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Cost-utility of primary open-angle glaucoma in Brazil

Custo-utilidade do tratamento do glaucoma primário de ângulo aberto no Brasil

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ABSTRACT

***Objective:** To determine the most cost-effective strategy for the treatment of early-stage primary open-angle glaucoma, by comparing the following alternatives: observation, medical therapy or laser treatment. **Methods:** Using a Markov model, from the perspective of the Brazilian Public Health System (SUS) and a horizon of the average life expectancy of the Brazilian population, we compared the incremental cost-utility ratio (ICUR) among the three treatment alternatives, as well as their costs and the gain in quality of life as measured in QALYs (Quality-adjusted life years). **Results:** The ICUR of initial laser treatment and initial medical treatment over observation only, was R$ 2,811.39/QALY and R$ 3,450.47/QALY, respectively. Both strategies were cost-effective, with a slight advantage for the laser treatment. This difference decreases further when increasing age into the model. The two alternatives have provided significant gains in quality of life (around 2.5 QALYs for the laser treatment and 5.0 QALYs for treatment with eye drops). **Conclusion:** Both primary treatments, with laser trabeculoplasty as well as with medications, were cost-effective and provided real gains in quality of life when compared with no treatment of POAG.*

***Keywords:** Primary open-angle glaucoma/therapy; Primary open-angle glaucoma/economy; Laser therapy; Cost-effectiveness analysis; Quality of life; Brazil*

RESUMO

Objetivo: Determinar a estratégia mais custo-efetiva para o tratamento do glaucoma primário de ângulo aberto em fase inicial, comparando-se as seguintes alternativas: observação, tratamento clínico ou tratamento com laser. **Métodos**: Por meio de um modelo de Markov, sob a perspectiva do Sistema Único de Saúde (SUS) e um horizonte da expectativa de vida média da população brasileira. Comparou-se a razão de custo-utilidade incremental (ICUR) entre 3 alternativas de tratamento, assim como seus custos e o ganho em qualidade de vida, medido em QALY (Quality-adjusted life years). **Resultados:** A ICUR do tratamento inicial com laser e do tratamento inicial com colírios, em relação a não tratar foi de R$ 2.811,39/QALY e R$ 3.450,47/QALY, respectivamente. Ambas as estratégias foram custo-efetivas, com uma discreta vantagem para o tratamento a laser. Esta diferença diminui ainda mais quando se aumenta a idade de entrada no modelo. As duas alternativas propiciaram ganhos significativos de qualidade de vida (em torno de 2,5 QALYs para o tratamento com laser e de 5,0 QALYs para o tratamento com colírios). **Conclusão:** Tanto o tratamento primário com trabeculoplastia a laser quanto com medicações foram custo-efetivos e proporcionaram ganhos reais de qualidade de vida quando comparados com o não tratamento do GPAA.

Descritores: Glaucoma primário de ângulo aberto/terapia; Glaucoma primário de ângulo aberto/economia; Terapia a laser; Análise de custo-efetividade; Qualidade de vida; Brasil

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Introduction

Knowledge of the current situation of glaucoma costs is key for planning actions intended to decrease the economic and social impact of blindness in Brazil and worldwide.[1] Health costs have increased in a significant way and good planning should involve the analysis of these costs using current information and making appropriate predictions for the future.[1] Glaucoma is a leading cause of irreversible blindness in the world, accounting for very high costs, both direct medical costs (consultations, frequent complementary exams, chronic use of medication, surgery) and non-medical direct costs (cost of caregiver, rehabilitation, etc), and indirect costs (temporary or permanent absence from work).[1-2]

It is known that health care costs related to glaucoma tend to increase with the severity of the disease and when the diagnosis is made in late stages of the disease.[3-4]

The availability of new methods of treatment and diagnosis imposes questions about how to best allocate resources. The technology assessment in health has become important for a number of reasons: great variability of clinical practice, uncertainty about the actual impact of certain diagnostic or therapeutic interventions, rapid development and diffusion of new technologies and incompatibility among new technologies and the ones already established.[5]

