Shifting from inpatient to outpatient treatment of deep vein thrombosis in a tertiary care center: a cost-minimization 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 therapies for the treatment of deep vein thrombosis (DVT), unfractionated heparin (UFH) and low molecular weight heparin (LMWH), were examined. The former (UFH) was administered in an inpatient setting where patients were hospitalised for 7 days. The latter (LMWH) was provided on an outpatient basis.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients with DVT eligible for outpatient therapy. The exclusion criteria included, amongst others, at least two prior pulmonary emboli or DVTs, active bleeding at the time of DVT diagnosis, more than two transfusions in the 48-hour period before DVT diagnosis or physician progress notes describing a major bleeding. Patients with an active documented peptic ulcer were also excluded, as were those with a high fall risk.

Setting
The setting was a tertiary care teaching hospital. The economic study was carried out at the General Campus of the Ottawa Hospital in Canada.

Dates to which data relate
The effectiveness evidence came from studies published between 1996 and 2001. The data on resource use were gathered in 1996 for UFH patients and between March 2000 and January 2001 for LMWH patients. The price year appears to have been 2000.

Source of effectiveness data
The effectiveness evidence was derived from published studies.

Outcomes assessed in the review
The specific health outcomes estimated from the published studies were not reported because the authors mentioned only the conclusions of these studies.

Study designs and other criteria for inclusion in the review
Two of the studies included were clinical trials. There was no information on the other two studies included in the
Sources searched to identify primary studies
Not stated.

Criteria used to ensure the validity of primary studies
The authors underlined the relevance of two primary studies included in the review, which were the only two published trials comparing UFH and LMWH.

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

Number of primary studies included
Four primary studies were used in the review.

Methods of combining primary studies
Not relevant because the study estimates were not combined.

Investigation of differences between primary studies
Not stated.

Results of the review
The conclusions of the studies demonstrated the clinical equivalence of the two therapies.

Measure of benefits used in the economic analysis
No summary benefit measure was used in the economic analysis because a cost-minimisation analysis was conducted.

Direct costs
Discounting was irrelevant because the costs per patient were incurred during a short time. The unit costs were analysed separately from the quantities of resources used. The health services included in the economic evaluation were nursing time, drugs, monitoring and other resources (e.g. diagnostic laboratory tests and medical imaging procedures). Medical consultation fees were not included because the physicians were not hospital employees. The cost/resource boundary adopted in the study was that of the hospital.

For the UFH group, resource use was estimated from a case/costing hospital database. For the LMWH group, resource use was obtained from the results of a prospective observational study performed in the institution (this study was carried out only to obtain evidence of resource use and not to estimate the clinical effectiveness of LMWH). The unit costs were derived using actual data, which were extracted from the hospital accounting software system. The price year was 2000. The data for the LMWH group were collected between March 2000 and January 2001. The prices estimated in the UFH group were gathered in 1996 and were reflated using the consumer price index, which increased by 10.7% in Canada from 1995 to 2000.

Statistical analysis of costs
The costs were reported as average values and 95% confidence intervals (CIs). Student's t-test was used to test the statistical significance of the difference in the estimated total costs.
**Indirect Costs**
The indirect costs were not included.

**Currency**
Canadian dollars (Can$).

**Sensitivity analysis**
A worst-case scenario analysis was conducted to evaluate the effect of uncertainty on the cost estimates used in the base-case. The drug unit costs were increased by 20%, the mean nursing time spent with each patient was increased by 20%, and the nursing services and laboratory tests were inflated by 20%.

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

**Cost results**
The mean direct costs per patient were Can$2,826.17 in the inpatient UFH group and Can$247.98 (95% CI: 216.13 - 279.83) in the outpatient LMWH group, (p<0.0005). In the worst-case scenario the mean per patient costs in the outpatient setting increased to Can$366, which were still far below the costs estimated in the inpatient setting.

**Synthesis of costs and benefits**
Not relevant because a cost-minimisation analysis was conducted.

**Authors' conclusions**
The shift from inpatient unfractionated heparin (UFH) to outpatient low molecular weight heparin (LMWH) therapy for the treatment of patients with deep vein thrombosis (DVT) reduced the hospital costs by 91.2%. This conclusion was based on the clinical equivalence of the two treatment strategies.

**CRD COMMENTARY - Selection of comparators**
The rationale for the choice of the comparator was clear. UFH represented the standard approach for patients with DVT, while LMWH is the new therapy. Two types of LWMH were used, tinzaparin and dalteparin. The authors acknowledged that other heparins, such as enoxaparin, nadroparin and reviparin, may be used in different settings. You should decide whether they represent valid comparators in your own setting.

**Validity of estimate of measure of effectiveness**
The analysis of effectiveness used data obtained from published studies. A formal review of the literature was not undertaken and only the conclusions of the primary studies were reported in this analysis. However, the authors also reported the results of a meta-analysis, which suggested that the two therapies were equivalent. The authors stated that there was, in general, sufficient evidence supporting the equivalence in clinical outcomes between the two alternatives investigated.

**Validity of estimate of measure of benefit**
No summary benefit measure was used in the economic analysis due to the cost-minimisation design adopted.

**Validity of estimate of costs**
The perspective adopted in the study was explicitly stated. All relevant categories of costs were included in the economic evaluation. The unit costs and the quantities of resources used were analysed separately and the price year was provided. These enhance the reproducibility of the economic analysis in other settings. The reflation of the costs was appropriate. The source of the cost data was reported and the authors described the methodology used to calculate the total costs. Statistical tests were conducted on the costs and a scenario analysis was also performed. The authors also considered the issues of cost shifting, and the fact that some costs had been incurred in locations other than the study hospital. This approach enhanced the internal validity of the cost analysis.

Other issues
The authors compared their findings with those from other studies. In terms of the generalisability of the study results to other settings, the authors stated that their results were applicable to other settings interested in developing DVT treatment. Although only a few sensitivity analyses were conducted, the cost-advantage associated with outpatient treatment was sufficiently large to warrant saving in many settings. The analysis referred to carefully selected patients with DVT and the study conclusions should be limited to patients similar to those in the present analysis.

The authors discussed some limitations of their analysis. In particular they underlined that, for a proportion of patients referred to the outpatient clinic (LMWH group), part of the work-up had already been done, potentially reducing the other cost elements of these cases. Also, part of the hospital savings with the outpatient treatment were due to a shift in the drug purchasing cost to the patients (approximately $80 to $100). It would be interesting to investigate whether this cost shift would reduce patient acceptance of outpatient treatment for DVT.

Implications of the study
The study results suggested that for patients meeting the criteria for outpatient treatment, the switch from inpatient UFH to LMWH led to significant cost-savings from the perspective of the hospital.

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