With each war come new changes to the military, some changes which find their way into civilian life.

Medical care on the battlefield has continued to evolve since Vietnam and continues to impact medical care at home in communities around the country.

This lesson plan will involve a review of medical innovations introduced on the battlefield, from World War II to today. Students will examine the effects of these innovations on both the rate of deaths and casualties in war, as well as the broader effects these innovations have on the general public.
Battlefield Deaths in Decline

Ask students to research the number and percentages (out of the total number of those who served) of those who were killed and wounded in:

1.) The Revolutionary War and
2.) The war in Afghanistan.

Students should see that both the numbers and percentage of deaths are lower in Afghanistan (less than 1% vs. 2% in Revolutionary War), and the percentage of wounded is lower in Afghanistan (2% vs. 3% in Revolutionary War). Ask students to individually brainstorm at least 3 different reasons that battlefield deaths and woundings have decreased over time, then discuss as a group. Some factors include:

- Long range weapons that decrease contact with the enemy
- More advanced and varied forms of transportation for the wounded
- New and more effective medicine to both treat injury and prevent disease
- More skilled medical personnel on the field

Medical Innovations

Ask students: What are some of the positive impacts of war? It may be hard to identify many, but all can agree that the advancement of medicine and medical care are positive consequences of the challenges faced in war.

During World War II, combat medics, or military personnel whose primary duty is to provide frontline trauma care, provided the first step of care to an injured soldier at aid stations on the field, as depicted in slide 1. For those that needed further care, ground evacuations by ambulance, such as the one depicted in slide 2, brought soldiers to mobile field hospitals if present in the area. Slide 3 depicts a field hospital in Bougainville, New Guinea during WWII, where necessary procedures like amputations might have been performed to treat traumatic injuries. Over 15,000 soldiers received amputations of limbs in World War II as a result of their injuries.

During the Korean War, the installation of Mobile Army Surgical Hospitals (MASH), which were first introduced in World War II, became the standard for treating
Another major medical advance of the Korean War was the widespread establishment of MASH facilities, such as the ones depicted in slides 4 and 5. As a result of the wide presence of MASH facilities, the mortality rate for those evacuated from the field dropped from 4% in World War II to 2.5% in Korea, meaning a wounded soldier who was evacuated had over a 97% chance of surviving.

Another major medical advance of the Korean War was the improvement in vascular reconstruction surgery, or the repair of arteries and vessels. Improvement in vascular reconstruction led to a significantly lower rate of amputation as compared with World War II, at just 13% of the injured vs. 36% in World War II. Famed Army surgeon Michael DeBakey (seen in slide 6) was a pioneer in both the widespread establishment of MASH facilities and the improved methods for vascular reconstruction. Further improvements in vascular reconstruction reduced the amputation rate in Vietnam to just 8%.

With the Vietnam War came major advances in medical care, some of which continue to be used as standard practice in civilian medical care today. Perhaps the most significant innovation in medical care of the Vietnam War was the widespread use of air ambulances for helicopter evacuation—also known as medevacs (see slide 7). The Bell UH-1 helicopter reduced the amount of time from wounding to treatment to an average of 35 minutes, a monumental decrease as compared to the 4-6 hours from wounding to treatment for the evacuated in Korea (see slide 8). There were a total of 116 helicopter ambulances operating in Vietnam by 1968, and after state authorities in the US began following suit in using helicopters to transport highway crash victims, the practice became the norm—many hospitals in the US have helicopter landing pads for this purpose.

Another innovation which factored into a greater ability to receive medical care was the installation of long-range radios able to cover distances of up to 5 miles— they were known as PRC-25s, as seen in slide 9. The widespread use of long-range radios reduced the response time to an injured soldier—it took an average of just 9 minutes from request to the launch of a medevac toward its destination. Improved radio communication also meant that the status and needs of the injured soldier could be relayed to the hospital while en route. “Dust-off” became the radio signal to call for air evacuation (see slide 10). Dust-off continues to be the term used to refer to air evacuation crews.
Perhaps the greatest innovation in medical care introduced on a wide scale in Vietnam was the use of pre-hospital care by para-medical professionals, a system which is now known to the public as EMS (Emergency Medical System). The para-medics that administered care before a wounded soldier could be transported to a hospital would perform certain procedures such as shock resuscitation and fluid replacement, with a more organized blood program to more quickly assist those suffering from major blood loss. The use of non-type specific blood (O negative, which is the universal donor) was introduced on a wide scale in Vietnam and has become the standard practice in blood transfusion for traumatic injuries.

