Modelling lifetime cost consequences of toric compared with standard IOLs in cataract surgery of astigmatic patients in four European countries

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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 aim was to compare the costs and consequences of reducing spectacle dependence for astigmatic patients after bilateral cataract surgery, implanting toric (AcrySof Toric) versus monofocal intraocular lenses, in four European countries. The authors concluded that, from a societal perspective, toric implants were cost saving compared with monofocal lenses, but country-specific data were needed. It was not clear if the best clinical evidence was used and how uncertain the results were, making it unclear if the authors' conclusions were appropriate.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The aim was to compare the costs and consequences of reducing spectacle dependence for astigmatic patients after bilateral cataract surgery, implanting toric intraocular lenses (AcrySof Toric), compared with implanting monofocal intraocular lenses, in four European countries.

Interventions
The two interventions were toric intraocular lenses and monofocal intraocular lenses, implanted during cataract surgery.

Location/setting
France, Italy, Germany and Spain/primary and secondary care.

Methods
Analytical approach:
The analysis was based on a Markov model, with a cycle length of one month, that followed a hypothetical cohort of patients receiving cataract surgery, aged 70 years, over their remaining lifetime to a maximum age of 100 years. The authors stated that a societal perspective was adopted.

Effectiveness data:
The frequencies of re-intervention, not needing spectacles for distance or near vision, or both, wearing spectacles for different time periods, and types of spectacles purchased reading, distance, or both, and bifocal or multifocal, were from a US randomised controlled trial (RCT; ALCON RandD Biostatistics. 2006, see 'Other Publications of Related Interest' below for bibliographic details). This trial compared AcrySof Toric intraocular lenses (256) with AcrySof spherical intraocular lenses (261). Most were unilateral, but some patients received bilateral implants (59; 37 toric and 22 monofocal) and their spectacle requirements were used to model everyday practice. A published European observational survey showed that spectacles purchased after monofocal implants varied across the four countries, and the authors adjusted the US clinical trial results for the monofocal lenses based on this study.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
The measure of benefit was the rate of spectacle independence.
Cost data:
The direct health care costs included: cataract surgery (surgery, intraocular lenses, surgery time, and transport) and spectacles (optometrist and ophthalmologist consultations, time and transport, spectacle maintenance, and cleaning). The annual rate of spectacle replacement was estimated from the European survey, which showed that many patents changed their spectacles every two to three years. Country-specific resource use and average unit costs, based on national tariffs and from available published sources, were from a previous economic modelling study. All costs were reported in Euros (EUR), for the price year 2006, and discounted at an annual rate of 3%.

Analysis of uncertainty:
A sensitivity analysis was conducted using a discount rate of zero.

Results
The average duration of spectacle use was 12.9 to 14.4 years with monofocal lenses and 13.5 to 15.0 years with toric lenses, depending on the country. The duration of use of reading spectacles was longer in the toric group (10.1 to 11.2 years) than in the monofocal group (1.7 to 6.6 years).

The resources for reading spectacles were greater for the toric group, but there were fewer requirements for bifocal or varifocal lenses. The average number of other types of spectacles needed (distance vision or both) was lower in patients with toric lenses (1.8 to 2.0) compared with patients with monofocal lenses (4.1 to 5.9).

The total societal costs (including time) were EUR 5,205.7 to EUR 7,580.5 with monofocal lenses and EUR 4,897.5 to EUR 6,888.8 with toric lenses, depending on the country. Cost savings with toric lenses were reported in all countries, resulting in lifelong discounted cost savings that ranged from EUR 308.2 in Spain to EUR 693.9 in Italy. The lower savings in Spain were due to lower spectacle costs.

Applying a discount rate of zero to the future costs generally increased the cost savings (EUR 391.6 to EUR 897.0).

Authors’ conclusions
The authors concluded that, from a societal perspective, toric intraocular lens implants were a cost-saving alternative to monofocal lenses, but country-specific data were needed to confirm the results.

CRD commentary
Interventions:
The interventions were clearly reported and appear to have included the usual practice in each country. The authors justified their exclusion of laser in-situ keratomileusis (LASIK), but this means that the cost-effectiveness of the toric lenses versus LASIK, in populations who are eligible for both, has not been evaluated.

Effectiveness/benefits:
The effectiveness estimates, such as spectacle prescription rates, were from a US RCT, in which only a small number of patients were implanted bilaterally. The authors cited the trial as a Clinical Study Report, which was presumably unpublished, provided by the manufacturer of the AcrySof Toric lenses (Alcon). Limited information was reported on this trial (the sample size and the follow-up period), which makes it difficult to fully judge the validity of these data. The frequencies for each type of spectacles needed (after bilateral monofocal implants) were from a survey in all four countries, which should make the results generalisable, but the US data for toric lenses were not adjusted. There was no indication that a systematic review was performed and it is unclear whether the best available evidence was analysed.

Costs:
The costs appear to have reflected the stated perspective. The cost estimates were from official national sources in the study settings. The unit costs, resource use, discounting, and the price year were generally well reported. The authors noted that the external validity of the survey of spectacle costs could be challenged. Future costs were appropriately discounted given the time horizon, but the discount rate (3%) might not be applicable to other settings.

Analysis and results:
The analytic approach and modelling assumptions were described and a diagram was presented. The clinical and economic outcomes were not synthesised, given the cost-consequences framework. The uncertainty in the model inputs, such as the estimates from the clinical trial and the European survey, was not assessed, which might limit the external validity of the analysis. The authors acknowledged the need for additional country-specific data and they tried to use conservative effectiveness estimates for the toric lenses. A description of the clinical trial and the European survey might have helped to quantify the uncertainty around the frequencies. The authors discussed the key limitations of their study, and the need for a RCT in each country, with patients with bilateral implants and with country-specific spectacle prescription rates.

Concluding remarks:
It was not clear if the best clinical evidence was used and how uncertain the results were, making it unclear if the authors' conclusions were appropriate.

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