Cost-effectiveness of medications compared with laser trabeculoplasty in patients with newly diagnosed open-angle glaucoma

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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 study

The study compared the cost-effectiveness of treatment with topical prostaglandin analogues or laser trabeculoplasty treatment versus no treatment in newly diagnosed mild open angle glaucoma patients. The authors concluded that prostaglandin analogues and laser trabeculoplasty were cost-effective options, but when more realistic levels of medication adherence were considered, laser trabeculoplasty might be more cost-effective. The methods were adequate, with sufficient reporting of the methods and results. Given the scope of the analysis, the authors’ conclusions appear valid.

Type of economic evaluation
Cost-utility analysis

Study objective
The study compared the incremental cost-effectiveness of treatment with generic topical prostaglandin analogues or laser trabeculoplasty treatment versus no treatment in patients newly diagnosed with mild open angle glaucoma.

Interventions
The three alternatives compared were generic topical prostaglandin analogues, laser trabeculoplasty, and no treatment (observation only) in patients aged 60 years with newly diagnosed mild open angle glaucoma (defined as glaucomatous damage with a mean deviation of -6dB or less of visual field loss on standard automated perimetry).

Location/setting
USA/primary and secondary care.

Methods
Analytical approach:
The analysis was based on a Markov cohort model with annual cycles. The model had five disease health states: mild, moderate, and severe glaucoma, followed by unilateral and bilateral blindness. The time horizon was 25 years. The authors did not explicitly state the study perspective.

Effectiveness data:
A selective approach appears to have been used to identify relevant sources of data. Clinical data came from a selection of published randomised controlled trials (RCTs) (see Leske et al 2003, Glaucoma Laser Trial Research Group 1995 in Other Publications of Related Interest). Changes in intraocular pressure values were the key clinical inputs. The open angle glaucoma progression was determined using data from these trials. Some author assumptions were also used for progression to more severe disease states. Mortality rates came from US life tables.

Monetary benefit and utility valuations:
Utility valuations came from published studies (see Lee et al 2008, Brown et al 2001 in Other Publications of Related Interest).
Quality-adjusted life-years (QALYs) were the summary benefit measure. Future benefits were discounted at an annual discount rate of 3%.

Cost data:
The costs included physician visits, ancillary glaucoma tests, medications, laser and surgical procedures, treatment for adverse effects, and low vision aids. Costs were based on published sources including the US Medicare Fee Schedule for services and average wholesale prices (glaucoma medications) from the Red Book. The price year was 2010. All costs were presented in US $. Future costs were discounted at an annual rate of 3%.

Analysis of uncertainty:
One-way sensitivity analyses were carried out on key model inputs, including effectiveness of treatments, costs, utility and the time horizon. The impact of changing the effectiveness of prostaglandin analogues and laser trabeculoplasty was investigated in a two-way sensitivity analysis.

Results
For no treatment, the 25-year expected costs were $2,700 and the expected QALYs were 16.06.

For laser trabeculoplasty, the 25-year expected costs were $13,788 and the expected QALYs were 16.71.

For prostaglandin analogues, the 25-year expected costs were $18,101 and the expected QALYs were 17.14.

The incremental analysis showed that, compared with no treatment, the incremental costs per QALY gained was $16,824 with laser trabeculoplasty and $14,179 with prostaglandin analogues.

Sensitivity analysis showed that when prostaglandin analogues were 25% less effective or laser trabeculoplasty was 20% more effective, laser trabeculoplasty was associated with better value for health benefits than prostaglandin analogues.

Authors’ conclusions
The authors concluded that both prostaglandin analogues and laser trabeculoplasty were cost-effective options. When considering more realistic levels of medication adherence, laser trabeculoplasty might be a more cost-effective alternative.

CRD commentary
Interventions:
The interventions were adequately reported. The selection of the comparators was appropriate as both treatment options were common medical therapies that had been compared in clinical trials.

Effectiveness/benefits:
A selective approach appeared to have been used to identify relevant sources of evidence as no information on a review of the literature was reported. The clinical inputs used in the model were described, but limited information on the data sources was reported. However, the authors stated these inputs came from large RCTs, the methodological rigour of which should have ensured the validity of the clinical estimates. Key clinical inputs were varied in the sensitivity analysis. QALYs were an appropriate measure of benefit, given the impact of the disease on quality of life and these were appropriately discounted given the 25-year study time horizon. The sources for the utility estimates were reported, but the methods used to derive the utilities were not described.

Costs:
The perspective of the analysis was not stated, but appears to have been conducted from the viewpoint of the payer, as direct medical costs were considered. Data sources were clearly reported, which enhanced the transparency of the costs analysis. The impact of variations in the cost of prostaglandin analogues and adverse effects from laser trabeculoplasty was assessed in sensitivity analysis. The price year was reported, which would allow reflation exercises in other time periods.

Analysis and results:
An incremental analysis was appropriately used to combine costs and benefits of the three options under examination.
Uncertainty was investigated appropriately, using both one-way and two-way sensitivity analysis for key inputs of the model. These types of analyses assist in evaluating uncertainty in the model results, but probabilistic sensitivity analysis would have been more thorough and would have evaluated the overall model uncertainty. The study results were clearly reported for the base case and the sensitivity analysis. The authors acknowledged some limitations of their analysis. The results appeared to be specific to the authors' context, so it was unclear whether they would be relevant in other settings, although they might be relevant in jurisdictions with similar relative costs and epidemiology.

Concluding remarks:
The methods were adequate; the methods and results were sufficiently reported. Given the scope of the analysis, the authors' conclusions appear valid.

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