A United States cost-benefit comparison of an apodized, diffractive, presbyopia-correcting, multifocal intraocular lens and a conventional monofocal lens

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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 demonstrate the value of an apodized, diffractive, presbyopia-correcting multifocal intraocular lens compared with a conventional monofocal intraocular lens. The net benefit of the multifocal lens exceeded its acquisition cost and the net benefit of the conventional lens. The results and methods for valuing the health benefits were reported clearly and in detail. It is hard to assess the appropriateness of the authors' conclusions because it is unclear if the evidence was derived from a non-randomised trial.

Type of economic evaluation
Cost-benefit analysis

Study objective
The objective was to demonstrate the value of an apodized (smoothed), diffractive, presbyopia-correcting multifocal intraocular lens compared with a conventional monofocal intraocular lens.

Interventions
The study investigated the use of the ReSTOR apodized, diffractive, presbyopia-correcting multifocal intraocular lens. This was compared with a conventional monofocal intraocular lens.

Location/setting
USA/secondary care.

Methods
Analytical approach:
A decision tree model was used to depict the probable costs and outcomes resulting from implantation of the two intraocular lenses. The time horizon was 14 years. The authors reported that a patient perspective was taken.

Effectiveness data:
The effectiveness data were derived from an open-label study. The study involved 495 cataract patients bilaterally implanted with either the multifocal or the conventional lens. Of the 495 patients, 339 received bilateral implantation of the multifocal lens and 156 received bilateral implantation of the conventional lens. The main effectiveness estimate was the rate of independence from glasses at six months after the intervention, which was obtained post-operatively using a questionnaire.

Monetary benefit and utility valuations:
Willingness-to-pay estimates for independence from glasses were derived from the 495 patients who provided the effectiveness data.

Measure of benefit:
The measure of benefit was monetary.

Cost data:
The direct costs were those relating to the two interventions and reading, distance, and bifocal glasses. These costs were derived from standard reference sources, which were mainly Medicare and Medicaid data. The proportion of patients
needing glasses was derived from the 495 patients who provided the effectiveness and benefit data. The number of pairs of glasses needed for those patients who were spectacle dependent over the 14-year time horizon was assumed by the authors. As the costs could be incurred over 14 years, future costs were discounted at an annual rate of 3%. All costs were reported in US dollars ($) at 2006 prices.

Analysis of uncertainty:
A probabilistic sensitivity analysis was carried out by specifying the distributions for all the model parameters. The authors reported that 10,000 Monte Carlo iterations were used to simultaneously select random values from these specified probabilistic distributions.

Results
In the multifocal group, 271 (79.9%) patients reported that they did not require glasses, compared with 12 (7.7%) in the conventional group (p <0.001). The willingness-to-pay for spectacle independence did not vary significantly between the two groups, $4.74 ±1.6 in the multifocal group compared with $4.39 ±1.9 in the conventional group (p=0.108). The average cost per patient was $4,069 in the multifocal group and $376 in the conventional group.

The costs and benefits were combined using a net benefit approach, in which the costs of the intervention were compared with its monetary benefit. The expected net benefit of the multifocal lens was $11,670, compared with a net benefit of $155 for the conventional lens. The difference in net benefits between the two groups resulted in a net advantage of $11,515 for the multifocal lens patients.

The probabilistic sensitivity analysis showed that the multifocal lens had a mean net benefit of $10,359 (95% CI 10,340 to 10,379) and the conventional lens had a mean net benefit of $182 (95% CI 177 to 188).

Authors' conclusions
The authors concluded that the net benefit of the apodized, diffractive, presbyopia-correcting multifocal intraocular lens exceeded its acquisition cost and the net benefit of the conventional monofocal intraocular lens.

CRD commentary
Interventions:
The two interventions were reported clearly and in detail.

Effectiveness/benefits:
The effectiveness data were derived from a single study, which was a multi-site clinical trial. The authors did not report how patients were allocated to each group, so it was unclear if the trial was randomised, which means that it may have been prone to the biases inherent in non-randomised trials. The patient groups were also significantly different in terms of their age, with patients in the multifocal group being younger than those in the conventional group. When comparing the patients' baseline characteristics, the authors did not compare the groups in terms of their sight characteristics.

Costs:
Only the costs to patients were included and this was explicitly stated by the authors. It appears that all the major costs relevant to this perspective were included. The cost information was derived from routine sources such as Medicare and Medicaid. The resource use data was derived from questionnaires given to patients six months after the intervention, and then extrapolated using authors’ assumptions. The time horizon over which the costs were incurred was reported, as was the price year and the discount rate.

Analysis and results:
A decision tree model was used and its details were adequately reported including a diagram. The uncertainty in the model was assessed using probabilistic sensitivity analysis, which in the UK is considered to be the gold standard method for assessing overall model uncertainty. The authors reported a number of limitations to their study, such as the fact that the trial was not blinded, and the costs of complications from the intervention were not included.

Concluding remarks:
The authors did not report whether or not the trial used to derive the effectiveness and resource use data was
randomised, therefore these data could have been prone to bias. The results were reported clearly and in detail, as were the methods used to value the health benefits. It is hard to assess the appropriateness of the authors’ conclusions because it is unclear if the evidence was derived from a non-randomised trial.

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