Cost-effectiveness sequential modeling of ranibizumab versus usual care in 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 examined the cost-effectiveness of first-line ranibizumab (RAN) in comparison with usual care, which consisted of various sequences of treatments, for the treatment of age-related macular degeneration. The authors concluded that RAN appeared to be cost-effective when visual acuity improvement was the measure of benefit. The study was well carried out, but some aspects of the study, such as the sources of data, were not presented in detail and so the authors’ conclusions should be treated with some caution.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study examined the cost-effectiveness of first-line ranibizumab (RAN) in comparison with usual care, which consisted of various sequences of treatments, for age-related macular degeneration (AMD).

Interventions
RAN as first-line therapy was compared with a sequence of treatments, which could include simple surveillance, laser therapy, verteporfin, pegaptanib, and combination therapies RAN-verteporfin or pegaptanib-verteporfin. The choice of treatments in the sequence depended on the AMD type. Patients who switched from RAN as first-line therapy could receive one of the other options.

Location/setting
France/secondary care.

Methods
Analytical approach:
This economic evaluation was based on a decision model with a one-year time horizon. The authors stated that the analysis was carried out from a societal perspective.

Effectiveness data:
Clinical inputs for the model were derived from a selection of known, relevant studies. These included clinical trials, published studies, and clinical reports, supplemented by expert opinion for the definition of confidence intervals around the mean values. The key model input was the success rate with RAN or the other options.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
Depending on the definition of the success rate, two summary benefit measures were used. These were visual acuity improvement of greater than 15 letters on the Early Treatment of Diabetic Retinopathy Scale and the rate of legally defined blindness avoided.

Cost data:
The economic analysis considered the costs of treatments, medical visits, angiography, optical coherence tomography,
photodynamic therapies, visual adaptive devices for blindness, and social allowances for patients suffering from legally defined blindness. The unit costs and quantities of resources used were presented separately for all medical categories. The sources of data were not explicitly reported. All costs were in Euros (EUR) and the price year was 2006.

Analysis of uncertainty:
The issue of uncertainty was investigated by means of pre-determined probability distributions assigned to all model inputs through a Monte Carlo simulation. The results were presented as means with their standard deviations.

Results
Based on visual acuity improvement, the success rate was 48.8% with RAN and 33.9% with usual care. The one-year costs were EUR 9,123 with RAN and EUR 7,604 with usual care. The average cost-effectiveness ratios were EUR 18,721 with RAN and EUR 22,543 with usual care, making RAN the preferred strategy.

Based on the rate of blindness avoided, the success rate was 99.7% with RAN and 93.1% with usual care. The one-year costs were EUR 9,196, with RAN and EUR 5,713 with usual care. The average cost-effectiveness ratios were EUR 9,224 with RAN and EUR 6,133 with usual care, making usual care the preferred strategy.

These values were presented as means with standard deviations, which showed that differences in effectiveness, costs and cost-effectiveness ratios were statistically significant. The results of the sensitivity analysis were not reported.

Authors’ conclusions
The authors concluded that RAN appeared to be more cost-effective than usual care when visual acuity improvement was used as the benefit measure.

CRD commentary
Interventions:
The authors provided a justification for their selection of the comparators, which appear to have been appropriately selected to reflect the available treatment patterns determined by a panel of experts. The analysis focused on sequential therapies, which reflected real-world treatment practices and were based on clinical expert opinion. The authors stated that bevacizumab, another potentially relevant agent, was excluded because, at the time of the study, it had no marketing authorisation in France.

Effectiveness/benefits:
The derivation of the clinical inputs was not described. The clinical data appear to have been taken from sources known to the authors. The study design, patient population, types of treatment delivered, and length of follow-up of the source studies were not reported. This limited reporting makes an objective assessment of the validity of the clinical evidence impossible. The benefit measures were appropriately selected and the authors stated that their choice was conservative for RAN, and in line with the final expected goal of any new active therapeutic strategies. The two success rates were disease-specific measures, which will prevent comparison with the benefits of other interventions, but they are commonly used in studies of patients with AMD. The authors noted the potential limitations of using a quality-adjusted measure due to the methodological issues associated with the use of questionnaires to elicit the utility values for this patient population.

Costs:
The analysis of costs was carried out from the broadest perspective and all relevant categories of costs appear to have been included. Indirect costs were not considered, presumably due to the advanced age of the patient population. A breakdown of cost items was provided, and detailed information on unit costs, quantities of resources used, and the price year was provided, but the sources of costs were not reported. Probability distributions were assigned to the cost inputs in the sensitivity analysis, which provided mean values and standard deviations for the total costs.

Analysis and results:
The costs and benefits were synthesised using average cost-effectiveness ratios, although an incremental approach would have been more appropriate. The findings were clearly presented. The issue of uncertainty was investigated through a probabilistic analysis, the methods of which (i.e. probability distributions) were clearly reported, but the...
results were not presented using acceptability curves. The study focused on French treatment patterns and the authors did not consider the potential transferability of their results to other settings.

**Concluding remarks:**
On the whole, the study was well carried out, but some aspects of the study, such as the sources of data, were not presented in detail. Thus the authors’ conclusions should be treated with some caution.

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