◣ Editorials

Should Family Physicians Use Coronary Artery Calcium Scores to Screen for Coronary Artery Disease?

Yes: Screening Improves CAD Risk Management in Selected Patients

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This is one in a series of pro/con editorials discussing controversial issues in family medicine.

Sudden death is often the first manifestation of atherosclerotic coronary artery disease (CAD). One-third of deaths from CAD in the Atherosclerosis Risk in Communities study occurred without warning signs, and there was no prior diagnosis of CAD in most of these persons.[1] For the primary care physician, recommended strategies for mitigating the risk of sudden death and other cardiac events include identifying and managing CAD risk factors such as hypertension, hyperlipidemia, and tobacco use.[2] A study that supports this approach showed that among those dying from CAD, more than 87 percent had at least one traditional CAD risk factor.[3] More problematic, however, is that a large number of patients without CAD will have risk factors, and many with CAD will have normal cholesterol levels.[4] Moreover, a recent study of survivors of ST elevation myocardial infarction found that less than one-half would be considered candidates for intensive preventive management according to current global CAD risk scores.[5]

Addressing these limitations, new prevention strategies have sought to directly visualize the presence of CAD by measuring coronary artery calcium (CAC) on non–contrast-enhanced computed tomography scans of the chest.[2] Coronary artery calcification is thought to result from the replacement of dead cells and extracellular lipid in atheromatous plaque with apatite, thus signifying advanced lesions.[6] Although not necessarily representative of the degree of stenosis, coronary artery calcification does signify the presence of CAD.[7] Perhaps reflecting the overall burden of atherosclerotic plaque, CAC scores correlate with the likelihood of having a cardiac event. Low CAC scores are associated with a low risk of events (0.4 percent per year, even in patients with intermediate risk based on global CAD risk scores). Higher scores are associated with increased relative risk of coronary death or myocardial infarction.[2]

CAC scoring adds predictive value to existing global risk scores, such as the Framingham risk score. In particular, CAC scores help to reclassify a patient from intermediate risk (i.e., 10-year risk of a cardiovascular event of 10 to 20 percent) to either the lowest or highest risk group. One-fourth of the patients in the Multi-Ethnic Study of Atherosclerosis longitudinal cohort were better classified into the correct category of CAD risk when CAC scores were considered.[8] Similarly, one-half of the patients in a cohort of asymptomatic older patients followed for 9.2 years were reclassified from intermediate risk into either the high-risk or low-risk category, among which 40 percent were deemed high-risk.[9] In a cohort of veterans, 15 percent of those estimated to have low risk by the Framingham risk score were found to have significant burdens of CAC and higher relative risk of cardiac mortality, compared with veterans who had lower CAC scores but high Framingham risk scores.[10]

Practically speaking, better risk prediction may help tailor prevention recommendations with regard to lipid and blood pressure management. Interestingly, knowledge ▶

that patients had abnormal CAC scores was associated with increased adherence to aspirin use, dietary modifications, and physical activity.[11] A recent study of asymptomatic patients randomized to receive CAC screening or a non-screening strategy found improved management of risk factors (blood pressure, low-density lipoprotein cholesterol, and waist circumference) with lower use of resources, offsetting increases in cost among the group in which CAC data were available.[12] Finally, CAC screening may be cost-effective in some subgroups, most demonstrably in men deemed by Framingham risk scores to have intermediate risk.[13]

Certain considerations should temper enthusiasm for widespread CAC screening for CAD risk assessment. A calcium score of zero does not completely exclude the presence of CAD, because up to 6 percent of symptomatic patients with no detectable coronary calcium who undergo cardiac catheterization will have significant coronary stenosis.[14] From a safety standpoint, CAC screening involves exposure to ionizing radiation (about 1 mSv, which is comparable to screening mammography), and the frequency of screening tests has not been established. Most importantly, evidence is lacking as to whether screening asymptomatic adults impacts morbidity or mortality from CAD. Accordingly, current guidelines recommend considering CAC screening only for patients determined to be at intermediate risk by the Framingham risk score or other risk models in whom the findings would change management.[2]

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