

# UMMC builds ventilators for COVID-19 pandemic response

## UMMC

The COVID-19 pandemic has left hospitals in short supply of personal protective equipment and medical supplies. As patients develop severe respiratory symptoms, there is another concern: if hospitals will have enough ventilators to support them all.

Dr. Charles Robertson, an assistant professor of anesthesiology at the University of Mississippi Medical Center, has built about 170 ventilators of his own design to use in the event of a shortage, doubling the Medical Center's supply.

"I was watching the coronavirus spread in China during January, then by the time February came and cases started increasing in South Korea, Italy and Iran, I knew it was coming to the United States, and that if enough people became sick, we may not have enough ventilators," Robertson said.

Physicians and engineers around the world have been coming up with ways to increase ventilator capacity, whether by putting multiple people on one unit or building ingenious mechanical hands to squeeze manual devices, Robertson said.

His idea: to build the "absolute simplest, cheapest functioning ventilator from widely available parts," he said.

The Robertson Ventilators are made from garden hose sections, adapters, valves, a solenoid and a lamp timer, all of which can be bought at a hardware store or online. The parts cost less than 100 dollars per ventilator and can be assembled in less than an hour. The ventilator works when plugged into the standard oxygen line in a hospital room, meaning it can be used in more locations than a standard ventilator.

Ventilators work by pushing air into the lungs, then stopping for an exhale, then repeating as needed. Robertson's design controls air flow



Dr. Charles Robertson, assistant professor of anesthesiology, has built ventilators to use at the Medical Center in case of a shortage during the COVID-19 pandemic.

using an on-off valve similar to what you'd find in a landscape water feature or lawn sprinkler controlled by the timer and the solenoid.

"We've been through a couple iterations of exact parts and assembly routines and have the process pretty streamlined," Robertson said. "The goal was to create a ventilator with adequate operation and utmost simplicity in construction."

Robertson and a team of UMMC certified registered nurse anesthetists have built about 170 ventilators to augment the Medical Center's existing supply of 150 hospital ventilators.

"This device is for extreme use situations during a pandemic," Robertson said. "We would only be using these ventilators if every single hospital ventilator is in use and we have patients that are about to die because of that."

In these cases, it could be used as a "bridge therapy," where a patient uses this ventilator for several hours while waiting on the hospital ventilator to become available.

"These ventilators have passed rigorous testing in our research laboratories under broad physiologic conditions and lung pathologies,"

said Dr. Richard Summers, associate vice chancellor for research. "We have measured their ability to maintain clinical parameters such as oxygenation, carbon dioxide and tidal volume."

Summers is working to get the ventilators approved for use. Sometimes referred to as compassionate use, this designation would allow the Medical Center to use them as approved medical devices if they must.

"We have filed for an Emergency Use Authorization with the U.S. Food and Drug Administration who have indicated their interest in these ventilators," Summers said. "I think this effort represents the independent 'can do' attitude and ingenuity of our physicians and scientists to confront this crisis in the service of the people of Mississippi."

Robertson tested the ventilator with the assistance of UMMC's Simulation and Interprofessional Education Center and Center for Comparative Research. In the latter, the veterinary team used the Robertson Ventilator instead of the standard ventilator to maintain oxygen to laboratory animals for up to six hours.

Dr. John Prescott, chief

academic officer of the Association of American Medical Colleges, has been in communication with Robertson about his ventilator.

"Innovation is happening at academic medical centers across the nation in response to the coronavirus pandemic," Prescott said. "I recently had the opportunity to FaceTime with Dr. Robertson and was very impressed with his new ventilator. It's simple, inexpensive and initial testing indicates it could be an extremely valuable asset in the coming weeks."

The Robertson ventilator, although functional, lacks the more sophisticated features of a standard one. It lacks a bellows, which pushes air quickly into the lungs. In natural breathing, the inhale is faster than the exhale. Hospital ventilators mimic this action on their standard setting. However, Robertson said that people with depressed respiration, like those with severe COVID-19, sometimes need the opposite therapy: long inhale time, short exhale time. His design does that.

