Using 3D printing equipment, a breathing machine in the US can serve up to 4 Covid-19 patients in an emergency.

According to FDA regulations, any doctor or hospital using VESper will have to report every detail operation when they use it on the patient, along with the course of the disease after it is used.

In the midst of the Covid-19 epidemic, hospitals in the US were running out of ventilation and that was a sign of crisis. The state of New Yorks yesterday had to allow physicians to use a common ventilator for two patients.

Governor Andrew Cuomo said standard ventilators would be fitted with an additional pipe to share the airflow to the two. The method would not be perfect, but in the absence of a ventilator it is considered to work, Mr. Cuomo said.

Covid-19 patients with pneumonia and severe dyspnea needed mechanical ventilation to support breathing, while doctors sought to help their immune systems fight the disease.

Their mechanical ventilation therapy usually lasts 11-21 days, 3 to 7 times that of patients with other respiratory diseases. Therefore, if the number of Covid-19 patients accumulates, it is very easy for hospitals to suffer from a lack of ventilators.

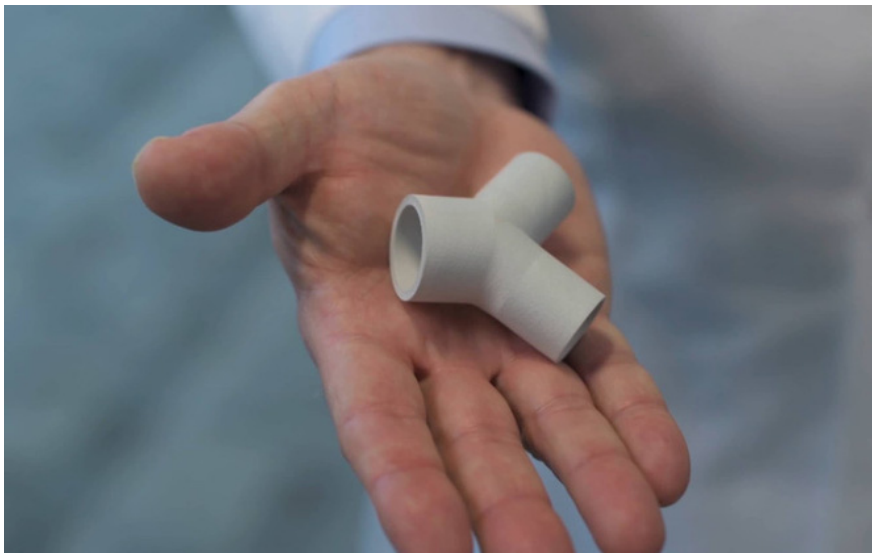
In New York, Governor Cuomo said it needed at least 30,000 ventilators to treat Covid-19 patients caused by the new strain of coronavirus (SARS-CoV-2). But the state currently has only 4,000 ventilators in the hospital system, along with 4,000 units added by the federal government. New York has also bought 7,000 more, but the total is not enough.

The current solution is to use the same breathing machine for many patients. To do this, you must have properly designed valves and air dividers that ensure oxygen flow and air pressure are introduced into the patient's lungs.

The US Food and Drug Administration (FDA) recently approved hospitals to use a gas divider called VESper in an emergency with Covid-19. This device was developed by Prisma Health, based on 3D printing technology.

What's even better is that the VESper blueprint has been shared for free as an open source, meaning that any hospital that owns a 3D printer can now print it and use it right away.

According to Prisma, the VESper head they designed will allow the expansion of the ventilator's capacity, up to a maximum of 4 tubes to serve 4 Covid-19 patients at the same time.



The device is designed to be compatible with ISO standard ventilators, allowing filtration of bacteria and viruses in the duct. It is also very durable, resistant to beating and does not cause cross-effects when many patients share the same ventilator.

A Y-shaped VESper dispenser can serve 2 patients. That is the standard configuration. But Prisma said that in case of necessity, doctors can pair the connectors together to form a maximum divisor of up to 4 threads at the same time while ensuring the effectiveness of treatment.

It is important to note that by using the same ventilator, with only one breathing configuration and procedure, physicians must gather from 2 to 4 patients with the same medical condition to use it. use the same device.

Speaking of VESper's idea, Prisma said it was developed by Ryan Farris who is currently a software engineer. Farris' wife, Sarah is an emergency room physician. She shared the idea of ??a ventilator head with her husband,

a device that she thought could solve the emergency room crisis she faced.

Previously, a study published in Academic Emergency Medicine showed that the scenario of using a breathing machine for 4 patients weighing 70 kg at the same time and lasting 12 hours is feasible.

The study was conducted by Dr. Charlene Irvin Babcock, an emergency medical doctor at St. Mary's Hospital. John, USA, however, is just a computer simulation, not a real person.

It was not until 2017, after the shooting event at a Las Vegas concert, that idea was applied to real patients. When the doctors at Sunrise Hospital had to take in so many victims at the same time, they were forced to connect T-tubes to share the ventilators for two at once.

"It was very successful," said Dr. Babcock. " *The doctors there kept patients alive for hours, when they had to wait for ventilators from other aid units to come."*

But what Farris and Sarah realized now was that the T-tubes did not optimize the efficiency of ventilator sharing. And they designed a 3D printing prototype of the VESper device based on the Y-shaped.

Prisma provides the couple with a simulation center for this splithead virtual test in hospital clinical models and scenarios. After the virtual test proved to be effective, VESper was sent to the FDA for urgent permission in the Covid-19 epidemic.

FDA has now approved VESper as a medical device for emergencies.

That means it will only be used in situations where all standard ventilators are already full, and the hospital has no other way of sustaining life for Covid-19 patients.

This permission is considered reasonable, because the use of a ventilator also poses certain risks. Medical associations in the United States have recommended that every Covid-19 patient should use only a single ventilator.

"The physiology of patients with Covid? 19 onset of acute respiratory distress syndrome (ARDS) is complex, " they said. Even under ideal circumstances, 40% to 60% of ventilator patients who fall into ARDS will die.

Dr. Babcock also agrees that using a breathing machine for many people will not be easy. Doctors will have to transplant patients with similar lung sizes.

" *You would not want to put a child patient with an adult patient, because that would not make sense,* " Dr. Babcock said. " *You also won't want to place a patient with severe bronchospasm with a patient without bronchospasm."*

According to FDA regulations, any doctor or hospital using VESper will have to report every detail operation when they use it on the patient, along with the course of the disease after it is used.

This data will be used by the FDA to continue to evaluate the potential of the device, towards the formal approval of VESper for both common situations.

In addition to providing VESper 3D printing blueprints at home, Prisma also donates these splits to donations to hospitals that do not have 3D printers or are unable to print it.

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