Current practice patterns and attitudes to enhanced glaucoma services in Trinidad and Tobago.

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ABSTRACT

Background

Glaucoma is a sight-threatening, eye condition, usually asymptomatic until advanced stages. There is a lack of research in Trinidad and Tobago concerning glaucoma. Hence, a lack of autonomy in equipment and tests used to detect glaucoma. This study seeks to enhance glaucoma service in Trinidad and Tobago.

Aim

To enhance the treatment of glaucoma in Trinidad and Tobago by analyzing the optometric equipment and methods used by optometrists in the diagnosis of glaucoma in Trinidad and Tobago and their attitudes towards advancement in glaucoma services.

Method

An anonymous online questionnaire was created and emailed to all registered optometrists in Trinidad and Tobago.

Results

28 optometrists participated in the questionnaire. This research showed that 96.4% of optometrist have a tonometer available in practice. NCT was the most common and preferred tonometer (60.7%). Direct ophthalmoscopy (75%) was the preferred method of fundus evaluation. Participants were also the most confident in direct ophthalmoscopy.

Only 32.1% of optometrists had access to automated perimeters and the majority had access to specialist equipment in varying degrees. 27 optometrists were interested in the enhancement of the optometry practice in different ways.

Conclusion

Most optometrists in Trinidad and Tobago have the necessary equipment to measure IOP and to evaluate the fundus but lack the equipment to test visual fields. There is still room for advancement in the availability of equipment and hence the enhancement of glaucoma services in Trinidad and Tobago. They expressed interest in providing enhanced optometric services for glaucoma and other conditions but there is a need for advanced education.

CHAPTER

ONE

1.0 INTRODUCTION

Glaucoma is the number one cause of irreparable vision loss worldwide.[1] It is a group of diseases characterized by the gradual degeneration of retinal ganglion cells leading to a process called 'cupping'- a characteristic change of the optic nerve head (ONH)[2]. Along with these changes, there is also a reduction of the visual field.[2] When referring to glaucoma the most common subtype is primary open-angle glaucoma (POAG). This subtype initially presents with no symptoms and is not always associated with high intraocular pressure (IOP), changes occur gradually which can lead to loss of visual field and eventually blindness.

Due to its asymptomatic nature optometrists rely on routine eye examinations to detect glaucoma[1] however, a major concern is the lack of autonomy across practices in the method and equipment used for screening and detection[1]. Hence the need for further research to enhance the detection and diagnosis of glaucoma in Trinidad and Tobago.

While international research has been conducted on enhanced glaucoma services[1,3] this topic has not been explored in Trinidad and Tobago. Furthermore, the results of external studies cannot be completely transposed into Trinidad and Tobago because of variations in the scope of optometrist's roles and the laws that govern these roles. This highlights the importance of evaluating this study as it provides relevant quantitative data that would lead to more efficient ways of detecting and diagnosing glaucoma.

This study determines the availability of equipment to detect and diagnose glaucoma to optometrists in Trinidad and Tobago. Categories of this equipment include tonometry, fundus evaluation and specialist equipment. In addition, the attitudes of the optometrist will be assessed to determine the optometrists' degree of interest to enhance glaucoma services.[1]

1.1 Background of the study

To detect and diagnose glaucoma there are three specific tests that an optometrist should do; tonometry- to check intraocular pressure/IOP, fundus evaluation -to exam the health of the optic nerve and perimetry- to detect any loss of visual field[1]. A variety of equipment exist to perform these tests and there is no strict procedure or equipment that needs to be used during glaucoma suspected cases but there are preferred or more accurate tests that can be performed to ensure the proper diagnosis of glaucoma.

To determine how equipped optometrists in Trinidad and Tobago to detect glaucoma the availability of necessary equipment was assessed. This was done by evaluating the methods they use for glaucoma detection and their attitude towards the enhancement of the scope of optometry for future advancement in the field.

A research study was conducted in Ireland[1] on this same research topic. This was done to investigate the equipment optometrists in Ireland use for glaucoma diagnosis and their interest in enhancing the practice. Data was collected by developing a survey which was sent to all optometrists in Ireland. The survey contained information regarding the types of equipment optometrists used for procedures done to detect and diagnose glaucoma. Such as tonometry, fundus evaluation, perimetry and specialised equipment for further investigation. There was also a section to obtain information regarding the optometrist's interest in the enhancement of glaucoma services for the advancement of the practice. The data collected from this study established that optometrists in Ireland were well equipped to diagnose glaucoma and they would benefit from a set procedure for monitoring and management of patients. They also expressed interest in further advancement.

Ensuring that optometrists are well equipped to detect this condition is very important therefore conducting this study would produce valuable information that would determine if the optometrists in Trinidad and Tobago have suitable equipment to accurately detect glaucoma in patients during a routine eye examination and to establish if there may be a need for improvement of the current practice patterns in the detection of glaucoma.

1.2 Statement of the Problem or Rationale of study/Motivation for the study

Motivation for this research came from the lack of information in Trinidad Tobago on this topic. There seems to be a range of opticals available where persons can go to get their eyes tested, but when it relates to sight-threatening conditions such as glaucoma how well equipped are optometrist to detect and diagnose these conditions on a routine eye exam? Do optometrists in Trinidad and Tobago follow the same procedure and use similar equipment for glaucoma detection? Are they interested in change in the optometry profession? All these questions motivated this research project.

This research evaluated the ability of optometrists to assess and diagnose glaucoma in patients. This study would help determine if there is any need for enhancement to the current tests and procedures usually performed and can eventually lead to the improvement of the practice in the future.

If this study is not explored, there will continue to be a lack of research about the current practice patterns for the detection of glaucoma in Trinidad and Tobago. Additionally, without this information, there is no way of knowing if there is a need for change and improvement that can decrease the risk associated with undetected glaucoma.

1.3 Aim or Purpose of the study

To enhance the treatment of glaucoma in Trinidad and Tobago by analyzing the optometric equipment and methods used by optometrists in the diagnosis of glaucoma in Trinidad and Tobago and their attitudes towards advancement in glaucoma services.

1.4 Specific objectives of the study

The main objectives of this study were to:

- Evaluate the current practice patterns of glaucoma services in Trinidad and Tobago.
- Evaluate the ability of the optometrists to perform necessary glaucoma testing using optometric equipment.
- Assess the availability of the testing equipment to the optometrist
- Assess the attitude of optometrists towards enhanced glaucoma services.

1.5 Research questions:

1. What are the types of equipment optometrists in Trinidad and Tobago have available for glaucoma detection?

2. Would optometrists be interested in the enhancement of glaucoma services in Trinidad and Tobago?

1.6 Hypothesis:

- The optometrists of Trinidad and Tobago have the necessary equipment available for the proper detection of glaucoma patients.
- Optometrists in Trinidad and Tobago possess a positive attitude towards the enhancement of glaucoma services.

1.7 Significance of the study

Glaucoma is the number one irreparable vision loss worldwide. The data from this study provides information about how well equipped the optometrists are in Trinidad and Tobago which is important for glaucoma detection. The data collected from this research study produced valuable information to determine if the optometrists in Trinidad and Tobago have suitable equipment to accurately detect glaucoma in patients during a routine eye examination which is significant to reduce the risk of undetected glaucoma that can lead to vision loss and blindness in affected patients.

