The cost-effectiveness of bimatoprost 0.03% in the treatment of glaucoma in adult patients:
a European perspective
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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.

Health technology
Bimatoprost 0.03% (Lumigan) eye drops were compared with latanoprost (Xalatan) 0.005% eye drops, both taken once daily for a 6-month period.

Type of intervention
Treatment for intraocular pressure (IOP) and secondary prevention of glaucoma.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised adult glaucoma patients whose IOP was inadequately controlled with topical beta-blockers. No specific inclusion or exclusion criteria were noted.

Setting
The setting was primary care. The economic study was carried out in three European countries (Austria, Finland and France).

Dates to which data relate
The effectiveness data were derived from a single study published in 2003, while resource use was determined by a decision model. The prices referred to 2002.

Source of effectiveness data
The effectiveness data were derived from a single study.

Link between effectiveness and cost data
The costing was carried out retrospectively on a different sample of patients to that used in the effectiveness study.

Study sample
The reader is referred to the parent study (Noecker et al. 2003, see ‘Other Publications of Related Interest’ below for bibliographic details) from which the effectiveness data were taken, and which may contain details that were not reported in the current study. The study sample comprised adult glaucoma patients whose IOP was inadequately controlled with topical beta-blockers. There was no report that power calculations were carried out and no details of sample selection. A total of 269 patients were included, but the number receiving bimatoprost or latanoprost was unclear.
Study design
The study by Noecker et al. 2003 was a multi-centre, RCT in which patients were followed for 6 months. The report did not specify whether blinding methods were used. There was a 4.5% drop-out rate for bimatoprost and a 3.7% rate for latanoprost.

Analysis of effectiveness
The report did not specify whether the analysis was conducted on an intention to treat basis or on treatment completers only. Primary health outcomes from the study for inclusion in the model were the proportion of patients needing to change therapy because of adverse events and the proportion of patients in need of adjunctive medication. The final outcome was the proportion of patients reaching an IOP target of 17 mmHg. The comparability of the patients between the two groups was not reported.

Effectiveness results
In the trial, the proportion of patients needing to change therapy because of adverse events was 4.5% for bimatoprost and 3.7% for latanoprost.

At 6 months, the proportion of patients in need of adjunctive medication was 40.6% for bimatoprost and 46.3% for latanoprost.

At 6 months, the proportion of patients reaching an IOP target of 17 mmHg was 64.7% for bimatoprost and 44.9% for latanoprost. At 12 months, this proportion was 63.8% for bimatoprost and 45.6% for latanoprost.

Clinical conclusions
The authors did not draw conclusions about effectiveness independently from the cost conclusions.

Modelling
A decision tree analysis was used to model evidence concerning the proportion of patients needing to change therapy because of adverse events and the proportion of patients in need of adjunctive medication. The model was based on a 6-month time horizon, with the results being extrapolated up to 1 year based on a long-term trial (Higginbotham et al. 2002, see 'Other Publications of Related Interest' below for bibliographic details).

Methods used to derive estimates of effectiveness
Some modelling assumptions were made.

Estimates of effectiveness and key assumptions
The authors did not identify specific assumptions.

Measure of benefits used in the economic analysis
The summary measure of health benefit was the number of patients achieving a target IOP of 17 mmHg.

Direct costs
The costs were estimated from the perspective of the health care provider for three countries (Austria, Finland and France). The analysis focused on the costs of medication, adjunctive medication, initial visits to the ophthalmologist and follow-up visits to the ophthalmologist. Discounting was appropriately not used given the short time horizon of the study. The unit costs were reported separately from the resource quantities, and were taken from official sources in the countries under consideration. The quantities were determined through the decision model. The price year was 2002.
Statistical analysis of costs
The costs were treated deterministically and, although the ranges were reported, the source of these ranges was unclear.

Indirect Costs
The indirect costs were not relevant to the perspective adopted.

Currency
Euros (EUR).

Sensitivity analysis
One-way and multi-way sensitivity analyses were carried out to estimate the robustness of the model to changes in the underlying parameter values.

Estimated benefits used in the economic analysis
After adjusting for adverse events, 63.8% of patients receiving bimatoprost and 45.6% of patients using latanoprost reached the target level IOP of 17 mmHg.

Cost results
The total cost over 6 months was EUR 249 to 527 for bimatoprost and EUR 234 to 530 for latanoprost.

The authors did not report separate results for each country considered.

Synthesis of costs and benefits
The cost per patient achieving the target IOP was EUR 391 to 827 for bimatoprost and EUR 514 to 1,162 for latanoprost.

As bimatoprost was both more effective and less costly than latanoprost, the authors did not calculate the incremental cost-effectiveness ratio.

The authors reported “all sensitivity analyses showed results in favour of bimatoprost compared with latanoprost”. The results were therefore considered to be robust.

Authors’ conclusions
From a European perspective, bimatoprost was a more cost-effective monotherapy than latanoprost in the treatment of glaucoma.

CRD COMMENTARY - Selection of comparators
The authors provided a useful background discussion. The comparator was justified by the existence of an RCT that used the technologies of interest. You should decide if latanoprost is standard treatment in your own setting.

Validity of estimate of measure of effectiveness
The authors used a single published study to inform their effectiveness estimates, but it was unclear whether any form of systematic review had been undertaken to establish whether these results were valid in their own right. The authors might have considered a broader range of studies and combined data based on sample size to create a study with greater internal validity. Nevertheless, the study used was an RCT which helps to reduce the likelihood of systematic
differences between patients in the two groups, and gives greater confidence that the observed results are due to treatment differences rather than to potential confounding factors. It would have been useful had the authors provided further details of the initial study, such as how the sample was selected, and reported the comparability of the groups at baseline.

**Validity of estimate of measure of benefit**
The number of patients reaching the IOP target was used as the summary measure of benefit. This is a relatively narrow measure that would only enable comparisons of the results with similar studies exploring IOP and glaucoma.

**Validity of estimate of costs**
The cost analysis was carried out from the perspective of the health care provider. Costs relevant to this perspective were central to the analysis; only medication and health care visits were considered in the analysis. Useful details, such as reporting the unit costs separately from the quantities and a detailed representation of the decision model, improve the readers' understanding and ability to interpret the results. However, the results were not presented separately for each country of interest despite unit costs being detailed for each. This reduces the applicability of the results to each specific country. More importantly, although the authors emphasised that “use of bimatoprost implied lower annual total costs compared with latanoprost”, the results presented do not support this conclusion. The range of costs for latanoprost encompassed the range of costs for latanoprost; with such results a statistical analysis would be unable to conclude that the costs of the technologies are statistically significant. Therefore, it is not accurate to conclude that bimatoprost is less costly. The same is true for the cost-effectiveness results.

**Other issues**
The authors were able to draw some comparisons of the effectiveness results, citing other papers that reported similar results, but there were no comparisons of the cost-effectiveness results. The issue of generalisability was addressed with the scope of the study encompassing Austria, France and Finland, and the authors concluded that the results are applicable to European glaucoma patients. However, in the absence of results for each individual country and detailed results from the sensitivity analysis for each country, as well as averages, the reader should be cautious about generalising the results. As already noted, the strength of the conclusions drawn is not supported by the results presented, and this further raises issues of the ability to generalise the results. Some limitations were acknowledged. These focused on limitations of the modelling design, such as the use of assumptions.

**Implications of the study**
The authors did not make any recommendations for policy, but did recommend that European ophthalmologists consider bimatoprost as a first-line monotherapy at an early stage of glaucoma treatment. Carrying out prospective economic analysis as a part of clinical trials was highlighted as an area for further work.

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