Aneurysm occlusion in elderly patients with aneurysmal subarachnoid haemorrhage: a cost-utility analysis
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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
This study examined the cost-effectiveness of aneurysm occlusion after subarachnoid haemorrhage, in various subgroups of elderly patients, based on their age, gender, neurological condition, time since haemorrhage, and aneurysm size and location. The authors concluded that occlusion was harmful for some subgroups of elderly patients and beneficial for others. The cost-effectiveness framework was valid and the authors’ conclusions appear to be robust, but the data sources were not described.

Type of economic evaluation
Cost-utility analysis

Study objective
This study examined the cost-effectiveness of aneurysm occlusion after subarachnoid haemorrhage, in various subgroups of elderly patients based on their age, gender, neurological condition at admission, time since haemorrhage, and aneurysm size and location.

Interventions
Aneurysm occlusion (coiling or clipping) was compared against supportive medical treatment (conservative treatment).

Location/setting
Netherlands/hospital.

Methods
Analytical approach:
The analysis was based on a Markov model, with a lifetime horizon. The authors did not explicitly state the perspective adopted.

Effectiveness data:
The clinical inputs were from a selection of relevant published studies and Swedish registries. The point estimates, range of values, and source for each parameter were provided. The probability of re-bleeding was the key input for the model. Some assumptions were made.

Monetary benefit and utility valuations:
The utility values were from a published systematic review of health utilities after a stroke, and a published study for the healthy state.

Measure of benefit:
Quality-adjusted life-years (QALYs) were the summary benefit measure and they were discounted at an annual rate of 4%.

Cost data:
The economic analysis included the costs of surgical procedures (coiling or clipping ruptured aneurysms), conservative treatment, nursing home, and death (not directly related to aneurysm treatment). All the economic data were from published studies. All costs were adjusted to 2005, using Dutch inflation indices, and converted into Euros (EUR) at a
2007 exchange rate. A 4% annual discount rate was applied.

Analysis of uncertainty:
A Monte Carlo simulation was carried out to examine the uncertainty, using predetermined probability distributions for the model inputs. In total, 192 patient subgroups were considered. Alternative assumptions for the discount rate and mortality risk were considered.

Results
The reference group was women aged 70 to 74 years, who were admitted in good clinical condition less than four days after a subarachnoid haemorrhage and who had an anterior aneurysm of less than 10mm. In these women, aneurysm occlusion provided a gain of 0.29 QALYs at an additional cost of EUR 72, over conservative treatment, resulting in an incremental cost per QALY gained of EUR 247.

In almost all of the 191 other patient subgroups, the costs of occlusion were higher than those of conservative treatment. Occlusion was generally less effective than conservative treatment for patients who were admitted in a poor condition 10 days or more after haemorrhage. It provided minimal or no health benefits for patients over 80 years old who were admitted in poor condition four or more days after haemorrhage.

At a cost-effectiveness threshold of EUR 50,000 per QALY, occlusion was likely to be cost-effective for women aged 70 to 79 years and men aged 70 to 74 years who were admitted in good condition less than four days after haemorrhage.
In women aged 70 to 74 years, who were admitted in good condition less than four days after onset, with a small posterior aneurysm, occlusion saved EUR 1,409 and gained 0.36 QALYs, making it dominant.

Occlusion was cost-effective in only seven of the 192 subgroups. Its cost-effectiveness was worse in patients with a large aneurysm than in those with a small aneurysm, and slightly better when the aneurysm was located in the posterior circulation than in the anterior circulation.

Influential inputs were the treatment costs for both strategies. Conservative treatment was mainly affected by the probabilities of poor or good outcome after re-bleeding and the risk of recurrent subarachnoid haemorrhage after treatment. Occlusion was sensitive to the probability of poor or good outcome after coiling. A lower discount rate improved the cost-effectiveness ratio for the reference group. Doubling the mortality from other causes led to a worse ratio.

Authors’ conclusions
The authors concluded that occlusion was harmful for some subgroups of elderly patients and beneficial for others. For those over 80 years old, it should not be considered unless their life expectancy was longer than usual. The procedure should be performed as early as possible to achieve the most benefit.

CRD commentary
Interventions:
The rationale for the selection of the comparators was clear as the two available strategies were selected.

Effectiveness/benefits:
The clinical sources were not described, making it difficult to judge their quality. It was stated that high uncertainty was found for some items, and extensive sensitivity analysis was conducted to assess this. Important assumptions were made that generally favoured the occlusion strategy. QALYs were an appropriate benefit measure, given the impact of subarachnoid haemorrhage on both survival and quality of life. No information on the derivation of the utility values was provided.

Costs:
The perspective was not explicitly stated, but appears to have been that of the health care system, given the cost categories analysed. The costs were presented as category totals and were not broken down into individual items. The patterns of resource use were not clearly reported and the data sources were not described. In general, the costs were not reported in detail.
Analysis and results:
The results were selectively presented, due to the large number of patient subgroups analysed. An incremental approach was used to synthesise the costs and benefits of the two strategies. Valid approaches were used to investigate the uncertainty and the key findings were presented. The large number of subgroups of patients analysed showed that occlusion had a different impact depending on the patients’ characteristics, mainly their age and time since haemorrhage. The study might be difficult to transfer to other settings, because little information was provided on the key sources, but it provided an interesting insight into the importance of subgroup analyses.

Concluding remarks:
The cost-effectiveness framework was valid and the authors’ conclusions appear to be robust, but the data sources were not described.

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