New device multiplies Prisma Health ventilator capacity

THE JOURNAL STAFF

GREENVILLE — Prisma Health worked with multiple partners to develop potentially lifesaving ventilator technology ahead of a spike in COVID-19 cases in South Carolina.

VESper is a 3D-printed Y-shaped device that allows multiple patients to safely use the same ventilator, according to a Prisma Health news release.

An emergency department doctor came up with the idea and worked with several community partners to develop a prototype of the VESper. Last Friday, she approached Dr. Marjorie Jenkins, Prisma Health's chief academic officer and dean of the University of South Carolina School of Medicine Greenville, about navigating the Food and Drug Administration red tape to get the device approved for hospital use.

Specifications were sent to engineers at Clemson University and University of South Carolina for 3D materials testing and printing of prototypes. The team began working to secure FDA approval, and collaborations with private sector businesses came together within a matter of days.

"It really took a village. It was like Friday night at 10 o'clock," Jenkins said Monday. "And then today we received emergency approval — which is three days later."

Prisma Health experts are working with national COVID-19 teams who have no more ventilator capacity and who can initiate emergency use of the prototype, allowing one machine to breathe for multiple patients.

"You can take multiples

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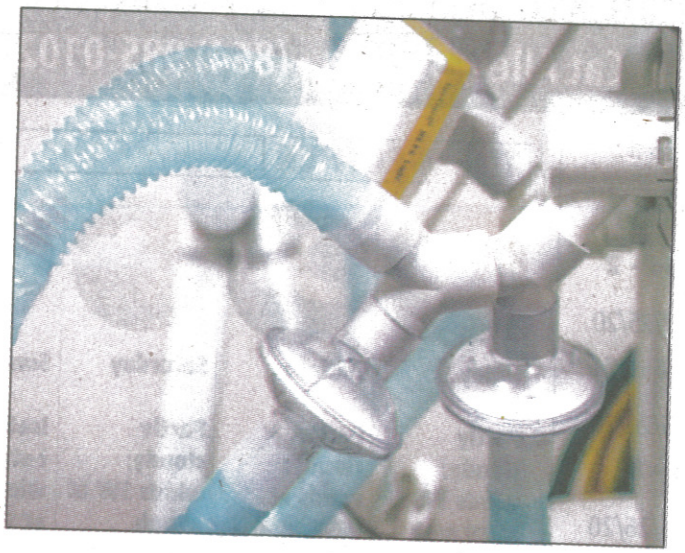

The VESper, a 3D-printed Y-shaped splitter device for ventilators, can increase the number of patients on a single breathing machine. It can be "daisy-chained" together, Prisma Health Dr. Peter Tilkemeier said, and is an open source code that can be duplicated around the world.

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of these and daisy-chain them together," said Dr. Peter Tilkemeier, chair of the Department of Medicine at Prisma Health–Upstate. "I think the most important part of this is that the source code to print them will be open-sourced. So, if you have the right device and the right plastic, you don't have to wait for us to ship them to you."

The VESper is undergoing field testing, which will determine whether the device performs as designed, per FDA guidelines.

Emergency use authorization, used when no satisfactory alternatives are available, offers critical-care patients access to a medical device that has not gone through normal FDA approval.

"Immediately, we realized we had an opportunity to impact patient outcomes all over the country, and potentially beyond the U.S.," Jenkins said.

Testing with manikins showed VESper is able to deliver the proper breathing parameters with minimal manipulation to standard ventilators.

"When we see rapid increases in patients who require machine-assisted breathing, an acute shortage of necessary equipment can happen overnight," Tilkemeier said. "The VESper device can be lifesaving when the number of critically ill patients requiring breathing support is greater than the number of available ventilators. A number of U.S. hospitals are likely to begin experiencing this with COVID-19."

The Y splitter tubing meets international quality standards (ISO), is easily produced, allows filtering of bacteria and viruses in the ventilator tubing and is impact resistant, according to the release.

Prisma Health is collaborating with other major companies, such as HP Inc. and its Digital Manufacturing Network, to produce validated parts for distribution in areas of greatest need and areas with the potential to exceed their ventilator capacity in the near future, such as COVID-19 "hot spots" as designated by the Federal Emergency Management Agency (FEMA). Currently, Prisma Health and South Carolina hospitals have enough ventilators available for patients.

CEO 'so proud of the creativity and perseverance'

"This is an exemplary demonstration of rapid innovation and collaboration," Prisma Health president and chief executive officer Mark O'Halla said. "I am so proud of the creativity and perseverance of our clinical team who came together to develop a potentially life-saving solution at a critical time for our country, our communities and our patients. We are anxiously awaiting the results of the prototype field tests."