The value of myocardial perfusion scintigraphy in the diagnosis and management of angina and myocardial infarction: a probabilistic economic analysis

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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

CRD summary
The objective was to assess the cost-effectiveness of strategies involving single photon emission computed tomography (SPECT), compared with strategies without SPECT, for the diagnosis and management of coronary artery disease. The authors concluded that strategies involving SPECT were likely to be cost-effective when the risk of coronary artery disease was relatively low, but for higher prevalence rates, strategies without SPECT seemed optimal. The methods were clearly described and seem to have been appropriate and the conclusions appear to be valid.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to assess the cost-effectiveness of strategies involving single photon emission computed tomography (SPECT) alone or with other tests, compared with strategies without SPECT, for the diagnosis and management of coronary artery disease (CAD) in a hypothetical cohort of patients, with a starting age of 60 years.

Interventions
Four strategies were investigated.

Strategy one was stress electrocardiography (ECG), followed by SPECT if the stress ECG was positive or indeterminate, followed by coronary angiography (CA) if the SPECT was positive or indeterminate.
Strategy two was stress ECG, followed by CA if the stress ECG was positive or indeterminate.
Strategy three was SPECT followed by CA if the SPECT was positive or indeterminate.
Strategy four was CA.

Location/setting
UK/secondary care.

Methods
Analytical approach:
The initial diagnostic decision was modelled using a decision tree, the long term costs and consequences were then captured through the use of a Markov model. A 25 year time horizon was used and the authors did not explicitly state a study perspective.

Effectiveness data:
The effectiveness estimates were derived from published studies, which were supplemented with estimates from the British Heart Foundation and authors' assumptions. The decision tree probabilities were identified following a systematic review of relevant databases, including Medline and EMBASE. Further details of the search strategy were reported in another paper (Mowatt, et al. 2004 see 'Other Publications of Related Interest' below for bibliographic details). The main clinical parameters were the sensitivity, specificity and mortality associated with each of the diagnostic tests, and the risk of myocardial infarction.

Monetary benefit and utility valuations:
Quality of life estimates were derived from a published study, which used the standard gamble approach.

Measure of benefit:
The primary measure of benefit was the quality-adjusted life-year (QALY).

Cost data:
The cost categories included those of tests and treatment. The resource use and cost data were mainly obtained from published studies, which were supplemented in some instances by National Health Service (NHS) reference cost data. The price year was 2001 to 2002 and all costs were reported in UK pounds sterling (£). They were discounted at an annual rate of 6% and were, where appropriate, adjusted for inflation.

Analysis of uncertainty:
Probabilistic sensitivity analysis was used to address the parameter uncertainty and the results were presented as cost-effectiveness acceptability curves. Further sensitivity analyses on many of the estimates were also carried out.

Results
At coronary artery disease (CAD) prevalence levels of 10.5%, the incremental cost per QALY gained over strategy one (ECG followed by SPECT followed by CA) by strategy two (ECG followed by CA) was £26,249; the incremental cost per QALY gained over strategy two by strategy three (SPECT followed by CA) was £9,261, while the incremental cost per QALY gained over strategy three by strategy four (CA) was £48,576.

Strategy one and strategy three showed extended dominance over strategy two (i.e. managing patients with a combination of strategy one and strategy three would result in a lower incremental cost per QALY than managing all patients with strategy two).

At higher prevalence levels of CAD, the order of the effectiveness of the strategies did not change, but the incremental cost per QALY gained ratios decreased.

At a threshold of £20,000 per QALY, strategy three had a 90% likelihood of being optimal and at ratios of over £75,000 per QALY, strategy four was more likely to be optimal.

The model results were found to be sensitive to the prevalence of CAD and test performance.

Authors' conclusions
The authors concluded that strategies, which included SPECT, were likely to be cost-effective when the risk of CAD was relatively low, but for higher prevalence rates, strategies without SPECT seemed optimal. The authors suggested further research was necessary to assess the cost-effectiveness of ECG.

CRD commentary
Interventions:
The interventions were well described and represented the current practice in the authors' setting.

Effectiveness/benefits:
The effectiveness estimates were derived from a wide range of sources, each of which was clearly described and appeared appropriate. Full details of the estimates were included in the paper along with their probability distributions. Although the clinical inputs were thoroughly and transparently reported, it is not possible to determine if all of them were derived systematically.

Costs:
The authors did not explicitly report a study perspective, so it is not clear if the appropriate cost categories were included. However, overall, the cost analysis was well reported. Full details of the source of the cost data and the methods used to derive the cost estimates were provided. Uncertainty was investigated through sensitivity analyses. Appropriate adjustments including the price year and discounting were reported.
Analysis and results:
An incremental analysis of the costs and benefits was appropriately conducted. Further, the impact of uncertainty was extensively addressed in the sensitivity analysis and clearly reported alongside the baseline results. Overall, the methods and results were well reported, including a diagram of the model. The authors noted some limitations to their analysis.

Concluding remarks:
The methods were clearly described and appear to have been appropriate and the conclusions appear to be valid.

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