Comparison of eptifibatide and abciximab with decision analysis

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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.

Health technology
Two platelet glycoprotein (GP) IIb/IIIa-receptor inhibitors used to reduce ischaemic events in percutaneous coronary interventions (PCIs) were compared. These were abciximab, which was the first to receive approval from the Food and Drug Administration (FDA), and eptifibatide. Abciximab was administered through an intravenous bolus of 0.25 mg/kg immediately before PCI, followed by a 0.125 microg/kg per minute infusion for 12 hours. For patients with a serum creatinine concentration of less than 2 mg/dL, eptifibatide was administered through an intravenous bolus of 180 microg/kg, followed by a 2 microg/kg per minute infusion for 20 hours. Patients with a creatinine concentration between 2.0 and 4.0 mg/dL received an initial bolus of 135 microg/kg and a 0.5 microg/kg per minute infusion.

Type of intervention

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients undergoing PCI who had received either eptifibatide or abciximab. The exclusion criteria included cardiogenic shock, acute internal bleeding, and thrombocytopenia. Further exclusion criteria were recent major surgery or trauma, stroke within the previous 30 days, history of haemorrhagic stroke, and bleeding diathesis. In addition, patients with a serum creatinine concentration of greater than 4.0 mg/dL, or those who were dialysis dependent, were excluded from the eptifibatide group.

Setting
The setting was secondary care provided at a 489-bed acute-care community hospital in Southern California, USA. The economic study was conducted in the USA.

Dates to which data relate
The effectiveness evidence was derived from a retrospective chart review of patients undergoing PCI in 1998-1999 (this was also used as the resource use source). The price year was not reported.

Source of effectiveness data
The effectiveness data were derived from a single study.

Link between effectiveness and cost data
The costing was conducted retrospectively on the same sample of patients as that used in the effectiveness analysis.
Study sample
A retrospective review was conducted on 227 patients undergoing PCI who received eptifibatide (n=109) or abciximab (n=118), on the basis of their physicians' preference during a 10-month period. The patients also received aspirin, ticlopidine and an initial heparin bolus. The author did not report the use of power calculations, or whether any patients were excluded for any reason.

Study design
This was a retrospective cohort study with 180 days of follow-up, which was conducted in a single centre. Losses to follow-up and blinding of the outcome assessment were not reported.

Analysis of effectiveness
The analysis of the clinical study was undertaken on the basis of treatment completers only. The primary health outcome was not stated. However, the clinical outcomes assessed from medical records were major and minor ADEs during hospitalisation, and 30- and 180-day outcomes for death, acute reclosure of vessels, repeat PCI, acute MI and emergency coronary artery bypass grafting (CABG). The groups were comparable at baseline in terms of age, gender, numbers of vessels stented and concomitant diseases. There were more elective PCIs in the abciximab group (35%) than in the eptifibatide group (17%), and the creatinine concentration was also higher (1.5 versus 1.2 mg/dL). These differences were not adjusted for in the analysis.

Effectiveness results
There were no major bleedings in either group. There were five minor bleedings in the eptifibatide group and two in the abciximab group.

Thrombocytopenia was observed in three patients in the abciximab group, and none in the eptifibatide group.

In total, 10 ADEs were observed in the abciximab group and 11 in the eptifibatide group.

The clinical outcome data, including the composite of the negative outcomes, showed no statistical difference between the groups.

Failure at 30 days was observed in 15.6% of the abciximab group and in 11% of the eptifibatide group. There were 0.9% deaths, 3.7% MIs, 6.4% unscheduled repeat PCIs and 4.6% CABGs in the abciximab group, and 1.7% deaths, 0.8% MIs, 7.6% unscheduled repeat PCIs and 0.8% CABGs in the eptifibatide group.

Failure at 180 days occurred in 22% of the abciximab group and in 19.5% of the eptifibatide group.

Clinical conclusions
In this study, no statistical differences in clinical outcomes were observed between the two groups at 30 and 180 days, even though the eptifibatide group had characteristics of higher acuity. The abciximab group had a higher creatinine concentration.

Modelling
A decision-tree was used to evaluate the cost-effectiveness of GP IIb/IIIa-receptor inhibitors. This was adapted from a decision tree published by Cox (see Other Publications of Related Interest). It modelled the cost, success, failure and adverse drug event (ADE) rates of both agents. Failure was defined as an occurrence of death, myocardial infarction (MI), or an unscheduled percutaneous transluminal coronary angioplasty or bypass surgery. All of the parameters came from a single study.

