

New test for coronary artery disease linked to higher rates of cardiac procedures and greater costs

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A new, noninvasive diagnostic test for coronary artery disease is associated with a higher rate of subsequent invasive cardiac procedures and higher health-care spending. That's according to an observational study of Medicare recipients conducted by researchers at the Stanford University School of Medicine.

In the study, which will be published in the Nov. 16 issue of the [Journal of the American Medical Association](#), patients who underwent coronary CT angiography were about twice as likely to have a subsequent invasive cardiac procedure as patients who underwent a [stress test](#), a more common [diagnostic procedure](#). CT angiography was also associated with higher total health-care spending.

Senior author Mark Hlatky, MD, professor of medicine and of health research and policy, said the findings raise questions of whether patients are benefiting from the additional procedures. "We don't know if those extra procedures will ultimately save lives and lead to better quality of life," he said, noting that they definitely increased costs. "Our study suggests that we need more definitive clinical trials to show whether patients are better off as a result of having CT angiography instead of a stress test."

When [coronary artery](#) disease is suspected, current clinical guidelines recommend an initial evaluation with a type of stress test that enables

doctors to see how a patient's heart works during [physical exertion](#). If the results suggest the presence of blocked coronary arteries, the next step is usually [cardiac catheterization](#) with an invasive coronary angiogram, which displays the size and location of plaque in a patient's artery.

The coronary CT angiography recently emerged as an alternative to the stress test: It uses intravenous dye and CT scanning to provide an inside view of the coronary arteries. "CT angiography is a potential game-changer with respect to how we evaluate patients with suspected heart disease," said Hlatky, adding that the number of coronary CT angiography procedures conducted on Medicare beneficiaries has increased steadily since the procedure first became eligible for reimbursement in 2006.

Experts predict a substantive growth in the use of coronary CT angiography over the next decade, but the impact of the test in practice hasn't been known. "Most prior studies have simply evaluated the accuracy of coronary CT angiography compared with the results of a standard invasive [coronary angiogram](#), and haven't looked at how the information was used," said Hlatky. "Before we did this study, it wasn't clear whether a CT angiogram would lead to more testing and more unnecessary procedures, or whether it would reduce the need for further testing and save money. We needed real data to document how coronary CT angiography would be used in practice."

For this study, Hlatky and his colleagues — internal medicine resident and first author Jacqueline Baras Shreibati, MD, and Laurence Baker, PhD, professor of health research and policy — examined the health-care use and spending among patients evaluated for suspected heart disease. This issue hadn't been addressed in previous studies.

The researchers studied 282,830 Medicare patients who received noninvasive testing for [coronary artery disease](#) between 2005 and 2008.

The median age of the study cohort was 73.6 years; 46 percent were male, and 89 percent were white. In the group, myocardial perfusion scintigraphy, a noninvasive imaging test that has been considered the most powerful technique for predicting future coronary events, was the most frequently used diagnostic test, followed in order by stress echocardiography, exercise ECG and coronary CT angiography.

The researchers examined outcomes in the six months after the patients were tested, looking at cardiac catheterization (a procedure during which a catheter is used to display what's happening in the coronary arteries), coronary revascularization (a process of restoring the flow of blood to the heart), heart attack, all-cause mortality and total and cardiac-related Medicare spending. After running their analysis, they found that those patients who received coronary CT angiography were about twice as likely to have a subsequent invasive cardiac procedure as patients who underwent a stress test. They also found that patients who received the CT angiography were nearly twice as likely to have a subsequent cardiac catheterization as patients who had the myocardial perfusion scintigraphy, and roughly 2.5 times as likely to undergo coronary revascularization.

These findings weren't a real surprise to Hlatky, who pointed out that it's highly unlikely for any older person to have completely normal-looking vessels. ("If you pull a 75-year-old off the street and give him this test, it's unlikely that the coronary arteries will be completely normal," he said.) The high-tech, sensitive nature of the test means that problems were being detected that led to further testing and more-invasive treatments, such as coronary revascularization.

While finding abnormal arteries might sound like a good thing, the concern is that the test may lead to overdiagnosis and potential overtreatment. Perhaps the patients who received more tests and treatment would have done as well or better if they had been treated with

medications rather than revascularization procedures. "We don't know whether the patients are better off for having this additional testing and higher spending," said Hlatky.

The researchers also found that heart-related health-care spending was nearly 40 percent higher among patients who received coronary CT angiography compared with myocardial perfusion scintigraphy, and nearly twice as high compared with patients who underwent stress echocardiography or exercise ECG.

Importantly, although it was associated with a slightly lower likelihood of hospitalization for heart attack, coronary CT angiography was associated with a similar likelihood of all-cause mortality as the other tests at the six-month mark. But, the researchers wrote, "a longer-term perspective is needed to fairly assess the association of mode of noninvasive testing with subsequent mortality."

Noting that the effect of coronary CT angiography testing on subsequent cardiac events and patients' quality of life is still unknown, Hlatky said, "The policy implication is that we need clinical outcome studies of [coronary CT angiography](#) to see whether the higher rates of invasive procedures and spending are worthwhile."

The National Institutes of Health recently launched a randomized multicenter trial, known as the Prospective Multicenter Imaging Study for Evaluation of Chest Pain or PROMISE, study, to test how the choice of initial diagnostic test ([coronary CT angiography](#) or stress testing) affects patient outcomes. Stanford is one of the trial sites; the work is being led by Michael McConnell, MD, professor of cardiovascular medicine.

"This is the first NIH trial to study prospectively a cardiovascular diagnostic imaging test for outcomes, which is a major change in

paradigm," said McConnell. "Usually diagnostic tests are compared to determine which makes the more-accurate diagnosis without thinking about the downstream effects. This study takes the view that it's how patients do that is ultimately most important."

Provided by Stanford University Medical Center

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