Among the studies of economic evaluation in health care, cost-effectiveness studies are of great importance, since they assess both the costs and the effectiveness of that health intervention. When the effectiveness is measured in quality of life (QALY: *Quality-adjusted Life years*), it is called cost-utility study.[5] The Ministry of Health has increasingly stimulated more cost-effectiveness (and cost-utility) studies to improve the allocative efficiency of SUS (Brazilian Single Health System).[6]

The treatment of primary open-angle glaucoma (POAG) in early stage is commonly initiated by the use of ocular hypotensive eyedrops.[7] Recently, the use of laser trabeculoplasty (either with argon or selective trabeculoplasty laser) is being considered as a viable alternative for the primary treatment of these cases.[8] Some studies suggest that initial use of the laser could save costs due to postponing the use of eyedrops in these patients.[9-11]

The aim of this study was to analyze the cost-utility of clinical treatment (chronic use of eyedrops) and laser treatment (trabeculoplasty) in patients with early primary open-angle glaucoma (POAG) under treatment in the Brazilian Single Health System (SUS).

Methods

The study population consisted of a hypothetical cohort of patients at 40 years of age who have primary open-angle glaucoma under initial treatment in SUS. Early glaucoma was defined by the presence of glaucomatous optic neuropathy and initial campimetric defect in the visual field, according to the classification of Hodapp, Parrish and Anderson (MD [mean deviation] index of Humphrey perimetry > -6 dB).[12] The study environment was the Brazilian public health system, in an attempt to improve the allocative efficiency of resources directed to the treatment of glaucoma.

The perspective of costs is from the SUS financier (payer), according to the guidelines of the Brazilian Ministry of Health.[6] These costs are those paid by health system to the service providers and to reference centers for the treatment of glaucoma by SUS. The direct medical costs are included in this analysis (appointments, tests, surgeries, etc). Non-medical direct costs (caregiver, rehabilitation, etc.) and indirect costs (loss of productivity) were not included.

For the initial treatment of POAG, the alternatives that were studied and compared in this study were the initial treatment with eyedrops (clinical treatment) or the initial treatment with laser trabeculoplasty (laser treatment). A third alternative, observation without treatment, was included with the aim of evaluating the cost-utility ratio of glaucoma treatment (eyedrops or laser) in relation to no treatment of glaucoma. The latter alternative made it possible to evaluate indirectly the natural history of POAG in the cohort of patients without any treatment. In this study, we decided not to consider surgical treatment as an alternative to the primary treatment in the patients of initial POAG, as it is not an option commonly used in the daily practice in this evolutionary stage, and literature shows some evidence that surgery in this stage of glaucoma may have a negative impact on the quality of life.[13]

The period of the study was the average life expectancy of the Brazilian population, according to the Brazilian Institute of Geography and Statistics (IBGE).[14] The cohort of hypothetical patients entered the model at age 40, and the life expectancy was adjusted every year according to the life table of IBGE. Both the costs and effectivities had a discount of 5%, as recommended by the Brazilian Ministry of Health.[6]

The effectiveness of interventions was measured in QALY or utility values, which are measures of quality of life based on the patient preferences for different states of health. The utility values used were those suggested by Brown et al (2001) and supported by Lee et al (2008).[15-16] These values have been identified by the method Time Trade Off, from interviews with people with glaucoma in various evolutionary stages of the disease.[15]

