

# Wash. students create innovative devices to solve vexing medical problems

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Last year, there was a national outcry after the price skyrocketed for a medical-injection device that counteracts the life-threatening symptoms of a severe allergic reaction.

But for a team of students at the University of Washington, the price jumps for the EpiPen signaled an opportunity - a chance to invent a cheaper device that could do the same thing, only better.

The team's idea, which is still under development, is part of a university program that brings students together with doctors and other clinicians to create devices meant to solve vexing medical problems.

The students in the program have invented a device that makes it easier for patients - particularly the elderly, whose hands can shake - to get eye drops in the eye; a mouth guard that fits athletes who wear braces; a pediatric exoskeleton that helps children with cerebral palsy and other gait disorders learn to walk; and a device that automatically keeps the bladder clear and free of blood clots in the hours after prostate or bladder surgery.

"There's so many great ones," said Jonathan Posner, an associate professor in [mechanical engineering](#) at the University of Washington.

Posner helped create the program, Engineering in Health, which puts surgeons, doctors and other clinicians together with UW students, many of them in engineering fields.

The program has not yet produced a federally approved device, but several students have formed companies, and a few have attracted angel investor funding, or seed funding from the university.

Others have applied for grants through the National Institutes of Health, and filed for patents. And some of the devices are being used on patients in clinical evaluations.

"You have to have many good ideas, and pursue them in a very deliberate and focused way for a period of time, and then a few of them emerge," Posner said. "It will take a little time - we're still a relatively young program."

One of the top projects from last year's class was the affordable alternative to the EpiPen. It is designed to be sold empty, and loaded with the drug by a pharmacist. When the drug expires, in about a year, the pharmacist could reload the pen.

The project is called EpiForAll, and Shawn Swanson, who took the Engineering in Health class last year, is one of the students on the team. He earned his master's degree in materials science and engineering in December, and since then he's been working full time on the auto-injector, with help from other students who are still enrolled.

The team worked with an allergy expert at Seattle Children's, who provided EpiPens containing medicine that was past its expiration date. The students pulled the pen apart and figured out how it worked. Then they came up with a novel design for a pen that costs about \$2 to manufacture. A glass ampul of the drug, epinephrine, costs \$1.

The design, Swanson said, could also be used for naloxone, a drug that's used to reverse the effects of opioid overdoses. That drug costs about \$15 per dose, Swanson said, but the naloxone auto-injector costs \$4,500.

EpiForAll won a first-place prize in the UW Buerk Center's Hollomon Health Innovation Challenge, which came with a \$15,000 award. That gave the EpiForAll team a high profile, as well as money to keep the project working.

Engineering in Health draws a wide range of students from different disciplines.

One team created a better way for medical professionals to practice placing intravenous (IV) catheters. It's called an IV trainer, and it's an improvement upon the trainers now in use, which deteriorate quickly or are expensive, said Elizabeth Lee, one of the former students who worked on the project.

Engineering in Health is a yearlong class for most students, who start in the fall.

Every year, UW clinicians submit one-page applications describing their greatest need and explain why the problem is so hard to solve. The program receives about 50 of these requests every year. Students work on 10 to 15 projects at the start of the course, then narrow that down to six or eight with the greatest potential for solutions.

The students begin their work by interviewing doctors and nurses.

"Often, what we find is the problem the clinician presents is not exactly the right problem," said Jon Liu, an associate professor in mechanical engineering, who teaches the courses. "The quote we often use - 'If Henry Ford had asked his customers what they wanted, they would have said they needed a faster horse.'"

In the winter and spring quarters, the students began designing and constructing prototypes.

Per Reinhall, the chair of mechanical engineering at the UW, said the department is now looking for "some kind of nimble funding source," so if students want to keep working on a [device](#) after the class ends, they can do so.

"It's very enriching work, very stimulating," Posner said. And, "if you can deliver better care, for less money, you can potentially have a winner."

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