First World War Spawned Medical Advances

Because of the scope of World War I, millions of soldiers suffered horrific injuries on a scale never before witnessed in combat. These wounds created a desperate need for new surgical techniques and medical technologies, many of which in one form or another are still in use today. The weaponry used in the First World War, which caused the most horrible injuries, was the use of artillery shells that were dropped on positions due to high-explosive blasts and shrapnel. Wounds included portions of the face or extremities, massive bleeding wounds, and trench foot. Trying to cope with these injuries posed a whole list of medical challenges, not least of which was where to start, how to stop bleeding, how to manage infection, how to keep people from dying.

The first order of business was to get the wounded from the battlefield to medical aid. While medical officers treated as many casualties as possible at the front lines, the enormous numbers of injured meant many of them had to walk or be carried by stretcher to field ambulances, which took them to dressing stations and then on to casualty clearing stations. Each step was farther from the front lines. The process of getting people to the hospitals could be considered an innovation of the First World War, in terms of the triage and steps involved to evacuate. The stream of bloodied soldiers too often overwhelmed medical personnel manning the crude stations, which were frequently just canvas tents. Often the doctors were forced to practice a system of triage, a selection process to determine which patients would be operated on immediately, which could wait a few hours, and which were untreated and, therefore, would be left to die.

Heavy bleeding and shock could be a death sentence, so doctors needed to find a way to replace lost blood quickly. Prior to WWI, blood transfusions had been used sporadically, but they were risky, in part because compatible blood typing wasn’t in widespread use. Challenges in pairing blood types sometimes led to death, but did manage to triple the survival rates of people suffering injuries to the abdomen. In 1917, it was found that blood could be donated in advance and stored using sodium citrate as an anticoagulant. The use of stored blood was adopted by the U.S., Canadian, and British medical corps, saving the lives of untold numbers of soldiers.

WWI also saw the debut of the portable X-ray machine. Radium discoverer and Nobel Prize winner Marie Curie organized a campaign to turn cars into X-ray vans to help scan wounds at the front. These radiology vehicles allowed doctors to save lives by detecting broken bones or shrapnel and bullets buried in flesh. During the first year of the War, up to 80% of soldiers with a broken thigh bone died as a result of their wound. But with the aid of X-ray machines by 1916, a mere two years later, approximately 80% of soldiers with the same wound survived.

Infection in the pre-antibiotics era was a deadly threat on the Western Front. Cholera, dysentery and lice-borne typhus threatened soldiers as they hunkered down in crowded, rat-infested, mud-filled trenches. Yet even the primitive sanitation efforts of the day kept down deaths from sickness. Without antibiotics, doctors and nurses had to rely on iodine and tissue-removal to clean wounds to prevent infection. But once patients survived amputations and severe facial disfigurement, doctors turned to the challenge of creating prostheses that would allow soldiers to return to civilian life. Faces ravaged by explosions, flamethrowers or blistering mustard gas spawned the First World War’s version of modern-day plastic surgery. Those whose faces were too far gone were fitted with a prosthesis, sometimes including an artificial eye, developed by dental technician Archie Lane, who worked with Gillies at the Queen’s Hospital plastic surgery center at Sidcup, England.

U.S. sculptor Anna Coleman Ladd also lent her talent to help mutilated soldiers, creating paper-thin tin masks based on pre-war portraits, which were enameled and colored to match their complexions. While not a perfect solution, it was a means to disguise the disfiguring injuries so they could have a semblance of a normal life. For combatants who had lost a leg or arm, a prosthesis could give the appearance of wholeness, but having a functional limb that allowed a person to walk or work was a problem. The medical-industrial collaboration born of the Great War gave birth to the field of prosthetics, which still combines expertise from divergent disciplines to craft state-of-the-art artificial limbs.