Comparison of the cost of preventing postoperative deep vein thrombosis with either unfractionated or low molecular weight heparin

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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
To prevent post-operative deep vein thrombosis (DVT) using either low-dose unfractionated heparin (UFH) or low molecular weight heparin (LMWH) versus no prophylaxis or selective treatment of DVT following general surveillance with the fibrinogen uptake test (FUT).

Type of intervention
Secondary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
Patients undergoing elective general abdominal surgery or elective hip surgery who are at moderate and high risk of developing DVT.

Setting
Hospital. The economic study was carried out in Sweden.

Dates to which data relate
The effectiveness data were extracted from three reviews published in 1992 and 1993. The resource use data were obtained from a randomised controlled study published in 1988. The prices used were from 1993.

Source of effectiveness data
The evidence for the final outcome was based on three reviews of previously completed studies and assumptions made by the authors.

Outcomes assessed in the review
The outcomes assessed in the review were prophylactic effectiveness, initial frequency of clinically detected thromboembolism with no prophylaxis, and frequency of bleeding complications.

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

Sources searched to identify primary studies
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
Three reviews.

Methods of combining primary studies
Not stated.

Investigation of differences between primary studies
Not stated.

Results of the review
In general surgery, prophylactic effectiveness of both UFH and LMWH was 90%; in hip surgery for UFH it was 72% and for LMWH it was 79%. The initial frequency of clinically detected thromboembolism with no prophylaxis in general was 11.5% and in hip surgery was 23%. For UFH it was 1.1% and 6.6% respectively and for LMWH it was 1% and 5% respectively. For the fibrinogen uptake test it was 29% and 59% respectively, for UFH it was 57% and 33% respectively, and for LMWH it was 4.1% and 19.5% respectively. The frequency of bleeding complications of prophylaxis with UFH in general and hip surgery was 4.8%, and for LMWH it was 3.6%, whilst, for treatment with no prophylaxis, UFH, and LMWH in general and hip surgery it was 11%.

Methods used to derive estimates of effectiveness
Assumptions on effectiveness were also made by the authors.

Estimates of effectiveness and key assumptions
The assumptions of effectiveness were:

(1) thromboembolism was detected clinically,

(2) among patients with thromboembolism, 86% had DVT and 14% had pulmonary embolism.

Measure of benefits used in the economic analysis
No summary benefit measure was identified in the economic study, and only separate clinical outcomes were reported.

Direct costs
Quantities were not reported separately from the costs. The cost components were reported separately. The hospital costs included were the costs of the surveillance test, prophylaxis and treatment of DVT. The perspective adopted in the cost analysis was not explicitly specified. Cost data were obtained from a hospital. The estimates of resource use data were based on a randomized clinical trial consisting of 24 patients. 1993 price data were used.
Indirect Costs
Not stated.

Currency
Swedish kroner (SEK). The exchange rate at the time of the study in 1993 was reported to be: SEK100 = $12.60 or 8.20.

Sensitivity analysis
A sensitivity analysis was carried out. The altered variables were: prophylactic effectiveness of unfractionated heparin and LMWH; initial frequencies of thrombosis without prophylaxis; costs of treating thromboembolism; costs of treating bleeding complications resulting from prophylaxis; and prices of the various LMWHs. A one-way simple sensitivity analysis and a multi-way simple sensitivity analysis were carried out. A threshold analysis was also performed.

Estimated benefits used in the economic analysis
Not applicable.

Cost results
In general surgery, the cost per patient for no prophylaxis was SEK1,950, for selective treatment of DVT it was SEK5,710 and for general prophylaxis with UFH and LMWH it was SEK735 and SEK665 respectively. In hip surgery, the cost per patient for no prophylaxis was SEK3,930, for selective treatment of DVT it was SEK10,790 and for general prophylaxis with UFH and LMWH it was SEK1,730 and SEK1,390 respectively.

Synthesis of costs and benefits
Costs and benefits were combined by performing threshold analysis. In general and hip surgery, general prophylaxis with UFH and LMWH (SEK 1,400 and SEK 3,120 respectively) was less expensive than no prophylaxis or selective treatment of DVT following surveillance with the FUT (SEK 7,660 and SEK 14,720 respectively). In general surgery, for the cost of general prophylaxis to be equal to the cost of no prophylaxis with selective treatment, the prophylactic effectiveness of UFH and LMWH should be less than 29% and 24% respectively (initial assumption: 90%). In hip surgery, it was 32% for both UFH and LMWH (initial assumption: 72% and 79% respectively).

For the general prophylaxis strategy to be as expensive as the no-prophylaxis alternative, the frequency of thromboembolism in general and in hip surgery for UFH should be 36% and 5% respectively. For LMWH, the initial frequency of thromboembolism in general and in hip surgery should be 3.2% and 4.3% respectively, in order to break even. For the no-prophylactic strategy to be as inexpensive as the general prophylaxis strategy using LMWH, the cost of treating one thromboembolism should be less than SEK4,715 in general surgery and SEK3,125 in hip surgery. For the no-prophylaxis strategy to be as inexpensive as the general prophylaxis strategy in general surgery (using LMWH), each bleeding complication resulting from prophylaxis costing SEK8,700 should increase to SEK44,305. In hip surgery, it should increase to SEK79,165.

To be cost-effective, the frequency of thromboembolism could be reduced by the least expensive LMWH from a range of 23.2% to 4.8% and the most expensive by 4.25%. General prophylaxis with LMWH will be more cost-effective than general prophylaxis with UFH. In general and hip surgery, the mean price of LMWH could be 37% and 128% respectively greater than UFH. Altering the 4 variables at the same time, the general prophylaxis strategy could be 15% cheaper than the no-prophylaxis strategy. The threshold and sensitivity analyses established the robustness of the results.

Authors' conclusions
The authors concluded that the least expensive management strategy in patients undergoing elective general abdominal or hip surgery would appear to be general prophylaxis with either unfractionated heparin or LMWH. Furthermore, general prophylaxis with LMWH would appear to be more cost-effective than general prophylaxis with unfractionated
heparin.

CRD COMMENTARY - Selection of comparators
The reason for the choice of the comparators is clear.

Validity of estimate of measure of benefit
The internal validity of the effectiveness results can not be assessed due to the lack of information regarding the study designs adopted in the three reviews used as references for the clinical outcomes.

Validity of estimate of costs
Resource utilisation was not reported separately from the costs. Adequate details of the methods of cost estimation were not given. The study seemed to lack a detailed cost analysis.

Other issues
Given the limitations referred to above, the results may need to be treated with some caution. The issue of generalisability to other settings/countries was addressed (the results were considered generalisable due to the comprehensive sensitivity analyses performed).

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Other publications of related interest

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