Cost-effectiveness of traditional and endovenous treatments for varicose veins
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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.

CRD summary
This study examined the cost-effectiveness of eight commonly used traditional or intravenous treatments for primary unilateral great saphenous vein reflux. The authors concluded that strategies of radiofrequency ablation or endovenous laser ablation, performed under local or tumescent anaesthesia, in an out-patient or clinician-office setting, or traditional out-patient varicose vein surgery were likely to be cost-effective. The methods were valid and the study was clearly presented. The authors’ conclusions appear to be robust.

Type of economic evaluation
Cost-utility analysis

Study objective
This study examined the cost-effectiveness of eight commonly used traditional and endovenous treatments for primary unilateral great saphenous vein (GSV) reflux.

Interventions
The interventions were: traditional GSV surgery as an in-patient, traditional GSV surgery as an out-patient, ultrasound-guided foam sclerotherapy (UGFS) in a clinician's office, endovenous laser ablation (EVLA) in a clinician's office, EVLA as an out-patient, radiofrequency ablation in a clinician's office, radiofrequency ablation as an out-patient, and conservative care with no surgery. Clinician-office treatment was under local anaesthetic, while hospital treatment was under general anaesthetic.

Location/setting
UK/hospital in-patient and out-patient, and primary care.

Methods
Analytical approach:
The analysis was based on a Markov model, with a five-year time horizon. The authors stated that the perspective of the UK NHS was adopted.

Effectiveness data:
The clinical evidence came from randomised controlled trials (RCTs) that were identified by a published literature review and meta-analysis. A further literature review was carried out to identify trials comparing sequential with concomitant phlebectomy. The estimates from these trials were combined, using meta-analysis. The probability of success, which was defined as a complete occlusion without varicosity at three months, was the key input of the model.

Monetary benefit and utility valuations:
The utility values were from a randomised study, which mainly assessed them using the European Quality of life (EQ-5D) questionnaire.

Measure of benefit:
Quality-adjusted life-years (QALYs) were the summary benefit measure and were discounted at an annual rate of 3.5%.

Cost data:
The economic analysis included the costs of surgery plus catheter, generator, ultrasonography, out-patient attendance, and sclerosant. The cost of conservative care for the NHS was assumed to be negligible. The costs were mainly from
NHS sources (Healthcare Resource Groups), while some were from list prices and manufacturer information. They were in UK pounds sterling (£), the reference year was 2008 to 2009, and a 3.5% annual discount rate was applied.

Analysis of uncertainty:
The uncertainty was investigated in a Monte Carlo simulation, with probability distributions assigned to the model inputs, and cost-effectiveness acceptability curves were presented. A one-way sensitivity analysis was carried out, using plausible ranges of values.

Results
Projected five-year costs were zero for conservative management, £429 with office UGFS, £1,031 with office EVLA, £1,110 with office radiofrequency ablation, £1,242 with out-patient surgery, £1,915 with out-patient EVLA, £1,964 with out-patient radiofrequency ablation, and £2,000 with in-patient surgery. The QALYs were 3.522 with conservative management, 3.836 with office UGFS, 3.940 with office EVLA, 3.944 with office radiofrequency ablation, 3.951 with out-patient surgery, 3.954 with out-patient EVLA, 3.958 with out-patient radiofrequency ablation, and 3.951 with in-patient surgery.

After excluding dominated strategies, which were more expensive or less cost-effective than more effective strategies, the incremental cost per QALY was £1,366 with office UGFS over conservative treatment, £5,799 with office EVLA over UGFS, £17,350 with office radiofrequency ablation over EVLA, £19,012 with out-patient surgery over office radiofrequency ablation, and £100,451 with out-patient radiofrequency ablation over out-patient surgery.

At a threshold of £20,000 per QALY, the probability of cost-effectiveness was 0.35 for office EVLA, 0.29 for out-patient surgery, and 0.24 for office radiofrequency ablation. The probabilities for the other procedures were very low.

The results of the base case changed substantially in the following scenarios: when the probability of occlusion of the GSV within three months of UGFS was the same as that for surgery, UGFS was cost-effective; when the odds ratio of re-intervention for residual varicose veins after sequential versus concomitant phlebotomy was 5.5, UGFS, office radiofrequency ablation, and office EVLA were equally likely to be cost-effective and out-patient surgery was dominated; when the cost of out-patient surgery was £700, it was the most cost-effective strategy; and when the cost of out-patient surgery was £1,200, UGFS, office radiofrequency ablation, and office EVLA were equally likely to be cost-effective.

Authors’ conclusions
The authors concluded that the strategies of radiofrequency ablation or EVLA, performed under local or tumescent anaesthesia, in an out-patient or clinician-office setting, or out-patient traditional GSV surgery were all likely to be cost-effective.

CRD commentary
Interventions:
A wide range of appropriate comparators was considered and represented some of the available strategies for patients with primary unilateral GSV reflux. The authors stated that the most common options were analysed.

Effectiveness/benefits:
The clinical data were appropriately from studies identified by a published review that selected only randomised controlled trials that compared at least two of the analysed strategies. The review that was carried out to identify further data for the model was not described, but it was stated that an appropriate meta-analytic approach was used to synthesise this evidence. The use of RCTs was valid as they have robust methods. The odds ratios from the meta-analysis were presented and used in the model. QALYs were an appropriate benefit measure, as they capture the impact of the disease on quality of life, which is relevant for these patients. They also allow cross-disease comparisons to be made. The use of the EQ-5D to derive the health utilities was valid.

Costs:
The economic analysis was well carried out and was consistent with the authors’ stated perspective. The unit costs and their sources were explicitly reported, but the surgery costs were presented as a total category. Resource use was from NHS Economic Evaluation Database (NHS EED) Produced by the Centre for Reviews and Dissemination Copyright © 2017 University of York
standard UK sources. The price year and the discount rate were clearly stated. The cost estimates appear to have been specific to the setting, but they were varied in the sensitivity analysis and this did not alter the base-case results.

Analysis and results:
An appropriate incremental approach was used to synthesise the costs and benefits and the results were clearly presented. Appropriate methods were used to investigate the uncertainty and the key findings were extensively reported and discussed. The authors acknowledged some limitations of their analysis, which mainly related to the need for assumptions and the uncertainty in the clinical data, which are common issues in decision models with several strategies.

Concluding remarks:
The methods were valid and the study was clearly presented. The authors’ conclusions appear to be robust.

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