ORIGINAL ARTICLE

Development of Components for A Glaucoma Screening Programme in Malaysia: A Qualitative Study

Hui WX[a], Sharanjeet-Kaur S[b], Hairol MI[c], Abd Rahman MH[b], Nasaruddin RA[a], Md Isa Z[d], Ismail R[e], Che Hamzah J[a]

[a]Department of Ophthalmology, Faculty of Medicine, Universiti Kebangsaan Malaysia, Wilayah Persekutuan Kuala Lumpur, Malaysia
[b]Centre for Rehabilitation & Special Needs Studies (iCaReRehab), Faculty of Health Sciences, Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia
[c]Centre for Community Health Studies (ReaCH), Faculty of Health Sciences, Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia
[d]Department of Public Health Medicine, Faculty of Medicine, Universiti Kebangsaan Malaysia, Wilayah Persekutuan Kuala Lumpur, Malaysia.
[e]Sentul Health Clinic, Wilayah Persekutuan Kuala Lumpur, Malaysia

ABSTRACT

INTRODUCTION: Glaucoma is a leading cause of permanent blindness, often going undetected in its early, asymptomatic stages, especially in older age groups. In Malaysia, glaucoma is a growing public health issue due to an increase in the ageing population. While screening is essential for early glaucoma detection, the most suitable strategy for Malaysia's healthcare system remains unclear. This study explored the perspectives of eye healthcare professionals on the most suitable glaucoma screening strategies for Malaysia. **MATERIAL AND METHODS:** This qualitative study used semi-structured interviews with 19 eye health professionals (ophthalmologists, optometrists, nurses, ophthalmic technicians, and assistant medical officers) practicing in the Klang Valley. The interviews were conducted face-to-face in their workplace or via a video conferencing platform. All interviews were recorded, transcribed, and analysed using thematic analysis. **RESULTS:** Six major themes were identified: types of glaucoma screening programmes, accessible screening locations, target screening population, instruments and use of digital technology, trained personnel, and referral criteria. Opportunistic case finding and population-based programmes were identified as the glaucoma screening programmes in which trained personnel conducted screening at accessible locations. Glaucoma screening for high-risk individuals was recommended, focusing on visual acuity testing, tonometry, anterior chamber angle assessment, funduscopy, perimetry, and retinal nerve fibre assessment. A lack of clear referral criteria due to low awareness and poor implementation of existing guidelines was observed. **CONCLUSION:** Further investigations are required to identify the best combination of components for glaucoma screening. This will enable policymakers to develop an effective glaucoma screening programme in Malaysia.

Keywords
glaucoma, screening, interviews, policy, Malaysia

Corresponding Author
Assoc. Prof. Dr. Jemaima Che-Hamzah
Department of Ophthalmology, Faculty of Medicine, Universiti Kebangsaan Malaysia, Bandar Tun Razak, Wilayah Persekutuan Kuala Lumpur, Malaysia
Email: jemaima@ppukm.ukm.edu.my

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INTRODUCTION

Glaucoma was reported as one of the leading causes of blindness following cataracts in 2020.[1] At least 3.6 million adults aged 50 years and above were estimated to be blind in 2020 because of glaucoma.[1] As Asia is the continent with the highest population density[2], with a growing ageing population, glaucoma cases were expected to increase from 51.32 million in 2013 to 80.87 million in 2040.[3] In Malaysia, according to the National Eye Survey 2014, glaucoma contributed to 6.6% of blindness in adults aged 50 years and older.[4]

Glaucoma is a chronic eye condition that impairs the patient's quality of life. [5] Glaucoma patients may experience significant financial burdens because glaucoma requires long-term and often expensive medical treatments.[5] The asymptomatic nature of glaucoma in its early stages makes it harder to detect.[6] Many people are unaware that they have glaucoma, which increases the risk of irreversible blindness.[7] Thus, early detection through screening is crucial in preventing blindness caused by glaucoma.

