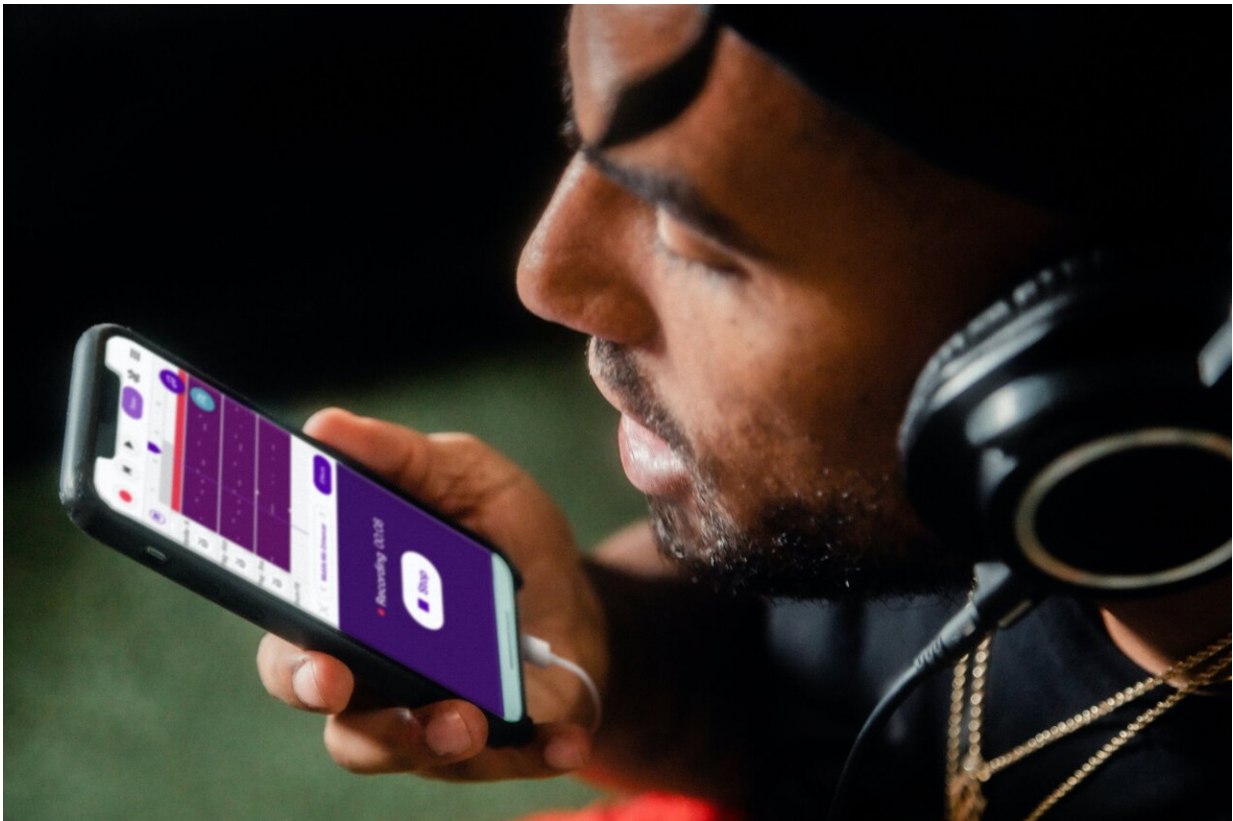


# Speaking from the heart: Could your voice reveal your heart health?

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Credit: Unsplash/CC0 Public Domain

An artificial intelligence (AI)-based computer algorithm accurately predicted a person's likelihood of suffering heart problems related to clogged arteries based on voice recordings alone, in a study presented at

the American College of Cardiology's 71<sup>st</sup> Annual Scientific Session.

Researchers found that people with a high [voice](#) biomarker score were 2.6 times more likely to suffer major problems associated with [coronary artery disease](#) (CAD), a buildup of plaque in the heart's arteries, and three times more likely to show evidence of plaque buildup in [medical tests](#) compared with those who had a low score. While the technology is not yet ready for use in the clinic, the demonstration suggests voice analysis could be a powerful screening tool in identifying patients who may benefit from closer monitoring for CAD-related events.

Researchers said this approach could be particularly useful in remote health care delivery and telehealth.

"Telemedicine is non-invasive, cost-effective and efficient and has become increasingly important during the pandemic," said Jaskanwal Deep Singh Sara, MD, a cardiology fellow at Mayo Clinic and the study's lead author. "We're not suggesting that voice analysis technology would replace doctors or replace existing methods of health care delivery, but we think there's a huge opportunity for voice technology to act as an adjunct to existing strategies. Providing a voice sample is very intuitive and even enjoyable for patients, and it could become a scalable means for us to enhance patient management.

The study represents the first time voice analysis has been used to predict CAD outcomes in patients who were tracked prospectively after an initial screening. Previous studies retrospectively examined voice markers associated with CAD and heart failure. Other research groups have explored the use of similar technology for a range of disorders, including Parkinson's disease, Alzheimer's disease and COVID-19.

For the new study, researchers recruited 108 patients who were referred for a coronary angiogram, an X-ray imaging procedure used to assess the condition of the heart's arteries. Participants were asked to record three

30-second voice samples using the Vocalis Health smartphone application. For the first sample, participants read from a prepared text. For the second sample, they were asked to speak freely about a positive experience, and for the third, they spoke freely about a negative experience.

The Vocalis Health algorithm then analyzed participants' voice samples. The AI-based system had been trained to analyze more than 80 features of [voice recordings](#), such as frequency, amplitude, pitch and cadence, based on a training set of over 10,000 voice samples collected in Israel. In previous studies, researchers identified six features that were highly correlated with CAD. For the new study, researchers combined these features into a single score, expressed as a number between -1 and 1 for each individual. One-third of patients were categorized as having a high score and two-thirds had a low score.

"We can't hear these particular features ourselves," Sara said. "This technology is using machine learning to quantify something that isn't easily quantifiable for us using our human brains and our human ears."

Study participants were tracked for two years. Of those with a high voice biomarker score, 58.3% visited the hospital for chest pain or suffered acute coronary syndrome (a type of major heart problem that includes heart attacks), the study's composite primary endpoint, compared with 30.6% of those with a low voice biomarker score. Participants with a high voice biomarker score were also more likely to have a positive stress test or be diagnosed with CAD during a subsequent angiogram (the composite secondary endpoint).

Scientists have not concluded why certain voice features seem to be indicative of CAD, but Sara said the autonomic nervous system may play a role. This part of the nervous system regulates [bodily functions](#) that are not under conscious control, which includes both the voice box and

many aspects of the cardiovascular system, such as heart rate and blood pressure. Therefore, it is possible that the voice could provide clues about how the [autonomic nervous system](#) is functioning, and by extension, provide insights into cardiovascular health, Sara said.

The study was conducted with English speakers in the Midwestern U.S. using software trained on voice samples collected in Israel. Sara said more tests are needed to determine whether the approach is generalizable and scalable across languages, countries, cultures and health care settings. He added that it will also be important to address security and [privacy issues](#) before incorporating such technology into telemedicine or on-site health assessments.

"It's definitely an exciting field, but there's still a lot of work to be done," Sara said. "We have to know the limitations of the data we have, and we need to conduct more studies in more diverse populations, larger trials and more prospective studies like this one."

**More information:** Conference: [accscientificsession.acc.org/](https://accscientificsession.acc.org/)

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