

Elastomeric masks provide a more durable, less costly option for health care workers

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Nurses in the intensive care unit at Allegheny General Hospital wearing elastomeric masks for protection. Credit: Highmark Health

A cost-effective strategy for health care systems to offset N95 mask shortages due to the Coronavirus Disease 2019 (COVID-19) pandemic is

to switch to reusable elastomeric respirator masks, according to new study results. These long-lasting masks, often used in industry and construction, cost at least 10 times less per month than disinfecting and reusing N95 masks meant to be for single use, say authors of the study, published as an "[article in press](#)" on the *Journal of the American College of Surgeons* website in advance of print.

The study is one of the first to evaluate the cost-effectiveness of using elastomeric masks in a health care setting during the COVID-19 pandemic, said Sricharan Chalikonda, MD, MHA, FACS, lead study author and chief medical operations officer for Pittsburgh-based Allegheny Health Network (AHN), where the study took place.

Disposable N95 masks are the standard face covering when [health care providers](#) require high-level respiratory protection, but during the pandemic, providers experienced widespread supply chain shortages and price increases, Dr. Chalikonda said. He said hospitals need a long-term solution.

"We don't know if there will be a shortage of N95s again. We don't know how long the pandemic will last and how often there will be virus surges," he said. "We believe now is the time to invest in an elastomeric mask program."

Dr. Chalikonda said an immediate supply of elastomeric masks in a health care system's stockpile of personal protective equipment is "game changing" given the advantages.

Benefits of elastomeric masks

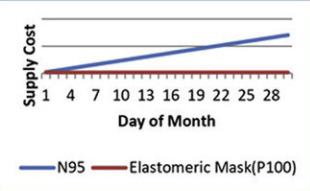



Elastomeric masks are made of a tight-fitting, flexible, rubber-like material that can adjust to nearly all individuals' faces and can withstand multiple cleanings, Dr. Chalikonda said. These devices, which resemble

[gas masks](#), use a replaceable filter. According to the Centers for Disease Control and Prevention (CDC), elastomeric masks offer [health care workers](#) equal or better protection from airborne infectious substances compared with N95 masks.

Like many hospitals during the COVID-19 crisis, AHN was disinfecting and reusing N95 masks for a limited number of uses. However, Dr. Chalikonda said, "Many caregivers felt the N95 masks didn't fit quite as well after disinfection."

At the end of March, AHN began a one-month trial of a half-facepiece elastomeric mask covering the nose and mouth. The mask holds a P100-rated cartridge filter, meaning it filters out almost 100 percent of airborne particles.

Implementation of an Elastomeric Mask Program as a Strategy to Eliminate Disposable N95 Mask use and Resterilization: Results from a Large Academic Medical Center

<h4>Lower Cost</h4>  <p>10x cheaper than disposable N95s after one month of use</p> 	<h4>Operational Efficiency</h4>  <p>94% successful in fit testing Multiple users with single mask</p>	<h4>Sustainability</h4>  <p>No limit to number of uses. Ready for next surge.</p>
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Implementation of an Elastomeric Mask Program as a Strategy to Eliminate Disposable N95 Mask Use and Resterilization: Results from a Large Academic Medical Center. Credit: American College of Surgeons

Until AHN could procure more elastomeric masks, the system began its program for P100 elastomeric mask "super-users": those providers who have the most frequent contact with COVID-19 patients. At each of AHN's nine hospitals in Pennsylvania and Western New York, the first providers to receive the new masks were respiratory therapists, anesthesia providers, and emergency department and intensive care unit (ICU) doctors and nurses. Initially, providers shared the reusable masks with workers on other shifts, and the masks underwent decontamination between shifts using vaporized hydrogen peroxide similar to the technique used to sterilize disposable N95 masks.

As more masks became available, workers kept their own mask and disinfected it themselves according to the manufacturer's guidelines. Gradually AHN provided more staff with the new masks.

Among nearly 2,000 [health care](#) providers receiving fit testing for an elastomeric mask (as required for any mask to make sure no unfiltered air penetrates it), 94 percent could wear one, the investigators reported. The small number of workers without a proper fit received an alternate type of respirator mask.

After a month of use, no one wearing an elastomeric mask chose to return to an N95 mask, according to the authors. Regarding the elastomeric masks, Dr. Chalikonda said, "Our clinicians were very comfortable with the fit, knowing it was an equivalent if not superior amount of protection, and that these masks were intended to be reused."

Furthermore, patients were receptive to their care providers wearing this type of respirator, he noted.

Cost savings

To determine if the elastomeric masks were cost-effective, the researchers performed a cost-benefit analysis over one month of mask disinfection and reuse comparing the new masks, with the filter replaced monthly, versus N95 masks at one hospital's 18-bed intensive care unit (ICU). Although the elastomeric mask costs about \$20 and the filter costs \$10 compared with only \$3 at that time for an N95 mask, the research team found the elastomeric masks were "conservatively" 10 times less expensive.

The cost savings, Dr. Chalikonda said, increases the longer they use the elastomeric masks, which often can last for years, and these masks can remain in storage for long periods, thus improving the planning and management of the medical supply stockpile for future outbreaks.

He explained the monthly cost is lower because they can disinfect elastomeric masks much more often, multiple caregivers can share the same mask, and, unlike N95s masks, they do not need to waste the mask after a failed fit test.

Another advantage of an elastomeric respirator program, according to Dr. Chalikonda, is it does not require any additional hospital resources to implement if the hospital already has an N95 mask reuse and resterilization program. The AHN elastomeric mask program presented fewer operational challenges than disinfecting N95 [masks](#), he stated.

More information: Sricharan Chalikonda et al. Implementation of an Elastomeric Mask Program as a Strategy to Eliminate Disposable N95 Mask Use and Resterilization: Results from a Large Academic Medical

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