



MODULE 5 LESSON GUIDE // U.S. NAVY MEDICINE

USS CLEVELAND LEGACY FOUNDATION STEAM STARS PROGRAM

LESSON OVERVIEW

This lesson introduces students to the U.S. Navy Medicine field, beginning with a brief look inside a Navy Hospital Ship and a comparison of how Navy medical careers are similar to civilian medical careers and the ways they are uniquely different. Students will learn about environmental impacts on the health and safety of Navy personnel, and how technology is used to treat and research innovations to address medical concerns. Throughout the presentation, students will see how the Navy uses STEAM technology, personnel, and innovation in the medical field. Finally, students will be guided through an interactive activity to design a medical invention or innovation.

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LESSON TITLE

U.S. Navy Medicine

TIME

100 min 1 class for Presentation and start of Activity
1 class to finish Activity and Wrap-Up

LEARNING OBJECTIVES

Students will:

- Learn how the military has pioneered and inspired innovation in medicine.
- Take a look inside a Navy Hospital Ship.
- Learn how the Navy's mission and service to Navy personnel drives unique responsibilities, capabilities, and key differences in its medical careers and opportunities.
- See benefits of Navy's values and emphasis on teamwork, collaboration, and empathy.
- Understand how Navy occupations have health effects on the human body and Navy assets, and how technology innovations are used to address and treat conditions.
- Use Empathy and Teamwork to motivate design thinking.
- Engage in a team project where they will empathize with specific needs of individuals, design a solution by drafting a prototype for an invention, and present for feedback.

NEXT GEN SCIENCE STANDARDS (NGSS)

This lesson helps students prepare for these Next Generation Science Standards Performance Expectations:

NS.5-8.5 SCIENCE AND TECHNOLOGY In grades 5-8, all students should develop: • Comprehension related to abilities of technological design • Understanding about science and technology.

HS-ETS1-2 Engineering Design: • Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

SEP.2.3-5.2 Define a simple problem that can be solved through the development of a new or improved object or tool.

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MATERIALS AND EQUIPMENT LIST

1. Module 5 Presentation (U.S. Navy Medicine)
2. Inspired Inventions Activity
 - Giant Post-It Paper (1-2 sheets per team)
 - Markers (1 set per team)

STUDENT ACTIVITY SHEETS/HANDOUTS

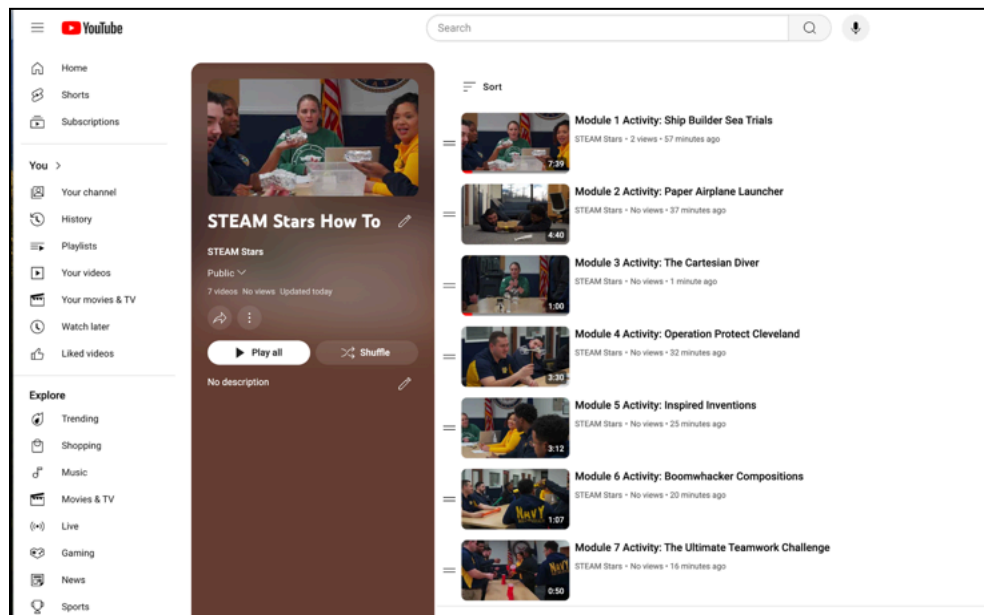
- M5 Student Worksheet

TECHNOLOGY TOOLS

- Digital display projector with internet access
- Ability to project and play Google Slides and YouTube videos with sound
- Printer/Copier





PREP WORK

- Test slide deck, embedded videos.
- Print the student worksheets. (Double-sided, 1 per person)
- Go to the [@USSCLF-STEAMStars YouTube](#) to watch helpful How-To videos!