1.8 Delimitation of the study

This study is targeted towards licensed optometrists working in Trinidad and Tobago gathering information about the equipment they have available for glaucoma detection as well as their attitudes towards the enhancement of glaucoma services.

1.9 Limitation of the study

Only a small number of optometrists participated in this study which limits the accuracy of the results as compared to if a larger number of optometrists participated. Nonetheless, this study accurately represents 15% of licenced optometrists working in Trinidad and Tobago and it is believed that the quality of the responses that were given was genuine to the study.

The short time frame given for the completion of the research can also be a limitation because if a longer period was given there could have been a higher chance of getting more responses to increase the accuracy of the data. Response bias can also be a limitation where the participants are answering the questions and they choose what they think is the best choice instead of truthful responses specific to themselves leading to the inaccuracy of the data gathered.

1.10 Definition of terms

- Glaucoma - Glaucoma is known as a group of eye diseases that can cause irreparable vision loss and blindness by damaging a nerve in the back of your eye called the optic nerve[4].
- Intraocular pressure (IOP) - The intraocular pressure is known as the fluid pressure inside the eye[5].
- Optometrist – An optometrist is known as a primary health care specialist trained to examine the health of the eyes[6].
- Opticians – Opticians are known as technicians trained to design and fit spectacles and contact lenses from prescriptions provided by optometrists and ophthalmologists[7].
- Ophthalmologist - An ophthalmologist is a medical or osteopathic doctor who specializes in eye care as well as performs surgeries, diagnoses and treats all eye conditions and diseases[7].
- Diabetic retinopathy- This is known as an eye condition that affects persons with diabetes which can cause vision loss and blindness[8].

- Cataract - Cataract is a medical condition that develops when the clear lens in the eye becomes opaque[9].
- Low vision- Low vision is known as vision loss with a limited amount of vision which cannot be corrected with visual aids or surgeries[10].

CHAPTER

TWO

2.0 LITERATURE REVIEW

Barrett and Loughman[1] investigated the current practice patterns and attitudes towards enhanced glaucoma services in Ireland. They used a sample size of 199 optometrists which represented 27% of registered optometrists in Ireland[1]. Three aspects of glaucoma testing Intraocular Pressure (IOP), Fundus Examination and Investigative equipment available to optometrist were assessed. They found that the non-contact tonometer (NCT) was the first-choice method of IOP measurement for 82% of optometrists. The other options of IOP measurement and respective percentages of an optometrist that chose them as the first choice were the Perkins applanation tonometer 11%, Goldmann applanation tonometer 3%, and iCare rebound tonometer 4%. 64% of respondents preferred indirect ophthalmoscopy as the preferred method of fundus evaluation. This figure was affected by factors such as the number of years since the optometrists were registered and the time allotted for each patient among other factors.

The investigative equipment was available to an optometrist in varying percentages; automated perimeters 87%, fundus camera 79%, digital slit lamp camera, optical coherence tomography (OCT) 11%, gonioscopy 7% and pachymetry 5%. They also found that 4 participants were not interested in expanding the role of optometrist as it relates to glaucoma management, however, all the other participants were interested in change in varying degrees, but the majority agreed that further education is needed for an optometrist to enhance and expand their role in glaucoma management.

H Baker, R A Harper, D F Edgar, and J G Lawrenson[3] determined the “Multi-stakeholder perspectives of locally commissioned enhanced optometric services.”

This study done in the United Kingdom is based on two Enhanced Scope Schemes/ ESS: Minor Eye Conditions Scheme/ MECS and Glaucoma Referral Refinement Scheme/ GRRS. The interest of this research paper is the enhanced glaucoma services, therefore GRRS only will be reviewed. The results for the GRRS research were derived from 80 patients, 2 GP, 4 glaucoma specialist optometrist, 2 GRRS commissioners and 14 optometrists.[3] The researchers collected data via a patient satisfaction survey, optometrist focus groups and commissioners telephone interview.

From the patient satisfaction survey, 99% of respondents were satisfied with their visits, 91% were satisfied with the location and 95% had confidence and trust in the optician. More in-depth questioning revealed that most patients found the experience ‘very good.

Open-ended questions were used to prompt the conversations in the optometrist focus group. This was done for various subject matters; however, the overall response was one of enthusiasm and positivity towards the enhancement of glaucoma services and their inclusion in the schemes.

Hospital eye services telephone interview responses by optometrists and ophthalmologists were mainly positive. They were happy with the quality of care through the schemes. A major point reiterated is the need for ongoing training and more effective communication.

The views of commissioners were engaged through telephone interviews. The two GRRS commissioners stated that the goals were met and superseded in certain instances. It was proven to be cost-effective and exhibited a high quality of care.

Overall, the GRRS scheme was well appreciated by all stakeholders through challenges were identified and the success of the scheme allowed for expansion.

The optometrist displayed a positive and proactive approach towards enhanced glaucoma service which broadened the scope of their service to the community.

CHAPTER

THREE

3.0 METHODOLOGY

3.1 Ethical consideration

Permission for this research topic was first given by the UWI Optometry Unit. The research study was then proposed to the UWI ethics committee and approval was given after which the research project was started. The questionnaire constructed to collect data in this study was then sent for approval to the Trinidad and Tobago Optometric Associations (TTOA) to acquire their assistance for the distribution of the questionnaire to all licensed optometrists working in Trinidad and Tobago. When approval for the questionnaire was given by the TTOA, the questionnaire was then sent to licensed optometrists throughout Trinidad and Tobago via email.

To protect the participant's confidentiality, all the data collected from the questionnaire was anonymous and no personal identification information was collected. The level of risk that was associated with this study was no more than minimal risk. The participants may have felt a sense of inconvenience when they were filling out the questionnaire but this was only a one-time study and the questionnaire would have only taken ten to fifteen minutes to complete. In addition, the breach of confidentiality was highly unlikely since the data collected was anonymous and it was also stored on a password-protected laptop on a password protected file to which only the three investigators had access.

On the first page of the questionnaire, a paragraph was written to inform the participants concerning the purpose of this research study, the risks involved and the type of participants required to take part in the study. Additionally, it was noted that participating in the survey was completely voluntary and the participant could have withdrawn at any time if needed, as well as anonymity of participating was assured since no personal data would have been collected.

The participants would have given consent to participate only when they ticked the box that stated ‘I consent to participate in this research study’ which would have allowed them to begin the survey.

3.2 Research design

An online questionnaire that assesses optometrists' current practices and attitudes as it relates to glaucoma diagnosis was developed. A quantitative approach was chosen as data can be easily replicated and it allows respondents to answer comfortably as anonymity was assured. Another reason for selecting the online questionnaire method is the current COVID-19 situation which places constraints on other types of sampling methods. An online survey using Google forms was chosen based on its effectiveness in international research on similar subject matters. The questionnaire was sent to licensed optometrists throughout Trinidad and Tobago via email from the assistance of the Trinidad and Tobago Optometric Association (TTOA). This survey was formulated upon reviewing existing surveys[1,2] and the literature from various studies was reviewed, analysed and compared to the data acquired from this survey.

