Audiovisual feedback device to improve manual ventilation
Audiovisual feedback device to improve manual ventilation, 2022 AMA Research Challenge

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Featured topic and speakers

In this episode of Making the Rounds, medical student at Louisiana State University Health Shreveport, Ben Maxey, discusses his research on audiovisual feedback from a handheld monitoring device that improves manual ventilation.

Speakers

- Ben Maxey, medical student, Louisiana State University Health Shreveport
- Brendan Murphy, senior news writer, American Medical Association

Host

- Marielisa Cabrera-Sánchez, 2021 AMA Research Challenge winner

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Transcript

Cabrera-Sánchez: Welcome to Making the Rounds, a podcast by the American Medical Association. I’m Marielisa, last year’s winner of the AMA Research Challenge, which is the largest national, multi-specialty research event for medical students, residents and international medical graduates.
Today’s interview features one of this year’s five finalists for the 2022 AMA Research Challenge, interviewed by AMA Senior News Writer, Brendan Murphy.

Murphy: Hello and welcome to Making the Rounds, a podcast by the AMA. I’m Brendan Murphy, senior news writer at the AMA. Today, we’re joined by Ben Maxey. Ben is a finalist for the 2022 AMA Research Challenge. Ben is a third-year medical student at Louisiana State University Health in Shreveport. Thank you so much for being here with us today, Ben. How are you?

Maxey: I’m doing well. Thanks for having me on the show.

Murphy: We’re psyched to have you. Ben’s poster is titled “Audiovisual Feedback from a Handheld Monitoring Device Improves Manual Ventilation.” Ben, I think myself and our listeners are anxious to hear more about your research. So, I’m going to start in with a few questions for you. Can you tell us a little bit about this topic why it appealed to you and how you got involved in the AMA Research Challenge?

Maxey: Absolutely. So the topic deals with manual ventilation. So when patients can’t breathe for themselves or aren’t breathing adequately, providers step in with things called bag valve masks, which are these devices that press air into a patient's lungs, basically, and breathe for them. But it turns out it's difficult to do that safely and effectively. So our goal was to come up with a solution that would make that safer and more effective.

So the idea of the research is to develop a device that will give feedback on how much air you're providing to the patients and how fast you’re doing that to hopefully prevent giving too much air or too little air, and keeping the patients safe while you're breathing for them.

As far as why it appealed to me. So my background is actually in electrical engineering. And so, coming into a project like this, it was nice to see the overlaps between engineering and medicine and be able to use my background in my new setting if that makes sense. Psyched to be able to use the engineering experience that I have to make a difference in a medical setting.

Murphy: And it is a unique project. Could you explain to our readers how the device works and how it differs from the typically used technology?

Maxey: Yeah, absolutely. So the device—Well, I guess the bag valve mask itself is like a self-inflating plastic bag that attaches to a mask. So you put the mask over the patient's nose and mouth. You squeeze the bag and air flows from the bag into the mask into the patient. And the device goes in between that bag and the mask.

And then on top of the device, you have this ring of LED lights. And as you’re pushing air through the device and into the patient, that LED ring starts lighting up. It goes around the circle and closes and
changes colors from green to yellow to red once you've hit your target volume that you're pushing into
the patient.

And so, it gives you visual feedback that way on how much air to give. And then there's also a speaker
within the device that gives you audio cues on when you're supposed to start each breath.

**Murphy**: And for our listeners who want to get a better visualization of this project, visit ama-
assn.org/research22, we have the posters from all five finalists including Ben's project that can give
you some visual direction if you're looking to understand the project a little more.

Moving on to the actual process of conducting this research, Ben. What were some of the challenges
you encountered in doing it?

**Maxey**: So whenever you're doing any kind of device development, there's a lot of two steps forward,
one step back. It's a lot of testing to make sure certain components work. And with a device like this,
there are several electronic components, several mechanical components that all have to come
together and work in tandem at the same time. So there's a lot of testing.

And, at certain times, you can move forward with several parts pretty quickly. And then you get to a
stage where it's not working but then you have to test several of the components you don't know which
ones not working. So the development process of the device itself can be challenging in that regard.

But once we had the device itself, the process of validating it and making sure it's working the way
we're intending and it's actually making a difference in the way people give ventilations to patients,
that part wasn't quite as challenging as just the development and testing process.

**Murphy**: What's interesting and unique about this is there's an element of entrepreneurship in it.

**Maxey**: Absolutely. I think so. So, of course, the device that we made is just a rough prototype that's
pretty enough and ergonomic enough to make testing easy. But, of course, it's not necessarily
something that would be directly marketed as it is right now.

