A cost comparison of balloon angioplasty and stenting versus endarterectomy for the treatment of carotid artery stenosis

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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
Percutaneous transluminal angioplasty with stenting (PTAS) of the carotid artery in the treatment of high-grade stenosis.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Patients undergoing elective treatment of carotid artery stenosis.

Setting
Hospital. The economic study was carried out in the USA.

Dates to which data relate
Effectiveness and resource use data were collected between August 1994 and October 1995. 1994-95 prices were used.

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

Link between effectiveness and cost data
Costing was undertaken retrospectively on the same patient sample that was used in the effectiveness analysis.

Study sample
All patients who underwent elective treatment of carotid artery stenosis between August 1994 and October 1995 at the authors' establishment were included in the analysis. 218 patients (98 in the PTAS group and 120 in the CE group) were admitted a total of 229 times for 234 procedures. After excluding those patients with complications during hospitalization or with additional procedures a total 185 patients were admitted 195 times for 195 procedures (84 for the PTAS group and 111 in the CE group). The authors do not mention whether power calculations were used to determine the sample size.

Study design
This was a retrospective cohort study carried out in a single centre. Follow-up was until discharge from hospital or 30 days in the case of neurologic complications. There appears to have been no loss to follow up.

**Analysis of effectiveness**
The analysis of effectiveness was based on treatment completers only, as patients who crossed over to the other group were excluded from the analysis. The primary health outcomes considered in the analysis were neurologic complications and death, and non-neurologic morbidity. Initial groups were shown to be comparable with respect to risk factors associated with carotid stenosis, although the PTAS group had a significantly greater number of patients with coronary artery disease and hypertension. The number of patients excluded from each group was similar, (p=0.380).

**Effectiveness results**
Neurologic deficits lasting more than 24 hours occurred after 8 of 104 PTAS (7.7%), and after 4 of 130 CE (3.1%). There was 1 death in the PTAS group (0.9%), and 2 in the CE group (1.5%). The total rate of stroke and death was 8.7% for the PTAS group and 3.1% in the CE group, (p= 0.085). The incidence of non-neurologic morbidity was 6.1% (6 out of 98 patients) in the PTAS group and 0.8% (1 of 120 patients) in the CE group.

**Clinical conclusions**
The risk of neurologic morbidity by PTAS did not appear to be reduced. The rate of total non-neurologic morbidity was also higher than the rate for CE.

**Measure of benefits used in the economic analysis**
No single measure of benefit was introduced in the economic analysis.

**Direct costs**
Quantities were not reported separately from costs. Only hospital costs were considered and hospital charges were used as a proxy for costs. Data were obtained from the hospital business office. The following hospital charges were included: radiology, operating room, cardiac catheterisation, and all other hospital charges. Professional fees were not included in the cost analysis. Discounting was not applied because of the short time frame of the study. 1994-95 prices were used.

**Statistical analysis of costs**
Two sample t-tests were used to compare the procedures and Fisher's exact test was used for comparison of proportions.

**Indirect Costs**
Not considered.

**Currency**
US dollars ($).

**Sensitivity analysis**
No sensitivity analysis was performed.

**Estimated benefits used in the economic analysis**
Not applicable.
Cost results
The average total hospital charge was $30,140 for the PTAS group and $21,670 for the CE group. The radiology and the procedure charges were greater for the PTAS group (p=0.0042 and p=0.0001 respectively). Charges for the uncomplicated PTAS group were $24,848, and $19,247 for the uncomplicated CE group.

Synthesis of costs and benefits
CE was the dominant strategy as it was cheaper and had fewer complications compared to PTAS.

Authors' conclusions
The authors concluded that PTAS for the treatment of carotid stenosis can not currently be justified on the basis of reduced costs alone when compared with CE. Furthermore, PTAS seems to have higher combined morbidity and mortality rates.

CRD COMMENTARY - Selection of comparators
Rationale for the choice of the comparator was justified by the authors, as CE has been established as the standard treatment for high grade stenosis of the external carotid arteries. You, as a database user should consider if this applies to your own setting.

Validity of estimate of measure of benefit
Sample size may have been insufficient to detect differences between the health technologies under investigation. The internal validity of the effectiveness evidence is not assured given the retrospective non-randomized nature of the study design, which might have lead to a patient selection bias.

Validity of estimate of costs
Aided information about the cost estimation was provided by the authors. Hospital charges were used in the analysis rather than true costs. Physicians' charges may have been important, but were not included in the cost analysis. It is not clear whether the cost:charge ratios in the different hospital departments were similar, and thus comparison of alike was carried out. Costs to patients and others in society should have been included in the analysis. Cost results may not be generalisable to other settings or countries.

Other issues
Use of the uncertainties around the data the results need to be treated with some caution. The issue of generalisability to other settings or countries was not addressed. However, comparisons with similar studies were made by the authors.

Implications of the study
A well designed randomised controlled trial directly comparing the two interventions should be carried out if ethical.

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None stated

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