3.3 Study population

The study population for this research is licensed optometrists working in Trinidad and Tobago.

3.3.1 Study site or Area of study

This research was conducted in Trinidad and Tobago.

Trinidad and Tobago are multicultural Caribbean islands with people groups such as Amerindians, Africans, Asians, West Indians, Americans, and Europeans shaping the general culture of the people. The islands are located on the Caribbean sea east of the coast of Venezuela. Historical the islands among other Caribbean islands were colonized by various groups such as the Spanish and British where African and East Indians were brought in through slavery and indentureship respectively. The official language of Trinidad and Tobago is English. Currently, the islands are inhabited by approximately 1.3 million people.

3.3.2 Inclusion criteria

The participants include licensed optometrists working in Trinidad and Tobago.

3.3.3 Exclusion criteria

Those excluded from this study are non-licensed optometrists, optometrists who do not practice in Trinidad and Tobago and ophthalmologists.

3.4 Sample size and sampling technique

Sample size

The population of optometrists in Trinidad and Tobago are 186 licensed optometrists. Within a 95% confidence level, the calculated sample size is 126 licensed optometrists.

3.4.1 Sample size determination

The sample size calculation was done using Raosoft.

3.4.2 Sampling technique

To randomly select 126 optometrists from a population of 186 optometrists, questionnaires were emailed to all registered optometrists in Trinidad and Tobago. This was achieved with the assistance of the Trinidad and Tobago Optometric Association as they sent the questionnaire to all the registered optometrists in Trinidad and Tobago. This ensured that each member of the population received an equal opportunity to be selected. This is a probability sampling method that has the benefit of unbiased selection and also the proper representation of the population.

3.5 Tests and instrument/ equipment

The research instrument which was used for the data collection in this study is the questionnaire in which the licensed optometrists working in Trinidad and Tobago completed. The responses obtained from the questionnaire determined if the optometrists were well equipped for the proper detection of glaucoma and their attitudes towards the enhancement of glaucoma services.

3.6 Data collection procedure

- A data collection plan was constructed and the relevant population and sample group required for the study were established.

- A questionnaire was then developed which included all the relevant information required for the study. An online survey using Google forms was chosen as the source for the data collection.
- The questionnaire was submitted for ethical approval along with the application for approval for the research project.
- Trinidad and Tobago Optometric Association were contacted for assistance in the distribution of the questionnaire.
- Upon receiving confirmation of assistance from the Trinidad and Tobago Optometric Association the questionnaire was distributed to licensed optometrists throughout Trinidad and Tobago via email.

3.7 Data analysis

The data collected for this research was cautiously reviewed, coded and analyzed using the Statistical Package for Social Sciences (SPSS) software version 24.0 for windows. This was chosen as it allows for efficient and effective analysis of quantitative data under which this research is categorized. This ensures data analysis is reliable and trustworthy. Descriptive statistics were generated descriptive for continuous variables and frequencies for nominal variables. A chi-squared test was done to determine if there were any associations among variables. A correlation was used to assess relationships between quantitative variables. Additionally, a binary logistic regression test was performed to investigate the relationship between the independent and dependent variables. A $P<0.05$ denotes significance at a 95% confidence interval (CI).

CHAPTER

FOUR

4.0 RESULTS

186 optometrists in Trinidad and Tobago were invited to participate in this research questionnaire. From this population of registered optometrists, 28 optometrists responded to the questionnaire representing 15% of the registered optometrist. This study has a margin of error of 17% at a 95% confidence level.

Participant Demographics

1. What is your age group?

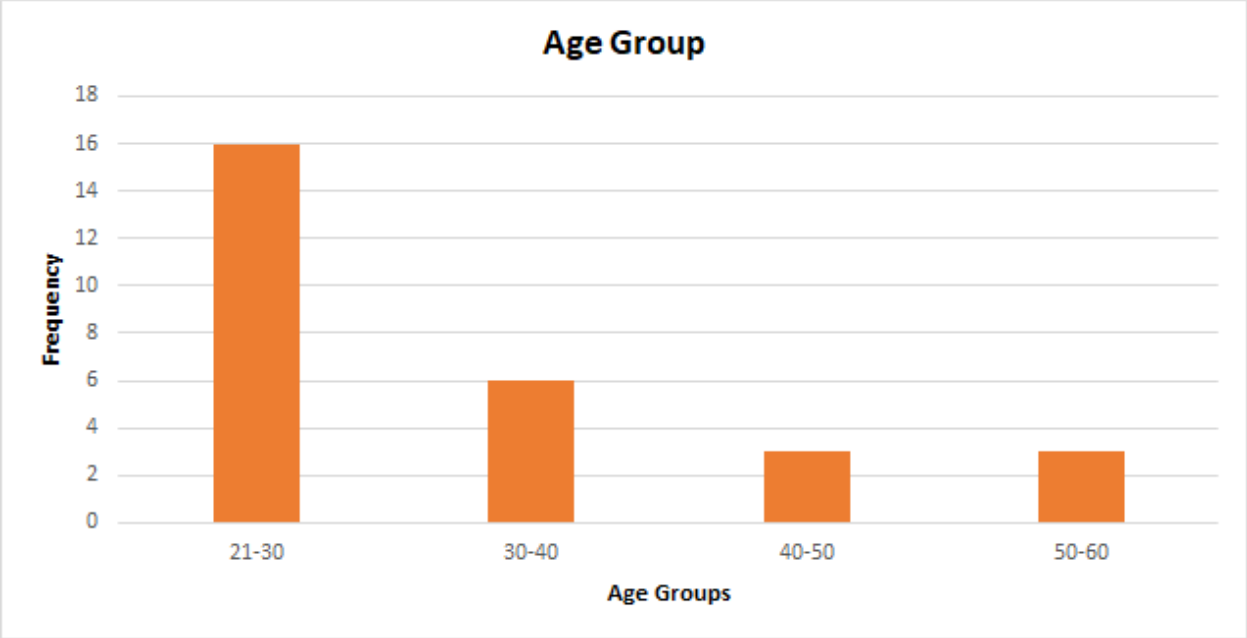

Figure 1 shows the number of participants from each age group.

