

# Southern Maryland Engineers Hope to Solve Ventilator Shortage With Breast Pumps

Posted by [Zach Hill](#) On 04/01/2020

**LEXINGTON PARK, Md.** — There are a lot of moms that still have them sitting around. Maybe stuffed in a drawer, maybe in a random bedroom closet, or maybe just tucked away with the rest of that old diaper bag you used before your baby grew up. Of course, we are talking about those old breast pumps that sit around collecting dust after you no longer need them.

But this team of engineers from Southern Maryland hopes they found a new use for those pumps. In the midst of a global health pandemic caused by the novel coronavirus(COVID-19), their ingenuity could potentially save thousands of lives that will be impacted by a shortage of ventilators across the country.

Brandi and Grant Gerstner, Alex Scott and Rachel LaBatt comprise the team of four engineers that have been working to repurpose traditional breast pumps. Their vision consists of reversing the suction that is created by the pumps, turning them into an "intermittent positive pressure ventilation" device that safely replicates the job of a ventilator.

*Pictured Above: Alex Scott, Brandi Gerstner, and Rachel Labatt.*

"[A breast pump] does pulsing intervals. It is a sanitize-able biomedical device that's approved by the [Food and Drug Administration(FDA)]. You know they're reliable, they've been used by moms everywhere for decades. What if I could reverse it?" Brandi Gerstner said, explaining how she got the idea. "What if I could make it blow rather than suck? And so I grabbed my old one from the basement, grabbed a screwdriver and an X-Acto knife... Sure enough, you can turn it around very, very easily."

While it might sound relatively simple, and the team says they can build one from scratch in about four hours now, there are still several features that the group has added to the devices that could potentially make this a game-changer for the global ventilator shortage.

"Safety is our first and foremost," Gerstner said. "We put safety valves and backflow filters in to make sure that we're not letting the virus get back into the compressor. We put in an electronic safety release, in case we exceed the medically safe pressure because I know that [coronavirus] patients occasionally have backpressure or some other anomaly... We are not going to put this on anybody unless we know that it's safe."

The Associated Press reported in mid-March that while the Society of Critical Care Medicine estimated that there are currently 200,000 ventilators available in the United States, over 960,000 coronavirus patients could eventually need a ventilator. While it is hard to predict how many cases will be seen across the country, the Gerstner family and their team want to help bridge the currently anticipated gap.

The group can currently build prototypes at a fraction of the cost of a traditional ventilator. A traditional device Gerstner says can run on the low-end around \$5,000 and upwards of \$50,000, but their prototypes are being constructed for roughly \$500.

"There are going to be patients who require those incredibly sophisticated ICU ventilators," Gerstner explained. "Currently, there's over a six-week backlog on the emergency disposable ventilators, but traditional ventilators are on much larger backlogs... The goal for this is to help meet the shortage for the majority of patients, to free up some of those highly sophisticated ventilators for those who need them."

While they are anticipating that costs will increase slightly with "additional safety measures" put in after going through the medical review process, Gerstner said she believes this will be a cost-effective way to take on the ventilator shortage from another angle of attack.

"The beauty of looking at breast pumps as a potential solution is, it's a thing that is available for free in a lot of mom's basements and closets," Gerstner said. "It's also a thing that is not part of the traditional ventilator supply line, so it's [using] different manufacturers that aren't already tapped. We can access a whole different set of manufacturers without impeding any of the already ongoing ventilator production work."

The team has self-described their solution as "rapidly deployable", but they still have a few hoops to get through before anyone finds a breast pump ventilator next to a hospital bed.

Next on their agenda, the team is looking to get into a biomedical simulation laboratory, with a review from a pulmonologist. While several members of the medical community have already reviewed their design, the pulmonologist review and "robust biomedical simulation laboratory data" is still needed before they can reach approval from the FDA.

Recently, the FDA opened a design portal for "emergency situation medical device approval pathways", which acknowledges the need to put medical devices in place faster than what is typically deemed conventional. However, the team still needs the previously mentioned biomedical data before they could be rapidly approved.

"Everything is open. There's no intellectual property restraint on this," Gerstner said. "I'm very hopeful that we can find the right collaborators in the biomedical community to get this design validated and replicated as quickly as possible... Our 'good' would look like rapidly getting into a high-quality biomedical simulation lab, and getting into a hospital."

Though they haven't been working on this project for too long, the group has already seen mounting support from the Southern Maryland community. Specifically, the Gerstner led team asked to thank the moms in the community that donated old pumps, as well as their donation coordinator, Stacy Seigel. But their journey is not nearly over.

"If we make something that safe, that can help, then that would be a win, right?" Gerstner said. "I think a lot of people are chasing this perfect solution. And then the Navy base around the corner always has the mentality of don't let perfect be the enemy of good enough."

The team is still accepting donations of old and new breast pumps, along with financial contributions and Arduino donations, to continue making prototypes. To find out how you can contribute, or potentially help get the device into a biomedical simulation lab, contact them at [breastpumpvent@gmail.com](mailto:breastpumpvent@gmail.com)

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*Grant and Brandi Gerstner with their child. The husband and wife leading the team of engineers to solve the ventilator shortage.*

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