Access to eye care in Asia, especially in rural areas, is limited compared with developed countries.[8] Six out of ten countries in Southeast Asia have not achieved the target number of ophthalmologists-to-population ratio (1:100,000).[9] Additionally, most ophthalmologists are concentrated mainly in urban areas.[9] This limitation may contribute to undetected glaucoma cases in these nations.[10]

The United States Preventive Services Task Force has not found sufficient data to recommend glaucoma screening for adults who do not have vision problems.[11] However, several studies in Asia have found that community screening was more effective than opportunistic case finding in detecting glaucoma early.[12,13] Furthermore, model-based studies have found that population-based eye screening was cost-effective in China and India.[14,15] These disparities in results may lead to confusion about the appropriate strategies for glaucoma screening. In Malaysia, the detection of glaucoma was primarily conducted through opportunistic case screening and, less commonly, community-based screening. There is no national glaucoma screening programme.

As glaucoma screening may reduce the risk of blindness, it is essential to find effective screening strategies. A study in the United Kingdom had identified tonometry combined with either visual field tests or optic disc photography, performed by trained personnel in primary care settings, as the key components for glaucoma screening.[16] In India, similar findings were reported, with recommendations to use the Goldmann tonometer, slit lamp, and fundoscopy using an ophthalmoscope and Volk lenses in a primary care setting.[17] However, no similar study has been conducted in Malaysia. Therefore, this study aimed to seek the opinions of eye healthcare practitioners on the components of a glaucoma screening programme and to triangulate possible strategies that may be suitable in a Malaysian healthcare setting.

MATERIALS AND METHODS

Study Design and Setting

This study employed an exploratory qualitative design in which semi-structured interviews were carried out between 15 December 2020 and 14 February 2021 in Klang Valley. Klang Valley, a densely populated urban area encompassing Kuala Lumpur, Putrajaya, and six Selangor districts, was chosen for its high number of healthcare facilities.

Participants

Purposive sampling was used to recruit nineteen registered eye healthcare practitioners from both the government and private healthcare sectors, who were proficient in English or Malay and willing to participate in an interview. The study was conducted during the COVID-19 pandemic, when the national quarantine was implemented. A list of ophthalmologists and optometrists in Klang Valley was obtained from the National Specialist Register and the Malaysian Optical Council websites, respectively. Eligible ophthalmologists and optometrists were approached and agreed to participate in online interviews. However, recruitment of other eye healthcare practitioners was confined to two selected health facilities, as most participants preferred face-to-face interviews.

Eligible participants were approached via WhatsApp and informed about the study. Informed consent and permission for audio recording were obtained from the participants before they were enrolled in the study. Participants were invited to join the study until data saturation was reached, when no new information was obtained from subsequent interviews.

Data Collection and Analysis

A topic guide for the semi-structured interview was developed after reviewing the literature review on glaucoma screening by a panel comprising ophthalmologists and optometrists. The topic guide consisted of open-ended questions on perspectives on glaucoma screening, the screening population, suitable locations, appropriate instruments to be used on-site, and a strategies to reduce false positives in glaucoma screening. The topic guide was piloted among the potential target population, who judged that the questions did not require significant modification.

The first author conducted the interviews in either English (10) or Malay (9), depending on the participants' language proficiency. Ten interviews were conducted via the Zoom or Skype platforms, while nine were conducted face-to-face in a quiet room at their workplace. The interviews lasted between 25 and 50 minutes, with probing questions used until the participants did not offer any new information. Online interviews were video-recorded, while in-person interviews were audio-recorded. The researcher observed and recorded participants' facial expressions and body language. The audio recordings were transcribed verbatim. The Malay interview transcripts were translated into English and back-translated to ensure accuracy. The transcripts were repeatedly checked against the audio recordings, anonymised, and imported into NVivo 14. Two eye healthcare practitioners trained in qualitative research methodology analysed the data using an inductive thematic analysis.[18] Any disagreements about the themes were resolved through discussion. Member checking and an audit trail were conducted to ensure the trustworthiness of the study.

RESULTS

Nineteen eye healthcare practitioners participated in the study, including six optometrists, five nurses, four ophthalmologists, three ophthalmic technicians, and one assistant medical officer. There were twelve females and seven males, with the majority being Malay (16), two Chinese, and one Indian. The mean age was 41.47±10.62 years and ranged from 29 to 69 years old. Sixteen participants had five to ten years of work experience, while three had over a decade of experience.