2. Gender

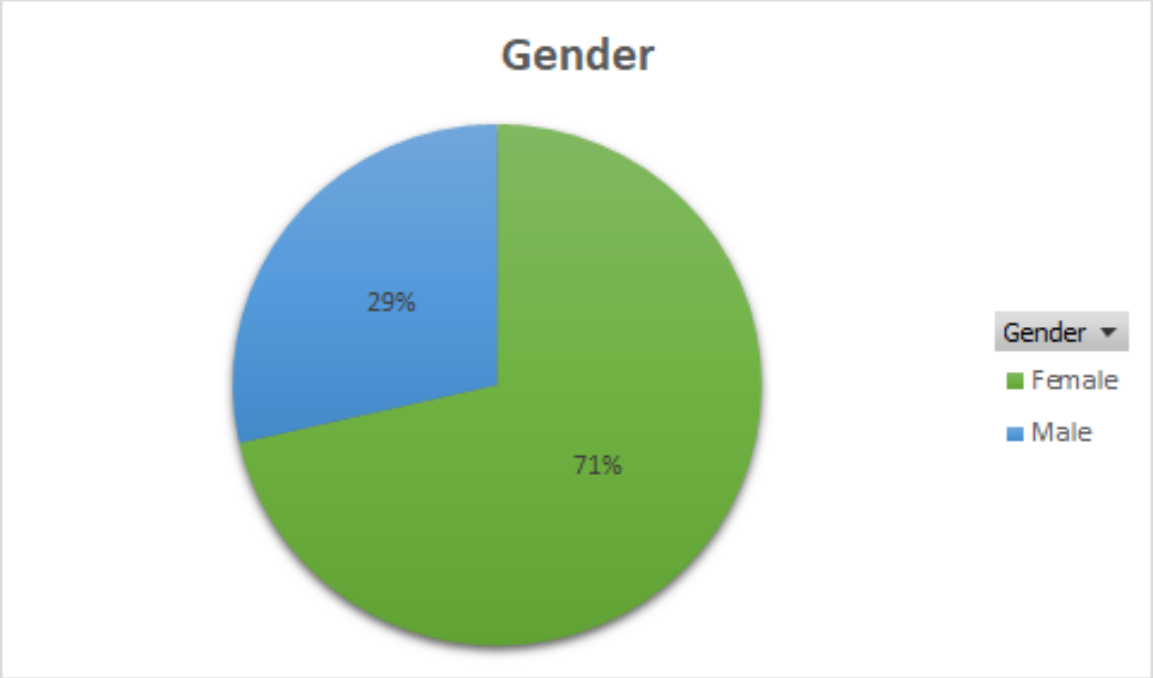

Figure 2 shows the percentages of male and female participants.

3. What is your current mode of practice?

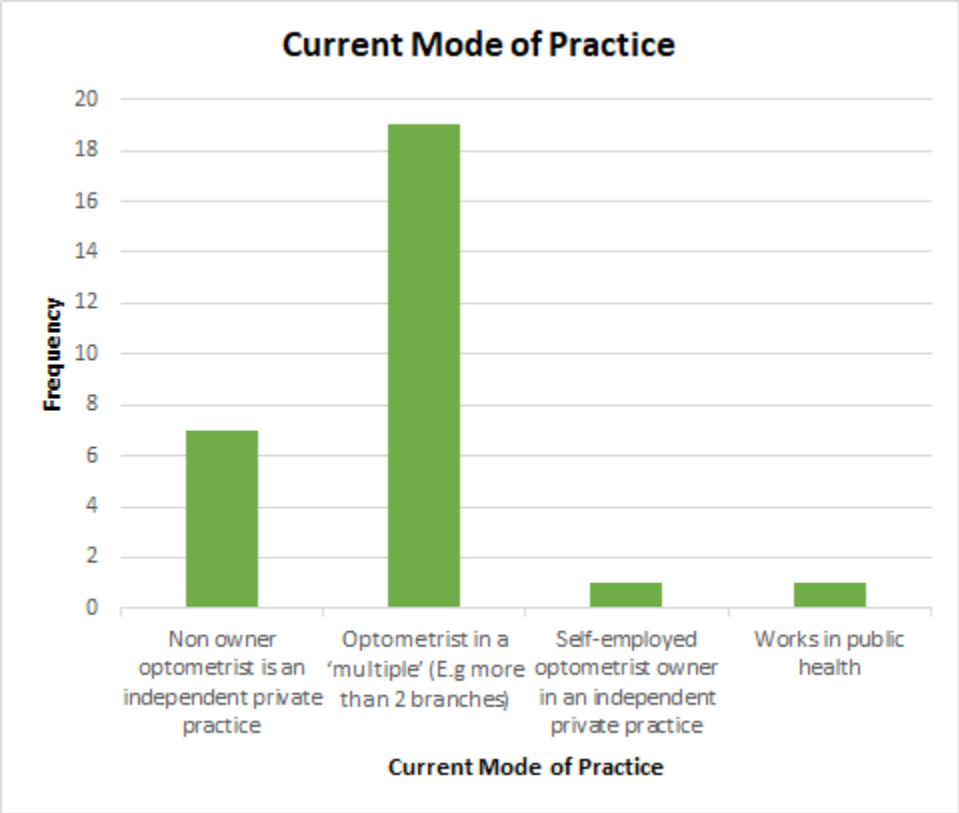

Figure 3 shows the current mode of practice of participants.

4. How long is your appointment slot for a routine eye examination?

The optometrists were asked to select or state the length of time they used for a routine eye exam. 60.7% said 30 minutes, 28.6% said 20 minutes, 3.6% responded 25 minutes and 3.6% responded 45 minutes. One participant said that there is no set time for appointments but it takes approximately 15-20 mins and maybe longer depending on the patient's needs.

Equipment Evaluation

Tonometry

5. Which tonometer/s do you have in the practice?

The table mounted non-contact tonometer was found to be the most popular tonometer among the practices with 60.7% of respondents confirming its availability in the practices. 10.7% had the Goldmann applanation tonometer, 3.6% had the Perkins applanation tonometer, 14.3% had the iCare rebound tonometer and 7.1% had the Reichert NCT handheld tonometer. While 3.6% had no tonometers in practice.

6. Which tonometer is your first choice during a routine eye examination?

	Frequency	**Percentages %**
Table mounted non-contact tonometer	20	71.4
iCare rebound tonometer	2	7.1
Pulsair handheld tonometer	5	17.9
Tonopen	1	3.6
Total	28	100

Table 1 shows the participants first choice tonometer during a routine exam.

7. How often do you use each tonometer in the practice?

   (E.g I use Non-contact tonometer 70% of the time, Goldmann applanation 20% and iCare rebound 10 %.) Options; iCare rebound tonometer, Table mounted non-contact tonometer, Goldmann applanation tonometer, Perkins applanation tonometer, Pulsair handheld tonometer, Schiotz tonometer, Tonopen, Other(specify).

Varying responses were given. These were responses stated:

- 18 participants said they used the table mounted non-contact tonometer (NCT) 100% of the time.
- One participant said they used the table mounted non-contact tonometer 95% of the time.
- Two optometrists used both the NCT and Goldmann applanation tonometer but in differing percentages; NCT 80% of the time and Goldmann applanation tonometer the remaining 20% and NCT 70% and Goldmann applanation tonometer 30% of the time.
- One optometrist used an NCT 50% and Pulsair handheld tonometer combination 50%.
- Perkins was used 95% of the time by one optometrist.
- The iCare rebound tonometer and Goldmann applanation tonometer was used in proportions of 70% and 30% respectively by one optometrist.
- Two optometrists used handheld tonometers 100% of the time.
- Only one optometrist did not have any tonometers in practice.

8. Do you carry out tonometry yourself in the practice or does another member of staff do it?

Responses to this question revealed that 50% of participants delegated tonometry to another staff member and the remaining 50% carried it out themselves.

