

A population health approach to dramatically reduce heart disease risk

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Credit: Petr Kratochvil/public domain

Researchers at the UNC School of Medicine and the UNC Gillings School of Global Public Health created a state-wide network of health

care professionals in urban, suburban, and rural areas who work in small primary care practices and used existing electronic health records to determine that tens of thousands of people across North Carolina were at high risk of developing cardiovascular disease who had not been identified as high risk before. Primary care doctors across the state then used this analysis to proactively engage patients to reduce their risk.

This first-of-its-kind study, published in *Journal of the American Medical Informatics Association*, was made possible through a \$15-million federal grant from the Agency for Healthcare Research and Quality's (AHRQ) Evidence NOW Program to help primary care practices use the latest evidence to improve the heart health of millions of Americans. UNC's Heart Health Now! Advancing Heart Health in NC Primary Care project was one of seven grantees back in 2015, and this paper is the first published results from their work.

Heart Health Now! principal investigator Sam Cykert, MD, professor of medicine in the division of general internal medicine and director of the program on health and clinical informatics at UNC-Chapel Hill, said, "The fact that nearly all patients have [digital data](#) now, we can use this information to identify people who are in trouble without necessarily waiting for them to come into the doctor's office. This is crucial because if we would wait in order to get every single piece of information from them at a doctor's visit, we would be missing opportunities to do good care and save lives."

Cykert added, "Over the years, I've cared for many people who suffered the debilitating effects of a heart attack or stroke much too early. Because of the lack of sophisticated information systems and processes, doctors could not quickly identify patient risk and prioritize new evidence for care. So many of these folks missed opportunities that could have prevented severe outcomes resulting from premature disease. We now have the systems and processes in place to quickly help many,

many people."

For this study, Cykert and colleagues formed alliances with 219 primary care clinics, 52 percent of which are in [rural areas](#), to examine 345,440 primary care patients age 40 to 79 – the age range that allows providers to calculate formal risk scores. In that patient pool, 108,515 lacked [cholesterol](#) scores on their electronic health care records. Without those numbers – total cholesterol plus HDL levels – primary care doctors lack all the criteria to determine precise cardiovascular risk. There are other indicators, of course, such as smoking status, weight, diabetes, exercise regimen, gender, etc.

Cykert and colleagues conducted two kinds of analysis to determine the risk of the patients who lacked cholesterol numbers. They analyzed the data from the 236,925 patients for which doctors did have cholesterol numbers and all other criteria. This allowed Cykert's team to create an equation to estimate the cholesterol levels of patients with missing cholesterol data. This kind of formal "data imputation" allowed Cykert's team to determine that 43,205 patients were at high risk of heart disease even though they had never been identified previously.

But that kind of research analysis isn't terribly practical for primary care docs running busy practices. So Cykert's team ran a second simpler analysis: the researchers plugged in very conservative cholesterol numbers for the patients who lacked such data – 170 mg/dl total cholesterol and 50 mg for HDL. "Those are good numbers," Cykert said. "But still, we determined that because of their other indicators, 40,565 patients were at high risk of heart disease and eligible for risk reduction interventions such as aspirin or statins."

Over the course of this study, about half of the patients with missing cholesterol data did wind up getting their cholesterol levels checked. "This allowed us to calculate the sensitivity and specificity of our

findings. Turns out, using formal imputation did find a few more patients at high risk but at the cost of finding some patients whose risk was overestimated."

The authors said the formal method actually yielded a lower specificity and a higher false-positive rate than did the conservative estimate of 170 and 50.

"Whether doctors are part of a large health system or in a small rural practice, the fact that all these patients have digital data now means we can identify patients who are at high risk of developing a very serious condition without waiting six months for them to make an appointment. Doctors can engage with these patients immediately and re-engage with them as needed to decrease risk, which is so crucial when it comes to decreasing the number of heart attacks and strokes."

More information: Samuel Cykert et al. A population approach using cholesterol imputation to identify adults with high cardiovascular risk: a report from AHRQ's EvidenceNow initiative, *Journal of the American Medical Informatics Association* (2018). [DOI: 10.1093/jamia/ocy151](https://doi.org/10.1093/jamia/ocy151)

Provided by University of North Carolina at Chapel Hill School of Medicine

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