Special Focus:
The burden of disease in glaucoma

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Core Concepts
- As the population grows and life expectancy increases, so do the numbers of glaucoma patients and thus the glaucoma burden increases.
- Expenditures related to glaucoma care increase with the severity of the disease.
- From population-based studies, 50–80% of glaucoma patients are not aware of their disease.
- Quality of life in glaucoma is affected earlier than previously thought.
- The individual burden of glaucoma impacts many routine daily-life activities, including reading, driving, finding fallen objects, and recognizing faces.
- Glaucoma not only impacts glaucoma patients, but also caregivers and all of society.

The “glaucomas” encompass several entities that have in common a greater loss of retinal ganglion cells than their age-related physiological loss. After cataract, the glaucomas remain the second cause of blindness worldwide; they are the leading cause of irreversible and preventable blindness. We review the expenditures for glaucoma management, the role of caregivers and consider how glaucoma may affect patients’ quality of life.

Glaucoma expenditures
Glaucoma belongs to age-related eye diseases such as ARMD and cataract. With human longevity increasing, glaucoma prevalence will increase dramatically through the next two decades (Image 1). For instance, the number of Americans older than 65 is projected to increase by 50% by 2020. Quigley has shown an exponential prevalence of glaucoma with age for all ethnicities. Therefore, managing and treating glaucoma patients will increase society’s expenditures. Since healthcare expenditures for all countries are not infinitely expansible and since most governments face economic crisis, each medical specialty must thoroughly examine diseases and the resulting societal burden.

Evaluation of the burden of a given disease is complex: see the detailed review by Lee and Matchar on techniques used by health economists. We can consider cost-of-illness analyses that comprise the costs of treatment interventions (including provider care for in- and outpatient care, medications, devices and aids and costs related to the side effects of treatments) and disease-related non medical and indirect costs (such as loss of worker productivity, caregiver productivity and loss of government tax revenue from the patient and the caregivers). Another approach is assessment of the value of treatments that demonstrate that an intervention is cost-effective and cost-saving, for instance. The cost-effectiveness analysis is probably the best known among non specialists, but others are also used. Finally, the point of view of the different actors involved in healthcare should be specified because the benefits are different for patients, providers, payers and society.

Overall, the direct annual medical costs for glaucoma have been estimated at $2.9 billion in the United States. If we consider only medical treatment, medications account for 30–50% of the cost, but this will probably change with the introduction of generics. During 2000–2006, medication costs increased from $445 to $557 per year with an increased cost for prostaglandins and a decreased cost for beta-blockers. However, the non-medical part of the cost of glaucoma visual impairment is much higher: in a European study, patients with advanced glaucoma had an average total healthcare cost of € 830 versus € 2703 euros for home help, with wide variations between countries.

The costs depend on glaucoma severity
The more severe the disease, the costlier is its treatment, as shown by Traverso et al. across several European countries with medical costs ranging from € 455 for earlier stages to € 969 for more advanced disease. In the Unites States this ranged from $623 for suspected glaucoma to $2511 for advanced cases, as confirmed in a large cohort of 181,922 Medicare beneficiaries with glaucoma. Therefore, funding should be directed to the earlier detection of glaucoma on one hand and the control of these cases over time on the other hand.

Most of the resources are used by a minority of patients
Stein and colleagues evaluated the medical cost of 19,927 new open-angle glaucoma patients and followed them from 2001 to 2009.
The costliest 5% of these patients consumed 24% of the resources. In contrast, the less costly 50% of patients accounted for only 18.9% of the resources. Glaucoma-related charges were greater during the first 6 months ($955) and then decreased to about $500 every 6 months. This accords with routine clinical practice because the efficacy and safety of treatment must be checked after initiation. In this study, resources were distributed as follows: 32% for visits to eye care providers, 31% for glaucoma medications, 16% for glaucoma diagnostic tests, and 20% for laser and surgical procedures.

The amount of the burden differs depending on the country
As expected, there are large differences between countries concerning annual costs for glaucoma patients.13 This is mainly from differences in drug prices, and between currencies, whether generics are available and the costs of eye care providers (ophthalmologists or optometrists) and of diagnostic tests. Adjusted costs are on average half in Europe of what they are in the United States.31

While this literature mainly comes from developed communities, the burden of glaucoma is more difficult in developing countries.14 Another point is country size and prevalence of different types of glaucoma, especially for India and China.15, 16

Non adherence always needs to be considered
Adherence is non optimal in glaucoma patients being treated for a “symptom-free” disease and who are more worried by diagnostic tests, visits to professionals and the side effects of treatments than by the disease itself.17 Therefore, a low estimate of non adherence may reach 25%.18 Economically this means that 25% of the medical resources dedicated to glaucoma are wasted annually, which is unacceptable for payers.

