

Glaucoma screening

A global perspective



Introduction

Rather than referring to a single condition, glaucoma is a term used to describe a range of disorders affecting the optic nerve. This, combined with the fact that symptoms rarely if ever present themselves until a more advanced stage of illness, means that screening for glaucoma needs to be both comprehensive and widely available.

Glaucoma's status as the leading cause of irreversible blindness worldwide makes it a threat well worth combating. That being said, the reality of the situation is that screening the general population, on which scale the prevalence of the disease is relatively low, is unlikely to be the most effective use of resources.

This paper will highlight the issues facing eye health professionals around the world and identify areas where groups particularly at risk might be let down by the existing availability of screening.

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Genetic factors

It is important to distinguish between primary open angle glaucoma (POAG) where blockages develop within the eye's drainage canals, increasing pressure on the eye, and angle closure glaucoma (ACG). The latter, where the entrance to the drainage canals themselves are either too narrow or blocked completely, is less common but still statistically significant.

For the moment, however, we can look at the global problem posed by these two types of glaucoma combined. A report by the British Journal of Ophthalmology estimated there to be 60.5 million people living with glaucoma in 2015. This was predicted to reach 79.6 million by 2020, with POAG accounting for 74% of that number.

Furthermore, the report estimates bilateral blindness to affect 4.5 million people with POAG and 3.9 million people with ACG in 2010, predicting this to rise as high as 5.9 and 5.3 million people in 2020, respectively.

Genetic factors affecting glaucoma are pronounced. The same study claims that women constitute 55% of POAG and 70% of ACG cases, with ethnicity also playing a huge role.

The BrightFocus Foundation is a non-profit organisation which supports research into glaucoma among other conditions. In an article from January 2015 they advise that, based on American studies on African-American and Hispanic communities, these groups are 3 to 4 times more likely to develop glaucoma compared to Caucasians from the same area.

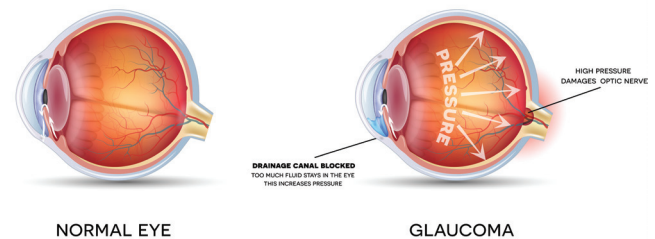
The reasons behind this increased risk of POAG among these specific, genetically diverse groups are unknown. Currently, the prevailing theory is that the genetic differences between these ethnic groups extend to the structure of the optic nerve. Studies indicate that the optic nerve area in general is larger in African-Americans, complicating a glaucoma diagnosis in some cases.

These studies are confirmed globally as highlighting credible genetic issues, as opposed to lifestyle factors exacerbating the problem. Peter R Egbert, again in the British Journal of Ophthalmology, presented this report on glaucoma in West Africa.

Although somewhat anecdotal, Egbert's report supports BrightFocus in its assertion that the effects of glaucoma, particularly POAG, hit black communities earlier, more commonly and with greater severity.

Other ethnic groups also suffer disproportionately from ACG, overall the second most common type of glaucoma. The Glaucoma Research Foundation, in a 2011 article, indicates that among urban Chinese citizens, twice as many glaucoma patients suffer from ACG as POAG.

GLAUCOMA



This issue is complicated further by the evidence suggesting that ACG is asymptomatic among East Asian populations. In Nature Magazine, a 2005 report indicates that the majority of Asian people suffering from ACG experience no symptoms, rendering existing sub-classifications of the disease inadequate.

