Cost-effectiveness of ranibizumab compared with photodynamic treatment of neovascular 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
This study investigated whether ranibizumab was a cost-effective treatment in patients with predominantly classic choroidal neovascularisation secondary to age-related macular degeneration. The authors concluded that compared with photodynamic therapy, ranibizumab was only cost-effective when administered as needed or for specific subgroups of patients, which needed to be identified by further research. The methods and the reporting of the study were satisfactory and the authors’ conclusions appear to be appropriate.

Type of economic evaluation
Cost-effectiveness analysis, cost-utility analysis

Study objective
The objective was to determine if ranibizumab was a cost-effective treatment for patients with mainly classic choroidal neovascularisation secondary to age-related macular degeneration (AMD).

Interventions
Ranibizumab was compared with photodynamic therapy. Ranibizumab was an approved treatment for neovascular AMD and it was administered intravenously once a month. Photodynamic therapy was the current practice for the treatment of classic choroidal neovascularisation secondary to AMD and it was administered based on the evaluation of an angiography every three months.

Location/setting
Spain/secondary care.

Methods
Analytical approach:
A Markov model was constructed to simulate the ongoing risk of declining visual acuity in the better-seeing eye. The two time horizons were two years and lifetime. The authors stated that the perspective was that of a third-party payer.

Effectiveness data:
The main clinical parameters were based on the Anti-Vascular Endothelial Growth Factor Antibody for the Treatment of Predominantly Classic Choroidal Neovascularisation in AMD (ANCHOR) trial, which lasted for two years. This was the only identified randomised controlled trial (RCT) that compared the efficacy of ranibizumab monotherapy with photodynamic therapy in patients with AMD. The clinical endpoint was the visual acuity in the better-seeing eye.

Monetary benefit and utility valuations:
The utility estimates were from a published study (Brown, et al. 2000, see 'Other Publications of Related Interest' below for bibliographic details). This study used the time trade-off method to derive the utility, for degrees of visual acuity in the better-seeing eye, from patients with age-related macular degeneration.

Measure of benefit:
The benefit measure was the number of quality-adjusted life-years (QALYs) and these were discounted at an annual rate of 3%.
Cost data:
The cost categories were drug costs, follow-up consultations, and the diagnostic procedure. The unit costs were from the hospital that employed the authors. The drug costs were from a national database. Resource use was determined by an ophthalmologist according to the clinical practice at the time. The price year was 2007 and all prices were in Euros (EUR). An annual discount rate of 3% was applied.

Analysis of uncertainty:
Probabilistic sensitivity analyses were performed to explore the uncertainty in the parameter estimates, such as the unit costs, transition probabilities, and visual acuity state values. Univariate sensitivity analysis was performed by replacing the number of ranibizumab injections with data from the Prospective Optical coherence tomography imaging of patients with Neovascular AMD Treated with intra-Ocular ranibizumab (PrONTO) trial. A threshold sensitivity analysis was performed to find the number of ranibizumab injections that changed the cost-effectiveness decision.

Results
The treatment of predominantly classic choroidal neovascularisation secondary to AMD using photodynamic therapy had total costs of EUR 12,937 and QALYs of 1.003 for the two-year horizon and costs of EUR 49,721 and 4,522 QALYs for the lifetime horizon. Ranibizumab had a total cost of EUR 31,265 and gained 1.143 QALYs for the two-year horizon and a cost of EUR 163,588 and 7.412 QALYs for the lifetime horizon.

The incremental cost-effectiveness ratio of ranibizumab over photodynamic therapy was EUR 131,275 per QALY for the two-year and EUR 39,398 for the lifetime horizon.

The sensitivity analysis showed that photodynamic therapy was the best option in all cases, at the threshold of EUR 30,000 per QALY, for the two-year horizon, and 74% of cases, for the lifetime horizon. Using dosage data from the PrONTO trial, the incremental cost-effectiveness ratio was reduced to EUR 29,566 for the two-year and EUR 11,469 for the lifetime horizon. The threshold number of injections was five for the two-year horizon and 9.5 for the lifetime horizon.

Authors' conclusions
The authors concluded that ranibizumab was not cost-effective, compared with photodynamic therapy, for the treatment of AMD when administered monthly, but it was cost-effective when administered as needed (as in the PrONTO trial). They noted that further research was needed to identify the subgroups of patients for whom ranibizumab was cost-effective.

CRD commentary
Interventions:
The ranibizumab strategy was well described and was appropriately compared with the current practice of photodynamic therapy in the authors' setting. There were other relevant treatments that were not included, so the analysis might have been partial and not complete.

Effectiveness/benefits:
The authors gave a narrative review of the published clinical evidence, but it was not clear if a systematic review of the literature was conducted. This means it is not possible to determine if the best available clinical evidence was used. They gave a justification for their selection of the ANCHOR trial as the source for the clinical evidence. The instrument and the sample population used to derive the utility estimates were reported.

Costs:
The perspective was stated and it appears that all the relevant costs for this perspective and the study question were considered. The sources of the cost data were also given. Details of the price year and discounting were reported.

Analysis and results:
The incremental analysis was appropriate to determine the cost-effectiveness of the strategies. The issue of uncertainty was fully addressed in both univariate and probabilistic sensitivity analyses. The results of both the base case and the sensitivity analyses were clearly reported. The authors highlighted the limitations and generalisability of their study.
Concluding remarks:
The methods and the reporting of the study were satisfactory and the authors' conclusions appear to be appropriate.

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