Cost-effectiveness of glaucoma interventions in Barbados and Ghana

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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 evaluate the cost-effectiveness of strategies to reduce glaucoma-attributable vision impairment and blindness, in Barbados and Ghana. The authors concluded that in high-incidence populations, glaucoma screening interventions might be cost-effective, depending on the willingness-to-pay threshold. The methods were poor and, as the authors pointed out, the results should not be viewed as an estimate of the cost-effectiveness of any existing screening intervention.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to evaluate the cost-effectiveness of strategies to reduce glaucoma-attributable sight impairment and blindness, in Barbados and Ghana.

Interventions
Three case finding and treatment interventions were evaluated. Ideal identification depended on referral by the patient upon glaucoma incidence. Syndromic identification was referral by the patient upon mild visual impairment. Universal screening was examination of the entire population at ages 45, 55, 65, 75, and 85 years.

For each intervention, two medical care scenarios were evaluated. Guideline care was the care recommended by the American Academy of Ophthalmology. The alternative was a trabeculoplasty (laser surgery) with no follow-up care.

Location/setting
Ghana and Barbados/secondary care.

Methods
Analytical approach:
A published model was used to simulate the natural history of glaucoma, in three parts: incidence, progression, and field loss (Rein, et al. 2009, see ‘Other Publications of Related Interest’ below for bibliographic details). The time horizon was the lifetime of the patient. The authors reported that a societal perspective was adopted.

Effectiveness data:
The clinical and effectiveness estimates were from published data and authors’ assumptions. The input parameters included the glaucoma incidence and progression rates, treatment efficacy, duration of treatment efficacy, and treatment contraindications. The main effectiveness estimates were the sensitivity and specificity of screening, which were mainly from three published studies.

Monetary benefit and utility valuations:
A previous study by the authors assessed the utility loss associated with a mean deviation of visual field loss from normal in decibels. These US utility losses were converted into World Health Organization (WHO)-defined disability-adjusted life-years (DALYs), for Barbados and Ghana.

Measure of benefit:
Two summary measures of benefit were derived: DALYs saved and quality-adjusted life-years (QALYs). QALYs
were only reported for Ghana. Future outcomes were discounted at an annual rate of 3%.

Cost data:
The direct costs included those of eye examinations, treatment, gonioscopy, automatic threshold perimetry, beta-blockers, prostaglandin analogues, alpha-two antagonists, topical carbonic inhibitors, trabeculectomy, and trabeculoplasty. The non-pharmacologic costs were US medical costs adjusted to represent those of the two countries. The medication costs were their purchase prices from the International Drug Price Indicator Guide. The indirect costs included those of productivity lost due to vision loss and informal care for those with WHO-defined blindness. These were from published studies conducted in developing countries. The direct and indirect costs were reported separately. The price year was 2005 and future costs were discounted at an annual rate of 3%. All costs were reported in US dollars ($).

Analysis of uncertainty:
One-way sensitivity analyses were undertaken to explore the impact of variations in the medical costs, reduced glaucoma incidence, the substitution of QALYs for DALYs, variation in treatment efficacy, and changes in the discount rate.

Results

Barbados: The average medical cost was zero for no treatment, $413 for ideal identification and guideline treatment, $50 for ideal identification and laser treatment, $83 for syndromic identification and guideline care, $16 for syndromic identification and laser treatment, $583 for universal screening and guideline care, and $198 for universal screening and laser treatment.

The DALYs were 0.064 for no treatment, 0.010 for ideal with guideline care, 0.031 for ideal with laser, 0.046 for syndromic with guideline care, 0.051 for syndromic with laser, 0.016 for universal with guideline care, and 0.034 for universal with laser.

The additional cost per DALY avoided, compared with no treatment was $7,728 for ideal with guideline care, $1,528 for ideal with laser, $4,690 for syndromic with guideline care, $1,272 for syndromic with laser, $12,108 for universal with guideline care, and $6,632 for universal with laser treatment.

Ghana: The average medical cost was zero for no treatment, $189 for ideal with guideline care, $31 for ideal with laser, $29 for syndromic with guideline care, $7 for syndromic with laser, $328 for universal with guideline care, and $154 for universal with laser treatment.

The DALYs for were 0.032 for no treatment, 0.004 for ideal with guideline care, 0.014 for ideal with laser, 0.024 for syndromic with guideline care, 0.027 for syndromic with laser, 0.008 for universal with guideline care, and 0.016 for universal with laser treatment.

The additional cost per DALY avoided, compared with no treatment was $6,896 for ideal with guideline care, $1,771 for ideal with laser treatment, $3,947 for syndromic with guideline care, $1,407 for syndromic with laser treatment, $13,504 for universal with guideline care, and $9,808 for universal with laser treatment.

These results were most sensitive to variations in the screening and medical costs.

Authors' conclusions
The authors concluded that, as countries develop, their populations live longer producing a higher incidence of glaucoma, and glaucoma screening interventions might be cost-effective. The willingness-to-pay threshold, based on a country's gross domestic product, had a greater effect leading to different treatment decisions in different countries.

CRD commentary
Interventions:
The interventions were described.
Effectiveness/benefits:
The clinical and effectiveness data were mainly from published studies. No systematic review was reported to identify these sources, making it unclear if all the relevant clinical and effectiveness data were considered. Limited reporting on these estimates means that it is not possible to make any conclusions on their validity or reliability.

Costs:
The authors explicitly reported that a societal perspective was adopted. It appears that all the categories of costs, relevant to this perspective, were included. As recommended by current guidelines, the authors did not combine the direct and indirect costs, and they estimated the cost-effectiveness excluding the indirect costs. The authors reported the limitation that many of the costs were from countries other than Barbados and Ghana. The authors tried to adjust these costs, but the estimates might not have been generalisable to Ghana and Barbados. The price year, time horizon, and discount rate were all reported.

Analysis and results:
The cost and outcome information gathered by the authors was synthesised in a decision analytic model. The model was described appropriately, but no diagram was given. One-way sensitivity analyses were conducted to evaluate which parameters had the greatest impact on the results. This type of analysis goes some way towards evaluating uncertainty, but probabilistic sensitivity analyses are more thorough and evaluate the overall model uncertainty. The authors produced an incremental economic evaluation, but all the interventions were compared with no treatment, rather than the next best alternative. As they correctly pointed out, their results should not be viewed as an estimate of the cost-effectiveness of the particular screening interventions.

Concluding remarks:
The methods were poor and, as the authors pointed out, the results should not be viewed as an estimate of the cost-effectiveness of any existing screening intervention.

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