Fundus Evaluation

9. Which of the following techniques is your first choice to examine the fundus during a routine eye exam pre COVID?

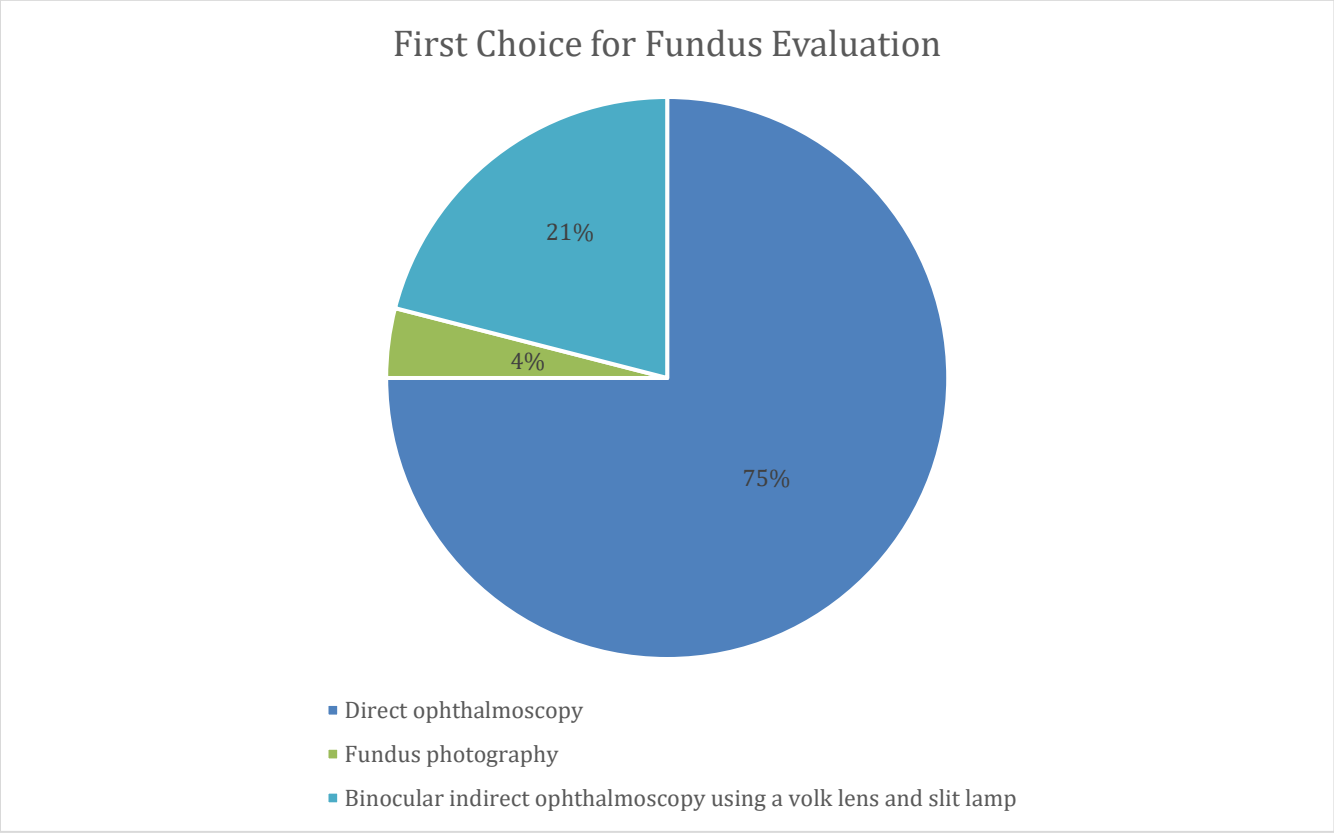

Figure 4 shows the first-choice technique for fundus evaluation.

Questions 10-12. How confident are you when performing:

- Direct ophthalmoscopy
- Binocular indirect ophthalmoscopy using a volk lens and slit lamp
- Binocular indirect ophthalmoscopy using a condensing lens and headset.

Select from a scale of 1-5, with 1 being unable to perform the procedure and 5 being excellent when performing the procedure. Questions 10-12 were grouped for simplicity of results display.

Fundus Examination Technique	**1 Unable to perform skill**	**2 Fair**	**3 Good**	**4 Very Good**	**5 Excellent**
Direct ophthalmoscopy	0	0	1	9	18
Binocular indirect ophthalmoscopy using a volk lens and slit lamp	0	1	5	9	13
Binocular indirect ophthalmoscopy using a condensing lens	4	3	6	10	5

Table 2 shows a summary of the number of participants in each level of confidence for the skills listed.

Perimetry

13. Do you have an automated perimeter?

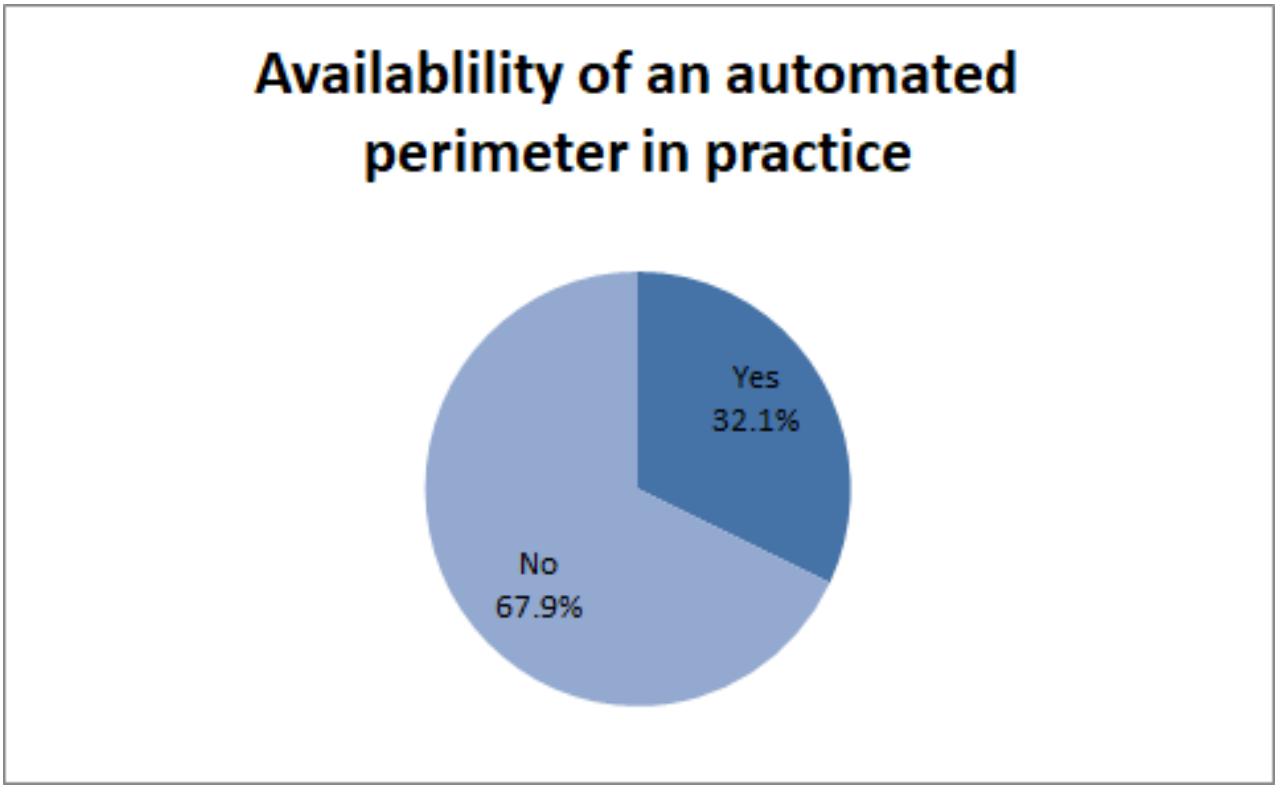

Figure 5 above illustrates the availability of an automated perimeter in the practices.

