INAHTA Briefs

Issue 2010/150

Title **The Effectiveness and Cost Effectiveness of Biomarkers for the Prioritisation of Patients Awaiting Coronary Revascularization: A Systematic Review and Decision Model**

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Reference Volume 14.09. ISBN 1366-5278. www.hta.ac.uk/project/1515.asp

Aim

To determine the effectiveness and cost effectiveness of strategies based on conventional clinical information and novel circulating biomarkers for prioritizing patients with stable angina awaiting coronary artery bypass grafting (CABG).

Conclusions and results

Formally employing more information in prioritizing patients awaiting CABG appears to be a cost-effective approach and may improve health outcomes. The most robust results relate to a strategy employing a risk score using conventional clinical information along with a single biomarker (eGFR). The additional prognostic information via collecting the more costly novel circulating biomarker CRP, alone or in combination with other biomarkers, is unlikely to be cost effective in terms of waiting list prioritization. Our review included 390 reports of biomarker effects. The quality of study reports varied, with evidence of small study (publication) bias and incomplete adjustment for simple clinical information, eg, age, sex, smoking, diabetes, and obesity. The risk of cardiovascular events while on the waiting list for CABG was 3 per 10 000 patients per day within the first 90 days. Risk factors associated with an increased risk, and included in the basic risk equation, were: age, diabetes, heart failure, previous myocardial infarction, and involvement of the left main coronary artery or three-vessel disease. The optimal strategy in terms of cost effectiveness was a prioritization strategy employing biomarker information. Evaluating shorter maximum waiting times did not alter the conclusion that a prioritization strategy with a risk score using estimated glomerular filtration rate (eGFR) was cost effective. These results were robust to most alternative scenarios investigating other sources of uncertainty. However, the cost effectiveness of the strategy using a risk score with both eGFR and C-reactive protein (CRP) was potentially sensitive to the cost of the CRP test itself.

Recommendations

See Executive Summary www.hta.ac.uk/project/1515.asp

Methods

See Executive Summary www.hta.ac.uk/project/1515.asp

Further research/reviews required

1. To establish and develop a national register of coronary angiography in the UK, which would provide a platform for health technology appraisal and other outcomes-based research relevant to the NHS. Such a register should include details of angiographic findings, clinical details required for estimating risk equations, circulating biomarker information, and follow-up for events and revascularization. 2. To develop the decision-analytic framework by incorporating a more comprehensive range of biomarker strategies, and to reflect more formally the uncertainties in the various input sources estimates with probabilistic sensitivity analysis. To consider these in relation to a broader set of approaches to the overall management of stable disease, including a policy of shortening overall waiting times. 3. To consider the consequences of uncertainty in the model more formally using value of information analysis to target specific areas where further research appears most worthwhile. 4. To develop initiatives for improving the quality of biomarker prognosis research, for example by developing standards for reporting, and to foster collaborations that pool individual participant data sets.

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ISSN 1654-501X