

**TAMARA VOS-DRAPER:** Our team was awarded a Department of Defense grant through the Spinal Cord Injury Research Program based on some of the previous work we had done on developing a prototype pressure-mapping system for people with spinal cord injuries to self-manage their seating behaviors and managing pressure. Up until now, the project has consisted of a pressure-mapping system that you can see on a smartphone with the plan for people to use it at home-- people who use wheelchairs who have spinal cord injuries and are at risk for pressure ulcers-- to self-monitor or self-manage their skin health.

Despite decades of interventions towards preventing pressure ulcers in people with spinal cord injuries, people continue to have pressure ulcers. About 35% of people with a spinal cord injury will have an ulcer at any given time. I think it's 60% to 70% will experience an ulcer at some point in their life.

So it's a lifelong risk that people have that we're trying to equip people better to manage on their own. Some of the strategies that we've tried in the past have been very good. It's consisted of a lot of education, teaching people how to eat properly, how to relieve pressure, how to position themselves carefully in the chair, how to get the right equipment.

What we've missed, I think, is providing real-time feedback to compensate for the lack of sensation. So what we're missing is, people aren't able to feel where the pressure is. So even if we're giving them alerts or we're reminding them to change pressure, if they can't see the effect of their actions, I don't think it's as effective. So that's the basis that we're building this project on.

Within the display of the app, there's two pieces. There's one that shows the map itself, and it shows a shape of a bottom. It shows red for high pressure, blue for low pressure, so you can see the effect of changing the weight distribution. You can see the immediate effects, so the user gets that gratification of seeing the results of their actions.

The second part of the app shows little indicator bars for certain areas of the map that we're usually concerned about, like under the ischial tuberosities, the coccyx and sacrum. And it shows a percentage of pressure in those areas. So as it increases past the recommended percentage, it turns red to alert the user. In the future, we'll have alerts and other types of feedback given to the user besides just the visual imagery.

The goal of this current study is to further the development of the app itself based specifically on feedback from veterans. We will be recruiting participants through the Minneapolis VA. We have a study coordinator at the VA in Minneapolis who will be coordinating that piece of it. All of the participants will need to be veterans with a spinal cord injury.

We are hoping that with the redesign of the app itself that we'll have better user engagement. What we found with the last prototype was, it was built on an iPhone or iOS platform. Because of the level of funding we had, we were limited with how much we could develop. We found out very quickly that not everybody carries an iPhone, and a lot of other platforms are used. So we need to make the device more friendly across different platforms.

And also, we need to make it connect more seamlessly. Before we were using a clunky hotspot system for connecting. It used a lot of battery life, and it wasn't ideal. It worked, and we were able to show that it was feasible, but it could be better.

The other piece that we're looking at with the app development is taking information from the mapping system and utilizing the data to throw alerts, to give feedback to the user based on their own seating history. So highly individualized feedback.

I anticipate it being about three to five years away from being fully commercialized. It's possible that we could have smaller prototypes ready for commercialization in a shorter time. We want to make this work. I want it to be effective. So, I think taking a little bit longer to make sure that it's as effective as it can be, makes sense.

I'm ecstatic, actually, for the next two to three years. We have this Department of Defense grant as well as a recently awarded NIH R21 mechanism for the same project. So different goals, but all working on different pieces of this system. So I'm confident and extremely excited that in two to three years, we will have something that we can put in our patients' hands to begin using.