditions, but World War I required it right then in 1914, and desperation made the feat possible.

Antiseptic

World War I was seen to drive a number of other medical developments as well, namely antiseptic. Before the war, it had been made by Joseph Lister, a British surgeon who first wrote about his use of carbolic acid to prevent infection in open wounds in a series of articles in *The Lancet* in 1867. This, Lister argued, was a much better option than previous anti-infection solutions like amputation, bloodletting, and cauterization. Initially, his publications were not well-received by the scientific community, as many found Lister's new treatment "tedious and confusing" (Worboys, 2013). However, this perspective changed in the early twentieth century. Before, infection had always been the leading cause of death worldwide. This had initially been a result of poor sanitation and a lack of education, but even when these improved, infection still held onto the number one spot. Antiseptic is the reason why this is no longer the case, and World War I is the stage on which this shift happens. The unsanitary conditions in World War I's infamous trenches made soldiers prone to infection, and the problem was that there was no reliable cure: French surgeon Théodore Tuffier said, "the usual antiseptics, bichloride, carbolic, iodine, etc., fail[ed]" (Hampton, 2017). But Alexis Carrel, hired by the French army to renovate a hospital, and Henry Dakin, who had perfected a sodium hypochlorite solution that killed dangerous bacteria without burning the flesh, provided soldiers, and eventually the entire world, with a new and improved antiseptic that could kill bacteria and prevent further infection. Because Carrel and Dakin were brought together by World War I to solve the infection problem, they developed antiseptic in time and changed the death toll. Eight million deaths and thirty-three million total casualties is a lot, but the numbers would be even higher without their contributions ("Mobilized Strength and Casualty Losses"). War was a frontier that forced the medical field to push toward improvement in order to save lives.

The development of both anesthesia and antiseptics in the beginning of the century allowed for serious improvements in surgery to take place later. Previously, surgery involved leather restraining straps and amputation—removing a body part, like an arm or a leg, that was unable to be treated due to limited expertise or resources. This traumatic experience meant the patient, if they were able to survive the great pain and blood loss that the procedure entailed, had to live the rest of their life without this body part, permanently affecting their ability to move, work, and interact with others. With the increased use and understanding of anesthesia and antiseptics though, surgery has surged forward: medical professionals learned to treat injuries in ways that did not have the life-changing effects amputation had, such as removing affected tissue instead of the whole limb when treating gangrene infections. This immensely improved people's standard of living and the state of public health in ways still evident today.

World War II

Mental Health

The theme of war driving medicine forward is seen in the second world war as well, seen in the improvement of mental health treatment. Most important was arguably the latter because, even by 1941, the world still had not forgotten the horrors of World War I. It left physical and mental scars on the population; American novelist Gertrude Stein coined the term "the lost generation" to describe this mental state, which came to be known as "shellshock". When the world

found itself face to face with yet another war, people were conflicted. Although war was unavoidable at that point, mental health was emphasized and successfully addressed throughout the war: “service members with combat fatigue, which later became known as post-traumatic stress disorder, were given a safe place to stay away from battle zones with plenty of food and rest,” resulting in “about 90% of patients recovering enough to return to the fight” (Vergun, 2020). This was a great improvement from previous attempts at treating mental health, which were minimal. Lasting effects from World War I and efforts to deal with them in World War II were just the beginning of the mental health movement and, therefore, very important to the development of medicine and health in this aspect.

Vaccination

World War II also brought forward the development and expanded use of vaccines. Because those involved in the war had to go to places all around the world, many of which were hot spots for diseases like smallpox and typhoid, vaccines were essential in protecting service members. For example, in preparation for going to the tropical islands in the Pacific, which were known to be affected by malaria, they received atabrine to combat it. Vaccinations for smallpox, typhoid, tetanus, cholera, typhus, yellow fever, and bubonic plague were also given out depending on where they were sent (Vergun, 2020). Concerns regarding a pandemic during a global conflict also led to the development of the famous influenza vaccine that gets administered every year. Laws that still exist today, such as court-martialing any military personnel that refused vaccination, were created back then to enforce vaccination. Although vaccine development had begun before the onset of World War II, vaccines would not have gotten as far as they did without the pressure and concern that resulted from the threat of war. This demonstrates the strong causal relationship between war and medical development.

Coronavirus Pandemic

This relationship continues to exist between the two today. Most notable is the recent COVID-19 outbreak. While not a physical war, the pandemic forced pharmaceutical companies into a race against time to develop an effective treatment to fight this newfound enemy, similar to the methodology used in wars. Under normal circumstances, the process of developing a vaccine includes research, clinical trials, approval, and mass production and can take anywhere between five to fifteen years. The coronavirus vaccine, on the other hand, was created and approved within a year. The remarkable difference in speed illustrates the continued role of war as a frontier in medicine that pushes it forward.

Conclusion

As seen in World War I, World War II, and the recent global battle against the coronavirus, war—both physical and mental—will continue to represent a frontier in medicine as it forces the field to develop faster just to keep up. It serves as motivation for medicine to improve and a consequence if it does not. Although we cannot conclude that the aforementioned wars themselves were beneficial, it cannot be denied that they pushed the medical frontier forward in ways peacetime could never replicate.

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