The costs of the interventions were extracted from the table OF procedures and medical fees of SUS.[17] The frequency of medical visits and exams were obtained from what is established for the Glaucoma Reference Centers of SUS.[18] The price of medications was the amount paid by SUS to the Reference Centers.[18] In the alternative medical treatment, the average number of eyedrops by patients and the ratio of the types of eyedrops in each evolutionary stage were obtained from cross-sectional survey carried out in a group of 225 consecutive patients with POAG assessed by the authors. The cost of adverse effects to medical treatment includes the cost of inadvertent use of beta-blockers in patients with bronchial asthma (increase of 23.8% to the final average cost per patient using beta-blockers, according to the Australian suggestion of study Tunnel Vision).[9] In the alternate laser treatment, the laser trabeculoplasty was considered in both eyes in the first year. There is the possibility of a new application in each eye if necessary (following the suggestion of Cantor et al, we added 21% to the costs of the initial trabeculoplasty to cover the costs of a possible new laser application[19]). In the following years, the costs of re-introduction of eyedrops for glaucoma were consider according to literature data (50% of laser efficiency at the end of the year, that is, 50% of patients without the need of eyedrops and 50% with the need of eyedrops).[9] Laser adverse events were not taken into consideration in the costs due to the low incidence. Post-laser transitory anterior uveitis in post-laser peripheral anterior synechiae do not affect the quality of life, so they were not taken into account. Detachment of the retina after laser is very rare, having been eliminated from this evaluation.[9] As in the clinical treatment alternative, the adverse effect of beta-blockers in patients with asthma was taken into consideration.[9] The monetary values are in Reais (R$) and refer to the year 2014.

For the cost-utility analysis, a Markov model was developed with the following stages: (1) Early glaucoma; (2) moderate glaucoma; (3) Severe glaucoma; (4) Blindness in the better eye; and (5) death. Stage 1 (Early glaucoma) was the stage of entering the model (where the entire hypothetical cohort entered the model at 40 years of age) and stage 5 (Death) was the terminal stage. Every year the members of the cohort could remain at the same stage or progress to the next stage according to the transition probabilities. Participants who have progressed should follow the following path: Early glaucoma, moderate glaucoma, severe glaucoma and blindness, without skipping stages or returning to earlier stages. The probabilities of transition between stages for each alternative studied (observation, clinical treatment and laser treatment) were taken from literature.[9, 20, 21] Patients of any stage (1 to 4) could reach the stage 5 (death) without going through the other stages, in accordance with the yearly probability of death for the Brazilian population.[14] The choice of Markov modeling was due to the characteristics of the pathology in study: a chronic desease with recurring costs (chronic use of eyedrops, medical visits and exams).

In constructing the model, some assumptions were adopted. The duration of each cycle in the model was 1 year. The whole cohort was 40 years old, as it is from this age that the prevalence of POAG starts to increase.[22] In the clinical treatment strategy, the first treatment line was performed with the use of prostaglandin analogues. In the event of failure to achieve the target intra ocular pressure, the following eyedrops were prescribed: timolol maleate 0.5% and dorzolamide hydrochloride 2%, in this order. This choice was based on clinical experience of two of the authors (glaucoma specialists) and also following the guidance of the Brazilian Glaucoma Society.[7] In the laser treatment strategy as initial therapy, the laser application in 360° of the trabecular was considered in both eyes in the first year. If necessary, it was allowed to repeat the laser trabeculoplasty once more.[9] In the laser failure in controlling the intraocular pressure, patients were reintroduced to hypotensive medication in the following sequence: prostaglandin analog and timolol maleate 0.5%.[7,9] The probabilities of transition between stages were fixed, i.e., there were no adjustments in the probability with evolution of th emodel. Another assumption was that the average utility values for each health state (early, moderate, severe glaucoma, blindness and death) are not influenced by the type of treatment strategy.[23]

The outcome measure used in this study was the incremental cost-utility ratio (ICUR), which shows the incremental cost per benefit achieved (R$/QALY).

The robustness of the model was tested by univariate sensitivity analysis using the Tornado diagram for the variables with the greatest impact on the outcome.

The data collection was performed in Microsoft Excel 2010, and the cost-utility analysis was performed using software TreeAge Pro 2011 Health Care (Tree Age Software, Williamstown, Massachusetts, USA).

Results

For the construction of the reference model (*Base case model*), 3 types of parameters have been considered: costs for each health state for each treatment strategy; the utilities related to each health state; and transition probabilities between each health state. The costs associated to each medical resource used in the reference model, as well as the costs of each evolutionary stage of the model for each treatment strategy, are arranged in tables 1 and 2.

