

Cost Effectiveness of a Gene Expression Score and Myocardial Perfusion Imaging for Diagnosis of Coronary Artery Disease

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Purpose: To estimate the cost-effectiveness of myocardial perfusion stress imaging (MPI), a commercially available, lab-certified gene expression score (GES) test, and combinations thereof to diagnose obstructive coronary artery disease (CAD) in patients initially presenting for chest pain – a population growing in size and increasingly expensive for the US healthcare system, and with prior probability (PP) of CAD having been estimated between 10 and 25 percent (or more).

Methods: We developed a Markov model to estimate incremental cost effectiveness ratios (ICERs) for three diagnostic strategies (and “no testing”): MPI alone, GES alone, and GES→MPI. Patients with GES score above a pre-determined level or with positive MPI readings were assumed referred to invasive coronary angiography (ICA) and treated according to test findings. Others were assumed to receive recommended medical care. In the GES→MPI strategy, patients with GES scores above a predetermined level were referred to MPI and managed according to MPI results. We used a societal perspective, 3-percent discount rate, and a lifetime horizon. We derived cost estimates from average Medicare payments, blended according to observed patterns of treatment choices. Transition probabilities and utility weights for various health states were derived from relevant literature sources. Diagnostic test accuracy for MPI was derived from a published meta-analysis. Test accuracy for GES was derived from a recent study in which CAD status was confirmed by quantitative coronary angiography.

Results: For all testing strategies, ICERs fall as PP of CAD increases. The combination of GES and MPI had more favorable ICERs than single-test strategies over a range of relevant PP of CAD. In our base case (PP = 15%) the GES→MPI strategy had the most favorable ICER (ICER = \$72,045 vs. \$72,249 for MPI, \$79,979 for GES-alone) while at higher PP levels, MPI weakly dominated the GES→MPI strategy. ICERs for most test strategies fell below \$100,000 for PP>15%. Results are moderately sensitive to assumed prices of various diagnostic tests (including ICA). MPI-alone becomes relatively more expensive when patient time costs or the consequences of radiation exposure are included.

Conclusions: The GES test, particularly when combined in sequence with MPI, yields ICERs comparable to or more favorable than MPI alone. In most situations tested, combinations of the two tests yielded more favorable ICERs than either test alone.

Reference: Phelps CE, Douglas PS, O'Sullivan A, et al. Cost Effectiveness of a Gene Expression Score and Myocardial Perfusion Imaging for Diagnosis of Coronary Artery Disease. *Med Decis Making*. 2013;33:P4-3.