Health and engineering scientists create mobile app for patients with heart failure

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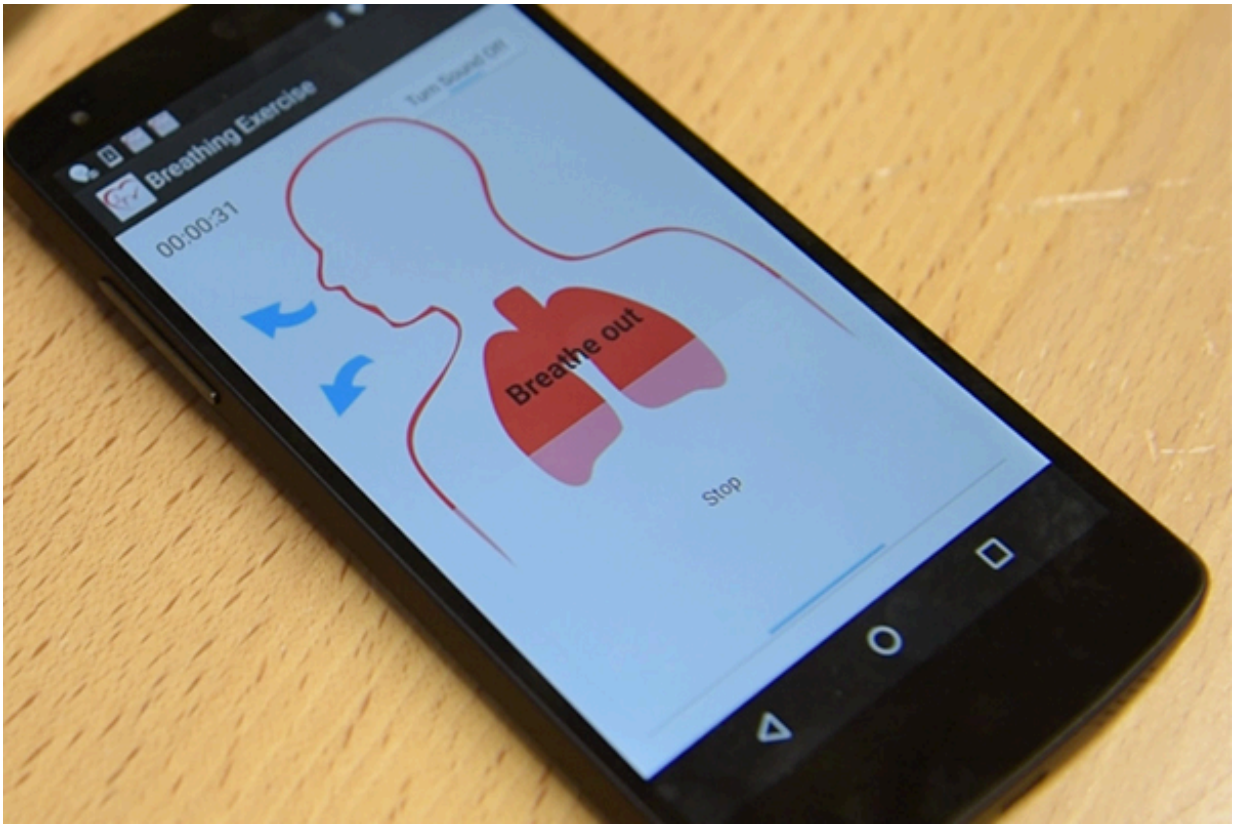

HeartMapp, now copyrighted by USF, also provides patients with a web interface to access historical and real-time information about their physical condition using the Microsoft Wrist Band – to help with their physical activity and heart rate.

Interprofessional collaborations between health professionals and

engineers can help improve patient care. That's what's happening at USF. A nurse scientist and an engineer worked together to develop a smartphone application for patients with heart failure.

Ponrathi Athilingam, PhD, assistant professor at the USF College of Nursing, and Miguel Labrador, PhD, professor in the Department of Computer Science and Engineering at the USF College of Engineering, created HeartMapp, an Android-based application to help older adults with congestive heart failure (CHF) improve their self-care and reduce costly hospital readmissions.

"As a cardiology nurse of 25 years, I know that patients with heart failure, who must follow an intricate medication regimen and self-management practices at home to stay healthy and prevent getting admitted to the hospital, struggle with self-care," Dr. Athilingam said. "After patients leave the hospital, they are alone. However, they do have a phone as a companion. So, we developed this easy-to-use, patient-centered technology to help them keep their heart health on track."

HeartMapp is a non-invasive mobile application that serves as a health coach for patients. The app has six modules allowing patients to assess their heart condition daily, monitor vital signs, perform breathing and walking exercises, take their medication, read educational information on heart health and review statistics in graphs that show their performance. The app also reminds patients every morning to check their weight, blood pressure and answer questions about their symptoms, thinking ability and mood.

"The app puts patients in green, yellow and red zones based on the status of their heart failure symptoms," Dr. Athilingam said. "The green zone means their symptoms are under control. The red zone means they're gravely ill and need to immediately go to the hospital. The goal is to identify patients when their symptoms decline to the 'yellow zone' to

provide appropriate, early treatment and prevent hospital admissions."

"HeartMapp is more than just a smartphone application, it's a mobile information system," Dr. Labrador said. "Besides the typical application technology, the system has different machines in the background receiving data from sensors and mobile devices, processing it with computer science algorithms and saving it in databases for patients, doctors, nurses and caregivers."

Heart failure is a serious public health issue in the United States. According to Center for Disease Control and Prevention, more than five million people live with the condition. Heart failure occurs when the heart is not able to pump enough blood and oxygen to support other organs. Some symptoms include shortness of breath, weight gain, swelling and body weakness.

HeartMapp was also accepted into the National Science Foundation's Innovation Corps (I-Corps) program, where researchers spent six months receiving real-world, hands-on experience that could help transition the mobile app out of the laboratory and into a commercially feasible product.

Dr. Athilingam and Dr. Labrador are currently working on a pilot study testing HeartMapp with nine patients from the USF Health Cardiology clinic. The patients, who are participating in the pilot study, find the app useful. A patient, who wishes to remain anonymous, thinks HeartMapp is a great tool that constantly keeps her informed about the state of her health.

"HeartMapp makes me self-aware," the patient said. "It also allows me to keep track of my symptoms and be attentive of changes – pushing me to take action or check with my doctor regularly."

Dr. Athilingam and Dr. Labrador are constantly updating HeartMapp with new features based on patients' feedback. Their goal is to develop an efficient app that helps patients improve their overall health and well-being and reduce expensive hospital readmission rates.

"We're hoping to get more funding to test the efficacy of HeartMapp to demonstrate that the app can improve patients' condition and reduce hospital readmissions penalty fees," Dr. Athilingam said. "When we show its efficacy, we could then potentially implement the product into cardiology clinics, commercialize it to companies and expand to iPhone and Microsoft operating systems."

Both researchers are committed to HeartMapp. They will continue to work together as a team to improve the quality of life for patients with heart failure using the power of technology.

"In this day in age, there are difficult problems to solve," Dr. Labrador said. "These problems need the knowledge and expertise of many different disciplines. If we don't bring these disciplines together, we won't be able to solve these complex problems."

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