Table 1

Resources used and associated costs used in the model

Treatment Strategy	Resourse	Frequency (months)	Code (SUS)*	Unit Value (R$)
Clinical Treatment	Initial Costo[a]	12	03.01.01.010-2	35.11
	Follow-up appointment[b]	3	03.03.05.001-2	17.74
	Use of 1 medication[c]	3	03.03.05.005-5	127.98
	Use of 2 medications[d]	3	03.03.05.018.7	146.64
	Use of 3 medications[e]	3	03.03.05.022-5	226.02
Laser Treatment	Initial Costo[a]	12	03.01.01.010-2	35.11
	Follow-up appointment[b]	3	03.03.05.001-2	17.74
	Monocular trabeculoplasty	NA	04.05.05.012-7	45.00
	New application of rabeculoplasty[f]	NA	04.05.05.012-7	9.45
	Use of 1 medication[c]	3	03.03.05.005-5	127.98
	Use of 2 medications[d]	3	03.03.05.018.7	146.64

* Table code for procedures of the Brazilian Single Health System (SUS), SIGTAP table [cited 2013 Sep 8]
[a] Initial Costo: includes complete eye examination with tonometry, fundoscopy and campimetry;
[b] Follow-up appointment: includes complete eye examination with tonometry and fundoscopy;
[c] Use of medication 1 of prostaglandin analogue type;
[d] Use of 2 medications: prostaglandin analogue + timolol maleate 0.5%;
[e] Use of 3 medications: prostaglandin analogue + timolol maleate 0.5%+ dorzolamide hydrochloride 2%;
[f] The cost of a new trabeculoplasty was included as a 21% increase in the cost value of the first trabeculoplasty (as suggested in the literature[9]).

Table 2

Cost of each evolutionary stage of glaucoma according to the treatment strategy

Treatment Strategy		Anual cost(R$)	Variation fo sensitivity (± 20%)	Reference
Without treatment		0.00	*****	*****
Clinical Treatment	Initial	881.59	705.27 – 1057.91	a
	Moderate	941.07	752.85 – 1129.28	
	Severe	1.015.96	812.77 – 1219.15	
	Blindness	1.063.79	851.03 – 1276.54	
Laser Treatment (First year)	Initial	524.49	419.59 – 629.39	b
	Moderate	524.49	419.59 – 629.39	
	Severe	524.49	419.59 – 629.39	
	Blindness	524.49	419.59 – 629.39	
Laser Treatment (Following years)	Initial	415.59	332.47 – 498.71	
	Moderate	415.59	332.47 – 498.71	
	Severe	415.59	332.47 – 498.71	
	Blindness	415.59	332.47 – 498.71	

a) Clinical Treatment: Average annual cost based on:
- Annual initial appointment + 4 follow-up appointments + eyedrops needed for 1 year of treatment in the reference center of SUS
- Proportion of the amount of eyedrops used in each evolutionary stage of glaucoma (Source: the authors themselves);
- Amount of eyedrops per year (Reference: Reference Centers for glaucoma treatment of SUS);[17,18]
- Eyedrops prices paid by SUS to the reference centers (Source: SUS);[17,18]
- Cost of adverse effects: Only the cost of Asthma Crisis secondary to inadvertent use of beta-blockers in these patients were included. RR = 2.29. An increase of 23.8% was made to the final average cost per patient (Source: Tunnel Vision).[9]

b) Laser treatment:
- First year accounts for: 1 initial appointment + 4 follow-up appointments + trabeculoplasty in both eyes + eyedrops necessary to complement the treatment + new trabeculoplasty (Source: SUS).[17,18]
- Following years: 1 initial appointment + 4 follow-up appointments + eyedrops necessary to complement the treatment (Source SUS).[17,18]
- Efficacy estimated at 50% at the end of the first year, i.e. 50% of the patients without eyedrops. The other 50% were divided as follows: 25% requiring prostaglandin analogues, and 25% requiring prostaglandin analogue + timolol maleate 0.5% (Source: Tunnel Vision).[9]
- The cost of repeating the trabeculoplasty has been added in the initial cost (21% more), according to the study of Cantor et al. 2008.[19]
- Adverse events of using timolol maleate 0.5% (asthma attack): 23.8% added to the average value of using PG + Ti 0.5% (Source: Tunnel Vision).[9]
- The cost was considered the same for all evolutionary stages of glaucoma.