The results from the semi-structured interviews were presented in six major themes: (1) types of glaucoma screening programmes, (2) accessible screening locations, (3) target screening population, (4) instruments and use of digital technology, (5) trained personnel, and (6) referral criteria.

Theme 1: Types of glaucoma screening programmes

Participants perceived that there were two types of glaucoma screening programmes in Malaysia: i) opportunistic case finding done by eye care providers and ii) population-based screening by non-profit organisations. Furthermore, the Ministry of Health utilised the existing diabetic retinopathy screening programme to screen patients for glaucoma.

'….. The first is we do it in-house in our practice and the second is through community vision screening.' (P19, optometrist)

'Ministry of Health has a diabetic screening programme. During the diabetic screening, cases with suspicious changes to the optic nerve head are often picked up.' (P5, ophthalmologist)

Theme 2: Accessible screening locations

Most participants preferred primary care facilities and optometrist practices as locations for glaucoma screening because of their accessibility to the public, availability of expertise and instruments.

"Usually, the first point of care happens at community level such as optometry practices and health clinics. Some health clinics have fundus camera and this can be used to not only diagnose diabetic retinopathy, but also glaucoma. You only need doctors to diagnose glaucoma" (P1,ophthalmologist)

Some participants proposed using hospitals as screening sites. As one ophthalmologist (P10) noted,

"*If you want a location, I think hospitals have more patients. Most people come for mild illnesses. So, we have the opportunity to screen them there.*"

This viewpoint highlights the potential of hospitals to screen an existing population who are attending for other medical reasons.

Several participants believed in conducting screenings in public places.

'…conducted near a shopping mall as it is convenient.' (P15, Nurse)

'…target areas such as places of worship … and community centres.' (P4, ophthalmologist)

Public places were thought to be suitable for screening due to their accessibility and the possibility of reaching a wider and diverse population.

Theme 3: Target screening population

Most participants perceived that targeted screening of individuals with glaucoma risk factors was a more appropriate approach:

"I think for a screening programme, perhaps you can try and narrow down the group of people that come for screening to increase the pick-up rate." (P4, ophthalmologist)

High-risk individuals identified by participants were individuals aged 40 and above who have a family history of glaucoma, systemic diseases like diabetes and hypertension, obstructive sleep apnoea, a history of eye surgery, high myopia, hyperopia, and taking steroid medication.

Some participants preferred that glaucoma screening be conducted at all ages:

'I believe that everyone should go for a yearly screening regardless. Some people do get glaucoma at an early age.' (P8, Optometrist)

Screening of all ages may prevent undiagnosed glaucoma, especially in high-risk young individuals, e.g. myopia, under steroid medication, and family history of glaucoma.

Theme 4: Instruments and use of digital technology

Most participants recommended using a variety of instruments, including the visual acuity chart, pen torch, ophthalmoscope, slit lamp, fundus camera, Volk lens, optical coherence tomography (OCT), Humphrey Field Analyser (HFA), pachymeter, gonioscope, and various types of tonometers.

However, ophthalmologists disagreed with other healthcare providers regarding the use of specific instruments for screening, such as the slit lamp, OCT, HFA, pachymeter, and gonioscope. They felt that these instruments were better suited for diagnostic purposes.

Some participants believed that portable instruments, especially those with artificial intelligence (AI) were ideal for screening.

'…portable fundus camera with AI is a more effective way.' (P8, Optometrist)

AI helps in improving the accuracy of screening without ophthalmologists on site and refers the suspected individuals to ophthalmologists in well-equipped hospitals for better management of cases.

Theme 5: Trained personnel

All participants agreed that eye healthcare practitioners should be involved in glaucoma screening. Most agreed that civilians should not be involved due to their lack of knowledge about glaucoma.

'I would say definitely no. Because when we are talking about the chronic type of glaucoma, the layman may not have adequate knowledge even to suspect that they have this disease.' (P5, ophthalmologist)

This indicates that screeners should be well-trained personnel with a fundamental understanding of eye disease.

