Cost-effectiveness of prehospital versus inhospital thrombolysis in acute 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 study examined the cost-effectiveness of pre-hospital thrombolysis in comparison with conventional in-hospital thrombolysis for patients with ST-elevation myocardial infarction. The authors concluded that the pre-hospital strategy was a cost-effective alternative to in-hospital thrombolysis since it led to a gain in survival and a reduction in costs from the perspective of the Brazilian Health System. Although the study results were reported clearly together with details of the economic and clinical analysis, the authors’ conclusions should be considered with some degree of caution given the limitations of the study.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The objective was to examine the cost-effectiveness of pre-hospital thrombolysis in comparison with conventional in-hospital thrombolysis for patients with ST-elevation myocardial infarction (STEMI).

Interventions
The study examined pre-hospital versus in-hospital thrombolysis for the treatment of STEMI. The drugs of choice were tenecteplase and streptokinase in the pre-hospital and hospital setting, respectively. The Mobile Emergency Care Service delivered the pre-hospital treatment.

Location/setting
Brazil/hospital.

Methods
Analytical approach:
A decision analytic model was developed to assess the costs and benefits of the two strategies under examination on the basis of published evidence. A Markov model was then used to estimate disease progression. Two time horizon, 1 year and 20 years, were considered in the analysis. The authors stated that the analysis was carried out from the perspective of the National Health System.

Effectiveness data:
The clinical estimates used in the analysis were derived from two main sources, which were identified selectively. Mortality risk with the two approaches was taken from a randomised clinical trial (RCT) that was carried out in Scotland over the period 1988 to 1991 (the GREAT Study), and which was included in a meta-analysis. Diagnostic accuracy was also taken from this source. The second source was a published decision model from which disease progression was estimated. Life expectancy was derived from the Brazilian Institute of Geography and Statistics.

Monetary benefit and utility valuations:
None.

Measure of benefit:
The summary benefit measure used in this economic evaluation was the life-years (LYs). They were calculated using the decision model. Discounting was not mentioned.
Cost data:
The analysis considered the costs of medical visits performed in the two settings, drugs used for thrombolysis, emergency care at the hospital, hospital stay, complementary examinations, outpatient follow-up appointments and outpatient medication. The costs of re-infarction, and annual follow-up after acute MI or suspected acute MI were also included. Resource consumption was mainly based on the Directives on the Treatment of Acute Myocardial Infarction published by the Brazilian Society of Cardiology. The costs were valued using government prices. The costs were in Brazilian reais (BRL) and the price year was 2005. Discounting was not mentioned.

Analysis of uncertainty:
The issue of uncertainty was not addressed.

Results
Over a 1-year timeframe, the expected LYs were 0.7696 with pre-hospital thrombolysis and 0.7661 with in-hospital thrombolysis.

The average costs per patient were BRL 1,025.45 with pre-hospital thrombolysis and BRL 1,070.34 with in-hospital thrombolysis.

Over a 20-year timeframe, the expected LYs were 11.48 with pre-hospital thrombolysis and 11.32 with in-hospital thrombolysis.

The average costs per patient were BRL 5,640 with pre-hospital thrombolysis and BRL 5,816 with in-hospital thrombolysis.

Thus, the pre-hospital strategy led to a gain in life expectancy and a reduction in costs in comparison with the in-hospital strategy, regardless of the timeframe of the analysis.

Authors’ conclusions
The authors concluded that a pre-hospital strategy for thrombolysis in patients with STEMI was a cost-effective alternative to in-hospital thrombolysis, as it led to a gain in survival and a reduction in costs from the perspective of the Brazilian Health System.

CRD commentary
Interventions:
The two alternatives appear to have been appropriate for the comparison. A justification for the drugs used in each setting was provided. Tenecteplase was selected as it was the only bolus thrombolytic agent available in Brazil, while streptokinase was the cheapest drug for hospital use from the perspective of the National Health System. However, they may not be the drugs of choice in other health care systems.

Effectiveness/benefits:
The clinical sources of data were identified selectively rather than through a review of the literature. No formal justification was provided for the selection of the two main sources from among those available in the literature. Clearly, the use of an RCT should have ensured the validity of the clinical evidence. However, it should to be noted that the study was somewhat updated, which casts some doubts on the relevance of these estimates for the scope of the analysis. The bulk of the evidence came from the previous modelling study, the characteristics of which were not reported. The use of LYs as the benefit measure was appropriate since they are comparable with the benefits of other health care interventions.

Costs:
The analysis of the costs reflected the viewpoint of the study. The unit costs were reported, although some costs were presented as macro-categories. Resource use reflected the local consumption of health services. The costs were consistent with the perspective of the study. The price year was reported. Discounting does not appear to have been performed, although it would have been relevant given the long timeframe of the analysis. The use of statistical analyses of economic data was not reported.
Analysis and results:
The dominance of one strategy over the other precluded the need for a synthesis of the costs and benefits. The results of
the analysis were presented clearly and discussed. However, the issue of uncertainty that is often associated with
modelling was not addressed and this represents a limitation of the study validity. The authors identified a further
drawback of the analysis: the use of probability data for outcomes that occurred in another population and scenarios
dissimilar to those of the Brazilian health care system.

Concluding remarks:
Although the study results were reported clearly together with details of the economic and clinical analysis, the authors’
conclusions should be considered with some degree of caution given that the study had some limitations.

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Other publications of related interest
Vale L, Steffens H, Donaldson C. The costs and benefits of community thrombolysis for acute myocardial infarction: a

Morrison LJ, Verbeek PR, McDonald AC, et al. Mortality and prehospital thrombolysis for acute myocardial infarction:

GREAT Group. Feasibility, safety, and efficacy of domiciliary thrombolysis by general practitioners: Grampian region

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