In the strategy of clinical treatment, the proportion of each type of eyedrop according to the evolutionary stage of glaucoma was obtained from a consecutive cohort of 225 patients with POAG under treatment in the city of Juiz de Fora - MG. The proportions were as follows: early glaucoma: 53% with 1 eyedrop, 29% with 2 eyedrops, and 19% with 3 eyedrops; moderate glaucoma: 28% with 1 eyedrop, 44% with 2 eyedrops, and 28% with 3 eyedrops; severe glaucoma: 23% with 1 eyedrop, 31% with 2 eyedrops, and 46% with 3 eyedrops; blindness: 9% with 1 eyedrop, 36% with 2 eyedrops, and 55% with 3 eyedrops.

Table 3 shows the average utility values for each health state, as well as the variations used for the sensitivity analysis. The transition probabilities between health states are shown in table 4.

The cost of the alternative "Observation without treatment" was R$ 0.00. At the end of the average life expectancy of the cohort uner study, the expected average cost per patient for the strategies "Clinical Treatment" and "Laser treatment" was R$ 14,866.55 and R$ 6,984.53, respectively. There has been an incremental cost of R$ 7,882.03 for the clinical treatment in relation to the laser.

On the other hand, the treatment was more effective, generating 15.018 QALYs, whereas the laser treatment generated 12.734 QALYs. Leaving the patient without treatment generated the total of 10.249 QALYs.

The incremental cost-utility ratio (ICUR), i.e., the cost of every QALY obtained was R$ 2,811.39 for the laser treatment

Table 3

Average utility values for each stage (health state) of the model

Health States	Utility Value	Variation for sensitivity analysis	Reference
Early glaucoma	0.92	0.80 – 0.99	a, b
Moderate glaucoma	0.89	0.70 – 0.95	a, b
Severe glaucoma	0.86	0.60 – 0.90	a, b
Blindness	0.26	0.20 – 0.60	a, b
Death	0.0000	*****	

a. Utility values based on the studies of Lee BS et al. (2008) and Brown MM et al. (2001).[15,16;]
b. The average utility values are the same for the different strategies of treatment of POAG.[23]

Table 4

Transition probabilities between health states

Treatment Strategy	P (Inicial to Moderate)	P (Moderate to Severe)	P (Severe to Blindness)	P (Death)	Reference
Without treatment	0.14893	0.28595	0.30000	IBGE	a
Clinical Treatment	0.02242	0.02242	0.02242	IBGE	b
Laser treatment	0.07447	0.14297	0.15000	IBGE	c

P: Probability

IBGE: Brazilian Institute of Geography and Statistics. It refers to the probability of dying each year in the model, according to the Life Table for the Brazilian population.[14]

a) Strategy without treatment:
- Initial to moderate glaucoma Rein et al and EMGT (Early Manifest Glaucoma Trial).[20, 21]
- Moderate to severe glaucoma: A multiplier (1.92) was used multiplied by the fact of having glaucoma in both eyes (Leske et al. 2003). Rein et al and EMGT[20, 21]
- Severe glaucoma to blindness: Tunnel Vision.[9]

b) Transition probability: Clinical treatment strategy:
- Initial to moderate glaucoma Rein et al and CIGTS (Collaborative Early glaucoma Treatment Study).[20, 24]
- Moderate to severe glaucoma: Rein et al and CIGTS.[20, 24]
- Severe glaucoma to blindness: Rein et al and CIGTS.[20, 24]

c) Transition probability: Laser treatment strategy:
- Initial to moderate glaucoma 50% reduction in the rate of progression of untreated (Tunnel Vision).[9]
- Moderate to severe glaucoma: 50% reduction in the rate of progression of untreated (Tunnel Vision).[9]
- Severe glaucoma to blindness: 50% reduction in the rate of progression of untreated (Tunnel Vision).[9]

and R$ 3,450.47 for the clinical treatment. There was no dominant alternative, and both treatment strategies (clinical and laser) are considered to be cost effective.

