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Glaucoma detection: The content of optometric eye examinations for a presbyopic patient of African racial descent

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Abstract

Background: Standardised patient (SP) methodology is the gold standard for evaluating clinical practice. We investigated the content of optometric eyecare for an early presbyopic SP of African racial descent, an 'at risk' patient group for POAG.

Methods: A trained actor presented unannounced as a 44-year-old of African racial descent, complaining of recent near vision difficulties, to 100 community optometrists for an audio-recorded eye examination. The eye examinations were subsequently assessed via a checklist based on evidence-based POAG reviews, clinical guidelines, and expert panel opinion.

Results: 95% of optometrists carried out optic disc assessment and tonometry, which conforms to College of Optometrists' advice that those over 40 years should receive at least two of tonometry, optic disc assessment, or visual field testing. 35% of optometrists carried out all of these tests and 6% advised SP of increased POAG risk in those of African racial descent.

Conclusion: SP encounters are an effective measure of optometric clinical practice. As in other healthcare disciplines, substantial differences exist between optometrists in the depth of their clinical investigations, challenging the concept of a 'standard sight test'. There is a need for CPD in glaucoma screening, which emphasises increased POAG risk in those of African racial descent.

Introduction

The prevalence of primary open angle glaucoma (POAG) in the UK population aged over 40 is estimated to be 2.0%, with 542,000 estimated to have the disease and up to 65% of cases undetected.(1) Prevalence is higher in people described as Afro Caribbean and West African, with onset at a younger age compared to people described as Caucasian.(2) Late presentation with advanced disease is a risk for blindness from glaucoma.(3) Late detection may result from patients not engaging with community eyecare, from a failure of health professionals to identify the disease at an early stage, or from unusually rapid disease progression.

Population screening for glaucoma is not performed in the UK, hence POAG sufferers are typically detected through "case finding".(4) To aid early detection of glaucoma the CoO advises patients to have an eye examination every two years, and more frequently if there is a family history of the condition.(5) The College advises the public that those aged over 40 years should receive a combination of at least two of the following three tests: optic disc assessment, tonometry, visual field assessment.(6) The Association of Optometrists takes the view that "for at risk groups" basic field screening and tonometry is one of the "core units" of the Regulation Eye Examination.(7)

In the UK, most cases of suspect glaucoma are referred to the Hospital Eye Service by general practitioners,(1) although over 90% of these referrals are initiated by optometrists.(8) Bowling et al. 2005 reported that nearly half (45.8%) of all patients referred to glaucoma clinics were discharged at first visit. Detection rates for POAG are likely to vary across the optometric profession because criteria for using screening tests and for referral of suspects have been shown to vary widely between optometrists.(9)

There are approximately 10,500 optometrists in the UK (10) and about 95% work as primary care optometrists in community optical practices.(11) These community optometrists are the major providers of primary eyecare services in the UK. To investigate the content of typical optometric community eyecare in England we used a methodology (standardised patients) which, although novel in eyecare, is the gold standard methodology for the evaluation of clinical practice.(12) This paper aims to provide data on the content of typical optometric eye care in England for a patient in an 'at risk' group for POAG, presenting with recent deterioration in her near vision.

The standardised patient (SP) is trained to give consistent verbal and behavioural responses to the examiner (13) in order to accurately portray a specific complaint.(14) In order to measure everyday clinical practice, it is important for the SPs to be unannounced: the practitioner must not believe that the SP is there to assess their clinical practice.

The primary research objective of the present study was to determine whether the eye examination performed by optometrists in England is appropriate for the detection of POAG. A panel of glaucoma experts advised on the questions and tests appropriate for an optometrist examining a pre-presbyopic patient of African racial origin in this age group presenting with near vision problems (Tables 2 and 4). It must be stressed that the views of the panel of experts are not intended to define good practice, but rather to list possibly relevant investigations and questions to be assessed in our research.

Guidance on what an eye examination may include is published in the College of Optometrists' (CoO) Code of Ethics and Guidance for professional conduct. For the routine eye examination this states:(15)

"The optometrist has a duty to carry out whatever tests are necessary to determine the patient's needs for vision care as to both sight and health. The exact format and content will be determined by both the practitioner's professional judgement and the minimum legal requirements."

