

Duke creates open-source protective respirator

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Credit: Julie Schoonmaker

A protective respirator created by a Duke University medical and engineering task force is now being used by Duke Health doctors as they treat patients with suspected cases of COVID-19.

In an effort to combat the worldwide shortage of protective medical equipment, Duke is making the design widely available as an open-source design. (See link at end of story.)

"We have these helmets that we wear during arthroplasty surgery (joint repairs) and we started to wonder, 'Can these be repurposed?' " said Duke orthopedic spine surgeon Melissa Erickson, who first had the idea.

Duke engineering professors Ken Gall, Paul Fearis and Eric Richardson tackled the task of turning the surgical helmet, which uses room air, into a powered air purifying respirator (PAPR), which uses filtered air. The Duke Engineering team worked closely with Duke's Innovation Co-Lab, which has 65 3-D printers, to print and test numerous prototype designs.

The [task force](#) developed 3-D-printed parts to modify the helmet under Erickson's guidance.

"Basically, (a PAPR) is the highest level of protection we can offer our providers, particularly those that are intubating patients," said Eric Richardson, associate professor of the practice in [biomedical engineering](#).

"The whole nation is undergoing a PPE ([personal protective equipment](#)) shortage, and our goal is to take care of our patients, take care of our communities and also take care of our health care workers," Erickson said. "And what we started realizing is, there is a limited number of PAPRs."

"So if there's national shortages on PPE and PAPRs, maybe we can use things that we have plenty of in the hospital and do modifications to be able to increase the number of protective personal equipment that we have to provide for [health care workers](#)," Richardson said.

The task force's PAPR was rigorously tested by a HEPA certification company, Precision Air Technology, before care providers could begin using it.

The team has already made more than a dozen additional helmets to deliver to Duke Health. Richardson and the task force plan to continue printing the devices in order to deliver more hoods to Duke Health in the coming days.

"It's fun working with extremely talented people and having an urgent and meaningful goal," Richardson said. "I think we're all exhausted, but feeling like we're making impact."

The design is available for others to 3-D print their own modified PAPRs. For specific details, visit <https://olv.duke.edu/covid-19/technologies-and-startups/#surgical-hoods>.

Provided by Duke University

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