Cost comparison of aortic aneurysm endograft exclusion versus open surgical repair

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
Endograft treatment (EAG) of abdominal aortic aneurysm (AAA).

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study looked at 32 patients who were to undergo either conventional or endovascular AAA repair.

Setting
The setting was hospital. The economic evaluation was carried out in Toledo, Ohio, USA.

Dates to which data relate
Effectiveness data referred to the period between March 1997 and April 1998. Resource use and cost data referred to the same period. The price year was 1997.

Source of effectiveness data
Effectiveness data were derived from a single study.

Link between effectiveness and cost data
The costing was undertaken retrospectively on the same patient sample as that used in the effectiveness study.

Study sample
120 patients were evaluated for AAA over a 13-month span. Of 25 patients treated with endograft, 9 were excluded from the analysis (two endografts were performed at another hospital, two were off-protocol, one received a TALENT graft, and four had incomplete cost data). 85 conventional aortic reconstructions were performed during the study interval with the last 16 patients selected as the control group. Randomisation was not performed since the study was retrospective. Of the 16 patients in the conventional group, 19% were female, the mean age was 73, 81% smoked, 75% had hypertension, 6.2% had diabetes, 31% had ischaemic heart disease, 19% had had previous coronary artery bypass graft (CABG), 12% previous vascular surgery, the mean AAA diameter was 59 mm (+/-4) and the American Society of Anesthesiologists (ASA) score was 3.1. Of the 16 patients in the endovascular group, 44% were female, the mean age was 72, 69% smoked, 38% had hypertension, 0% had diabetes, 25% had ischaemic heart disease, 31% had had previous CABG, 25% previous vascular surgery, the mean AAA diameter was 51 mm (+/-4) and the ASA score was 3.
Power calculations were not performed, the sample size was dependent on the number of patients who had undergone endograft surgery and who could be included in the analysis.

**Study design**
The study was a retrospective cohort study, in which both groups were differentiated with respect to the intervention received. The study was a single-centre study. The duration of follow-up was not reported.

**Analysis of effectiveness**
The primary health outcomes were 30 day mortality and adverse outcomes (not further specified). Groups were shown to be comparable in age, sex and prognostic features.

**Effectiveness results**
Thirty day mortality was zero in both groups and there were no adverse outcomes. Three patients required extended care facility before discharge (2 patients in the OSR group and 1 in the EAG group) but no further information was provided.

**Clinical conclusions**
Endovascular repair for AAA can be performed with a high degree of success and with acceptable morbidity and mortality rates.

**Measure of benefits used in the economic analysis**
No outcome measure was used in the economic analysis. A cost-minimisation analysis was performed, based on the finding that the effectiveness of the interventions was equivalent.

**Direct costs**
Costs were not discounted since the costs included in the analysis all occurred within a period of less than one year. Quantities and costs were reported separately. The quantities measured were the length of hospital stay, the intensive care unit stay, the operating room time, the number of days intubated, number of patients requiring transfusion and the number of units of blood transfused. The costs measured were the cost of transfusion, the mean cost of intubation, the imaging cost, the operating room cost with and without graft which included the cost of invasive monitoring, medications, anaesthesia and graft. Costs included labour, overhead and supplies costs. Physician charges were not included. The quantity/cost boundary was that of the hospital. The estimation of quantities was based on the actual data, retrospectively collected from hospital charts. The estimation of costs was based on a cost accounting module used by the hospital finance department. The quantity of resources was measured during the period March 1997 to April 1998, during the hospitalisation of the patients. The price year was 1997.

**Statistical analysis of costs**
A statistical analysis of costs was carried out using Wilcoxon rank sum test.

**Indirect Costs**
Indirect costs were not included in the analysis.

**Currency**
US dollars ($).
Sensitivity analysis
Sensitivity analysis was not carried out.

Estimated benefits used in the economic analysis
No summary measure of benefit was used in the economic analysis. The equivalence of effectiveness of the interventions was assumed. Side-effects and complications of the interventions were not included in the analysis.

Cost results
The mean total cost for the conventional treatment was $12,714 (+/- 1,116) and for the endovascular intervention $12,905 (+/- 495). There were no significant differences in total hospital costs between conventional and endovascular interventions (p=0.26). Costs of adverse effects were not included in the analysis.

Synthesis of costs and benefits
A synthesis of costs and benefits was not performed. The authors assumed that the interventions were equivalent in terms of effectiveness and this was therefore a cost-minimisation study. There was no significant difference in the cost of the two interventions. However, the endovascular group showed a significant decrease in utilisation of intensive care unit services and abbreviated length of stay (these resource uses, however, were not included in the calculation of costs).

Authors’ conclusions
The total hospital cost is not different for the two treatments studied despite differences in experience with their use. Endograft treatment utilised significantly less hospital resources than open surgical repair. The endograft prosthesis contributes a significant cost increment that may decline with expanded use.

CRD COMMENTARY - Selection of comparators
The selection of the comparator was justified as open repair surgery was the conventional treatment for AAA.

Validity of estimate of measure of benefit
The analysis was based on a retrospective cohort study, which was appropriate for the study question, although some bias may be present in the analysis due to its retrospective nature. The study sample seems to have been representative of the study population, although more information could have been provided on the exclusion criteria. In particular, some patients were excluded because of the lack of cost data and this may have biased the analysis. Patients were shown to be comparable at analysis in terms of gender, age and other prognostic factors. A more detailed justification of the assumption that the interventions were equivalent in terms of effectiveness would have strengthened the analysis. In particular, the exclusion of long term follow-up needs to be justified since it does appear that some patients experienced adverse events.

Validity of estimate of costs
Costs and quantities were reported separately and statistical analyses were performed. However, some aspects of the analysis were problematic. For the cost perspective adopted, not all relevant categories of cost were included. Moreover, since complications did occur in some cases, these extra costs should have been considered in the analysis. Costs of follow-up of patients were not included either, although they were different for the two groups. Finally, adverse outcomes have been reported in patients followed for a year; these costs were not included in the analysis. These omissions may affect the authors’ conclusions.

Other issues
Comparisons with other studies were not made and the issue of generalisability to other settings was not addressed. The results appear to have been presented selectively, as in the absence of outcome measures other than 30 day mortality.
More justification is required to assert that the interventions were indeed equivalent. Moreover, the duration of follow-up of the patients may be insufficient to draw conclusions regarding the interventions, since the omission of adverse events may affect the results of the analysis.

**Implications of the study**
Further research on longer term effects of the interventions is required.

**Source of funding**
None stated.

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