

HEALTH ECONOMICS

COST EFFECTIVENESS OF GLAUCOMA MEDICATIONS AND LASER TRABECULOPLASTY IN THE TREATMENT OF PATIENTS WITH NEWLY-DIAGNOSED OPEN-ANGLE GLAUCOMA

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Background: Open-angle glaucoma (OAG) is a major cause of visual impairment worldwide. Although there are several effective treatment options for lowering intraocular pressure and preventing disease progression in patients with newly diagnosed OAG, little is known about whether these treatments are cost effective relative to observation alone and whether one treatment strategy confers the greatest value. The purpose of this study is to compare the incremental cost effectiveness of treatment of patients with newly-diagnosed OAG with prostaglandin analogs (PGAs), laser trabeculoplasty (LTP), or observation only.

Methods: Taking a societal perspective, a Markov process analysis was used to model the cost effectiveness over a 25 year time horizon of treatment of newly diagnosed patients with mild OAG using PGAs, LTP, versus observation alone. Costs and utilities that were incorporated into the model were obtained from clinical trials and population-based studies. Incremental cost effectiveness ratios were generated comparing each group with one another. Sensitivity analyses were performed to assess the impact of different model parameters including reduced medication adherence.

Results: The incremental cost effectiveness of LTP over observation only was \$ 4706 / quality-adjusted life years (QALY). PGAs provided better results than LTP, but at a higher cost: incremental cost effectiveness of treatment with PGAs over LTP was \$ 25189 / QALY. Assuming a willingness-to-pay of \$ 50000 / QALY, if PGAs are $\geq 11\%$ less effective than the level of effectiveness recorded in Phase III clinical trials (due to patient difficulty with medication adherence), LTP is the most cost effective treatment option. If the yearly cost for PGAs is reduced 50% (when these medications become soon become generic in the United States), their effectiveness relative to that recorded in Phase III clinical trials can be 15% lower and they would be a more cost effective alternative relative to LTP.

Conclusions: PGAs and LTP are both cost effective treatment alternatives for patients with newly diagnosed mild OAG. Assuming optimal patient adherence with medications, treatment with PGAs is more cost effective relative to LTP at \$ 25189 / QALY. However, when assuming more realistic levels of medication adherence, LTP may be a more cost effective alternative at today's prices for prostaglandin analogs.

CHANGE IN INTRAOCULAR PRESSURE IN TEN YEARS AND ITS ASSOCIATED SYSTEMIC FACTORS OF THE HEALTHY SUBJECTS

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Background: We investigated the change of the intraocular pressure (IOP) and its associated systemic factors of healthy subjects who took health examinations in 1999 and 2008.

Methods: Subjects who had no clear history of ocular diseases and who had health examinations at Yamanashi Koseiren Health Care Center in 1999 and 2008 were enrolled. The IOP was evaluated using a pneumatic tonometer. The right eye was chosen for the analysis. The IOP change between two examinations and its significantly associated factors were investigated.

Results: A total number of enrolled subjects were 3845 (50.9 ± 8.6 years) including 2059 male (50.4 ± 8.9 years) and 1786 female (51.6 ± 8.2 years) subjects. Mean IOPs of male and female subjects in 1999 were 13.4 ± 2.9 mmHg and 12.8 ± 3.1 mmHg, respectively ($p < 0.0001$). The IOPs of male and female subjects significantly decreased in ten years by -0.84 mmHg and -0.58 mmHg, respectively ($p < 0.0001$). Changes in systolic and diastolic blood pressures, low density lipoprotein cholesterol, total cholesterol, body mass index, and γ GTP were positively correlated to the IOP change, while only change in ocular perfusion pressure showed a negative correlation to the IOP change.

Conclusions: The IOP of healthy subjects was significantly reduced by aging and several systemic factors were related to the IOP changes.

