Innovative decontamination process mitigates N95 mask shortage in hospitals

April 13 2020, by Laura Rossacher

VCU's decontamination process uses high-intensity ultraviolet light, an effective means of sterilizing hospital environments such as patient rooms and operating rooms. Credit: Virginia Commonwealth University

Virginia Commonwealth University Health System has begun a pilot program to safely decontaminate N95 masks using equipment and a method developed by a team of VCU Health doctors and researchers. As the COVID-19 pandemic has caused increased demand for N95 masks, this independently developed method of decontaminating and reusing masks allows VCU Health to replenish its own supply, providing the equipment necessary to keep its employees safe.

Among the most essential personal protective equipment used by health care workers, the N95 respirator forms a seal around the wearer's nose and mouth and is 95% effective in preventing droplet penetration. VCU's decontamination process uses high-intensity ultraviolet light, an effective means of sterilizing hospital environments such as patient rooms and operating rooms. Used masks are collected on each unit and deposited in a paper bag and plastic bin, labeled with the wearer's name, employee number and where they work. When a unit's collection bin is full, it is sent to the mask decontamination facility, housed in the former Museum of the Confederacy near VCU Medical Center.

While other approved methods of decontamination for the masks—such as using alcohol or steam—can work, they can also compromise the integrity of the masks after one or two uses. VCU's process makes the masks reusable multiple times. Additionally, the process can be easily implemented by other institutions.

"We have to preserve what we have," said Stephen L. Kates, M.D., chair of orthopedic surgery at VCU Health, who is part of the development team for this method. "The ideal thing would be to give every nurse and doctor and technician a brand-new 3M mask every day. But given these unprecedented times, we can't do that right now."

Before the masks are returned to the original user, they undergo a strict series of quality checks, including testing for moisture, penetration, fit

and breathability.

"N95 masks are critical to the safety of those working the front lines of the COVID-19 pandemic," said Gonzalo Bearman, M.D., director of the VCU Health Infection Prevention Program. "Using this decontamination method, we're providing our team members increased access to [personal protective equipment] so they and our patients may remain safe during a time when PPE access is not always guaranteed."

On a typical day, VCU Medical Center uses about 450 masks. As the COVID-19 pandemic continues, that number is rising, Kates said. The equipment VCU Health experts designed and constructed can process 12,000 masks per day, more than 10 times what is currently available.

"Right now, we're focused on implementing this method for heavy mask users such as those in the intensive care units, the emergency department and operating rooms," Kates said of the pilot program.

The decontamination method is replicable and can be adapted by health systems across the country. The VCU Health developers plan to share their design and process with the University of Virginia and other Virginia hospitals and national hospitals.

Provided by Virginia Commonwealth University