Age-related factors

While genetics plays a significant role in deciding who is most at risk from glaucoma, advancing age is a factor which raises risk across all ethnic groups. Prevent Blindness America released these figures which clearly indicate the increased prevalence of all glaucoma types as citizens get older. Based on these figures, the overall percentage of the US population aged 40 and over with glaucoma looks like this:

Age group	Population % with glaucoma
40-49	0.69
50-54	0.94
55-59	1.21
60-64	1.58
65-69	2.11
70-74	2.88
75-79	3.93
80+	7.89

A jump of over 7% over the latter half of most people's lives makes age a major concern. Again, we see more than half a million more women than men falling victim to glaucoma across all age groups.

Under current guidelines, just who should be screened for eye health in general and glaucoma in particular depends principally on their age. WebMD recommends that people aged under 40 with no genetic predisposition to the disease should get a full eye exam every 5 to 10 years.

For those aged 40 and over and/or who are at a more general risk, this recommended frequency ranges from every 1-3 years for those in their 40s to every 6-12 months for over-65s.

Unfortunately, this does not seem to be happening in practice. Studies from the Glaucoma Research Foundation indicate that while 74% of those interviewed from the general population were having eye exams every two years, only 61% of those (fewer than half of those studied) were receiving the most effective glaucoma screening.

More worrying still were the findings that 30% had never heard of glaucoma at all, including 16% of African Americans and 9% of Caucasians. Compare this with an existing annual bill of \$1.5 billion to the US Government for glaucoma treatments, and the implications of an aging population.

Given these findings, a global shift towards a more top-heavy population thanks to longer life expectancy means age-related glaucoma risks are only set to worsen.



What do these factors have in common?

Given the incurable nature of all glaucoma types, screening of the population is of critical importance. That being said, what unifies the above genetic and age-related factors is that those most at risk, on average, have far lower levels of access to effective screening.

Writing for Forbes magazine, Robert Pearl M.D. indicates that access to healthcare in general is so poor for certain demographics that, on average, it actually lowers the country's overall standing for healthcare among the 34 most developed nations on Earth.

While the USA is an extreme example, given its approach to health care which is not typical among other Western nations, a similar trend can be broadly observed across the developed world and beyond.

Typically, access to routine medical care is curtailed in areas traditionally populated by the working-class elderly and ethnic minority groups. In rural areas and across the developing world, the problem is only made worse.

Given this, Pearl's fifth suggestion, recommending healthcare professionals partner with community organisations and church groups is especially relevant in this context. Glaucoma screening is critical in that, with an aging population, the resources needed to cover treatment of advanced glaucoma are only set to increase. This in turn becomes harder as the population grows and more people become at risk over time.

Proposed solutions

The question, then, becomes one of identifying the most effective means of screening people for glaucoma. A 2007 study from the Health Technology Assessment programme indicates that no screening programmes for POAG exist anywhere in the world, and focusing on the UK we see that glaucoma is detected most commonly by community optometrists on an opportunistic basis.

Obviously, this system could benefit from considerable improvement, and the study looks at the cost-effectiveness of screening. Given the relatively low prevalence of glaucoma in the UK compared to other conditions (0.3% among those in their 40s), screening the general population is not cost-effective. However, targeted screening of high-risk groups could be, if adequate provision could then be made to treat those with the disease.

Given the data identifying groups most at risk around the world, the challenge is to bring greater eye testing coverage, with specialist provision for detecting glaucoma, directly to these communities and encourage people to get tested. We can then begin to back up these initiatives with monitoring programmes to better care for those identified by screening.

For this to be feasible in non-clinical settings, equipment used to perform screening needs to be both accurate and portable. The Henson 9000 perimeter offers both of these features, and has been developed specifically to meet the challenges of screening across different populations.



Glaucoma screening in practice

Case study:

RNIB Glaucoma screening pilot for high-risk groups

This pilot in 2012-2013 was undertaken by the Royal National Institute of Blind People (RNIB) in partnership with the City and Hackney Primary Care Trust in London. The pilot was titled Glaucoma case finding pilot within the African Caribbean community.

Groups targeted by the pilot study

The majority of glaucoma detection in the UK is opportunistic, as the general population is not screened regularly due to cost-effectiveness. The condition is still a leading cause of sight loss, so this pilot aimed to show the outcome of developing a programme targeted to those at most risk of glaucoma.

