Outcomes and costs of abciximab versus eptifibatide for percutaneous coronary intervention

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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
The study compared the use of abciximab and eptifibatide in patients undergoing stent placement during percutaneous coronary intervention (PCI). The authors reported that abciximab and eptifibatide were dosed according to the usual clinical practice at their institution (for eptifibatide, this was a 180 microg/kg double-bolus followed by a 2 microg/kg per minute continuous infusion for 18 to 24 hours).

Type of intervention
Primary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients who received a glycoprotein (GP) IIb/IIIa inhibitor on the date of stent placement. GP IIb/IIIa inhibitor selection was at the discretion of the physician.

Setting
The study setting was tertiary care. The economic analysis was undertaken at the University of Pittsburgh Medical Centre, USA.

Dates to which data relate
The outcomes and resource use for patients recruited between February 1999 and February 2001 were evaluated. 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 undertaken retrospectively on the same patient sample as that used in the effectiveness study.

Study sample
Power calculations were performed a priori for proportions and analysis of variance (ANOVA). These found that a sample size of 500 patients could show a 13% difference in the primary outcome between groups with 80% power, at a 5% level of significance. The International Classification of Diseases (ICD-9) CM codes for stent placement (36.06, 36.07) were used to identify patients. Overall, 983 patients were identified. Of these, 23 were excluded from the analysis due to incomplete data, leaving 960 in the analysis. There were 249 patients (72% male) in the abciximab
group and 711 (65% male) in the eptifibatide group. The mean age was 62 years in the abciximab group and 64 years in the eptifibatide group.

Study design
This was a retrospective cohort study that was undertaken at the University of Pittsburgh Medical Centre, USA. The authors did not report the duration of follow-up, but it appears to have been until the patient was discharged from hospital. As this was a retrospective analysis, there was no loss to follow-up. No blinded assessment was reported.

Analysis of effectiveness
All of the patients included in the study appear to have been accounted for in the analysis. The primary outcome of the study was in-hospital bleeding, stratified as major, moderate or minor. Major bleeding was defined as an intracranial haemorrhage or a decline in haemoglobin concentration of more than 5 g/dL. Moderate bleeding was defined as the need for a blood transfusion. Minor bleeding was defined as retroperitoneal or gastrointestinal bleeding, or a decline in haemoglobin concentration of more than 3 g/dL but less than or equal to 5 g/dL. The secondary outcomes included in-hospital death, myocardial infarction, revascularisation, the triple composite end point of these outcomes, thrombocytopenia and length of stay.

The patient groups were shown to be comparable in terms of their age, race, disease state, mean weight, and mean serum creatinine and glomerular filtration rate. However, there were significantly fewer males in the eptifibatide group than in the abciximab group. Logistic regression analyses were performed to determine the influence of thrombocytopenia, renal insufficiency, use of heparin, and GP IIb/IIIa inhibitor in each of the bleeding outcomes.

Effectiveness results
The proportion of patients suffering a major bleed was 2.4% in the abciximab group and 2.8% in the eptifibatide group.

The proportion of patients suffering a moderate bleed was 12.4% in the abciximab group and 10.5% in the eptifibatide group.

The proportion of patients suffering a minor bleed was 4.0% in the abciximab group and 3.9% in the eptifibatide group.

The proportion of patients with no bleeding was 81.1% in the abciximab group and 82.7% in the eptifibatide group.

The differences observed between abciximab and eptifibatide were not statistically significant, regardless of bleeding severity.

The authors also found no statistically significant differences in the incidence of thrombotic complications, thrombocytopenia or hospital length of stay.

Clinical conclusions
The authors concluded that in patients undergoing stent placement during PCI, abciximab and eptifibatide were comparable in terms of safety and effectiveness.

Measure of benefits used in the economic analysis
The authors did not derive a summary measure of health benefit. However, as no statistically significant differences in effectiveness were demonstrated, the study could be characterised as a cost-minimisation analysis.