The ventilator also doesn't have any alarm systems for

# Statewide burn ban in effect amid COVID-19 crisis

MS Forestry Commission At the request and advice of the Mississippi Forestry Commission (MFC), Gov. Tate Reeves has signed a proclamation initiating a statewide burn ban, with no exemptions, effective immediately. The burn ban will remain in effect until further notice.

"The COVID-19 pandemic has put significant strain on Mississippi's Emergency Medical Services professionals, particularly the state's rural volunteer fire departments," said Russell Bozeman, MFC state forester.

Since March 1, MFC wildland firefighters have responded to and suppressed 189 wildfires that have burned approximately 4,259 acres across the state where 303 structures were threatened and saved. Additionally, MFC wildland firefighters have been assisted by volunteer fire departments on 557 additional outdoor fires.

"The current amount of wildfire is not normally a need for concern," Bozeman said. "However, the smoke

malfunctions, but he is looking at ways to address that.

"I'm considering ways to attach a whistle to parts of the ventilator where we may experience malfunctions, but I'm still working on configurations for that," he said.

While the ventilators are meant to be simple, inexpensive solutions, building hundreds of the units requires a more coordinated approach.

"We would welcome logistical assistance from Amazon and Home Depot to help us to make more units," Robertson said.

from these fires creates problems for anyone with respiratory issues and increases our firefighter's chances of exposure when they respond."

Additionally, the State Fire Marshal's Office has received numerous calls from city and rural fire departments across Mississippi requesting a statewide burn ban. Rural communities rely heavily on volunteer fire departments for EMS services. Fire response in rural communities, along with increased EMS response, has put additional strain on these city and rural fire departments.

"This statewide burn ban will remove some fire response strain from city and rural volunteer fire departments, remove smoke from the air relieving those with respiratory issues, and allow our responders to focus more on EMS related services," said Bozeman.

Under a statewide burn ban, outdoor burning of any kind is prohibited. There are no exemptions for agricultural or prescribed burns under this burn ban. Persons caught violating a burn ban can be fined, as well as be held responsible for any smoke or fire damage. Burn bans are enforced locally by the county sheriff's department.

To report a wildfire, call 911 or contact MFC's Central Dispatch at 833-MFC-FIRE.

For additional information, visit [mfc.ms.gov](http://mfc.ms.gov) and like and follow @MSForestryComm on Facebook, Twitter and Instagram.

## PUBLIC HEARING NOTICE CITIZEN PARTICIPATION

The City of Tchula is considering applying for rehabilitation funds from the Mississippi Home Corporation (MHC) HOME Investment Partnerships Program- Homeowner Rehabilitation/Reconstruction Program. The State of Mississippi has allocated approximately \$3 million that will be made available to cities, and counties, on a competitive basis to undertake homeowner rehabilitation /reconstruction activities.

The activities for which these funds may be used are in the areas of affordable housing for low and very-low-income persons. The City of Tchula proposes to apply for grant funds through the (MHC) HOME Rehabilitation Grant Program. More specific details regarding eligible activities, program requirements, and the rating system will be provided at a public hearing which will be held at the City of Tchula City Hall located at 1027 Main Street, Tchula, Mississippi on Friday, May 1, 2020 at 5:00 pm. The purpose of this hearing will be to obtain citizen input into the development of the application. The location for the hearing is a handicapped accessible facility. All comments are welcome and must be submitted in writing. If a translator is needed for non-english speaking persons, please contact Rio Winters at (662)283-2675 at least 5 days prior to the meeting in an effort to accommodate this request

The City of Tchula does not discriminate on the basis of disability in the admission or access to or treatment or employment in its programs or activities.



The ventilators were built from garden hose and other readily available parts. The ventilators are meant for use only if UMMC exhausts other ventilator options.

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