PROCEDURE PART 1: PRESENTATION

Module 5 - U.S. Navy Medicine

<p>Slide 1.</p> 	
<p>Slide 2.</p> 	<p>Our Cleveland Connection is the Cleveland Clinic. I bet you didn't know that the Cleveland Clinic has military roots? Pictured to the lower right is one of the four founders of the Cleveland Clinic in his Navy uniform! This is Frank Bunts, MD, who attended the Naval Academy before medical school and served in the National Guard during WWI.</p> <p>In the early 1900s, the future Cleveland Clinic's founders were just beginning their careers in medicine here in Ohio, when they were called to aid in the war efforts. In 1917, George W Crile, MD, organized the first American medical unit to land in France during World War I. Informally known as the Lakeside Unit, this group of doctors, nurses and support personnel from Cleveland took over a British military hospital, where they provided care to patients injured in battle. Impressed with the efficiency and team collaboration they saw in the military, Dr. Crile, and his partners Frank Bunts, MD, and William Lower, MD, began dreaming of recreating it at home. Medical practices in America were far behind, and in rural Ohio, even moreso. But the four founders knew they wanted a team and facilities that worked like a military hospital unit. This was the genesis of Cleveland Clinic's group practice. Today, they provide patient care, education, and research and have 6 million patient visits a year in over 200 locations and are known around the world as innovators and pioneers in medicine.</p>
<p>Slide 3.</p> 	<p>Did you know the Navy operates two hospital ships, <i>Comfort</i>, and <i>Mercy</i>, both of which are fully operational hospitals? The one you see in this picture is <i>Mercy</i>. Inside both ships you'll find similar settings to a regular on-land hospital.</p>
<p>Slide 4.</p> 	<p>Each one of these photos is from on board a hospital ship. Looks a lot like a regular hospital, right? Well, except some things are a little different! <i>(Point to the top center photo of a person being loaded onto a ship over water.)</i></p> <p>Each hospital ship has 1,000 beds, 12 fully-equipped operating rooms, digital radiological services, a medical lab, a pharmacy, an optometry lab, and a</p>




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	<p>CAT-scan. An estimated 71 civilians and up to 1,200 medical and communications individuals staff the ships when fully loaded.</p> <p>The crew that serve on these ships are part of the Navy Hospital Corps. This group is the most decorated rating in the Navy and one of the most decorated in the military, meaning, they have the most awards and recognitions. Members of the Navy Hospital Corps have earned 22 Medals of Honor, 179 Navy Crosses, 959 Silver Stars and more than 1,600 Bronze Stars. 20 ships have been named in honor of Navy Hospital Corps personnel.</p>
<p>Slide 5.</p> 	<p>But Navy Medicine is more than just hospital ships. Navy Medicine is a global health care network of over 63,000 personnel that provides health care support to the U.S. Navy, Marine Corps, families and veterans in medical facilities, hospitals, clinics, on ships, in submarines, on the battlefield, in the air, and in research units around the world.</p> <p>What began as an effort to care for injured and sick sailors during the Revolutionary War, Navy medicine has since evolved into a complex network of highly trained medical professionals who provide cutting-edge, 24/7 medical care to more than a million individuals.</p> <p>Depending on their expertise, a Navy medical corpsman can do any of a variety of jobs, including patient care, care for wounded warriors, field medicine, humanitarian relief, and even research.</p>
<p>Slide 6.</p> 	<p>While many of the jobs are similar to civilian healthcare professions, they are all specialized on the needs and mission of the Navy. This gives every job very unique responsibilities. For instance, a Navy Search and Rescue technician not only knows how to administer emergency medicine, they can also perform clinical operations, drive a helicopter, and swim for up to a mile carrying their medical bag.</p> <p>Here's another example. Does anyone know what an EMT is? And what does an EMT do?</p> <p>EMT stands for Emergency Medical Technician. They are health technicians, a step below a paramedic. If you've seen one, it's usually in an ambulance, performing emergency medical care. Well, the Navy has what they call "DMTs." DMT stands for Deep Sea Diving Medical Technicians. You can probably guess what their specialty is, but let's watch a video to see more.</p>
<p>Slide 7.</p> 	<p>(Run Time: 2:24)</p>