LONGITUDINAL TRENDS IN RESOURCE UTILIZATION IN AN INCIDENT COHORT OF OPEN ANGLE GLAUCOMA PATIENTS

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Background: Open-angle glaucoma (OAG) is a chronic, progressive, incurable disease that affects nearly 2 million individuals in the United States. It is also one of the leading causes of visual impairment worldwide and is the most common cause of blindness among African Americans. The total burden of illness for patients with OAG in the U.S. has been estimated to be nearly \$3 billion/annually. To date, nearly all estimates of the cost of care for people with OAG have been prevalence based. In this report we present an estimate of the clinical cost of care for people with incident glaucoma using a large administrative data set. In addition, we identify characteristics of those 5% of patients who have the highest clinical charges during the first two years following diagnosis.

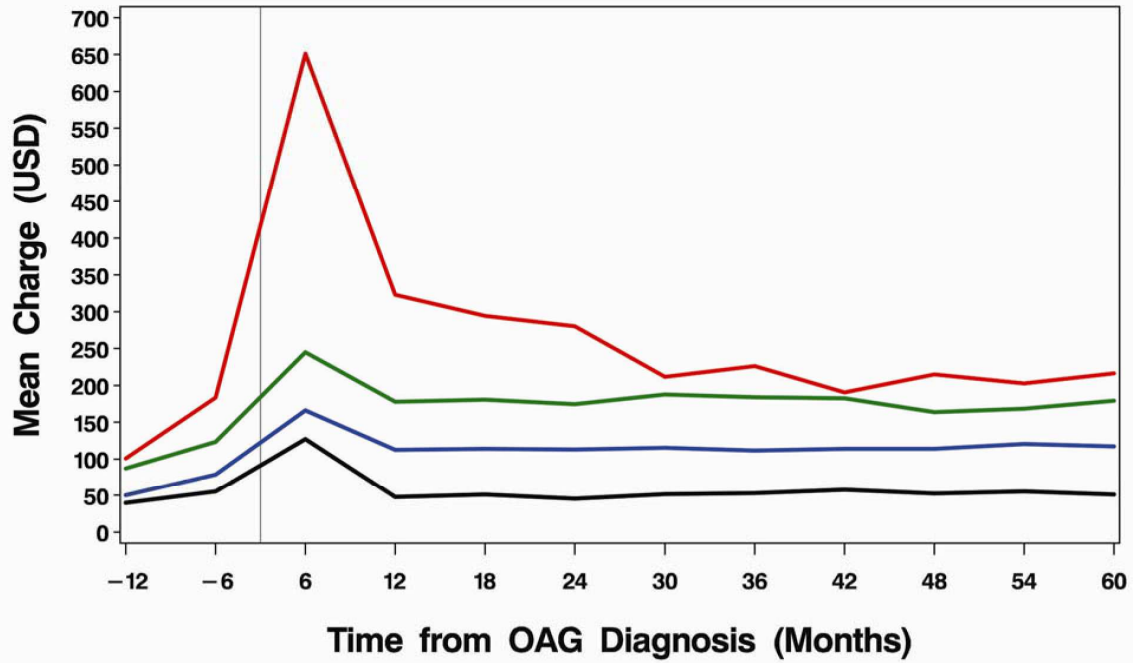
Methods: Using the i3 InVision Data Mart dataset (Ingenix, Eden Prairie, MN) we identified patients with incident OAG and evaluated their resource consumption over five years. Incident glaucoma was defined as having a diagnosis of OAG on a visit to an eye care provider that was preceded by enrollment one year in which there was a visit to an eye care provider and no diagnosis of OAG. We stratified the sample by severity using clinical events (i.e. surgery and number of medication prescribed) as a proxy for disease severity. We totaled resource use every 6 months and plotted over five years by disease severity. We used logistic regression methods to evaluate demographic predictors of a person with OAG being in the top 5% of charges.