Can we decrease glaucoma expenditures?
The best way to reduce glaucoma expenditures would be early detection and effective treatment of glaucoma to avoid evolution to advanced damage with severe visual impairment. However, early glaucoma detection is difficult in practice. Glaucoma causes 11% of the blindness in the US19, even though treatment is very cost-effective.20 When no treatment in glaucoma is compared with glaucoma treatment, extra costs are around €30,000 annually. This is within the range of the quality-adjusted life years (QALY) usually considered for other diseases (€20,000 to €80,000).20 These findings accord with those from Rein et al., who estimated QALYs to range from $11,000 to $20,000 for glaucoma treatment versus no treatment, respectively.21 Today these costs can be reduced given that switching drugs is costly, mainly because of ophthalmologist visits.22, 23 A first-line therapy that balances efficacy and safety and achieves a low target intraocular pressure decreases costs.23 The lower price of generics may also decrease glaucoma medical treatment expenditures.

Caregivers’ burden
Caregivers significantly assist patients whatever the disease stage, but particularly for individuals with visual impairment. They escort them for doctor’s visits and help in daily activities, which impacts their working time (productivity loss) and leisure time. While most caregivers are family members, neighbors and friends are often involved, particularly in rural areas with insufficient public transport. A few papers have addressed the real costs of caregivers. In a sample of glaucoma patients attending six ophthalmology units across London, about 50% arrived with a companion.24 The social cost was higher than the direct medical cost and travel expenses accounted for 20% of total patient cost. An Australian study investigated the role of caregivers in 114 adults with visual acuity worse than 20/40.25 Patients were asked to diarize prospectively the quantitative and qualitative help they received from caregivers over a year. The need for a caregiver was not linearly related
to visual deterioration. A threshold was found corresponding to loss of driver's license. Mean yearly caregiver time dedicated to helping patients was 152.2 h (median, 81.3 h) with a wide range 0 to 851 h. The median time accounted for 4.6% of a 35-h work week but could reach 50% for some individuals. The median estimated cost was $710 per year, again with a wide range from 0 to $7491. Patients were helped by several caregivers, mainly for transport (78.9%), but also for banking and personal correspondence; healthcare and personal care time was small.

Quality of life in glaucoma-related visual impairment

Quality of life (QOL) covers several aspects of living for patients diagnosed with glaucoma or ocular hypertension (OHT).

We will discuss QOL only in terms of glaucoma-related visual impairment. QOL may be influenced by the side effects of treatments (medical and/or surgical), problems reaching the ophthalmologist’s office, the anxiety related to taking a visual field test and for some patients the anxiety of losing sight. In the Collaborative Initial Glaucoma Treatment Study, half the patients at inclusion were afraid of glaucoma-related blindness. Depression is associated with the severity of glaucoma and older age.

The older beliefs

Visual field defects were thought to interfere with daily-life activities only at an advanced stage of glaucoma: we use monocular visual fields clinically, but the brain utilizes both fields, and a binocular field gives less alarming results than monocular fields. However, visual impairment seems to have a much more frequent and earlier impact on QOL than previously thought. Another older and erroneous belief, which is still often taught in textbooks, is the black tunnel perception of the visual fields by glaucoma patients. Crabb et al. have recently reported that none of 50 glaucoma patients mentioned this with an average mean defect (MD) of –8.7 dB and –10.5 dB in the right eye and left eye, respectively. About 25% were unaware of their defect, but others depicted blurred or missing patches: 54% and 16%, respectively.

Motor vehicle accidents

Glaucoma patients are at higher risk of having motor vehicle accidents and to be the driver at fault; this has been confirmed both by insurance companies and the police. Visual field impairment also makes it difficult to obtain or to maintain a driver’s license and this is often the threshold requiring a caregiver.

Falls

Falls are very common among the elderly and may lead to severe injuries such as hip fracture that could shorten life. They are more common in glaucoma patients. While the etiology of these falls is multi-factorial, visual disability is recognized as a major cause for falls in older persons.

More subtle impairments

Daily-life activities are a challenge for glaucoma patients. Glaucoma patients may have difficulties with the following activities: grasping objects, recognizing faces, reading eye movements and postural control.

Conclusion

Glaucoma has long been regarded as an IOP-related disease. Progressively, with the help of researchers in various disciplines, glaucoma has become a “human” disease impacting the daily-life activities of many individuals, those suffering from glaucoma and those who help them in their daily tasks, at a substantial cost to society. With the advent of more refined tools, it is now possible to decipher the sometimes subtle impact of glaucoma on routine tasks more carefully. Another field of interest, which has not yet been fully investigated, is the involvement of caregivers (family, neighbors) assisting glaucoma sufferers. Since we cannot afford to do everything for everybody and the amount of resource spending is not always associated with increased QOL, it is perhaps time to consider new paradigms in the management of glaucoma. Medications are becoming less expensive with generics, and some authors propose that care be delivered by professionals with less training than doctors (therefore lowering care-provider costs) for some diagnostic tests and prescriptions. However, many professionals and patients may regard this as hazardous. This approach is summarized as follows: the right services to the right patients at the right time in the right place.

All these attempts will help policymakers to allocate adequate resources for glaucoma management, glaucoma patients, and to those who are directly or indirectly impacted in helping our patients.

References