14. If yes please indicate the type/brand-

Based on the 32.1% of respondents who said yes to having access to an automated perimeter also indicated that the brand which was available in their practices was the Humphery visual field analyser.

15. Do you have access to any of the following specialist equipment in the practice?

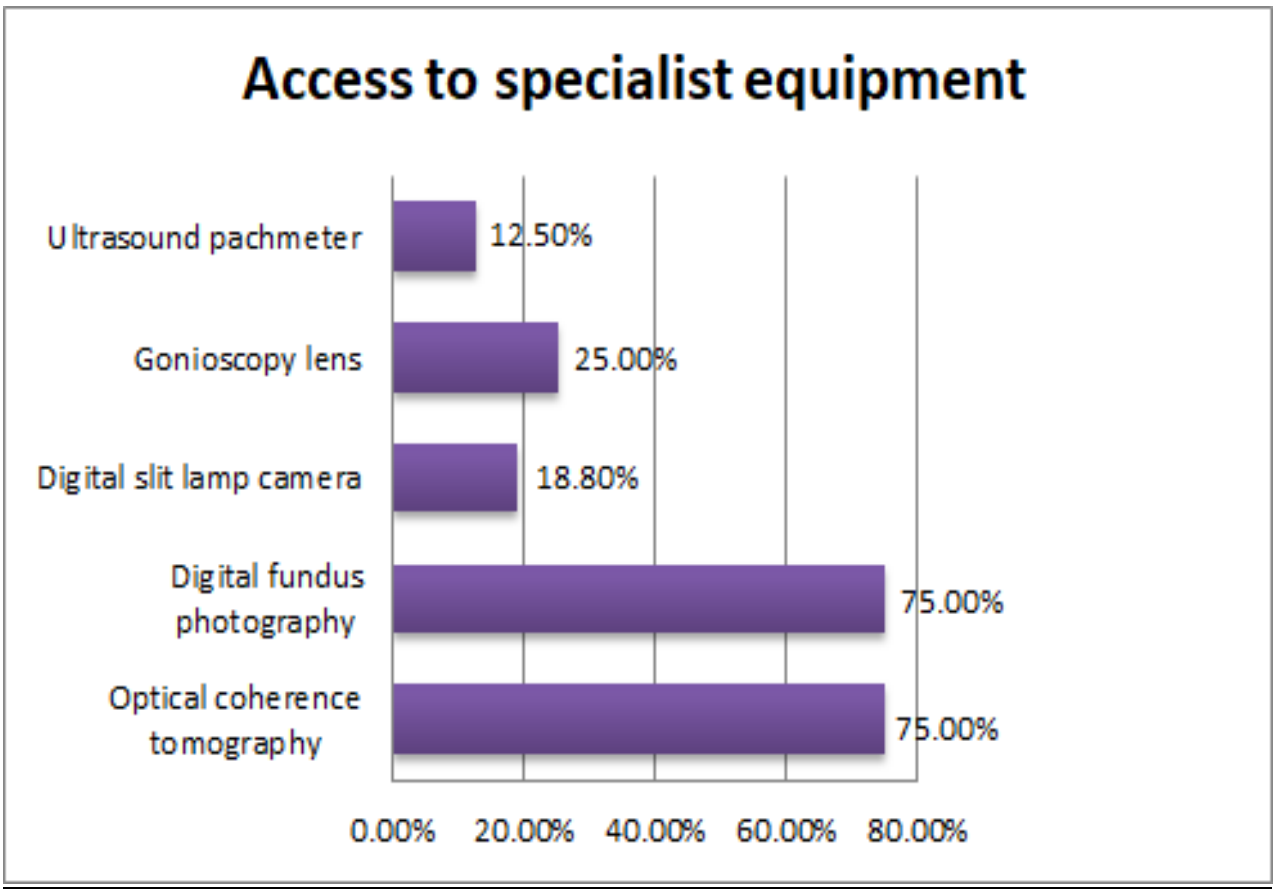

Figure 6 above shows the percentage of respondents who have access to specialist equipment.

Attitudes Towards the Enhancement of Glaucoma Services

16. To what extent would you be interested in providing enhanced optometric services for glaucoma? (Select all that apply to you)

96.4% of respondents showed some type of interest when asked if they were interested in providing enhanced optometric services for glaucoma whereas only 1 respondent (3.6%) stated that they do not think there is any need to enhance the services for glaucoma. 82.1% is interested in monitoring stable glaucoma patients, 67.9% is interested in repeating specific tests for suspected cases, 60.7% is also interested in monitoring glaucoma suspects including ocular hypertension and 46.4% is interested in providing medical management for glaucoma patients.

Questions 17-20. What is your suggested cost ($TTD) (Eg: $ 100) for:

- each appointment for patients requiring repetition of specific tests
- monitoring ocular hypertension and glaucoma suspects
- for shared management of stable glaucoma cases
- for the medical management of glaucoma a patient?

Questions 17-20 were summarized for simplicity of results presentation.

The mean and range for the suggested cost from the respondents for specific types of appointment in the management of glaucoma is illustrated in Table * below. Some respondents also stated that the cost of the appointment also depends on the type of test that is being done.

	Mean	Range
Cost for each appointment for repetition of specific test	$123.46	$50.00 - $300.00
Cost of each appointment to monitor ocular hypertension and glaucoma suspects	$157.86	$50.00 - $600.00
Cost of each appointment for shared management of stable glaucoma cases	$143.57	$50.00 - $600.00
Cost of each appointment for medical management of a glaucoma patient	$217.50	$50.00 - $500.00

Table 3 above shows the mean and range of the cost ($TT) for appointments.

21. Do you think advanced education is necessary for optometrist inclusion in enhanced glaucoma services? (Monitoring of stable glaucoma patients and glaucoma suspects).

When asked about the necessity of advanced education, 92.9% of the 28 respondents agreed that advanced education is needed for monitoring glaucoma patients. While 7.1 % said no to the necessity for advanced education for this purpose.

22. Do you think advanced education is necessary for the medical management of glaucoma patients?

100% of respondents believe that advanced education is also required for the medical management of glaucoma patients.

23. Are you interested in any specific area for enhanced optometric services?

The participants were also asked about their interest in other areas for enhanced optometric services. 3.6% of the respondents added additional services in the text box of the questionnaire indicating their interest in other optometric services such as contact lenses and low vision.

