Cost-effectiveness of thromboprophylaxis with intermittent pneumatic compression at Cesarean delivery
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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 examined perioperative thromboprophylaxis with intermittent pneumatic compression at the time of Caesarean delivery. This strategy was compared with an option of not using perioperative thromboprophylaxis.

Type of intervention
Primary prevention.

Economic study type
Cost-utility analysis.

Study population
The study population comprised a hypothetical cohort of pregnant women aged 30 years who had not been anticoagulated during their pregnancy.

Setting
The setting was a hospital. The economic study was carried out in the USA.

Dates to which data relate
The clinical data were derived from studies published between 1965 and 2005. No dates for the resource use data were reported. The price year was 2004.

Source of effectiveness data
The clinical data used in the model were:

the rate of DVT post Caesarean delivery (symptomatic and asymptomatic),

the rate of pulmonary embolism (PE) if DVT was not treated,

the rate of mortality associated with PE from untreated DVT,

the complications of DVT treatment (minor and major bleeding, cardiovascular accident and death in case of bleeding),

1-year recurrence after initial DVT,

post-thrombotic syndrome,

post-thrombotic syndrome after recurrence, and
the reduction in risk of DVT with intermittent pneumatic compression prophylaxis (effectiveness).

**Modelling**
A Markov model was constructed to simulate the risk of DVT and the history of disease in hypothetical pregnant women. The model followed women over their lifetime. The cycle length was not explicitly reported, but it might have been 1 year. The structure of the model was not represented graphically, but the key transition patterns and main health states were described. The model focused on the rate of DVT (asymptomatic or symptomatic) and its complications. The two main branches of the model differed only in that women receiving prophylaxis during and after their Caesarean delivery decreased their risk of DVT.

**Sources searched to identify primary studies**
There was no information on the sources of the clinical data.

**Methods used to judge relevance and validity, and for extracting data**
The approach used to identify the primary studies was not described.

**Measure of benefits used in the economic analysis**
The summary benefit measure used was the expected number of quality-adjusted life-years (QALYs). These were estimated using the modelling framework. QALYs were calculated by combining survival data with changes in quality of life associated with model health states. These values were derived from published studies but no details of the studies were given. The QALYs were discounted at an annual rate of 3%.

**Direct costs**
The cost analysis was carried out from the perspective of the health care system. The cost categories considered in the analysis were pneumatic compression boots and the treatment of health conditions such as DVT, PE, bleeding complications, cardiovascular accident and post-thrombotic syndrome. A breakdown of the cost items was generally not given. The exception was the costs of a DVT, which included those from pharmacological therapy, inpatient stay, physician visits and laboratory monitoring. The source of the resource use data was not reported. The costs were derived from the literature but no details of the source studies were given. Discounting was relevant, as long-term costs were evaluated, and an annual rate of 3% was used. All costs were inflated to 2004 values using the medical care component of the Consumer Price Index.

**Statistical analysis of costs**
The costs were treated deterministically.

**Indirect Costs**
Productivity costs were not considered.

**Currency**
US dollars ($).

**Sensitivity analysis**
A deterministic sensitivity analysis was performed on all model inputs. Both one- and two-way sensitivity analyses were carried out. The ranges of values under examination were derived from the literature. The impact of the most influential parameters was displayed using a tornado diagram. Two key thresholds for cost-effectiveness were considered, $50,000 and $100,000 per QALY.
Estimated benefits used in the economic analysis
The expected QALYs were 25.11120 with no prophylaxis and 25.11383 with prophylaxis (difference 0.00263).

Cost results
The expected costs were $22.60 with no prophylaxis and $126.60 with prophylaxis (difference $104).

Synthesis of costs and benefits
An incremental cost-utility ratio was calculated to combine the costs and QALYs of the two strategies.

The incremental cost per QALY gained with prophylaxis over no prophylaxis was $39,545, which is below the commonly cited threshold of $50,000 per QALY.

The results of the sensitivity analysis showed that the most influential parameters were the cost of intermittent pneumatic compression, the effectiveness of intermittent pneumatic compression, and the probability of having a DVT after Caesarean. Specifically, the incremental cost per QALY gained with prophylaxis remained below $50,000 as long as the incidence of post-Caesarean DVT (both symptomatic and asymptomatic) was at least 0.68%, intermittent pneumatic compression reduced the change of DVT by at least 50%, or the cost of intermittent pneumatic compression was less than $180.

Authors' conclusions
Thromboprophylaxis using intermittent pneumatic compression represents a cost-effective strategy in women undergoing Caesarean, although the results are highly dependent on variables such as the effectiveness of prophylaxis and the cost of compression boots.

CRD COMMENTARY - Selection of comparators
The choice of the comparators appears to have been appropriate in that both strategies (prophylaxis and no prophylaxis) are recommended in different settings and for women at different risk for DVT. For example, the authors stated that routine thromboprophylaxis is not standard practice in the USA. You should decide whether they are valid comparators in your own setting.

Validity of estimate of measure of effectiveness
The clinical data were derived from published studies. However, no systematic search for data was performed. In effect, it appears that the primary studies have been identified selectively rather than through a systematic review of the literature. No information on the primary studies was given, which means that it is not possible to make an objective assessment of the validity of the clinical estimates used in the model.

Validity of estimate of measure of benefit
The benefits (QALYs) were modelled using the Markov model. The sources of utility weights used to calculate the QALYs were not described, thus the approach used to derive quality of life was not clear.

Validity of estimate of costs
The categories of costs included in the analysis were consistent with the authors' stated perspective. As for the other methodological aspects of the analysis, little information was provided on the cost analysis. The costs were presented as macro-categories and a breakdown of items was provided only for the treatment of an episode of DVT. Details on the unit costs and quantities of resources used were not reported, which limits the possibility of replicating the analysis in other settings. Statistical analyses were not performed, but the impact of variations in cost estimates was investigated in the sensitivity analysis. The price year was reported, which enhances the generalisability of the study results to other time periods.

Other issues
The authors did not compare their findings with those from other studies. The issue of the generalisability of the study results to other settings was not addressed, although the use of sensitivity analysis improves the external validity of the study. In general, the methods of the analysis (e.g. information on sources of data or model details) were not extensively reported. Although the results of the sensitivity analysis were presented selectively, the effect of changes in key parameters was illustrated.

Implications of the study
The study results support the routine use of thromboprophylaxis in women undergoing Caesarean delivery. The authors noted that the availability of more reliable data on the frequency of perioperative DVT in different sub-populations of women would enable the results of the current analysis to be confirmed.

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MeSH
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