Since Vietnam, medical care has continued to evolve as a result of challenges faced on the battlefield. In 1995, damage control surgery was introduced and has since become the standard procedure for care in settings like Iraq and Afghanistan. The goal of damage control surgery is to perform stabilizing surgery before an injured soldier is able to reach intensive care, doing only what’s needed to prevent ongoing blood loss and organ spillage (see slide 12). Soldiers serving in Iraq and Afghanistan have also benefitted from medical innovations such as chitosan or Quik-Clot, which are derived from the shells of shrimp and speed up the process of clotting when applied to a wound, to prevent major blood loss (see slide 13).

Innovations in the transportation of the injured have also impacted the level and immediacy of care for wounded soldiers. The use of medevacs (air evacuation crews) became the norm—many hospitals in the US have helicopter landing pads for helicopter ambulances operating in Vietnam by 1968, and after state authorities in the US began following suit in using helicopters to transport highway crash victims, the helicopter ambulances operating in Vietnam by 1968, and after state authorities in the US began following suit in using helicopters to transport highway crash victims, the helicopter ambulances operating in Vietnam by 1968, and after state authorities in the US began following suit in using helicopters to transport highway crash victims, the helicopter ambulances operating in Vietnam by 1968, and after state authorities in the US began following suit in using helicopters to transport highway crash victims, the helicopter ambulances operating in Vietnam by 1968, and after state authorities in the US began following suit in using helicopters to transport highway crash victims, the helicopter ambulances operating in Vietnam by 1968, and after state authorities in the US began following suit in using helicopters to transport highway crash victims.

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- The time and method of evacuation, from wounding to treatment
- The type of immediate procedures that were performed by paramedics
- The type of procedures performed at the hospital level
- Whether their injuries need ongoing medical care

**Post-Visit Activity**

### Veterans Panel

Assemble an in-class panel of a Vietnam veteran and a veteran of a more recent conflict (e.g. Afghanistan) who each suffered injuries during their service, and a military medic or nurse. You can contact your local Veterans of Foreign Wars (VFW), Vietnam Veterans of America (VVA), or Iraq and Afghanistan Veterans of America (IAVA) chapters to identify veterans to visit your classroom. Have each veteran discuss the timeline of their injuries and treatment, and the nature of the care that they received. If a medic is included, have him/her discuss what type of injuries they dealt with most often, and what standards of care were in place. Ask students to note or ask about:

- The time and method of evacuation, from wounding to treatment
- The type of immediate procedures that were performed by paramedics
- The type of procedures performed at the hospital level
- Whether their injuries need ongoing medical care

**Further Suggested Reading**

Common Core Standards

CCSS.ELA-LITERACY.RH.9-10.2
Determine the central ideas or information of a primary or secondary source; provide an accurate summary of how key events or ideas develop over the course of the text.

CCSS.ELA-LITERACY.RH.9-10.7
Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative analysis in print or digital text.

CCSS.ELA-LITERACY.RH.11-12.2
Determine the central ideas or information of a primary or secondary source; provide an accurate summary that makes clear the relationships among the key details and ideas.

CCSS.ELA-LITERACY.RH.11-12.7
Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.

College, Career, and Civic Life (C3) Standards

D1.4.9-12
Explain how supporting questions contribute to an inquiry and how, through engaging source work, new compelling and supporting questions emerge.

D2.His.2.9-12
Analyze change and continuity in historical eras

D2.His.12.9-12
Use questions generated about multiple historical sources to pursue further inquiry and investigate additional sources.

PHOTO CREDITS

Cover: Echo Company 2/7 Vietnam Veterans Chapter
Page 6: US Army Medical Department, Office of Medical History

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