Economics of Testing for Coronary Artery Disease


Study Overview

**Objective.** To assess the cost-effectiveness of alternative approaches to diagnosis of coronary artery disease.

**Design.** Decision analysis to assess the health outcomes and economic costs of alternative diagnostic strategies. The approaches assessed were initial angiography and initial testing with 1 of 5 noninvasive tests: exercise electrocardiography (treadmill testing); planar imaging using thallium-201 or technetium Tc 99m sestamibi; single-photon emission computed tomography (SPECT); stress echocardiography with dobutamine, exercise, or dipyridamole as the stressors; and myocardial perfusion imaging with positron emission tomography (PET) followed by coronary angiography if noninvasive test results were positive. Inputs into the analysis were the results of an English-language literature review and meta-analysis of the accuracy of alternative diagnostic tests from published information on treatment effectiveness and disease prevalence.

**Setting and participants.** Men and women 45, 55, and 65 years of age with a history of chest pain and with an intermediate (ie, 25% to 75%) pretest probability of having coronary disease. Coronary disease was defined as stenosis of at least 50% in the left main coronary artery or stenosis of 70% or greater in any other coronary artery, as measured by angiography. The base case for the analysis was a man 55 years of age whose pretest risk for coronary disease was 50%.

**Main outcome measures.** Life-years, quality-adjusted life-years (QALYs), costs, and costs per QALY, derived from the societal perspective, over a 30-year time horizon. The main source of outpatient and diagnostic costs was Medicare payments in 1996. Cost-effectiveness ratios were defined as the difference between the costs of 2 testing interventions divided by the difference between the health outcomes (eg, QALY) each produces.

**Main results.** Life expectancy did not vary significantly with the initial diagnostic test. For a 55-year-old man, the best-performing test increased life expectancy by 7 more days than the worst-performing test. Tests with greater sensitivity increased QALYs more. Echocardiography improved health outcomes and reduced costs relative to stress testing and planar thallium imaging. The incremental cost-effectiveness ratio for SPECT relative to echocardiography was $75,000/QALY and for PET relative to SPECT, more than $640,000/QALY. Compared with SPECT, immediate angiography had an incremental cost-effectiveness ratio of $94,000/QALY. Qualitative findings varied little with respect to age, sex, pretest probability of disease, or the test indeterminacy rate.

**Conclusion**

Echocardiography, SPECT, and immediate angiography are more cost-effective than PET, exercise treadmill testing, and planar thallium and therefore are appropriate testing alternatives.

**Commentary**

Past studies of strategies for diagnosing coronary artery disease may have been biased by assumptions about outcomes and costs that favored certain types of interventions. To its credit, this study used published assessments of test performance that met predefined quality criteria, and the cost-effectiveness analysis was appropriately done using standard incremental cost-effectiveness ratios [1,2]. Yet, because of its reliance on published studies, the current analysis may be subject to publication bias; bias may be greater for tests for which there is great variation in reported accuracy, such as echocardiography.

**Applications for Clinical Practice**

According to Garber and Solomon’s findings, managed care organizations and other providers may manage certain patients with chest pain more cost-effectively if they employ echocardiography, SPECT, and immediate angiography.

(continued on page 24)
rather than the alternative tests. However, as costs and test characteristics (eg, specificity and sensitivity) vary among clinical settings and patient populations, individual providers and organizations may find these findings more or less applicable. Wherever possible, local costs and provider-specific characteristics should be assessed to determine the cost-effectiveness of coronary artery disease testing at their location.

References
