Computerized model of cost-utility analysis for treatment of age-related macular degeneration

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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
The objective was to assess the costs and effectiveness of several treatment options for patients with neovascular, age-related macular degeneration. The authors concluded that their study provided a structure for resource allocation. The methods were valid, but there were limitations in the reporting and the parameter uncertainty was not assessed. The impact of these limitations on the results is unclear.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to assess the costs and effects of several treatment options for patients with neovascular, age-related macular degeneration.

Interventions
The interventions were photodynamic therapy, pegaptanib, ranibizumab, and best supportive care. For ranibizumab two treatment regimens were considered. These were monthly injections for two years, and six injections in the first year followed by four injections in the second year.

Location/setting
USA/secondary care.

Methods
Analytical approach:
A decision tree model was developed to synthesise the costs and outcomes of the treatment options. The time horizon was two years and the authors stated that the study was conducted from a payer's perspective.

Effectiveness data:
The clinical data were derived from a selection of studies known to the authors and these included randomised controlled trials (RCTs). The key clinical outcome was vision improvement. The number of treatment-related adverse events was also reported.

Monetary benefit and utility valuations:
The utility values were calculated from a published study that used the time trade-off method. Full details of their derivation were provided.

Measure of benefit:
The summary benefit measures were quality-adjusted life-years (QALYs) and these were discounted at an annual rate of 3%.

Cost data:
The economic analysis included the medical costs directly related to the treatments and to blindness. The costs of the treatments were from an official national source and the resource use data were from the RCTs that provided the effectiveness estimates. The costs of blindness were reported as total categories and these included housing benefit and
council tax, depression treatment, residential care, low vision assessment, registration as blind, etc. These costs were obtained from a published study and they were converted from UK pounds sterling into US dollars ($) using purchasing power parity. All costs were discounted at an annual rate of 3%.

Analysis of uncertainty:
Not conducted.

Results
Four scenarios were presented, with varying visual acuity in the treated eye and in the other eye. All treatments were compared with best supportive care and all the results were presented in bar charts.

Over two years, in every scenario, compared with best supportive care, all treatments were associated with an increase in QALYs. The authors suggested that the most common scenario was a visual acuity of 53 in the treated eye and zero in the other eye. In this scenario, ranibizumab with six injections in the first year and four in second year, had the lowest cost-effectiveness ratio at $626,938 per QALY gained, compared with best supportive care. The results for other scenarios were presented.

In a five-year analysis, all treatments, except monthly ranibizumab injections, were associated with lower costs per QALY gained than best supportive care.

Authors' conclusions
The authors concluded that their study provided a structure for resource allocation.

CRD commentary
Interventions:
The interventions were compared with no active treatment, allowing the active value of the treatment to be evaluated. These interventions were not described in detail, which makes it difficult to objectively assess their relevance to other health care settings.

Effectiveness/benefits:
The effectiveness data were derived from RCTs, which are appropriate sources given the strengths of their design. No systematic review was reported, which means that relevant evidence might have been missed, and limited information on the source studies makes it difficult to assess the validity of the data. The derivation of the benefit measure was described clearly. The utility, used in the calculation of QALYs, was taken from a published study that was reported to have used a valid method. The use of QALYs was appropriate and allows cross-disease comparisons to be made.

Costs:
It appears that all those costs relating to the stated perspective were included. The unit costs were reported for the treatments, but not for the costs of blindness, which were presented as category totals. The blindness costs were derived from a published study that reported them in UK pounds sterling and it was unclear whether these costs were applicable to the model's US setting and this issue was not discussed. Discounting was appropriately reported, but the price year was not.

Analysis and results:
The synthesis of the costs and benefits was clear, but the separate total costs and QALYs were not reported. An incremental analysis was not reported, instead the authors compared all treatments with the best supportive care. This simple ratio is a less meaningful comparison as it does not allow an assessment of the additional costs and benefits that one treatment conveys over another. The authors conducted neither sensitivity analysis nor statistical analysis to address the uncertainty in the effectiveness and cost data. Given the use of data from a wide range of sources, some assessment of uncertainty was needed.

Concluding remarks:
The methods were valid, but there were limitations in the reporting and the parameter uncertainty was not assessed. The impact of these limitations on the results is unclear.
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