The legal requirements are defined in the Sight Testing (Examination and Prescription) (No 2) Regulations issued in 1998, following measures contained in the Health and Medicines Act 1989. The section relevant to the eye examination states:

(1) When a doctor or optometrist tests the sight of another person it shall be his duty
(a) to perform for the purpose of detecting signs of injury, disease or abnormality in the eye or elsewhere

(i) an examination of the external surface of the eye and its immediate vicinity
(ii) an intraocular examination, either by means of an ophthalmoscope or by such other means as the doctor or optician considers appropriate
(iii) such additional examinations as appear to the doctor or optician to be clinically necessary.

Methods

In research of this type the clinician is the research subject. In accordance with the tenets of the Declaration of Helsinki,(16) research participants should have the right to safeguard their integrity and should have the right to abstain from participation. Therefore informed consent of participants was a prerequisite for the study, which is common practice in other SP research.(17) This research was approved by the Institute of Optometry and City University research ethics committees.

A random selection of 100 optometrists was recruited as detailed in a previous publication.(18) Although the optometrists were expecting visits from SPs, steps were taken to ensure that the SP remained undetected. Participating optometrists were not given any information about the characteristics of the SP, nor were they aware that their ability to investigate appropriately a patient in a high risk group for glaucoma was being assessed. No SP visits took place within a month of the optometrist recruitment. The SP is a professional actor and, prior to visiting consenting optometrists, she underwent intensive one-to-one training on the different aspects of an eye examination.(19) This involved use of a document entitled "The journey through an eye examination" which describes an eye examination in lay terms. The actor observed and received several eye examinations (some whilst being observed) from different clinicians at the Institute of Optometry. The actor was trained to remember and record details of the clinical encounter. Some eye examinations during the training were video recorded to allow for quality control later in the study when it was felt that it would be helpful to remind the SP of certain tests. The SP was also given a copy of a video of one of their training eye examinations on a CD. At the end of the training the actor signed a confidentiality agreement stating that any information gathered during the eye examinations is confidential and will be used solely for the completion of the checklist provided.

A pre-designed checklist was completed by the SP immediately after each consultation. The checklist consisted of questions and tests that the optometrist may or may not have carried out. The actor used a digital audio recorder to facilitate accurate completion of the checklist for those practitioners (70%) who gave consent for this option.

Quality control of the actor's performance was essential. Each audio recording was played back by the researcher to ensure that the checklists were accurately completed. The actor was monitored after every 20-25 visits by attending the Institute of Optometry for an eye examination with a staff clinician. This eye examination was video recorded and the actor

completed a checklist in the usual way. The checklist was compared with the video recording for inaccuracies, so that any further instruction could be given if required.

The actor presented as a 44 year old patient of African racial origin attending for an eye examination, requesting new reading spectacles. She was instructed to report no personal or family history of glaucoma, and did not mention (or indicate any knowledge of) the increased risk of glaucoma in people of African origin. The patient had not had an eye examination for about two years. Although patients over the age of 40 with a close family history of glaucoma are automatically eligible for NHS funded community eyecare, those of African racial origin are not. The examination was private as there was no family history of glaucoma. The script (presenting symptoms and standardised answers to questions) is summarised in Table 1.

Table 1: A summary of the standardised patient symptoms and answers to questions asked during an eye examination.

- Your last eye examination was 2 years ago when you needed new reading glasses. If asked, you don't think that any other problems were detected.
- Your distance vision appears to be good but you have recently been experiencing difficulty whilst reading using your current spectacles. If asked, you have noticed the deterioration over the last couple of months and it is worse if you are reading in poor lighting and when you are tired. You have not experienced any other visual symptoms (e.g. floaters, flashes, double vision).
- You are in good health (no diabetes, no high BP) but you have an underactive thyroid for which you take thyroxine daily. You don't take any other prescribed medication. If asked, you attended an eye hospital as a child because you think you have a lazy eye (left eye). If asked, you remember having to wear a patch but are not aware of any surgery or injuries to your eyes. If asked, you don't suffer from glaucoma. Your father was diabetic (tablet and diet controlled) and has had cataract operations on both eyes. There is no other family history of any other ocular or medical condition.
- You do drive but did not drive in today. You are a project manager and spend most of your day using a VDU. Your hobbies are going to the gym and reading.

