Cost-effectiveness analysis of enoxaparin versus unfractionated heparin for acute coronary syndromes: a Canadian hospital perspective

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
Enoxaparin therapy for patients with acute coronary syndromes.

Type of intervention
Secondary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
A hypothetical cohort of patients presenting to hospital with acute coronary syndromes: unstable angina or non-Q-wave myocardial infarction.

Setting
Tertiary care (Vancouver General hospital). The economic study was conducted in Canada.

Dates to which data relate
The bulk of the effectiveness data were derived from the ESSENCE (Efficacy and Safety of Subcutaneous Enoxaparin in Non-Q-Wave Coronary Events) trial (1997). Two other studies were used for the probabilities of patients receiving revascularisation procedures (PTCA and CABG) after MI: Management of unstable Angina Pectoris and Non-Q-wave myocardial infarction in the USA and Canada (Anderson et al, 1997) and use of cardiac procedures and outcomes in elderly patients with MI in the USA and Canada (Tu et al, 1997). Costs were adjusted to 1999 Canadian dollar values.

Source of effectiveness data
Effectiveness data were derived from a review of previously published studies.

Modelling
A predictive decision analysis model was created using Data 3.0.18 (Treeage Software Inc). The end point of the decision analysis model was defined as any event of the ESSENCE trial composite end-point (death, MI, recurrent angina) at 30 days.

Outcomes assessed in the review
Treatment outcomes at 30 days were considered, as follows: probability of patients having 1 or more event at the composite end-point, mean number of events in patients having 1 one or more event at the composite end-point (death, MI, recurrent angina), revascularisation probabilities post MI for CABG and PTCA, revascularisation probabilities post
recurrent angina for CABG and PTCA, percentage of major bleeding episodes in patients with 1 or more bleeding episodes (intracranial, retroperitoneal, haematoma, and other (fall in haemoglobin of 30 g/l or more or requirement for transfusion of at least 2 units of blood)).

**Study designs and other criteria for inclusion in the review**
Not reported.

**Sources searched to identify primary studies**
Circulation publications, New England Journal of Medicine, Journal of the American College of Cardiology, American Heart Journal, Communications made at the 20th Congress of the European Society of Cardiology - Vienna, and the Archives of Internal Medicine were referenced as sources of information. No further details were provided.

**Criteria used to ensure the validity of primary studies**
Not reported.

**Methods used to judge relevance and validity, and for extracting data**
A prospective, randomised, double blind, parallel group trial was used to extract the probabilities for most of the indicators used in the model. Two other studies dealing with acute coronary syndromes were considered relevant and were also used to obtain probabilities for outcomes not addressed in the ESSENCE trial. No further details were provided.

**Number of primary studies included**
At least five studies were included.

**Methods of combining primary studies**
The narrative method was used.

**Investigation of differences between primary studies**
Not stated.

**Results of the review**
Probabilities for treatment outcomes at 30 days for UFH versus enoxaparin are shown below:

Probability of patients having 1 or more event at the composite end-point (%) 0.233 versus 0.198.

Mean number of events in patients having 1 or more event at the composite end-point: death, 0.157 versus 0.148; MI, 0.223 versus 0.195; recurrent angina, 0.772 versus 0.792.

Revascularisation probabilities post MI: CABG, 0.014 versus 0.014; PTCA, 0.015 versus 0.015.

Revascularisation probabilities post recurrent angina: CABG, 0.145 versus 0.145; PTCA, 0.288 versus 0.288.

Percentage of major bleeding episodes in patients with 1 or more bleeding episodes: intracranial, 0.93 versus 0; retroperitoneal, 0.93 versus 0.96; GI, 3.7 versus 9.6; hematoma, 11.2 versus 4.8; and other (fall in haemoglobin of 30 g/l or more or requirement for transfusion of at least 2 units of blood), 83.2 versus 84.6.
Measure of benefits used in the economic analysis
The measures of benefit were the number of patients reaching a composite endpoint and rise in major bleeding complications. These were estimated using decision modelling techniques.

Direct costs
Only direct medical costs were considered, namely hospital costs resulting from the treatment of events comprising the composite end-point, revascularisation procedures, enoxaparin therapy, UFH therapy, related medications and major bleeding. Costs were subdivided into 4 categories: labour, procedure, laboratory, and intake (food and drug costs excluding enoxaparin and UFH). Drug costs were obtained from the hospital's pharmacy department and labour costs were based on the existing union contracts. Cost estimates for major bleeding complications were obtained from a published Canadian pharmaco-economic analysis on the treatment of proximal vein thrombosis using low weight heparin (LMWH) and UFH (1997). All costs were adjusted to 1999 Canadian dollars (Can$) and discounting was not required because of the 30 day analytical horizon. Costs associated with minor bleeding episodes were not included in the analysis.

Indirect Costs
Indirect costs were not considered.

Currency
Canadian dollars (Can$).

Sensitivity analysis
Estimates of enoxaparin and UFH costs, event rates included in the composite end-point and major bleeding complications were varied over a plausible range of values. Ranges tested included 95% confidence intervals when available. Univariate analysis was used to calculate the effects of these changes on health outcomes, costs and cost-effectiveness. Multivariate analyses were also conducted by incorporating the range of costs and probabilities of the composite end-point and the costs of study drugs. The analyses indicated that the decision model was not robust to changes in the 30-day composite end-point, the probability of recurrent angina, or the base costs for treatment of recurrent angina or enoxaparin therapy.

Estimated benefits used in the economic analysis
At 30 days, 19.8% of patients who received enoxaparin compared to 23.3% of patients who received UFH, reached one of the primary composite events. There was no difference in major bleeding between the 2 treatment groups: 6.5% with enoxaparin versus 6.8% with UFH.

Cost results
The average total direct medical cost per patient was Can$848 with the enoxaparin strategy versus Can$892 with UFH strategy.

Synthesis of costs and benefits
A synthesis of costs and benefits was not performed as the enoxaparin strategy was dominant.

Authors' conclusions
Enoxaparin is the dominant antithrombotic pharmacotherapeutic strategy for patients with unstable coronary artery disease.
CRD COMMENTARY - Selection of comparators
The reason for the choice of the comparator (UFH) is clear, as both therapies (enoxaparin and UFH) are widely used in
the authors’ setting. You, as a database user, should consider if the same applies to your own setting.

Validity of estimate of measure of benefit
Benefits were estimated using decision modelling techniques. However, insufficient details were provided of the
methods used to identify and select the studies used to derive the inputs to the model. As a result caution should be
exercised when interpreting and applying the results of the model.

Validity of estimate of costs
Extensive details of the cost components were presented in the study. However, the sensitivity analyses revealed that the
model was not sufficiently robust to accommodate for variations in base costs for the treatment of recurrent angina or
enoxaparin therapy. The authors included only direct medical costs in the analysis, while a broader perspective would
have been more helpful. Cost results may not be generalisable to other settings or countries.

Other issues
Given the uncertainties of the data and the narrow range of costs included in the analysis, the results of this study should
be interpreted with a degree of caution. The authors provided comparisons with other study results and also a brief
discussion of the anticipated effect of other costs on study results.

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Unfunded.

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Other publications of related interest


Tu J V, Pashos C L, Naylor C D, et al. Use of cardiac procedures and outcomes in elderly patients with myocardial


Hull R D, Raskob G E, Rosenbloom D, et al. Treatment of proximal vein thrombosis with subcutaneous low-molecular-

Indexing Status
Subject indexing assigned by NLM
MeSH
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