3,041 people in the area of Black-Caribbean and Black-African descent aged between 40 and 65 were invited to a free glaucoma check. This group are 4-8 times more likely to have glaucoma, classifying them as a high-risk group. The study also cites that they are also more likely to present to eye services when the condition is more advanced, and therefore harder to treat.

What was the aim of the study?

The study aimed to understand behaviour and motivations of high-risk groups in relation to eye care. The study also wanted to develop, promote and measure uptake of the free glaucoma check from the setting of general practice.

Early detection of glaucoma is important, and this pilot initiated monitoring and treatment to minimise the risk of visual field loss. Targeted screening to high-risk groups can help to identify the disease at an early stage, and create a path to treatment.

Structure of pilot

Four GPs took part, with one practice (the host practice) responsible for appointment booking, referrals and communications with patients. The three remaining practices (A, B and C) were within 1.5 miles of the host practice, all of the patients invited had to be registered at one of these practices.

To measure the response patients were treated in different ways. First, all eligible patients were sent a letter and information leaflet, inviting them to book a free check. In the host practice and practice A patients were sent a second reminder letter if they did not respond. Patients from practices B and C were not sent a further reminder. Half of the patients from the host practice who did not respond were then randomly selected for a phone reminder.

The check was performed by a 'sessional' optometrist at the host practice, with a choice of several sessions a week, this included Saturday appointments. Patients were given a standard automated perimetry test (using suprathreshold testing), a measurement of intraocular pressure and optic nerve head imaging. Those with glaucoma symptoms, or suspected signs, were referred for secondary care.

Key findings and statistics

- 19.1% of patients made an appointment for a check
- 15.1% of those invited attended their check
- 17.1% of women attended compared with 13.1% of men

Proportion of people booking and attending was higher amongst the host practice (15.5% and 39.8% respectively) and amongst those who received the reminder letter. Those who were successfully contacted by phone had a high take up of appointments, 50.6% (39/77)

- More than 1 in 10 (11.4%) of people attending the free check had never had an eye examination before
- 96.7% rated the experience as positive
- 89% said that the location was convenient
- Cost per patient diagnosed was £9,013

Key findings statistics

Cost per patient diagnosed was £9,013. The question of cost effectiveness was raised, when identifying who should administer the glaucoma checks. Is it a good use of the optometrist's time to be conducting tests?

The method to screen the visual field was suprathreshold testing, which is the more time-consuming test. A screener like the Henson 9000 performs all central field screening tests quickly and accurately, and at a lower cost too.



Motivations for attending

The inclusion of a community member on the information leaflet was cited as the reason for attending by 61.2% of the patients, showing that relatability is important.

Other reasons stated for attending were:

- The patient had never had an eye examination or engaged with optometry services before
- Patient had a family history of glaucoma (48.9% cited this)
- Encouragement by family or friends
- Patient wanted to confirm or rule out presence of glaucoma
- Patient wants to look after their present and future eyesight

What conclusions were made?

The RNIB concluded that the pilot did develop, promote and measure the uptake of a glaucoma check service. The findings confirmed that general practice was the most acceptable setting for the check, with staff supportive of the pilot and patients satisfied.

Attendance was higher at the host practice, which suggests that familiarity and 'buy-in' is important for uptake.

The pilot engaged patients who had not previously used eye care services. The pilot also engaged those with a family history of glaucoma not attending annual check-up.

The pilot helped to provide parameters for a larger trial. The conclusion suggested that a larger programme that monitors progression of the disease is also required after initial checks.

Questions were raised about whether these checks were a good use of an optometrist's time. A quicker method of visual field testing, using the Henson 9000, would still provide accurate and comprehensive results, meaning the programme would be more viable.

What the trial did succeed in doing was engaging those at risk, which could be more effective than a widespread programme of the general population.

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