Carotid endarterectomy in octogenarians and nonagenarians: is it worth the effort
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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
The use of carotid endarterectomy (CEA) for elderly patients with carotid bifurcation disease.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients aged 80 to 89 years (middle group) and 90 to 97 years (oldest group) who underwent CEA at the authors' institution. Patients who underwent combined procedures (i.e. combined coronary artery bypass grafting and CEA), redo CEA, external CEA in the presence of occluded internal carotid artery, and the repair of carotid artery aneurysms, were excluded from the study.

Setting
The setting appears to have been either secondary or tertiary care. The economic study was carried out in the USA.

Dates to which data relate
The authors reviewed the medical records of patients who underwent CEA at their institution between February 1990 and February 2001. Hospital financial information for the patients was also reviewed. The price year was not stated.

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

Link between effectiveness and cost data
The costing was undertaken retrospectively, based on a sub-sample of patients taken from the same study sample as that used in the effectiveness analysis (i.e. the cost analysis was performed considering the earliest 230 patients from the effectiveness analysis). The authors reported that patients who underwent additional procedures during the same admission, or who were on other services, were not included for the estimation of length of stay data.

Study sample
Power calculations were not reported to have been conducted. The patients identified were those treated at the study centre between February 1990 and February 2001. It was not reported whether some patients were excluded for any reason from the initial study sample. Patients in the control group (i.e. 50- to 79-year-olds) were selected according to a date of procedure as close as possible to that for patients aged 80 years or older. Overall, there were 514 patients. Of
these, 251 were in the youngest group (50- to 79-year-olds), 247 in the middle group (80- to 89-year-olds) and 16 in the oldest group (90- to 97-year-olds).

Study design
This was a retrospective cohort study that was carried out in a single centre. The duration of follow-up was one year.

Analysis of effectiveness
Although the authors did not explicitly state it, the main health outcomes considered in the analysis appear to have been the combined 30-day death and stroke rate, the rate of complications (i.e. haemodynamic instability, cardiopulmonary insufficiency, haematoma, arrhythmias, hyperfusion syndrome and urinary tract infections) and the related lengths of stay after CEA. The three groups were shown to be comparable in terms of age, incidence of preoperative symptoms, hypertension and combined 30-day death and stroke rate. However, significant differences were noted between the groups in the incidence of diabetes, (p<0.01), and heart disease, (p=0.025).

Effectiveness results
The effectiveness evidence showed that there were no differences in combined 30-day death and stroke rate (1.8% versus 2.1% versus 10%) or other complications (11% versus 10% versus 10%).

In terms of hospital length of stay, no statistically significant differences were found between the three groups (2.37 +/- 0.10 days versus 2.67 +/- 0.22 days versus 2.36 +/- 0.52 days; p=0.7). However, the evidence showed significant differences in the percentage of patients discharged within 48% hours of the procedure (86% versus 75% versus 78%; p=0.045).

Clinical conclusions
No differences were found between the youngest and elderly groups in terms of the combined 30-day death and stroke rate. There was also no evidence of a statistically significant difference between the groups in the length of stay after CEA.

Measure of benefits used in the economic analysis
No summary measure of benefit was used in the analysis. In effect, a cost-consequences analysis was performed.

Direct costs
The authors did not state the perspective of the analysis, but it appears that the perspective of a health service has been adopted. The authors did not state the main resource use categories included, referring only to the hospital cost per case, including readmissions directly related to complications. Resource use was not reported separately from the costs. The authors did not report whether any discount rate was used. The resource use data appears to have been derived from the single study used for the effectiveness analysis, although the sources used to collect the unit cost data were not reported. The price year was not explicitly stated.

Statistical analysis of costs
The costs were treated stochastically. Mean values, standard deviations and critical p-values were reported for the cost-comparison performed among the study groups.

Indirect Costs
The indirect costs were not considered, although a rationale for their exclusion was not provided.
Currency
US dollars ($).

Sensitivity analysis
No sensitivity analysis was reported.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
The cost analysis revealed similar results for patients younger than 80 years old and those older than 80 years ($7,842 +/- 1,149 versus $9,400 +/- 944; p=0.3).

Synthesis of costs and benefits
A synthesis of the costs and benefits was not carried out because a cost-consequences analysis was performed.

Authors' conclusions
The results from the study confirmed that carotid endarterectomy (CEA) could be performed in the elderly with a complication rate and related length of stay comparable to that for younger patients.

CRD COMMENTARY - Selection of comparators
The reason for the choice of the comparator was clear. The youngest group of patients represents the logical option.

Validity of estimate of measure of effectiveness
A retrospective cohort study was undertaken, which appears to have been appropriate given the type of data available to answer the study question. However, as the authors reported, this type of study design is subject to selection bias, consequently introducing uncertainty into the reliability of the effectiveness results. The authors did not report evidence that the study sample was representative of the study population. The patient groups were not shown to have been comparable at analysis. The authors did not explicitly state the main health outcomes used. In addition, for some of the outcomes reported, only percentages were presented to compare the three groups and no further statistical tests were reported. The effectiveness results seem to have been reported selectively.

Validity of estimate of measure of benefit
The authors did not derive a summary measure of health benefit. The analysis was, in effect, a cost-consequences study.

Validity of estimate of costs
The authors did not explicitly state the perspective adopted in the analysis. It was unclear whether all the categories of cost relevant to the perspective adopted were included in the analysis. The costs and the quantities were not reported separately, and the sources of the unit cost data were not identified. Discounting does not appear to have been performed, but it may not have been relevant as the costs were estimated over a time horizon of one year. The price year was not reported.

Other issues
The authors compared their study results with those from other studies and highlighted any discrepancies, above all with respect to those studies that used modelling to derive the cost-effectiveness of the intervention. The issue of
generalisability to other settings was not addressed. A more detailed discussion of the limitations of the study would have been useful.

**Implications of the study**
The authors highlighted the fact that clinical judgement tailored to each individual patient may be the best management and the safest treatment strategy to prevent stroke in these patients. They made no comment on the need for further research.

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**Other publications of related interest**


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