Economic evaluation of dorzolamide vs pilocarpine for primary open-angle glaucoma

Rocchi A, Tingey D

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
Dorzolamide hydrochloride, a topically administered carbonic anhydrase therapy inhibitor for patients with primary open-angle glaucoma for whom beta-blockers have failed.

Type of intervention
Treatment.

Economic study type
Cost-utility analysis.

Study population
A hypothetical cohort of patients over 65 years of age with primary open-angle glaucoma.

Setting
Secondary care. The economic study was conducted in Ontario, Canada.

Dates to which data relate
The dates of the effectiveness and the resource use data were not reported. The price year was 1996.

Source of effectiveness data
Estimates of effectiveness were based partly on a review of published literature and partly on opinion.

Modelling
A Markov-type decision model was used in order to estimate costs and benefits over a 10-year time period.

Outcomes assessed in the review
The outcomes assessed were the efficacy, annual probabilities of discontinuation of therapy, annual rate of adverse events, and the rate of compliance for pilocarpine and dorzolamide strategies. Also the efficacy (success rate) of laser treatment and surgery, and probability of the use of medication after surgery were assessed.

Study designs and other criteria for inclusion in the review
Not stated.

Sources searched to identify primary studies
Criteria used to ensure the validity of primary studies
Not stated.

Number of primary studies included
8 published studies were used to find values for model parameters.

Methods of combining primary studies
None. Each estimate obtained from the literature was based on a single study only.

Investigation of differences between primary studies
Not applicable.

Results of the review
The efficacy of both drug therapies were found to be equal. The annual rate of discontinuation of therapy was 12% for pilocarpine and 1-10% for dorzolamide. Compliance rates were 66% to 80% for pilocarpine and 88% for dorzolamide. The efficacy of surgery was found to be 88-98%.

Methods used to derive estimates of effectiveness
The estimates of most parameters used in the main model were based on the opinions of an expert panel of 7 ophthalmologists from community and academic practices across Canada.

Estimates of effectiveness and key assumptions
The rate of discontinuation of the therapy was estimated to be 20% and 4%, and the rate of adverse event 25% and 2% with pilocarpine and dorzolamide, respectively. The rate of progression to laser treatment for patients complying with either of the two drug therapies was 5% after year 1, 10% after year 3, and 20% after year 5. The respective progression rates for noncompliant patients were 60%, 95%, and 100%. The efficacy of laser treatments was estimated to be 80% for the first year with a consequent failure rate of 10% during years 2 to 5. After laser treatment 95% of patients were estimated to use medication. The efficacy of surgery was estimated to be 90% and the rate of medication use after surgery 15%.

Measure of benefits used in the economic analysis
The measure of benefits was Quality-adjusted Life Years (QALYs) gained. The quality weights were derived from the vision domain of the Health Utilities Index estimates published in the literature. The source of the utility values was not reported.

Direct costs
Since the time frame covered by the analysis was 10 years, the costs were discounted by 5% pa. While no report was made of the quantities of resource use, the operating costs generated by the strategies both in hospital and on an outpatient basis (professional charges, drug acquisition, and procedures) were measured. The source of unit costs was the 1996 Ontario Ministry of Health Schedule of Benefits, for professional fees and laboratory procedures, and the Ontario Drug Benefit Formulary, for drug acquisition. Hospital procedures were priced by means of a corporate cost model developed at the Ottawa General Hospital. Total costs associated with each strategy were derived from a model. The price year was 1996.
Currency
Canadian dollars (Can$).

Sensitivity analysis
Both a one-way and a scenario analysis were performed. The former was used to analyse the effect of altering the adverse event rate for pilocarpine from 25% to 18.75% and to 12.5%. The scenario analysis simultaneously varied the rate of discontinuation, adverse event rate (for pilocarpine only), rate of patient compliance (for pilocarpine only), rate of progression to laser (for noncompliant patients only), use of medication after laser treatment, and efficacy of surgery.

Estimated benefits used in the economic analysis
The number of discounted (by 5%) Quality-Adjusted Life Years gained with dorzolamide over the pilocarpine option was 0.118 per patient (10-year period).

Cost results
A 5% annual discount rate was used. The incremental costs of dorzolamide over pilocarpine were Can$1,107.96 per patient (10-year period).

Synthesis of costs and benefits
Using a 5% discount rate for both costs and benefits, the cost per additional QALY gained by dorzolamide over pilocarpine was Can$9,390 at 1996 prices. The scenario analysis showed a decrease of the cost-utility ratio to Can$7,295 per QALY gained, whilst the one-way analysis yielded a cost-utility ratio of Can$20,900, when the adverse rate for pilocarpine was reduced to half of its base case value. Thus, the authors considered that the results were ‘extremely robust’ to sensitivity analyses.

Authors’ conclusions
All the results are at, or below, the suggested limit of Can$20,000 per QALY, which is graded as strong evidence for adoption and appropriate use of a new technology. According to these criteria, the study results suggest that dorzolamide should be listed for reimbursement by provincial formularies.

CRD COMMENTARY - Selection of comparators
The reason for the choice of comparator is clear. Pilocarpine was the most commonly used medical strategy to adjunctively treat patients for primary open-angle glaucoma. You, as a user of this database, should consider whether this is a widely used technology in your setting.

Validity of estimate of measure of benefit
The internal validity of the study results should be considered as low since the evidence was mainly based on the opinion of an expert panel. The utility valuation was based on the adverse consequences of the initial medical therapy options in terms of the patient's vision only, and hence ignored other troublesome side effects of the alternative treatments. This was, however assumed to bias the results against the new therapy alternative.

Validity of estimate of costs
Adequate detail of the sources of price information was provided. No quantities of resource use were reported separately from the costs. The estimate of resource use was based on the opinion of an expert panel.
The conclusions are justified given the uncertainties in the data. The results from the sensitivity analyses indicate that the model is robust to changes in the values of key parameters. The authors stated that the results are not generalisable to younger patients, who have different tolerability profiles to medications than elderly patients. Also, generalisability to other countries may not be possible due to differences in treatment practice and the decision criteria for cost-effectiveness of new technologies.

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