In this study, we looked at the results of our institutionwide QT-alert warning system. It's a first of its kind. To my knowledge, there is no other institution in the world that systematically alerts any physician who orders an ECG as to QT indicator. The QT interval, we know—whether it's due to a genetic long-QT syndrome or a drug-induced long-QT syndrome—is a noninvasive risk marker. We've set up—really at the calling of the American Heart Association, which said we need to do a better job at preventing in-hospital QT-related deaths—an automated computerized system, where if a patient has a QTC above 500 ms, the physician who ordered that ECG—whether that physician was a general physician, a psychiatrist, or a QT specialist—[is] informed that their patient has a higher risk value.

What we did in this study was to look at the results of that system. Just how high a risk is it if you own a QTC above a particular at-risk threshold of 500 ms?

We implemented this system in November 2010 and looked at the first seven months of ECGs. Not surprisingly, at Mayo Clinic there were a lot of ECGs—over 80,000 ECGs performed in over 50,000 patients—done during that period of time. One percent had a high risk value. One percent had unexplained QT prolongation over the 500-ms threshold.

We then looked [at] risk of death if you were a recipient of that high-risk QTC warning. The patients who had a high-risk QTC—[that] 1% [group]—[had] a risk of death within the first year following [their] ECG four times higher than all of the other patients. In fact, their less-than-one-year-mortality was 20%.

We then said: Not all QTCs above 500 ms—in other words, not all prolonged QT intervals, or QT prolongations—are created equal. We developed a pro QT score—in other words, the number of [the patient's] QT prolonging risk factors—and predicted risk of death. [It ranged] from zero percent risk (if you were a patient of mine who was flagged because your QTC was above 500 [ms] because of genetic long QT-syndrome) to a risk as high as 40% in less than one year (if you had multiple QT-prolonging risk factors: your potassium was out of whack, you were on two, three, [or even] four medications with known QT-prolonging potential). Those are the highest-risk individuals.

The next question is: Can we identify the high-risk individual? That answer is, yes, we know we can. We've shown that. We know it's worth identifying them because their risk of death within the first year of that ECG is very high.

Now the question is: Can we change that? Can we change [that patient's] natural history and prolong their life by modifying those at-risk QT variables—by removing QT-prolonging drugs that were present, by making sure physicians don't add a second, a third, [or even] a fourth medication with unwanted side
effects? Whether we can change the natural history of these individuals—patients at Mayo Clinic (inpatients, outpatients)—who cross the 500-ms line remains to be seen. Can we change their natural history and prolong their life?

The new phase—version "number two" of Mayo's sudden-death warning system—is to not only tell the ordering physicians [that their] patient exceeds this QT cutoff but also to inform them [of] their pro-QTC score. Because of the presence of [problematic] medicines—this medicine and this electrolyte abnormality—[the physician] might want to correct these issues. Once we do that, we'll be able to see [if] there's been a change in physician behavior and [if] there's been a change in [the] mortality prediction.