Cost-benefit analysis of endovascular versus open abdominal aortic aneurysm treatment
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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
Two surgical techniques for the management of abdominal aortic aneurysm (AAA) were studied: endovascular and open surgery.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients undergoing AAA treatments. Specific exclusion criteria were not reported.

Setting
The setting was a hospital. The economic study was carried out at the Department of Thoracic and Vascular Surgery, Gent University Hospital, Gent, Belgium.

Dates to which data relate
The dates during which both effectiveness and resource use data were collected were not reported. The price year was not indicated.

Source of effectiveness data
The effectiveness evidence was 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 analysis.

Study sample
Power calculations were not performed on the sample. A consecutive series of 29 patients was selected: 20 patients (median age: 71 years) underwent open surgery (OAT) and in 9 patients (mean age: 68 years) the endovascular technique (EAT) was used. All patients were selected in the same period (nine months). No patient was excluded from the study.

Study design
The analysis was based on a case-control study, carried out in a single centre. Patients were not followed after
discharge.

Analysis of effectiveness
All patients included in the study were accounted for in the analysis. The primary health outcomes were operating time, use of bifurcated grafts, median transfusion, median maximal aneurysm diameter, reimplantation of polar renal artery, hospital stay, ICU stay, and complications. Groups were comparable in terms of age and medical history, but there were more patients with previous abdominal surgery in the EAT group.

Effectiveness results
Operating time was significantly longer in the OAT group than in the EAT group (125 versus 90 minutes, p=0.026).

The use of bifurcated grafts occurred in 50% patients in the OAT group and in 67% patients in the EAT group, (p=0.275).

No patient required transfusion in the EAT group, while the median transfusion in the OAT group was 766 ml, (p<0.001).

The median maximal aneurysm diameter was 65 mm in the OAT group and 54 mm in the EAT group, (p=0.041).

No patient in the EAT group underwent reimplantation of polar renal artery whilst 2 patients required this in the OAT group, (p=0.326).

Both hospital stay and ICU stay were significantly longer in the OAT group (11 and 2 days) than in the EAT group (5 and 0 days).

No difference was found in the number of complications (6 in the OAT group and 1 in the EAT group).

Clinical conclusions
The effectiveness analysis has shown the feasibility and safety of endovascular surgery. Furthermore, EAT was a short-term, effective technique compared to open surgery, because it was associated with shorter ICU and hospital stay and less morbidity than OAT.

Measure of benefits used in the economic analysis
Health outcomes were left disaggregated and no summary benefit measure was used, therefore a cost-consequences analysis was carried out.

Direct costs
Discounting was not relevant, given the short time horizon of the study. Quantities used and unit costs were not reported separately. The cost/resource boundary selected reflected the perspectives adopted in the analysis: costs were then calculated as incurred by the hospital and by an insured patient. The costs included were hospitalisation (ICU and surgical ward), materials and implants, drugs, radiology, laboratory, pathology, blood bank, and various fees. Expenses incurred before and after the surgical intervention were not included in the analysis. The estimation of costs and quantities was based on actual data, obtained from the financial department of the hospital. The dates during which resource use data were collected were not reported. The price year was not indicated.

Statistical analysis of costs
Statistical analyses of costs were carried out to test for statistical significance of the results.

Indirect Costs
Indirect costs were not included.

**Currency**
Belgian francs (Bfr). Belgian francs were then converted into Euros but the exchange rate was not reported.

**Sensitivity analysis**
No sensitivity analysis was carried out.

**Estimated benefits used in the economic analysis**
Please refer to the effectiveness analysis reported earlier.

**Cost results**
Hospitalisation costs were Bfr 182,740 (Euro 4,568) in the OAT group and Bfr 73,162 (Euro 1,829) in the EAT group, (p=0.001).

Pharmaceutical costs were Bfr 45,259 (Euro 1,131) in the OAT group and Bfr 9,836 (Euro 246) in the EAT group, (p=0.002).

Surgical costs were Bfr 38,296 (Euro 957) in the OAT group and Bfr 153,293 (Euro 3,832) in the EAT group, (p=0.001).

Medical fees were Bfr 110,912 (Euro 2,772) in the OAT group and Bfr 79,185 (Euro 1,980) in the EAT group, (p=0.012).

Total costs to the hospital were Bfr 357,565 (Euro 8,939) in the OAT group and Bfr 317,733 (Euro 7,943) in the EAT group, and the difference was not statistically significant, (p=0.712), although the costs of single components differed systematically between the groups.

In fact, costs for hospitalisation, medical fees, and pharmaceuticals were significantly lower in the EAT group, but endovascular surgery was associated with far higher costs for materials and prostheses.

The total costs for patients were Bfr 24,969 (Euro 624) in the OAT group and Bfr 66,309 (Euro 1,167) in the EAT group, the difference being statistically significant, (p=0.003). This considerable difference was due to the fact that expenses for the endovascular graft were only partially reimbursed by the insurance company.

**Synthesis of costs and benefits**
Not relevant.

**Authors’ conclusions**
The authors concluded that endovascular AAA treatment was as safe and feasible as open surgery in the short run. EAT had the advantage of a shorter hospital stay (and ICU stay) and less morbidity than OAT. However, from the perspective of the hospital, there was no difference in total costs. The costs for patients (at current reimbursement rates) were far higher with the endovascular procedure. This holds only with a good patient selection (specific morphologic conditions) to avoid the risk of conversion of endovascular surgery to an open procedure. In fact this could result in a high morbidity rate and substantial costs.

**CRD COMMENTARY - Selection of comparators**
The reason for the selection of comparators was clear. Open surgery was considered the standard technique, while the endovascular procedure represented a more recent technique, whose cost-effectiveness had not yet been assessed. You,
as a user of this database, should consider whether these represent widely used technologies in your own setting.

Validity of estimate of measure of effectiveness
The effectiveness analysis was based on a case-control study, which appears appropriate to the study question. However, the sample size was quite small (especially in the EAT group), thus the power of the sample could have been too small to detect a treatment effect. Although the groups were well matched (in terms of demographics and clinical characteristics) and statistical analyses were carried out, it is not possible to exclude the role of patient selection bias and confounding factors, and this could represent a serious limitation to the internal validity of the study.

Validity of estimate of measure of benefit
As no summary health benefit measure was used, a cost-consequences analysis was conducted. As a result, costs and benefits were not combined in a cost-effectiveness ratio.

Validity of estimate of costs
The analysis of the costs was carried out from two perspectives (hospital and reimbursement system) and it appears that all categories of costs were included in the study. Appropriate currency conversions were carried out. However, the price year was not reported and neither quantities nor unit costs were reported. The cost estimates appeared to be quite specific to the study setting. These features limit the generalisability of the cost results.

Other issues
The authors made few relevant comparisons of their findings with those from other studies. The issue of the generalisability of the study results to other settings was not explicitly addressed and sensitivity analyses were not conducted, thus limiting the external validity of the study.

Implications of the study
From economic and clinical perspectives, the results support the use of endovascular AAA treatment. Overall costs to society do not differ due to shorter ICU stays. However, the authors highlighted the need for a better reimbursement of endovascular graft in order to reduce the high costs borne by the patients.

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