Direct costs
The direct costs included in the analysis were those of the health care provider, in this case the hospital. Such costs included drug acquisition costs (using pharmacy billing codes) and hospitalisation costs (collected from ICD-9 codes). The authors did not specify the costs covered by hospitalisation, reporting only that the total hospital costs included...
both the direct and indirect costs incurred during the patient's hospitalisation. The authors reported that the costs were calculated using the cost-to-charge ratio for the patients in a given department. Discounting was not necessary, as the costs were incurred during a short time period, and was therefore not performed. The study reported the average costs. The price year was not reported.

**Statistical analysis of costs**
Student's t-test and an ANOVA were used to analyse the cost data. To normalise skewed cost data, a log-transformation was applied.

**Indirect Costs**
Indirect costs, such as productivity costs due to premature death and morbidity, were not included in the analysis.

**Currency**
US dollars ($).

**Sensitivity analysis**
No sensitivity analyses were undertaken.

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

**Cost results**
The mean hospital cost per patient was $16,383 (standard deviation, SD=6,799) for those in the abciximab group and $14,115 (SD=6,285) for those in the eptifibatide group. This represented a mean difference of $2,268, (p=0.001, based on log-transformed data).

The difference in drug acquisition costs between the two groups was also significantly lower for patients in the eptifibatide group than those in the abciximab group, $465 (SD=263) versus $508 (SD=159), (p=0.003, based on log-transformed data).

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

**Authors' conclusions**
In patients undergoing stent placement during percutaneous coronary intervention (PCI), abciximab and eptifibatide were comparable in terms of their safety and effectiveness, despite the hospitalisation and acquisition costs being significantly lower with eptifibatide.

**CRD COMMENTARY - Selection of comparators**
A justification was given for comparing abciximab and eptifibatide. Both of these agents were used to reduce the ischaemic complications of PCI in a broad range of patients. You should decide if these two antithrombotic agents are commonly used in your own setting.

**Validity of estimate of measure of effectiveness**
The analysis was based on a retrospective cohort analysis. This was inappropriate for the study question since these
types of study are subject to inclusion biases. A randomised controlled trial would have been more appropriate as they
minimise the potential of biases and are considered to be the gold-standard study design. The study sample appears to
have been representative of the study population. The patient groups were shown to be comparable in terms of their
age, race, disease state, mean weight, and mean serum creatinine and glomerular filtration rate. However, there were
significantly fewer males in the eptifibatide group than in the abciximab group. Appropriate statistical analyses were
used to determine if differences between the patient groups were statistically significant. Further, regression analyses
were performed to determine the impact of certain variables on the outcomes.

Validity of estimate of measure of benefit
As the analysis demonstrated that both interventions were equally effective, no summary measure of benefits was
addressed and a cost-minimisation analysis was conducted.

Validity of estimate of costs
Since the authors provided very little information on their costing study, it was unclear whether all the categories of
costs relevant to the hospital perspective adopted were included in the analysis and if all major costs were included
within each category. For example, the authors reported that the both the direct and indirect hospitalisation costs were
included. However, they provided no details of the costs covered by these two, very broad and undefined categories.
Consequently, it is not possible to determine whether any relevant costs were omitted from the analysis. The costs and
the quantities were not reported separately, which will limit the generalisability of the authors' results. The authors also
failed to report the source from which the unit costs were derived. Appropriate statistical analyses of the costs were
performed to test if differences between the groups were statistically significant. Since all costs were incurred over one
year, discounting was unnecessary. The price year was not reported, which will hamper any future inflation exercises.

Other issues
The authors reported that the bleeding rates observed in their study were comparable to those observed in prospective
clinical trials. The issue of generalisability to other settings was not addressed. The authors do not appear to have
presented their results selectively. Although the authors found that hospital costs were lower for the eptifibatide group
than for the abciximab group, they reported that there were no significant differences in length of stay, which would
appear to be the main cost-driver in the study. From their discussion, the authors provided no clear indication as to why
the costs for the eptifibatide group were significantly lower.

The authors reported several limitations to their study, which were mainly due to the nature of the study design used to
compare the two antithrombotic agents. One such limitation was the inherent problems with potential miscoding when
using ICD-9 CM codes. A further limitation was unmeasured variables which could account for differences in patient
groups. Finally, the authors could not control treatment selection as drug use and dosing was at the discretion of the
clinician.

Implications of the study
The authors reported that the reasons for the cost-differences observed in this study required further research.

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