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<p>Slide 8.</p> 	<p>The medical issue that you saw in that clip is something that is very common with divers: Decompression Sickness, or DCS.</p> <p>The video also showed use of a recompression, or hyperbaric chamber, like this one. While we can see evidence of this technology being used as far back as the 1600s, it wasn't used by the US military until 1930, when they began conducting research about survivable pressures under water, using hyperbaric oxygen to treat Navy divers with decompression sickness. The US Navy's research then resulted in their development of dive tables, which is the official reference used by divers everywhere to determine how long a diver can safely stay under water at certain depths. This is a great example of a medical innovation pioneered by the Navy that greatly reduced injuries and then was freely given to the world.</p> <p>The Navy also uses hyperbaric chambers for another purpose, which is to aid fighter jet pilots from altitude hypoxia caused by a rapid decompression in flight, usually due to a mask leak or system malfunction. Isn't it amazing that they can still find new uses for a technology that was originally developed over 400 years ago?</p>
<p>Slide 9.</p> 	<p>Does anyone know what this device is called? It's an ultrasound machine.</p> <p>Well, if you've ever seen an ultrasound machine being used, you may have noticed it is similar to the SONAR equipment they use on ships and subs. In fact, did you know that it was an Internist at the Naval Medical Research Institute, Dr. George D. Ludwig, M.D., who was the first person to develop ultrasound equipment to use for medical purposes? As a Navy doctor, he had the idea to use this technology in a new way to meet a medical problem, and he used it to create an ultrasound device to detect gallstones! Today, ultrasound equipment is used for all kinds of medical interventions, such as monitoring the health of an unborn baby through pregnancy, like we see here. What a cool invention, or actually, innovation, right?</p>
<p>Slide 10.</p> 	<p>Now it's your turn! For our activity, we're going to create our own inspired inventions, or innovations for medical problems.</p>
	<p>Pre-Activity Discussion</p> <p>Ask students if they can think of a person (such as a family member, neighbor, or friend), who they wish they could help by making a new medical invention or innovation to meet their needs. Encourage them to write down the condition or need on their worksheet. Ask for a few students to share what these are (they don't have to name the people). For example, "stop smoking" or "allergies."</p>

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	<p>Tell them that the feeling we have when we consider someone else's needs is called empathy. Empathy is like a superpower that allows us to put ourselves in someone else's shoes, take their needs into consideration, and drive us to action. Explain that many inventors use empathy to design inventions.</p> <p>Introduce the next video about a student with an inspired invention.</p>
Slide 11. 	(Run Time: 3:13)
Slide 12. 	

PROCEDURE PART 2: ACTIVITY

Inspired Inventions

Procedure

Divide students into teams of 3-5 and make sure each student has a worksheet. Explain that teams will be working together to create a prototype of an invention to help solve a medical need for a person in need. They should work together as a team, using their worksheets as a guide. Even though each person may have their own person or condition in mind, they'll need to agree on one to tackle as a team for the activity.

Remind them that many of the greatest inventions were simple solutions to everyday problems, or innovations, like the ultrasound machine that was developed as a way to use sound wave reading technology in a new way.

Show teams the Post-It paper and markers, which should be accessible. Explain that they should be using the worksheet as a guide to draft their prototype concept. Once they are on the backside (drawing is done), they should come up and get some post-it paper and markers and start drawing the prototype on the large paper to present to the class.

**** OPTION TO BREAK THE LESSON UP INTO TWO PERIODS ****

Before the first period ends, let teams know that they can continue researching their projects at home as homework if they would like to (optional). They will have 15 minutes in class as a team to finish their prototype worksheet and get ready to present their draft to the class.

For the second period, allow 15 minutes for teams to finish their worksheets and prepare their presentations. Then proceed with the activity.

When prototype presentations are ready (or time is up), give each group the opportunity to present their invention to the rest of the class. Encourage those who aren't presenting to ask questions and come up with one suggestion that the presenting group can implement in their prototyping process. Extend this activity by allowing each group to use the feedback from their classmates to improve their invention.

Explain that Berto's helmet invention started with an idea from a science project, but then he took three years to continue researching and developing his idea; and that he looked at all kinds of things for inspiration in the brainstorming stage, including looking at the anatomy of big horn rams to see how they maintain neck stability when they butt heads. Encourage students to continue using empathy and the power of invention to consider how they might be helpful change agents in the world.

Let students know if they are interested in taking their prototype ideas to the next level, they can research websites for contests where they can submit their ideas online. Or go work for the Navy! Unlike many companies, the Navy encourages members to patent their own ideas and take credit for their inventions.

Lastly, the end of the worksheet closes with a challenge for each student to use their empathy superpower to identify a need and help someone in their life. Encourage students to follow through and share how it went.