Cost-effectiveness analysis of percutaneous coronary intervention versus thrombolytic therapy in patients with an ST-elevated myocardial infarction

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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 compare the cost-effectiveness of percutaneous coronary intervention (PCI), versus thrombolytic therapy, to manage patients with acute ST-elevated myocardial infarction, in Serbia. The author concluded that thrombolytic therapy was the most cost-effective strategy and PCI was inferior due to the high costs of primary intervention. The study had a valid framework. The data sources were not transparently reported, but the author’s conclusions appear to be robust.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to compare the cost-effectiveness of percutaneous coronary intervention (PCI), versus thrombolytic therapy, to manage patients with acute ST-elevated myocardial infarction (MI).

Interventions
PCI was compared with thrombolysis, using intravenous administration of streptokinase.

Location/setting
Serbia/hospital.

Methods
Analytical approach:
The analysis was based on a Markov model, with a 40-year time horizon. The perspective was not explicitly stated.

Effectiveness data:
Most of the evidence was from published clinical trials and a published cost-effectiveness model that incorporated most of the clinical data. The values used for each model clinical input were reported. The rates of cardiovascular events were key inputs for the model.

Monetary benefit and utility valuations:
The utility values were from published sources.

Measure of benefit:
Quality-adjusted life-years (QALYs) were the summary benefit measure and were discounted at an annual rate of 3%.

Cost data:
The economic analysis included hospital costs for the two procedures and the treatment of cardiovascular events. The resource quantities were from published studies and Scottish guidelines. The costs were from the Republic Institute for Health Insurance tariff Books. A 3% annual discount rate was applied. The price year was 2011 and the costs were expressed in Serbian dinars (RSD).

Analysis of uncertainty:
A first-order Monte Carlo simulation was carried out, with 1,000 virtual patients, to determine confidence intervals around the mean costs and benefits. A two-way sensitivity analysis was performed to validate the model findings, using...
ranges of ±50% of the baseline values.

Results
The expected lifetime costs were RSD 407,685 (SD 158,819) with PCI and RSD 272,085 (SD 139,131) with thrombolysis. The QALYs were 5.17 (SD 7.43) with PCI and 7.14 (SD 6.12) with thrombolysis.

Thrombolysis was dominant, as it was more effective and less expensive than PCI.

Thrombolytic therapy remained dominant in the Monte Carlo simulation. The most influential inputs were the initial cost of the PCI and repeated revascularisation. Even when varying the inputs by 50%, the PCI strategy remained dominated by thrombolytic therapy.

Authors' conclusions
The author concluded that thrombolytic therapy was the most cost-effective strategy for the management of ST-elevated acute MI. PCI was inferior due to the high costs of primary intervention.

CRD commentary
Interventions:
The selection of the comparators was appropriate as the two available strategies for the management of patients with acute MI were considered. The options were also relevant for other settings.

Effectiveness/benefits:
Little information on the sources for the clinical data was provided and it appears that no review of the literature was conducted. The authors stated that most of the data were from clinical trials, which should have had good internal validity, but they were not described, making it difficult to assess their validity. Most of the parameters were varied in the sensitivity analysis, which showed that the conclusions were robust. QALYs were appropriate as the main benefit measure and they allow comparisons with other disease areas, but the source for the utility weights was not described and it is unclear whether they were relevant to the analysis context.

Costs:
The economic viewpoint was not clearly stated, but costs relevant to the health care payer appear to have been used. The analysis was not transparent as the cost categories were not broken down into individual items and no information on unit costs and resource quantities was provided. Serbian sources were used for the unit costs, but the methods used to apply them to the resource use were not clear. These issues affect the validity of the cost analysis. The price year was reported, allowing reflation exercises for other time periods.

Analysis and results:
The expected costs and benefits were reported and were synthesised into average cost-utility ratios and in an incremental analysis. Both probabilistic and deterministic sensitivity analyses were carried out to assess uncertainty, but only a first-order Monte Carlo simulation was conducted, which did not account for distributions around the model parameters. The author acknowledged that issues around delay in PCI were not included, and this appears to be a key factor in determining the cost-effectiveness of the intervention. Previous economic evaluations comparing the two interventions had shown contrasting results. The author reported that the long time horizon was an improvement on other studies. These findings should be considered specific to Serbia, where the cost of drugs, compared with revascularisation, was low.

Concluding remarks:
The study had a valid framework. The data sources were not transparently reported, but the author’s conclusions appear to be robust.

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