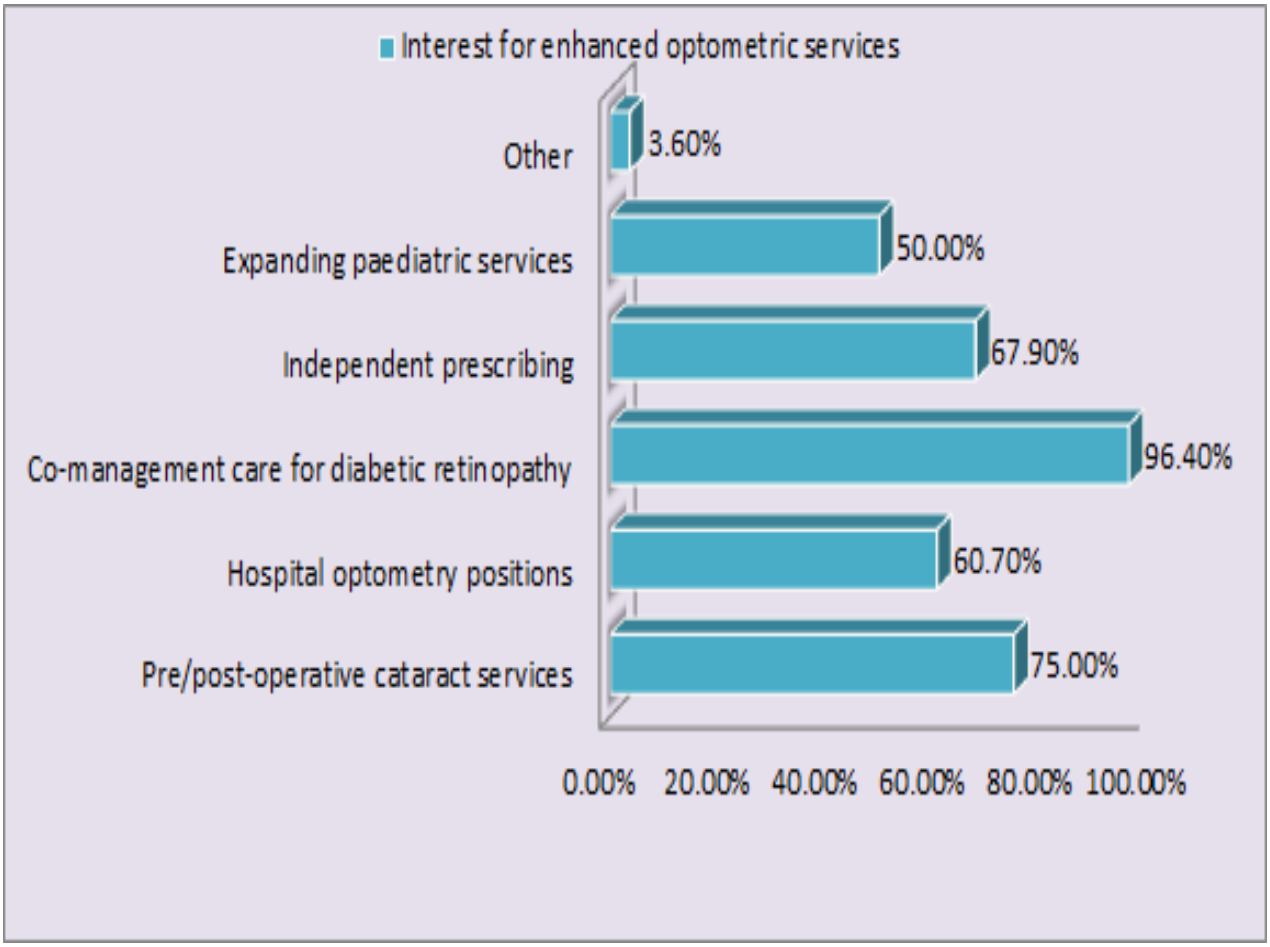

Figure 7 above illustrates the percentage of respondents interested in specific areas for enhanced optometric services.

Questions 24 - 33 asked the participants if certain barriers affect their ability to detect glaucoma. These questions were summarised in Table 7 for proper representation of the data collected.

Barriers that can affect optometrists ability to properly detect glaucoma.	**Strongly Disagree %**	**Disagree %**	**Agree %**	**Strongly Agree %**	**Does not affect my ability to detect glaucoma %**
It is difficult to perform repeated tests because of the limited amount of time available during the eye exam.	17.9	46.4	7.1	14.3	14.3
It is difficult to perform additional tests because of the limited amount of time available during the eye exam.	14.3	39.3	25	14.3	7.1
It is not financially feasible to acquire specialist equipment.	10.7	35.7	32.1	3.6	17.9
It is not financially feasible to book patients for repeat testing services.	17.9	64.3	10.7	0.0	7.1

Barriers that can affect optometrists ability to properly detect glaucoma.	Strongly Disagree %	Disagree %	Agree %	Strongly Agree %	Does not affect my ability to detect glaucoma %
Insufficient equipment in the workplace confines my ability to provide a comprehensive glaucoma exam.	7.1	39.3	32.1	21.4	0.0
Patients fail to return for necessary follow up eye examinations because they may not view the eye exam as imperative.	0.0	21.4	53.6	25.0	0.0
Specific glaucoma tests are not available during a routine eye exam and some patients are reluctant to pay the added cost.	3.6	25.0	57.1	14.3	0.0

Barriers that can affect optometrists ability to properly detect glaucoma.	**Strongly Disagree %**	**Disagree %**	**Agree %**	**Strongly Agree %**	**Does not affect my ability to detect glaucoma %**
It is difficult to monitor patients over time-based on their records as they tend to visit various practices.	3.6	25.0	57.1	14.3	0.0
Extra guidance would be useful in the operation of certain equipment and analysing results. E.g OCT.	3.6	3.6	71.4	21.4	0.0
I don't have access to education for glaucoma detection.	33.3	63.0	0.0	0.0	3.7

Table 4 above demonstrates how the respondents (%) are affected by certain barriers which can affect optometrists ability to properly detect glaucoma.

Analysis

Tonometry

Non-contact tonometers are the most available tonometers in practice (60.7%) whereas the Goldmann applanation tonometer is represented by only 10.7% of respondents. The NCT is easy to use and less time consuming which may influence its availability in the practice. Supporting this view the NCT was also the most favoured first choice tonometer (71.4%) conversely, the Goldmann was not selected as the first choice by any respondent. Another proposed reason for the selection of NCT as the first choice tonometer is the opportunity to delegate this part of the eye exam to another staff member which was done by 50% of the respondents.

As seen in table 5 a crosstabulation of the current mode of practice and tonometers available in practice, 15 optometrists working in a ‘multiple’ had NCT available while no optometrist working in a ‘multiple’ had no Goldmann applanation tonometers available. Goldmann applanation tonometers were available to three optometrists, who worked as non-owner optometrists in independent private practice and public health. These results influenced the view that there may have been a relationship between the type of tonometers available in practice and the current mode of practice of optometrists.