But as far as future steps go, it's definitely something we would want to see used in clinical practice.
And although it is just a prototype now, it's not too far off from a final design. We are in the process of
refining the mechanical and electronic components to make it a little bit more appealing to be used in
an actual clinical setting.

**Murphy**: That certainly is exciting. And I think we're all excited to see how this project evolves for you.
As far as what you've learned and maybe some advice you'd offer to medical students. What would
you say are some good lessons for students who want to pursue this type of project?
Maxey: So as far as this kind of research, if you're a med student like just getting into research, it can be pretty intimidating trying to find something that's interesting to you and, especially, if you've never done this sort of thing before. What I found helped me was to find—just a lab. Find a PI that was doing the research I was interested in. So I was interested in mostly just device development in general.

And once I found that and found a good fit with the PI, with the doctor that was overseeing the research, there's more opportunities to either steer the research into a more specific direction that you want. Or you might find a passion for what's already going on in the lab.

So I feel like for most kinds of research in addition to the type of research that I'm doing, finding a good mentor and a good lab and good co-workers is the first major step.

Murphy: That's very helpful insight. On an individual level, how will this research impact your career trajectory? Do you see yourself working perhaps as a physician entrepreneur?

Maxey: Yeah, it's definitely possible. Like I was saying, we're in the process of refining our device's design to make it more commercially appealing if you want to call it that. So it's definitely a possibility. I mean, with any kind of device, there's regulations and a whole process you have to go through with that. So if it was to be used clinically, it would be quite a while in the future, just because FDA regulations require that long approval process.

But there could be other uses. We're testing it right now as a training device. So we're seeing if it's effective in teaching people how to do these ventilations better, even when you're not using the device, so that could be a route we'd take it. But yeah, there's definitely possibility down the road of becoming an entrepreneur with devices like this.

Murphy: What else should our listeners know about your journey in medicine?

Maxey: So my journey in medicine—I guess the most applicable or I guess relevant to our conversation is just the different route that I've taken to medical school. And I guess the most important thing is that medical school is attainable whatever background you're coming from.

I mean, with me, I was going through engineering, and it wasn't until halfway through that I decided that medicine was what I wanted to pursue. And so, I can kind of be an uphill battle when you've been going through one major, and you decided halfway through that you need to get all these different pre-reqs and switch your frame of mind. But it's definitely possible.

And, honestly, coming from a non-traditional background can even have its advantages. I mean having gone through engineering, it's easier to see certain concepts and physiology differently. Have different analogs to the concept in engineering. And I know I have colleagues in my class that come from non-traditional backgrounds as well that are doing fantastic whether in other STEM fields or
things like philosophy and history.

So I guess that's a salient point, is that it's definitely possible and honestly advantageous if you're coming from a non-traditional background. So don't let that discourage you.

**Murphy**: And many med students do find different routes to medicine. Getting away from the career aspect of this. Let's say you do win the challenge, which comes with a $10,000 grand prize, what would you do with that money?

**Maxey**: Definitely put at least some of it back into the device. Like I said, we're going through that whole revision process in updating the design. And all the testing and components require funds. So some of that should go to the device. As far as other potential avenues for it, part of it could be financing a little bit of tuition.

I'm also involved in this project that's focused on STEM education for elementary and middle school kids in our area. And devoting some of the funds to that would be a pretty cool use of the money.

We run this, not really a camp, but it's like a one-day science expo for kids in the area.

It's called Ideas Day. Ideas Day is this event that we put on for elementary and middle school kids and preschool kids once a year that is trying to show them that science and math and engineering is a fun subject and not something to be afraid of. And having some more funds to get some cool exhibits would be a nice way to use that.

**Murphy**: That's really touching that you would give back in that regard. Thank you for joining us today, Ben. We really appreciate getting to hear from students like you.

**Maxey**: Absolutely. Thank you for having me on.

**Murphy**: To learn more about Ben's poster and get a visualization of the project, visit ama-assn.org/research22.

A reminder to our listeners. Tune in to the finals of the AMA Research Challenge on December 7 to see Ben and four other finalists present their work to a panel of expert judges for the chance to win a $10,000 grand prize presented by Laurel Road. This is Making the Rounds, a podcast by the American Medical Association. I'm Senior News Writer Brendan Murphy. Thanks for listening.

**Cabrera-Sánchez**: Join us on December 7 at 7 P.M., Central time to see all 5 finalists present their research to an elite panel of judges. The overall winner will receive a ten-thousand-dollar grand prize—sponsored by Laurel Road. For full details, visit ama-assn.org/research22.
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