Comparative effectiveness of ST-segment-elevation myocardial infarction regionalization strategies


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 incremental costs and benefits of approaches for increasing patient access to primary percutaneous coronary intervention (PCI). The authors concluded that new construction and staffing of PCI laboratories might not be warranted if an emergency medical services strategy that delivered patients to existing services was available. There were a number of limitations to the study and the methods were poorly reported, which makes it difficult to assess the authors’ conclusions.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to compare the incremental benefits and costs of different approaches for increasing patient access to primary percutaneous coronary intervention (PCI).

Interventions
Three approaches to increase patient access to PCI were compared. The first was standard emergency transport and care. The second was an emergency medical service (EMS), in which patients with ST-segment elevation myocardial infarction (STEMI) were transported to hospitals with existing capacity for PCI. The third was 13 hospital-expansion scenarios, in which new PCI capacity was added for a region of 16 hospitals through laboratory construction and staffing.

Location/setting
USA/in-patient secondary care.

Methods
Analytical approach:
The authors simulated the EMS transport, the reperfusion strategy, the clinical outcomes, and the costs for 2,000 patients. The model was described elsewhere (Concannon, et al. 2008, see ‘Other Publications of Related Interest’ below for bibliographic details). The time horizon was the lifetime of the patient. The authors did not explicitly report the perspective.

Effectiveness data:
A number of sources were used to derive the clinical and effectiveness estimates. These included randomised controlled trials, published age- and sex-adjusted life tables, published studies, and authors’ assumptions. The main estimate of effectiveness was the 30-day patient mortality, which was derived using the PCI-Thrombolytic Predictive Instrument. An important model assumption was that all patients accessed treatment by calling the emergency services (911). This assumption was tested in the sensitivity analysis.

Monetary benefit and utility valuations:
The utility estimates were from the Cost-Effectiveness Analysis Registry. They were adjusted for reduced quality of life due to complications from the index event or from the method of reperfusion.

Measure of benefit:
Quality-adjusted life-years (QALYs) gained were the measure of benefit. Future QALYs, over the lifetime of the patient, were discounted at an annual rate of 3%.

Cost data:
The costs from a published study of hospital operations (Lieu, et al. 1996, see 'Other Publications of Related Interest' below for bibliographic details) were updated to 2008 prices, using the National Income and Product Accounts gross domestic product deflator. All costs were reported in US dollars ($). All new equipment and facilities were assumed to be in use for 10 years.

Analysis of uncertainty:
One-way sensitivity analyses were conducted by varying the mortality, the discount rates for outcomes, the quality of life, and the adherence to strategies (access via 911).

Results
Compared with the usual care (no new construction or staffing), the EMS intervention had additional costs of $1,391,000 and saved a total of 2,749.8 QALYs. Compared with the EMS strategy, all the strategies of hospital expansion (adding new PCI capacity) were more costly and less effective.

Compared with usual care, the EMS strategy had an incremental cost-utility ratio of $506 per QALY gained. Compared with the EMS strategy, hospital expansion was dominated, as it was more costly and less effective.

The sensitivity analysis on adherence showed that the EMS strategy was more effective and less costly than the next best hospital expansion strategy, if at least 45% of all patients with STEMI called the emergency services for assistance.

Authors' conclusions
The authors concluded that new construction and staffing of PCI laboratories might not be warranted if an emergency medical services strategy was available.

CRD commentary
Interventions:
The interventions were reported clearly.

Effectiveness/benefits:
The effectiveness and clinical data were from a number of different sources. The authors did not report how these sources were identified, nor if a systematic review of the literature was undertaken. As a result, it is unclear if all the relevant published evidence was analysed.

Costs:
The perspective was not explicitly reported and the costs analysed were not reported. This makes it impossible to determine if all the relevant costs were included. The authors reported that the costs were from a published study and they provided the reference. The costs could be incurred over, at least, 10 years, but the authors did not report if future costs were discounted.

Analysis and results:
The nature of the model used to synthesise the evidence on costs and outcomes was not reported. A limited one-way sensitivity analysis was used to assess the impact of uncertainty on the results. A more thorough sensitivity analysis, such as a probabilistic sensitivity analysis, could have captured the overall model uncertainty. The authors reported that the main limitation to their study was the fact that the evidence was from a wide range of sources and assumptions were needed.

Concluding remarks:
There were a number of important limitations to the study. The methods were poorly reported, especially for the costs, where neither the perspective nor the cost categories were given. As a result, it is difficult to assess the authors' conclusions.
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