Some participants suggested civilians could be trained for glaucoma screening:

'They can be involved in taking intraocular pressure. Nowadays, there are a lot of automated tonometer and fundus camera.' (P7, optometrist)

This perspective suggests that technological advancements have simplified glaucoma screening, making it feasible for civilians to perform.

Most participants believed that ophthalmologists and optometrists should interpret the clinical results.

'….. But when all the results come back, I suppose the ophthalmologists and optometrists will have to look at each result' (P8, optometrist)

The participants believed that, at the end of the screening, clinical data should be reviewed by personnel with certification from a professional body.

Some participants felt that assistant medical officers, nurses and ophthalmic technicians could be trained to detect glaucoma.

'I think paramedics should also be trained in detecting glaucoma, especially if they are doing fundus photograph screening for diabetes.' (P1, ophthalmologist)

This approach optimizes the use of assistant medical officers, nurses, and ophthalmic technicians to screen for glaucoma in addition to diabetic retinopathy.

Theme 6: Referral criteria

Most optometrists were unaware of the referral criteria guidelines:

'In order for you to reduce the false positive rate, you can make sure that the optometrist knows what the criteria are to refer for glaucoma.' (P2, optometrist)

Clear referral criteria would help the eye healthcare practitioners to filter the patients and improve the accuracy of referrals.

There are no specific guidelines for glaucoma screening in Malaysia, according to participants.

'We don't have a specific guideline for glaucoma screening. Some hospitals have implemented some guidelines, but I think not all hospitals in Malaysia.' (P6, ophthalmologist)

This highlights the need to develop clear referral criteria for glaucoma.

DISCUSSION

This study identified the components needed for a glaucoma screening programme in Malaysia. The components included the types of glaucoma screening programmes, the target population, potential screeners, instruments, locations, and referral criteria.

Participants identified opportunistic case finding and population-based screening as the common glaucoma screening programmes in Malaysia. Opportunistic case finding was mostly conducted in a developing countries as it is more cost-effective.[19] However, several population -based glaucoma screening programmes have been successful in screening high-risk individuals.[20,21]

Many participants recommended targeted screening as an effective strategy for early detection of glaucoma. The findings were similar to those of another UK study on the clinical components of glaucoma screening.[16] That study found that targeted glaucoma screening should be conducted in a primary care setting using funduscopy or perimetry combined with tonometry by trained eye care providers.[16] Several studies reported that targeted screening among high-risk individuals, such as those aged 40 and above or with a family history of glaucoma, can effectively detect glaucoma.[14,22] This finding is relevant for policymakers who must justify the allocation of resources for a screening programme.

Participants suggested that screening should be conducted at primary healthcare settings and public locations. Previous studies have found that screening at primary healthcare clinics or hospitals effectively detects glaucoma.[23,24] Tan et al.[10] recommended screening in community settings such as churches and community centres to reach individuals who may not attend clinic-based screenings.[10] However, tertiary healthcare facilities are not ideal for screening in Malaysia because they are less accessible to the public[25] and have high patient loads.[26] Additionally, patients often need a referral letter to get their eyes examined at public hospitals.[25]

Our participants recommended many instruments for visual acuity testing, funduscopy, tonometry, visual field assessment, anterior chamber angle assessment, and retinal nerve fibre layer assessment. This aligns with the International Agency for the Prevention of Blindness's recommendations for using the visual acuity chart, ophthalmoscope, and tonometer in a primary care setting.[27] While one study suggests combining tonometry with either funduscopy or perimetry[16], our study suggested using Optical Coherence Tomography (OCT) for retinal nerve fibre layer assessment. Although OCT can improve the diagnostic accuracy of glaucoma[28], it is not usually used in screening programmes due to its high cost, lack of portability, and the need for trained personnel.[29]

Ophthalmologists recommended instruments such as OCT and HFA for glaucoma diagnosis rather than screening. These findings were similar to those of a UK

study.[16] This is due to their cost, limited portability, and the need for specialised personnel.[28,29,30] Screening tools should ideally be inexpensive and user-friendly.[31] However, other eye healthcare practitioners viewed them as important for glaucoma detection, as the inclusion of these instruments improves the accuracy of glaucoma detection in a screening programme.[28]

All participants preferred using a non-mydriatic fundus camera for glaucoma screening. In Malaysia, fundus cameras are widely available in primary healthcare clinics, as they are used in the diabetic retinopathy screening programme.[22] Thus, this makes them suitable instruments for glaucoma screening and facilitates programme implementation.