The sensitivity analysis is shown in the tornado diagram and highlights the most influential variables in the results (Figure 1). In this diagram, each bar represents the impact of uncertainty of a variable isolated in the ICUR. The tornado analysis of this model showed that 96.8% of the uncertainty in the model is given only by one variable: the age of entering the model. Changing in the age of entering the model to 40 and 90 years shows that the result is changed and the differences between treatments disappear (Figure 2). Other variables that had some influence in the model were the utility values for early glaucoma (explaining 2.8% of uncertainty) and the utility values for moderate glaucoma (0.3% of uncertainty). All other parameters of the model (other utilities, costs and probabilities) had no influence on the final result.

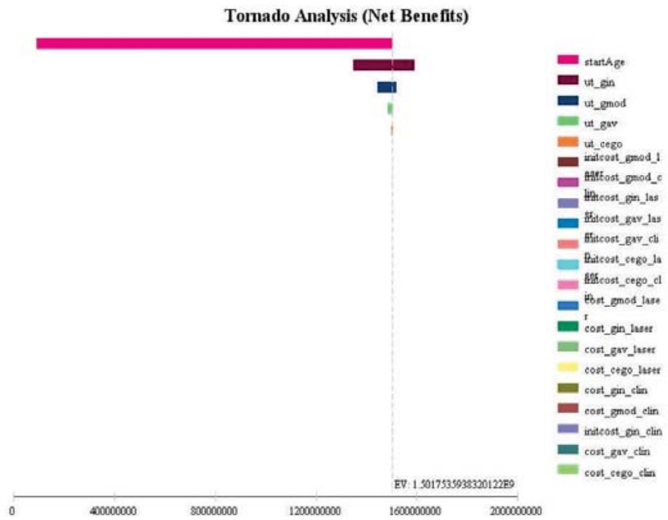

Figure 1: Tornado diagram showing the variables which most influence the result:

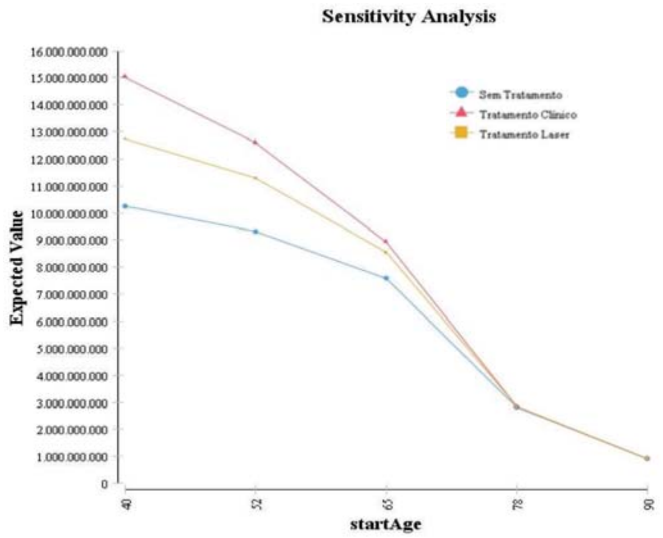

Figure 2: Sensitivity analysis of univariate of age of entering the model:

Discussion

The present study demonstrated that both alternatives of primary treatment for glaucoma - the clinical treatment and the laser treatment - are cost-effective from the perspective of SUS, generating significant gain in quality of life (measured in QALY) compared to patients without treatment.

