Cost-effectiveness of treatments reducing coronary heart disease mortality in Ireland, 2000 to 2010

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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
This study examined the cost-effectiveness of several medical and surgical treatments for coronary heart disease (CHD) over a ten-year period. The authors concluded that simple medical treatments for myocardial infarction, secondary prevention, angina, and heart failure were the most cost-effective strategies for the treatment of CHD in Ireland. The study appears to have been based on valid methodology, although some aspects of the analysis were not described in detail. The authors’ conclusions appear to be valid and robust.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The objective was to examine the cost-effectiveness of several medical and surgical treatments for coronary heart disease (CHD) over a ten-year period from 2000 to 2010, in patients aged between 35 and 85 years.

Interventions
The treatments were aspirin, thrombolysis, beta-blockers, angiotensin-converting enzyme (ACE) inhibitors, statins, cardiac rehabilitation, warfarin, heparin, glycoprotein IIb/IIIa inhibitors, coronary artery bypass graft (CABG) surgery, and angioplasty.

The conditions treated were acute myocardial infarction (AMI), secondary prevention after AMI or revascularisation, unstable angina, chronic angina, heart failure, and primary prevention of heart failure.

Location/setting
Ireland/primary and secondary care.

Methods
Analytical approach:
This economic evaluation used a published decision model, namely the IMPACT model, with a 10-year time horizon. The authors did not explicitly report the perspective of the analysis.

Effectiveness data:
The clinical data came from the published model. The treatment effectiveness was derived from recent meta-analyses and large randomised controlled trials (RCTs). Other clinical and epidemiological inputs were based on Irish sources wherever possible. For example, survival after coronary surgery was taken from the Irish Cardiac Surgery Registry, while survival after other procedures came from UK sources, because no Irish data were available. The number of patients receiving CHD treatments and the uptake rates were also obtained from Irish databases. Some assumptions were also needed. The primary clinical outcome was the number of deaths prevented or postponed associated with each treatment.

Monetary benefit and utility valuations:
Not relevant.
Measure of benefit:
Life-years (LYs) gained with the treatments were used as the summary benefit measure. These were discounted at an annual rate of 3.5%.

Cost data:
The economic analysis included the costs of the interventions (drugs and procedures). A breakdown of the cost items was not given because many interventions were considered. The costs of the procedures were derived from the Irish case-mix model of Diagnostic-Related Groups based on more than 90% of public hospitals and a few private and voluntary hospitals across Ireland. The sources of resource use data were not explicitly reported. The drug costs were based on official reimbursement rates and the defined daily dose. Published studies were also used when relevant. All costs were in Euros (EUR) and the price year was 2001. A 3.5% annual discount rate was applied.

Analysis of uncertainty:
The issue of uncertainty was addressed by means of a deterministic multi-way analysis of extremes for key model inputs using ranges of values derived from the literature. When meta-analyses or RCTs were used as the sources of clinical data, 95% confidence intervals for these data were used in the sensitivity analysis.

Results
The analysis revealed that all the treatments together prevented or postponed 1,883 deaths in Ireland in the year 2000, and generated a total of 14,504 additional LYs (range: 7,270 to 22,470). The main contributors to this were the secondary prevention following myocardial infarction and revascularisation.

All treatments were cost-effective, with aspirin, beta-blockers, ACE inhibitors, spironolactone, and warfarin offering the best value for money at less than EUR 3,000 per LY. For secondary prevention with statins, the incremental cost per LY gained was also attractive at less than EUR 7,000 per LY. Revascularisation for chronic angina was less cost-effective (CABG surgery: EUR 12,968 per LY, and angioplasty: EUR 14,864 per LY), as was the use of statins in primary prevention (EUR 11,442 per LY). The cost-effectiveness of primary angioplasty for myocardial infarction was EUR 19,206 per LY gained.

The sensitivity analysis did not substantially alter the conclusions of the base-case analysis.

Authors’ conclusions
The authors concluded that simple medical treatments for myocardial infarction, secondary prevention, angina, and heart failure were the most cost-effective strategies for the treatment of CHD in Ireland.

CRD commentary
Interventions:
All the available treatments for CHD were included. However, the authors stated that each intervention was compared with placebo or an older strategy. Only in a few cases were the treatments compared with each other.

Effectiveness/benefits:
Extensive information on the clinical data was provided in a separate appendix or in other publications. In general, when the authors did report the details, these sources appeared to be robust and appropriate. The use of UK data, when Irish data were not available, also appears to be valid given the similar epidemiological patterns between the two countries. A few details of the calculations used to derive the inputs to the model were described. Similarly, the authors reported some assumptions required. In general, the derivation of the clinical evidence appears to have been transparent, with the full data presented in other papers or reports. The derivation of the benefit measure was described. LYs are a valid benefit measure, which can also be compared with the benefits of other health care interventions.

Costs:
Although not explicitly stated, the economic viewpoint of the national health service payer was adopted and it appears that all the relevant categories of costs were included. These costs were not broken down into individual items, which reduces the transparency of the economic analysis, but it would have been difficult to provide information for each individual treatment. The price year and the use of discounting were reported. Furthermore, the sources of data were
reported and appear to have been appropriate for the Irish setting.

Analysis and results:
The incremental approach used to synthesise the costs and benefits was appropriate. The expected costs were not reported, although the details of the estimated LYs and the incremental cost-effectiveness ratios were presented for all interventions. The issue of uncertainty was addressed in the sensitivity analysis using a multivariate, but non-probabilistic, approach. The authors noted some limitations of their study such as the fact that it focused on the average net treatment costs and did not explicitly capture the reductions in health service use or other potential costs avoided.

Concluding remarks:
On the whole, the study appears to have been based on valid methodology, although some aspects of the analysis were not described in detail. The authors' conclusions appear to be valid and robust.

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