Cost-effectiveness of deep venous thrombosis prophylaxis in gynecologic oncology surgery

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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
Deep venous thrombosis (DVT) prophylaxis in gynaecologic oncology surgery.

Type of intervention
Primary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
Patients undergoing major pelvic and abdominal surgery for gynaecologic malignancy.

Setting
A hospital setting was used. The study was carried out in the USA.

Dates to which data relate
Effectiveness and resource use data were collected from studies published between 1968 and 1998. Cost data were collected from a 1998 source and two studies published in 1999. The price year was 1998.

Source of effectiveness data
Effectiveness data were derived from a review of the literature.

Modelling
A decision analytic model was used to estimate the cost-effectiveness of the three preventive strategies.

Outcomes assessed in the review
The review assessed the risk for DVT, risk reduction following preventive strategies, and rate of bleeding complications.

Study designs and other criteria for inclusion in the review
The review covered the English language literature.

Sources searched to identify primary studies
The sources searched to identify primary studies were not stated.
Criteria used to ensure the validity of primary studies
The criteria used to ensure the validity of primary sources was not stated.

Methods used to judge relevance and validity, and for extracting data
Summary statistics from individual studies.

Number of primary studies included
At least 61 primary studies were included in the review.

Methods of combining primary studies
A narrative method.

Investigation of differences between primary studies
There was no investigation of the differences between primary studies.

Results of the review
The baseline risk for DVT in patients without malignancy was 6%. The risk reduction in symptomatic patients given unfractionated heparin prophylaxis was 0.68. The risk reduction associated with external pneumatic compression prophylaxis was 0.69. The risk reduction associated with low molecular weight heparin prophylaxis was 0.68. The rate of bleeding complications requiring medical or surgical intervention was 0 for patients receiving external pneumatic compression. A 35-year-old patient undergoing a radical hysterectomy for stage IB cervical cancer had a DVT risk 50% higher than that for a patient with benign disease. A 55-year-old with stage I endometrial cancer had a two-fold increase in DVT risk. A 65-year-old with stage IIIC ovarian cancer had a four-fold relative risk of DVT compared with the patient with cervical cancer.

Measure of benefits used in the economic analysis
The number of DVTs prevented, the number of fatal pulmonary embolus (PE) prevented, and the number of life years saved were used as the measures of benefit. Life years were discounted at an annual rate of 3%.

Direct costs
Direct costs were discounted at an annual rate of 3%. Quantities and costs were reported separately. Direct costs covered the cost of diagnosis and treatment of DVT and PE, including costs of Doppler ultrasound and other diagnostic tests, costs of bleeding complications, and costs of post-operative chemotherapy. The quantity/cost boundary adopted was that of the hospital. The estimation of quantities and costs was based on actual data. Costs were collected from the Duke University Health System. Charges for gynaecologic malignancy were derived from the Health Care Financing Administration Medicare Provider Analysis and Review database for 1997. The price year was 1998.

Statistical analysis of costs
The statistical analysis of costs was not reported.

Indirect Costs
Indirect costs were not included.

Currency
NHS Economic Evaluation Database (NHS EED)
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US dollars ($).

**Sensitivity analysis**
Sensitivity analyses were conducted on cost and effectiveness estimates.

**Estimated benefits used in the economic analysis**
For a 35-year-old woman with cervical cancer, 244.8 DVTs per 10,000 were prevented with unfractionated heparin (LDH) and low-molecular weight heparin (LMWH). The number of fatal PEs prevented per 10,000 was 65 for LDH and LMWH and 66 for external pneumatic compression (EPC). Life expectancy was 22.446 with LDH and LMWH, 22.449 with EPC and 22.226 without prophylaxis. For a 55-year-old woman with endometrial cancer, 490 DVTs per 10,000 were prevented with LDH and LMWH and 497 for EPC. The number of fatal PEs prevented per 10,000 was 130 for LDH and LMWH and 132 for EPC. Life expectancy was 20.278 for LDH and LMWH, 20.281 for EPC and 20.012 without prophylaxis. For a 65-year-old with ovarian cancer, 980 DVTs per 10,000 were prevented with LDH and LMWH and 994 with EPC. The number of fatal PEs prevented per 10,000 was 260 with LDH and LMWH and 264 with EPC. Life expectancy was 6.807 for LDH and LMWH, 6.810 for EPC and 6.628 without prophylaxis.

**Cost results**
For a 35-year-old woman with cervical cancer the mean cost per patient was $2,866 without prophylaxis, $2,912 for EPC, $3,069 for LDH, and $3,084 for LMWH. For a 55-year-old woman with endometrial cancer, the mean cost per patient was $965 without prophylaxis, $973 for EPC, $1,123 for LDH, and $1,140 for LMWH. For a 65-year-old woman with ovarian cancer, the mean cost per patient was $31,955 without prophylaxis, $32,889 for EPC, $33,026 for LDH, and $33,042 for LMWH.

**Synthesis of costs and benefits**
External pneumatic compression was the most cost-effective strategy in each of the three patient groups. LDC and LMWH were dominated interventions.

The analysis comparing EPC to no prophylaxis gave the following results. For a 35-year-old woman with cervical cancer, the incremental cost per DVT prevented was $810 and the incremental cost per life year gained was $207. For a 55-year-old woman with endometrial cancer, the incremental cost per DVT prevented was $161 and the incremental cost per life year gained was $27. For a 65-year-old woman with ovarian cancer, the incremental cost per DVT prevented was $9,396 and the incremental cost per life year gained was $5,132. The variables that had the strongest impact on cost-effectiveness estimates were the probability of DVT and PE, the cost of treating disease in patients who do not experience a fatal PE, and life expectancy.

**Authors’ conclusions**
Prophylaxis of DVT is cost-effective in terms of life years gained even for patients with relatively short life expectancies, such as ovarian cancer patients. External pneumatic compression appears to be the most cost-effective strategy under baseline assumptions.

**CRD COMMENTARY - Selection of comparators**
A justification was given for the comparators used, namely currently available preventive strategies. You, as a user of the database, should decide if these health technologies are relevant to your setting.

**Validity of estimate of measure of benefit**
The authors did not state that a systematic review of the literature had been undertaken. More details about the conduct of the review could have been provided. Effectiveness estimates were derived credibly from primary studies. The estimation of benefits was obtained directly from the effectiveness analysis. The quality of the evidence on the relative
effectiveness of each of the regimens in gynaecologic cancer patients was variable.

**Validity of estimate of costs**
All categories of cost relevant to the perspective adopted were included in the analysis. Estimates probably underestimated the true cost of ovarian cancer care after the initial surgical procedure because most patients receive additional chemotherapy regimens as well as other surgical procedures in the treatment of their disease. Quantities and costs were reported separately. A sensitivity analysis was conducted on costs, but not on quantities. Charges were used to proxy prices. The price year was reported.

**Other issues**
The authors did make appropriate comparisons of their findings with those from other studies. The issue of generalisability to other settings was not addressed. The authors did not present their results selectively. The study considered patients undergoing gynaecologic oncology surgery and this was reflected in the authors' conclusions. The authors did not examine the costs of long-term disabilities and resultant costs associated with post-thrombotic syndrome. Estimates of costs were based on several sources, primarily hospital charges. The authors did not incorporate patient preferences for treatments or outcomes.

**Implications of the study**
Further trials comparing external pneumatic compression with low molecular weight heparin that incorporate patient preference measures are needed to better estimate the relative cost-effectiveness of low molecular weight heparin in this patient population.

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