Results

The participation rate, expressed as the proportion of optometrists who could be contacted who agreed to participate, was 27%. The results are summarised in Table 2. Thirty five percent of optometrists carried out all three tests typically used to detect POAG (ophthalmoscopic assessment of optic discs, tonometry, and visual field testing) and 95% carried out both optic disc assessment and tonometry. Only one optometrist who carried out a visual field assessment and ophthalmoscopy did not carry out tonometry.

Table 2: A table highlighting the proportion of optometrists visited by the SP that asked questions and/or performed tests listed on the checklist completed by the SP at the end of each examination.

Tests and questions from the checklist	% of optometrists that asked the question/ performed a test
Date of last eye examination	94%
Reason for visit	100%
Have you experienced any pain/discomfort of the eyes?	75%
Previous ocular history-do you have glaucoma?	30%
Is there a family history of glaucoma?	95%
Anterior segment examination using a slit lamp ➢ Gonioscopy	37% 0%
Fundus Examination a) using direct ophthalmoscopy b) using slit lamp biomicroscopy c) using head mounted indirect ophthalmoscopy d) using a fundus camera No Fundus Examination	99% 86% 22% 2% 8% 1%
Tonometry a) Using contact tonometry b) Using non-contact tonometry	96% 12% 84%
Visual Fields a) Using full threshold testing b) Using supra threshold testing	36% 4% 32%

*the proportions quoted are based on the entire sample (N=100). For fundus examination several optometrists used more than one method.

83% of optometrists advised a re-examination interval. Seventy-six percent advised two years, 22% advised one year and two optometrists advised 18 months. At the end of each eye examination the SP asked the optometrist if she was at a greater risk of any eye conditions. Ninety optometrists responded to this question, and responses are listed in Table 3.

Table 3: Responses to the question "Am I at a greater risk of any particular conditions"?

Advice given to the SP regarding her risk of developing any conditions	Percentage of optometrists
Not at risk of any conditions	27%
Not at risk of any conditions and advised not to worry	12%
At a low risk of glaucoma as no immediate family history (relevance of family history as a risk factor explained by optometrist)	16%
Would only be at a risk of developing glaucoma if there was a family history	44%
Ruled out risks of any conditions after the eye examination	14%
At an increased risk of glaucoma as patient of African racial descent	6%
Increased risk of glaucoma with age	5%
Regular eye examinations are important for early diagnosis of any conditions	2%
Important to have regular blood tests to keep a check on diabetes due to family history of diabetes	11%
Important to keep a regular check on the underactive thyroid	3%

*the proportions quoted are based on the entire sample (N=100). The totals do not add up to 90 (the number who addressed this question) because several optometrists recommended more than one option

Table 4 compares the percentages of optometrists working in independent, small and large multiple optical practices who performed the tests/procedures suggested by the expert panel as being appropriate for this patient. The randomisation process for practitioner selection

resulted in the SP visiting 50 independent practices, 34 large multiples and 16 small multiple practices as defined in Shah et al., 2008. On average, optometrists performed six of the eight tests/procedures (minimum 4, maximum 7).

Table 4: The percentage of optometrists working in independent, small multiples and large multiple practices who carried out tests/procedures felt to be appropriate for this patient by the expert panel.

Expert panel recommended tests	Independent (n=50)	Small Multiple (n=16)	Large Multiple (n=34)	Total Sample (n=100)
Ask about a family history of glaucoma	90%	100%	100%	95%
Gonioscopy	0%	0%	0%	0%
Fundus Examination	98%	100%	100%	99%
a) using direct ophthalmoscopy	84%	88%	88%	86%
b) using slit lamp biomicroscopy	22%	38%	15%	22%
c) using a fundus camera	14%	6%	0%	8%
Tonometry	94%	100%	97%	96%
a) Using contact tonometry	18%	19%	0%	12%
b) Using non-contact tonometry	76%	81%	97%	84%
Visual Fields	24%	50%	47%	36%
a) Using full threshold testing	8%	0%	0%	4%
b) Using supra threshold testing	16%	50%	47%	32%
Objective assessment of refractive error	80%	75%	91%	83%
Subjective refraction	100%	100%	100%	100%

*the proportions quoted are based on the entire sample (N=100). For fundus examination several optometrists used more than one method.

