Projected cost-effectiveness of primary angioplasty for acute myocardial infarction

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.

Health technology
Primary angioplasty for acute myocardial infarction.

Type of intervention
Treatment.

Economic study type
Cost-utility analysis.

Study population
Patients with acute myocardial infarction.

Setting
Secondary care. The economic study was conducted in the USA.

Dates to which data relate
Effectiveness data were derived from a review of published reports and unpublished studies. Some of the papers used were published between 1967 and 1997. Cost data relate to 1993.

Source of effectiveness data
Effectiveness data were derived from a review of previously completed studies, analysis of Kaiser Permanente data and an expert panel conference.

Modelling
A decision analytic model was created to compare three policies: primary angioplasty, intravenous thrombolysis and no intervention. Probabilities of health outcomes were taken from randomised trials and community-based studies.

Outcomes assessed in the review
Probabilities of health outcomes such as: in-hospital mortality among patient sub-groups (in cardiogenic shock, ineligible for intervention, with bleeding risk factors, thrombolysis candidates); outcomes for thrombolysis candidates (nonfatal disabling stroke, bleeding requiring transfusion, 1 year survival rate, 1 year reinfarction rate, 5 year survival rate, and procedure rates). Procedure rates were subdivided into CABG, angioplasty during hospital stay, angioplasty during next year. All those outcomes were assessed whether the patient was treated with primary angioplasty, thrombolysis or no intervention.
Study designs and other criteria for inclusion in the review
The base case used assumptions about health outcomes based on randomised trials. A base case hospital (fully covered lab scenario) was defined as having an existing cardiac catheterisation lab that performed elective procedures during weekdays and had cardiovascular surgical backup. Seven cardiologists reviewed the evidence tables that summarised the published reports about each assumption. To derive each final base case estimate, a modified Delphi approach was used in which each panelist submitted initial estimates, then reviewed and adjusted results to reach as much consensus as possible.

Sources searched to identify primary studies
Not stated.

Criteria used to ensure the validity of primary studies
Not stated.

Methods used to judge relevance and validity, and for extracting data
Not stated.

Number of primary studies included
38 studies were considered.

Methods of combining primary studies
A modified Delphi approach.

Investigation of differences between primary studies
Not stated.

Results of the review
Base case estimates for in-hospital mortality among patient sub-groups varied between 0.04 and 0.85, among thrombolysis candidates the range was 0.002 - 0.93, procedure rates (CABG, angioplasty during hospital stay, angioplasty during next year) were in the range 0.04 to 0.30.

Methods used to derive estimates of effectiveness
Estimates of effectiveness were also derived from an expert panel.

Estimates of effectiveness and key assumptions
Bleeding requiring transfusion: 0.03 for primary angioplasty, 0.02 for thrombolysis and 0.005 for no intervention.

Measure of benefits used in the economic analysis
Life-years saved and quality-adjusted life years (QALYs) saved were calculated. Quality of life adjustments were made using utilities from published patient preference studies.

Direct costs
The analysis incorporated costs of the initial hospital period, major cardiac procedures, reinfarction during the subsequent year and future medical expenses through the end of life. The cost management information system of an
HMO as well as experts' opinion was used in estimating the costs of hospital stay. The annual average costs of medical care were estimated based on the National Medical Expenditure Survey and the Coronary Heart Disease Policy Model. As stated by the authors, direct medical costs from a societal perspective were considered. 1993 costs were used and costs from other years were adjusted to 1993 dollars using the medical component of the Consumer Price Index. Costs were discounted at 3% per year over a period of 10 years.

**Statistical analysis of costs**
Not performed.

**Currency**
US dollars ($).

**Sensitivity analysis**
The authors varied four major factors both individually and simultaneously, as follows: (1) the effectiveness of primary angioplasty; (2) the hospital scenarios in which it might be offered; (3) the volume of services; (4) the time to treatment. Sensitivity analyses were also conducted for individual assumptions including in-hospital mortality, long-term survival, subsequent cardiac quality of life, the cost of thrombolysis, the cost of future medical care for survivors and the discount rate.

**Estimated benefits used in the economic analysis**
Life-years saved were found to be 684 and 741 QALYs were saved with primary angioplasty.

**Cost results**
Total costs (10,000 patients) for primary angioplasty were $724 million, for thrombolysis were $726 million, and for no intervention were $690 million.

**Synthesis of costs and benefits**
Under the base case scenario, primary angioplasty resulted in cost savings compared with thrombolysis and had a cost of $12,000/QALY saved compared to no intervention. In sensitivity analyses, when there was an existing cardiac catheterisation lab at a hospital with more than 200 patients with MI annually, primary angioplasty had a cost of less than $30,000/QALY saved under a wide range of assumptions. However, the cost/QALY saved increased sharply under effectiveness assumptions when the hospital had fewer than 150 patients with MI annually or when a redundant lab was built.

**Authors' conclusions**
At hospitals with an existing cardiac catheterisation lab, primary angioplasty for acute MI would be cost-effective relative to other medical interventions under a wide range of assumptions. The procedure's relative cost-ineffectiveness at low volumes or redundant labs, supports regionalisation of cardiac services in urban areas. However, approaches to overcoming competitive barriers and close monitoring of outcomes and costs will be needed.

**CRD COMMENTARY - Selection of comparators**
reason for the choice of the comparators is justified, as both primary angioplasty and intravenous thrombolysis for acute myocardial infarction are widely used alternatives.

**Validity of estimate of measure of benefit**
is not clear whether the probabilities of health outcomes were obtained via a thorough and systematic review of the
literature and therefore results may be biased.

**Validity of estimate of costs**

costing methodology is presented in great detail and no important cost components appear to have been omitted.

**Implications of the study**
The procedure's relative cost-ineffectiveness at low volumes or redundant labs, supports regionalisation of cardiac services in urban areas.

**Source of funding**
None stated

**Bibliographic details**

**PubMedID**
9385902

**Other publications of related interest**

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Angioplasty, Balloon, Coronary /economics /statistics & numerical data; Cardiac Catheterization; Cohort Studies; Cost-Benefit Analysis; Costs and Cost Analysis; Decision Support Techniques; Humans; Laboratories, Hospital; Myocardial Infarction /economics /therapy; Thrombolytic Therapy /economics

**AccessionNumber**
21998000025

**Date bibliographic record published**
31/01/2000

**Date abstract record published**
31/01/2000