An intervention is considered cost-effective by the World Health Organization when the cost per benefit achieved is less than the value of 3 times the Gross Domestic Product per capita.[25] In Brazil (2014), the limit to consider a cost-effective intervention would be R$ 81,897.00.[26] The initial treatment with laser showed an incremental cost-utility ratio lower than the initial treatment with eyedrops (R$ 2,811.39/QALY versus R$ 3,450.47/QALY, respectively). Thus, we can conclude that the laser trabeculoplasty would be the most cost-effective alternative in the environment of reference centres for glaucoma treatment, saving costs for the Brazilian public health system. The sensitivity analysis shows that this difference between treatments is greater the smaller the age of entering the model is, and disappears as the age increases.

The chronic use of hypotensive eyedrops is one of the greatest responsibles for the high costs of glaucoma treatment.[1-4] The laser trabeculoplasty postpones the introduction of eyedrops in the treatment of patients, thus reducing the direct medical costs.

One QALY means 1 year lived in perfect health.[27] Patients without treatment for glaucoma had at the end of the average life expectancy a total of 10.259 QALYs. But in patients with laser treatment, the gain was 12.733 QALYs, i.e., an increase of almost 2.5 QALYs. The gain with the clinical treatment was higher, 15.018 QALYs. Patients undergoing initial treatment with eyedrops had an increase in the quality of life of almost 5 QALYs, i.e., almost 5 years of perfect health compared to no treatment.

Despite being responsible for a greater gain in quality of life, the clinical treatment was the most expensive one. The total costs were almost double the initial treatment with laser.

Our results are similar to those found in the literature. Stein et al. have demonstrated, through Markov modeling, that in the U.S. both the initial treatment with laser and the initial treatment with prostaglandins were cost effective. These authors found that in a period of 25 years the ICUR was U$ 16,824/QALY for laser and U$ 14,179/QALY for clinical treatment. Another study that evaluated the economic efficiency of initial treatment with laser was the “Tunnel Vision”. In this study, Australian researchers have developed a dynamic model which demonstrated that the initial treatment with laser can save costs to the public health system. Cantor et al. analyzed the costs at the end of 5 years of 3 glaucoma treatment strategies for patients not controlled with 2 medications: laser trabeculoplasty, medications or filtering surgery. The laser was the less costly alternative in this study.

The present study has some limitations. Like any model-based study, the results are influenced by the availability of data in the literature and by the adoption of assumptions. Our model, due to lack of data, did not stratify patients according to the risk factors for progression, such as race, thickness and biomechanics of the cornea, family history of blindness, perfusion pressure, etc. In this model, we chose to consider the average glaucoma patient.

We did not take into account the possibility of using anti-glaucoma surgery in case of failure, no matter what the initial treatment was. Another fact that was not taken into account was the adhesion and persistence to treatment with eyedrops. This can lead to an increase in the speed of disease progression, generating higher probabilities of transitions. The low adhesion could be a source of error in costs because using less medication it would last longer and the patient would buy fewer bottles. In the present study, this fact was not relevant because the cost perspective was the one from SUS financier, so whether or not the patient used the medication they would receive a new bottle every 3 months.

The probabilities of transition between the health states of the models were obtained in the literature and they come from multi-centered clinical trials. It is known that in this type of study the results often are not the same as those obtained in clinical practice. The study patients are closely monitored and controlled, which minimizes scapes and optimizes adhesion and persistence. On the other hand, there are no real-life populational studies showing the rate of progression and the outcomes of the natural history of glaucoma (treated versus untreated).

The cost perspective is important and can influence the result. In this study we decided to use the perspective of SUS financier. Different results can be obtained by adding the direct non-medical costs and the indirect costs.

As in any study in which models are used, there is the need to make assumptions that may be a source of errors. We tried to always minimize those errors with the sensitivity analysis on the parameters of the model.

Finally, it is very important to be careful in generalizing the results of this study for patients with other types of glaucoma and those being treated in the national health care environment or out of the reference centers for glaucoma treatment of SUS.

Conclusion

Both the primary treatment with medications and the laser trabeculoplasty proved to be cost effective from the perspective of SUS in a period of life expectancy of the Brazilian population. The alternative treatment with laser presented the best incremental cost-utility ratio. Both strategies showed important and significant gains in quality of life when compared to the group of patients without treatment.

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