Discussion

In answer to the primary research question, 35 optometrists out of the 100 sampled carried out all three of the tests stated by the CoO as relevant for the accurate detection of POAG. Although it is encouraging that 95 of the optometrists carried out at least two of the key tests (ophthalmoscopy and tonometry), it is of some concern that one optometrist did not carry out any form of fundus examination and four optometrists did not carry out tonometry.

An alternative method to the SP approach to gain insight into optometric clinical activities is through questionnaires,(20) notably those administered by the CoO.(11) Although useful, these are subject to sampling bias since conscientious practitioners are more likely to respond. Additionally, there is a further source of bias with human nature resulting in replies which indicate higher standards of practise than may actually pertain. We have compared our SP generated data with those from a recent CoO Clinical Practice Survey of UK optometrists (N = 2715). This wide-ranging survey included questions on tests that would be performed on an over 40-year-old ‘black African-Caribbean’ adult with no family history of glaucoma. The survey included hospital optometrists (3%) who were excluded from our research, plus optometrists from Scotland (9%) and Wales (2%) who benefit from expanded scope of practice for NHS primary eyecare.

The usage of glaucoma ‘screening’ tests, and the criteria chosen for referral, varies widely across the optometric profession.(21) Although the SP did not have a family history of glaucoma, raised IOP or suspicious looking discs, it is still disappointing that only 36% carried out a visual field assessment. In the CoO survey, a comparable 43% of respondents would always carry out perimetry on a similar patient, although 51% would perform perimetry ‘sometimes’.(22)

Although most new generation perimeters contain supra-threshold screening programs, it is interesting to note that four optometrists carried out full threshold testing, despite the increased test duration. Advanced visual field loss has been found in 20% of patients newly diagnosed with POAG. This could be due to late presentation of patients, failure of optometrists to carry out visual field tests, inappropriate interpretation of visual fields, or unusually rapid disease progression. Examinations in small and large multiples were more likely to include visual field screening (50% and 47%) than in independent practices (24%, Chi-square= 2.99, p=0.08) . However, independent practices were more likely than multiples to include full threshold visual field testing in their examination (Chi-square= 2.83, p=0.09). This can be attributed to our finding that a greater proportion of multiple practices delegate screening tests to trained lay personnel compared to independent practices.(18)

The CoO survey (2008) established that at least 80% of optometrists have access to a non-contact tonometer and 54% to a Goldmann/Perkins tonometer.(22) Optometrists in the current study demonstrated a preference for non-contact tonometry (84%) over contact tonometry (12%). While 96% of practitioners undertook tonometry, it is of concern that four optometrists failed to measure IOP in a patient in this age group and of African racial origin, although all four examined the fundus and one carried out supra-threshold visual field screening.

Measurement of IOP alone is not effective for glaucoma screening.(23) Harper et al. (2000) concluded that the diagnostic accuracy of disc assessment in isolation is inadequate for screening. Hence, a combined strategy of IOP measurement, optic disc and visual field assessment is necessary.(4;9;23) Visual field screening should be used routinely, but the challenge is to design a protocol that can be implemented without imposing substantial further demands and costs on primary eye care practitioners.(4) Vernon et al. (1998) found an increased use of visual field screeners by optometrists between 1988 and 1993 led to an increase in the proportion of false positive referrals.(24) This suggests that the use of visual field tests per se does not necessarily increase the accuracy of referrals for suspect POAG. However, if a defect is noted during visual field testing, repeating the visual field testing has been found to reduce false positive referrals. (9;25) Similarly, when raised intraocular pressures were recorded using non-contact tonometry, repeating tonometry using a contact tonometer rather than a non-contact tonometer resulted in an improvement in the accuracy of referrals.(26)