Portable instruments are mostly used in community screening programmes because they are easily transported,[32] as shown in a Nepal screening programme which utilised portable tools such as Tonopen, portable slit lamps, direct ophthalmoscopes, and frequency-doubling technology.[33] Participants also suggested using AI-equipped instruments, as many studies have shown that AI can accurately identify probable glaucoma from fundus photographs.[34,35] As AI technology advances, it may enable more accurate identification of glaucoma which would allow eyecare providers to refer their patients more confidently to ophthalmologists.

Most participants recommended that trained eye healthcare practitioners conduct glaucoma screening. They perceived that members of the public have a low level of knowledge about glaucoma, which may lead to an inability to conduct glaucoma screening. Most studies use eye healthcare practitioners for glaucoma screening.[36,37] However, some participants proposed training laypersons to use automated instruments for glaucoma screening. Good agreement was found between laypersons and ophthalmologists when measuring the vertical cup-to-disc ratio with a fundus camera (intraclass correlation coefficient of 0.65).[38] This approach is similar to the World Health Organization's recommendation to use community health workers to address workforce shortages and improve access to care.[39]

There was a mixed view on the role of screeners in glaucoma screening. Ophthalmologists and optometrists largely preferred that either profession could interpret results and make a diagnosis. Burr et al.[16] reported that clinicians preferred ophthalmologists to interpret the results. However, due to a shortage of ophthalmologists in developing countries, it is difficult for them to conduct screening in the community settings. Optometrists may play a crucial role in both screening and result interpretation. A study in Malaysia found a high level of agreement (87%) between optometrists and ophthalmologists in diagnosing eye diseases.[40] Other studies also suggested that other healthcare providers can detect glaucoma if they are appropriately trained.[41,42] Therefore, eye care providers can detect glaucoma with an appropriate training programme.

Many participants in our study suggested the need for clear referral guidelines. In Malaysia, the Clinical Practice Guidelines (CPG) on the Management of Glaucoma were developed by the Ministry of Health Malaysia in 2017 to help eye healthcare practitioners manage glaucoma.[43] The referral criteria are outlined in the CPG,[43] but there is a lack of awareness among private optometrists and ophthalmologists. A workshop should be organised to introduce the CPG to these eye healthcare practitioners. Implementing guidelines has been shown to improve the accuracy of glaucoma referrals.[44] Thus, implementing clear referral criteria may reduce the number of false-positive referrals to the hospital.

Several factors in the Malaysian health system could influence glaucoma screening implementation. The high cost of specialised equipment[45,46] and the training of personnel[45,47] are significant barriers to the effective implementation of glaucoma screening. Furthermore, the high patient load[26] and the risk of false positives resulting from widespread screening[48] could strain resources at government hospitals. Therefore, a national screening strategy must balance resource allocation and workforce capacity to be feasible and sustainable.

This was the first qualitative study conducted in Malaysia to explore the perspectives of eye healthcare professionals

on glaucoma screening components. Most interviews were conducted online due to COVID-19 restrictions. Poor internet connectivity occasionally disrupted the interviews, which may have affected the participants' ability to fully express their opinions. This study also did not consider the perspective of glaucoma patients. Thus, future studies should consider their viewpoints.

CONCLUSION

In conclusion, this study provides a foundation for developing a glaucoma screening model in the Malaysian healthcare setting. These findings will inform policymakers in developing national glaucoma screening guidelines to reduce blindness in Malaysia. Further studies should include the development and validation of training modules for glaucoma screeners.

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INSTITUTIONAL REVIEW BOARD (ETHIC COMMITTEE)

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