Cost-effectiveness of identifying aortoiliac and femoropopliteal arterial disease with angiography or duplex scanning
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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
The study examined the cost-effectiveness of three diagnostic strategies for the assessment of aortoiliac and femoropopliteal arterial disease in patients with peripheral arterial occlusive disease: angiography, and duplex scanning plus either supplementary angiography (S1) or confirmative angiography (S2). The authors concluded that angiography was the most effective strategy. However, if society is unwilling to pay more than EUR 8,443 for knowing a patient's disease status, S1 should be considered the preferred strategy. The authors' conclusions appear valid given the good quality of the study methodology and the transparent reporting of the sources used.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The objective of the study was to examine the cost-effectiveness of three diagnostic strategies for the assessment of aortoiliac and femoropopliteal arterial disease in patients with peripheral arterial occlusive disease. The strategies were angiography (reference strategy), duplex scanning (DS) plus supplementary angiography (S1), and DS plus confirmative angiography (S2).

Interventions
The study examined arterial digital subtraction angiography, DS with supplementary angiography if DS was inconclusive, and DS with confirmative angiography if DS was either inconclusive or showed lesions. Inconclusiveness was defined as the situation in which no diagnosis could be established.

Location/setting
Netherlands/secondary care.

Methods
Analytical approach:
A decision analytic model was developed to simulate the management of patients under the three strategies being studied, and possible true- or false-positive and true- or false-negative cases. The time horizon was not explicitly reported, but only the short-term cost and benefits were considered. The authors stated that the perspective of the health care provider was adopted.

Effectiveness data:
The clinical data were derived from different sources, including published studies and primary data gathered at the authors' institution. The accuracy of S1 and S2 were obtained from both a meta-analysis and a series of patients. Angiography was assumed to be the reference strategy, thus its sensitivity and specificity were set at 100%. The prevalence of disease was set arbitrarily and was a key parameter of the model.

Monetary benefit and utility valuations:
The summary benefit measure used was the rate of correctly identified lesions. This was estimated using the decision model.

Measure of benefit:
Cost data:
The health service costs included in the analysis were personnel and materials associated with the direct implementation of the diagnostic tool, and overheads. A very detailed list of cost sub-categories was provided for all these items. The data on resource use and unit costs were based on data derived from the authors’ institution (the Academic Medical Center in Amsterdam). The costs were in euros (EUR). The price year was not reported.

Analysis of uncertainty:
Deterministic one- and two-way sensitivity analyses were undertaken to assess the robustness of cost-effectiveness ratios to variations in disease prevalence and the sensitivity and accuracy of DS. In a secondary analysis, overhead costs were excluded. Alternative scenarios focused on the identification of significant or non significant stenoses.

Results
The expected costs were EUR 180.70 with S1, EUR 462.80 with S2 and EUR 502.00 with angiography.

The rate of correctly identified lesions was 0.86 with S1, 0.81 with S2 and 0.90 with angiography.

The incremental analysis identified S1 as the reference strategy and S2 as a dominated strategy (both less effective and more expensive than S1). The incremental cost per extra correctly identified case with angiography compared with S1 was EUR 8,443.

The sensitivity analysis showed that with a prevalence above 70% or sensitivity of DS below 0.83, angiography was the most effective strategy. However, in the case of lower prevalence or higher sensitivity of DS, S1 became more effective (and less costly). Removing overhead costs did not alter the conclusions of the analysis.

Authors’ conclusions
The authors concluded that angiography was the most effective strategy for the detection of aortoiliac and femoropopliteal arterial disease in patients with peripheral arterial occlusive disease. However, If society were unwilling to pay more than EUR 8,443 for knowing a patient’s disease status, S1 (DS plus supplementary angiography) should be considered as the preferred strategy.

CRD commentary
Interventions:
The selection of the comparators was appropriate. Angiography was considered to be the reference strategy, while DS represents a widely used diagnostic option. The authors stated that all strategies reflected current practice. They are also likely to be relevant in other settings. It was pointed out that a further comparator could have been magnetic resonance angiography, which was not included in the analysis because it is not available in all medical centres.

Effectiveness/benefits:
The clinical estimates were identified selectively. The use of a meta-analysis should have ensured the validity of the effectiveness data due to the robustness of its design, although details of the types of studies included in the review and the size of the sample were not reported. Other data were derived from a sample of 80 patients admitted to the authors’ institution in order to reflect the Dutch context. The method used to calculate some estimates, such as the accuracy of the diagnostic approaches, was described. The benefit represents an intermediate measure of the impact of the interventions on patient health. It might not be readily comparable with the benefits of other health care interventions. Nevertheless, the rate of successfully detected cases represents a widely used output of diagnostic studies.

Costs:
The analysis of the costs was restricted to the viewpoint of the hospital. The categories of costs included in the study were consistent with such a perspective, and three main items were considered. The unit costs and quantities of resources used were presented separately and described in detail, which enhances the transparency of the analysis and improves the external validity of the economic study. Resource consumption and the unit costs reflected actual treatment patterns at the authors' institution. The price year was not explicitly reported, which may limit the possibility
of performing reflation exercises in other time periods.

Note: since this abstract was written the authors have informed us that the base year for the unit costing in the study was 2000.

Analysis and results:
The costs and benefits were appropriately synthesised using average and incremental cost-effectiveness ratios. The results of both the base-case and the sensitivity analyses were clearly presented. The issue of uncertainty was addressed by focusing on variations in key model estimates. The authors acknowledged that their findings applied only to patient populations similar to that considered in the analysis, such as patients with aortoiliac and femoropopliteal disease in whom an intervention was anticipated.

Concluding remarks:
The quality of the study methodology was satisfactory, with clear reporting of the methods and results. The authors’ conclusions appear valid.

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