A benefit resulting from the recent changes to the General Ophthalmic Services in Scotland was to encourage the use of dilation, contact applanation tonometry and full threshold field testing on patients, with the aim of reducing inappropriate hospital referrals. Optometrists are able to repeat tests and procedures when necessary by performing a supplementary examination.(27) Ang et al. 2007 investigated the influence of the new NHS contract on glaucoma referrals in Scotland. After the introduction of the new GOS contract, there was a statistically significant increase in true-positive referrals (from 18.0% to 31.7%; P=0.006), and a decrease in false-positive referrals (from 36.6% to 31.7%; P=0.006). In addition, there were increases in the number of referrals containing information from applanation tonometry (from 11.8% to 50.0%; P=0.000), from dilated fundal examination (from 2.2% to 24.2%; P=0.000), and from repeat visual fields (from 14.8% to 28.3%; P=0.004) when compared to the 6-month period prior to the introduction of the new contract (28).

Although gonioscopy is one of the tests required for a complete baseline examination to characterise the glaucoma type, it is not a core competence which UK optometrists are expected to possess at registration and is not routinely carried out in optometric practice. Optometrists may learn the technique during postgraduate training and 6% have access to a gonioscope lens.(22) However, none of the optometrists visited carried out anterior chamber angle assessment using gonioscopy. More than 90% of optometrists have access to a slit

lamp bio-microscope,(22) but only one third of optometrists visited carried out an anterior segment examination. A variety of approaches to fundus examination was apparent, with 9% examining the fundus by both monocular direct and binocular indirect ophthalmoscopy, and 8% taking fundus photographs. It is encouraging that 22% of optometrists used slit-lamp binocular indirect ophthalmoscopy on this patient, which is likely partly to reflect CPD in this area in recent years.

If not already discussed by the optometrist, the SP asked at the end of the examination if she was at greater risk of any eye conditions. Only 6% of optometrists discussed the link between race and glaucoma, which may reflect either lack of knowledge or a reluctance to alarm the patient. Furthermore, only 5% discussed the increased risk of glaucoma with age, while 16% advised the SP that she was at a low risk as there was no immediate family history, and 44% informed the SP that she would be at greater risk if there was a family history. All this suggests there is a need for CPD on the risk factors for glaucoma, particularly on the link between POAG and race.

There were differences between practitioners in the duration and depth of their clinical investigations. This is not surprising, since practitioners are individuals with different levels of experience, and variations in approach are inevitable. This highlights that not all eye examinations are identical, suggesting that a 'standard sight test' does not exist. Overall, the differences between different types of practice were not statistically significant; indicating that for a patient of this type the thoroughness of eyecare cannot be predicted reliably from the type of practice.

Optometrists who consent to participate in a study of this nature may be more confident of their skills and may perform better than those who declined participation.(29) Hence, our results may overestimate performance although we took several measures to minimise this risk.(18) A potential limitation is the possibility of practitioners detecting the SP actor during their visit. Participating optometrists were asked to inform the researchers if they detected the SP. None reported identifying this SP and nothing that took place during the eye examinations led the SP to suspect that she had been detected.

Another limitation is that our research only involved optometrists working within 1.5 hours travel from central London. We excluded optometrists working in the City of London, since their practices are likely to have an atypical patient demographic (e.g., relatively few children and older people). It should be noted that improved funding arrangements and expanded scope of practice for NHS primary eyecare in Scotland and Wales (27) mean that our data are unlikely to reflect the situation in these regions.

This study has further demonstrated that standardised patient encounters are an effective way of measuring clinical practice within optometry and should be considered for further comparative measurements of quality of care. As in research using SPs in other healthcare disciplines,(13;14) our research has highlighted a notable variation in the standards of different practitioners. We suggest that future CPD could usefully focus on specific criteria and methods for glaucoma screening such as indirect ophthalmoscopy and contact tonometry, and specific referral criteria. Most importantly, we feel that future CPD should emphasise predisposing factors for POAG, and in particular the increased risk of glaucoma in people of African racial descent.

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Competing Interest: None declared.

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