Measure of benefits used in the economic analysis

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There was no summary measure of benefit. In effect, a cost-consequences analysis was performed.

**Direct costs**
The cost boundary was the hospital. The hospital costs were for the drugs (acquisition plus administration), treatment failures (repeat PCI, MI, CABG or death) and treating ADEs. The latter was an aggregate of additional medications, procedures, laboratory tests, nursing time, and increase in length of stay as a result of the ADE. The costs of the initial PCI procedure do not seem to have been included in the analysis. The quantities were estimated from actual data and a decision tree was constructed to estimate the weighted average cost of successes, failures and ADEs. The quantity data came from medical records, while the cost data came from the hospital finance, pharmacy and nursing departments. Discounting was, appropriately, not undertaken since the study had a short-term horizon. The quantities and the costs were analysed and, in part, reported separately. Resources were measured from 1 June 1998 to 31 March 1999. The price year was not reported.

**Statistical analysis of costs**
The costs were treated deterministically. The group-weighted average costs were derived through a decision tree.

**Indirect Costs**
The indirect costs were not considered.

**Currency**
US dollars ($).

**Sensitivity analysis**
A sensitivity analysis was carried out to evaluate the possible impact of prescriber bias. As six physicians in the study prescribed only abciximab, a scenario that excluded patients from those clinicians was considered.

**Estimated benefits used in the economic analysis**
See the 'Effectiveness Results' section.

**Cost results**
The total average cost of treatment was $2,005 with eptifibatide versus $3,582 with abciximab. This cost included the cost of the ADEs observed in the two patient groups.

When patients from the abciximab-only prescribers were excluded (reducing the abciximab group to 78 patients), the total average cost of eptifibatide was $2,005 versus $3,307 with abciximab.

**Synthesis of costs and benefits**
The costs and benefits were not combined.

**Authors' conclusions**
An institution-specific decision analysis showed that eptifibatide and abciximab produced equivalent clinical outcomes, but eptifibatide had a lower cost to the institution than abciximab.

**CRD COMMENTARY - Selection of comparators**
The choice of the comparator was explicitly justified, although the therapeutic options considered may not have been
exhaustive. The appropriateness of having a no treatment arm was not discussed. You should therefore assess how appropriate this would be in your own setting.

**Validity of estimate of measure of effectiveness**
The basis of the analysis was a retrospective cohort study, which, as the author correctly stated, also represented the main limitation of the study. The study sample seems to have been representative of the study population. Differences in the patient groups at baseline were not adjusted for in the analysis, so there may have been selection bias. No sample size calculations were reported, thus, although no statistical differences in clinical outcomes were shown, some clinically relevant differences that were not detected in the study may exist. Variability around the results (e.g. confidence intervals), which may help the reader to evaluate the uncertainty around the results, was not reported.

**Validity of estimate of measure of benefit**
There was no summary measure of benefit. Hence the study was, in effect, a cost-consequences analysis.

**Validity of estimate of costs**
All the relevant cost categories appropriate to the study perspective appear to have been included. The author included the costs of drugs, treatment failures and ADEs, but does not appear to have included the costs of the initial PCI procedure. Although these would influence the result if there were differences between the groups, the similarity of the length of stay between the groups implies that any differences were not large. The quantities and the costs were analysed and, in part, reported separately. Resource use quantities were taken from a single study and a statistical analysis was conducted. The costs came from the institution's various departments and no statistical analysis was conducted. The price date was not reported, which may limit reflation exercises to other dates.

**Other issues**
As the author stated, since the outcome data were collected retrospectively, it was not known whether the patients relocated to another service area (e.g. hospital) because of a change in health care coverage or for another reason. However, it was assumed that this occurrence was infrequent and that it did not differ greatly between the groups.

**Implications of the study**
The author made no recommendations for policy.

**Source of funding**
None stated.

**Bibliographic details**

**PubMedID**
11494790

**Other publications of related interest**

**Indexing Status**
Subject indexing assigned by NLM
MeSH
Adult; Aged; Angioplasty, Balloon, Coronary; Antibodies, Monoclonal /administration & dosage /adverse effects /economics; California; Cost-Benefit Analysis; Decision Support Techniques; Female; Hospital Bed Capacity, 300 to 499; Hospitals, Community; Humans; Immunoglobulin Fab Fragments /administration & dosage /adverse effects /economics; Ischemic Attack, Transient /prevention & control; Male; Middle Aged; Peptides /administration & dosage /adverse effects /economics; Platelet Aggregation Inhibitors /administration & dosage /adverse effects /therapeutic use; Retrospective Studies; Treatment Outcome

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