Results: 19,927 beneficiaries were identified who met our inclusion criteria. Total charges for glaucoma care spiked during a short time interval after diagnosis, and then dropped and showed little change over the subsequent years (see Figure). This was true of all severity categories. The costliest 5% of enrollees were responsible for 24.1% of all glaucoma-related charges in the first two years following diagnosis. These people were younger, more likely to live in the Northeastern U.S. and have ocular comorbidities.

Conclusion: Plan participants with incident OAG who were evaluated over 5 years after diagnosis consumed the greatest share of resources during the first 18 months. Following this period, resource consumption fell and it remained fairly constant after that. This was true for all strata of severity.

All Glaucoma Charges

(excluding non-glaucoma surgery & other eye-related charges w/ new disease severity)



Severity — Severe (n=1610) — Moderate (n=1781)
 — Mild (n=8747) — Indeterminate (n=7789)

COST/EFFECTIVENESS ANALYSIS OF A TELEMEDICINE PROGRAM FOR THE DETECTION OF GLAUCOMA IN PRIMARY CARE CENTERSA. Anton¹, M. Fallon², F. Cots³, E. Duran⁴, M.A. Sebastian⁵, X. Castells³¹ICR and Parc Salut Mar, Barcelona - Spain; ²IMIM and Parc Salut Mar, Barcelona - Spain;³Parc de Salut Mar, Barcelona - Spain; ⁴Pamen, Barcelona - Spain; ⁵CAP Larrard, Barcelona - Spain

Purpose: Analysis of cost/effectiveness of a telemedicine program for the detection of glaucoma in primary care centers.

Methods: Cross-sectional study. Two detection methods for glaucoma were compared in a population-based randomly-selected sample of 1599 subjects from a target population of 47,500 inhabitants: opportunistic detection at the primary care center, named as “classic screening”, vs. “screening by telemedicine”. The classic screening method was evaluated during 2008 by recording data from primary care and ophthalmic consultations of all subjects referred to ophthalmology with suspicion of glaucoma but no previous diagnosis of the disease. The telemedicine screening was assessed in the same sample during 2009 and aimed to population at risk (over 65 years or over 40 years with another risk factor). During the telemedicine program 414 subjects were examined with Heidelberg Retina Tomograph (HRT-3), Nerve Fiber Analyzer (GDX-VCC), and rebound tonometry (Icare). All subjects with at least 2 of the 3 following criteria were considered suspects and referred to a glaucoma consultation: global Moorfields Regression Analysis borderline or outside normal limits, Nerve Fiber Index value of GDX ≥ 30 , and tonometry ≥ 21 mmHg. At glaucoma consultation patients from both detection methods were classified as non-glaucoma, probable glaucoma or glaucoma. The cost of diagnosis was assessed by adding the costs of personal, infrastructure and instruments implicated in the diagnostic process. The effectiveness by calculating the detection rate and, finally, cost/effectiveness of both screening methods was compared. Sensitivity analysis was performed by estimating costs of classic screening with the detection rate in the total population.

Results: Classic screening identified and examined 165 subjects, from those only 2 were finally diagnosed as probable glaucoma. Telemedicine screening examined 414 subjects (54% participation rate), 32 cases were referred to glaucoma consultation, 8 were diagnosed of glaucoma and 9 as probable glaucoma. Detection rate was 4.1% for telemedicine screening, 1.2% for classic screening in the sample selected and 3.1% for classic screening in the population. The cost of each was as follows: primary care visit = 15 €; general ophthalmic visit = 18 €, ophthalmic visit with tests = 52 €, telemedicine screening = 51 €, and glaucoma consultation = 126 €. The total cost of the telemedicine program was 24,150 €, total cost of the classic screening in the sample was 8,798 €, and total cost of classic screening in the population was 41,620 €. The cost per case detected was 1,420€ in the telemedicine screening and 1,759 € to 4,399 € by classic screening.

Conclusions: The telemedicine program offered a detection rate of 4.1%. An incremental cost of 24,150€ allowed the detection of 8 cases with glaucoma and 9 cases with probable glaucoma. Screening for glaucoma directed to population at risk maybe cost-effective.