		Tonometers in practice							
		Goldmann applanation tonometer	**Perkins applanation tonometer**	**Table mounted non-contact tonometer**	**iCare rebound tonometer**	**Pulsair handheld tonometer**	**None**	**Other**	**Total**
Current mode of practice	**Optometrist in a 'multiple**	0	0	12	2	3	0	2	19
	Non owner optometrist in an independent private practice	2	0	3	1	0	1	0	7
	Self-employed optometrist owner in an independent private practice	0	1	0	0	0	0	0	1
	Public health	1	0	0	0	0	0	0	1
	Total	3	1	15	3	3	1	2	28

Table 5 shows a cross-tabulation between the current mode of practice and the availability of tonometers in practice.

A chi-square test was done to confirm or refute this view. The results revealed that the assumption for the cross-tabulation table was violated. The assumption for table 5 is that the expected count is not less than 5 or that 20% of the cells or less have an expected count greater than 5. In this case, 96.4% of the cells had an expected count of less than 5 which violates the assumption. Therefore, the significance value for the likelihood ratio needs to be assessed which was 0.130. The significance value is greater than 0.05 hence, there is no association between the type of tonometers available in practice and the current mode of practice of optometrists.

Fundus Evaluation

Direct ophthalmoscopy was chosen as the first choice to examine the fundus by 75% of optometrists while binocular indirect ophthalmoscopy using a condensing lens was not chosen by any respondent. The time it takes to perform direct ophthalmoscopy is less when compared to binocular indirect ophthalmoscopy using a condensing lens. The consideration of time as a factor in this choice led to the view that the length of time available to perform a routine eye exam may influence the choice of equipment used to evaluate the fundus.

First choice to examine the fundus	**Length time for an appointment**						
		20 minutes	25 minutes	30 minutes	45 minutes	Other	Total
	Direct ophthalmoscopy	6	1	13	0	1	21
	Binocular indirect ophthalmoscopy using a volk lens and slit lamp	2	0	4	0	0	6
	Fundus photography	0	0	0	1	0	1

Total		8	1	17	1	1	28

Table 6 shows a cross-tabulation between the first choice to examine the fundus and the length of time for an appointment.

A chi-square test was performed. The crosstabulation table in table 6 revealed that of the eight optometrists with 20 minutes for an exam, 6 of them chose direct ophthalmoscopy. Also, 17 optometrists had 30 minutes for their exam and 13 of them chose direct ophthalmoscopy. The chi-square test showed that 83.3% of the cells have an expected count less than 5 hence, the assumptions were violated. The significance value for the likelihood ratio needs to be used in this case which is 0.367 and is greater than 0.05. This shows there is no significant relationship between the first choice to exam fundus and the length of time for an appointment.

A binary logistic regression was done. The current mode of practice and length of time for appointments were the two predictors. The goal was to predict the likelihood of direct ophthalmoscopy use vs indirect methods of fundus examination based on the two predictors mentioned before. The significance value for the current mode of practice was 0.845 and the significance value for the length of time of appointment was 0.966. Both of these values are greater than 0.05 therefore, both predictors were statistically insignificant. The current mode of practice and length of time for an appointment does not affect the likelihood of direct ophthalmoscopy use vs indirect methods of fundus examination as there was no association.

Another area assessed was the respondents' level of confidence in performing direct ophthalmoscopy, binocular indirect ophthalmoscopy using a volk lens and slit lamp and binocular indirect ophthalmoscopy using a condensing lens a scale from 1-5 was used.

1 is unable to perform the procedure and 5 being excellent when performing the procedure which is seen in table 2. It is seen that direct ophthalmoscopy had the highest overall confidence level among the three techniques with the binocular indirect ophthalmoscopy using a condensing lens having the least overall confidence. The level of competence in the skills may also influence the majority of optometrists' choice of direct ophthalmoscopy.

Automated Perimetry

Only 32.1% of respondents had access to an automated perimeter in the practice. The main brand used as stated by the respondents was the Humphery visual field analyser. Therefore the number of respondents who do not have access to an automated perimeter is relatively high (67.9%).

The Use of Specialised Equipment

75% of respondents stated that they had access to specialist equipment such as the optical coherence tomography (OCT) and digital fundus photography, 25% also stated they had access to the gonioscopy lens, 18.8% and 12.5% had access to the digital slit lamp camera and ultrasound pachymeter respectively. The most popular equipment in which the respondents possess in their practices is the OCT and digital fundus photography. The reason for the majority to own an OCT may be because of the various features the OCT offers, therefore making it desired in optometric practices.

Enhanced Glaucoma Services

The majority of respondents (96.4%) showed interest in providing enhanced optometric services for glaucoma. When asked about the cost per appointment they suggested for repetition of tests, monitoring ocular hypertension as well as glaucoma suspects and shared management of glaucoma patients, the price range varied widely from TT$50.00 to TT$600.00. Some of the respondents stated that the cost of the appointment may differ based on the type of test needed which can explain the wide range of the cost suggestions. Also, it is important to note that the respondent working in public health stated that they won't charge any cost since public health is free.

The majority of respondents also indicated that advanced education is necessary for optometrist inclusion in enhanced glaucoma services such as monitoring glaucoma suspects as well as stable glaucoma patients (92.1%) and for medical management of glaucoma patients (100%). Advanced education and training in those specific areas for glaucoma management would enhance the respondents' skills so they may feel confident in their ability to properly manage the enhanced glaucoma services.

The respondents also showed an interest in other enhanced optometric services in which most of the respondents, 96.4%, were interested in co-management care for diabetic retinopathy, 75% of respondents were interested in pre/post-operative cataract services, 67.9% were interested in independent prescribing, 60.7% were also interested in incorporating optometric positions in the hospitals and 50% showed interest of expanding paediatric services. 3.6% of the respondents added additional services in the text box of the questionnaire indicating their interest in other optometric services such as; contact lenses and low vision.

Some barriers can affect the detection of glaucoma. The respondents agreed that some of these barriers can limit their ability to properly diagnose glaucoma. 57.1% of respondents agreed and 14.4% strongly agreed that there is difficulty in monitoring patients since they usually visit different optometric practices, therefore, making it difficult to obtain necessary records over time. 57.1% of respondents agreed and 14.4% also strongly agreed that patients are reluctant to pay the added cost when specific tests are not available during the routine eye exam.

Another important barrier for the detection of glaucoma is that some patients do not return for necessary follow up examinations in which 25% of respondents strongly agreed and 53.6% agreed. It is also important to note 71.4% of respondents agreed and 21.4% strongly agreed that additional guidance to the operation and analysing the results for certain specialised equipment would be helpful in the detection of glaucoma. 63% and 33.3%of respondents disagree and strongly disagree respectively, that they do not have access to education for glaucoma detection indicating that they have the necessary resources to gather information for the proper detection of glaucoma.

CHAPTER

FIVE

5.0 DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 Discussion

The responses for this research represent 15% of the optometrist population in Trinidad and Tobago. The proceeding paragraphs present the categories assessed in this research.

Tonometry

Glaucoma is often associated with high intraocular pressure or IOP which contributes to its progression amidst other factors. Intraocular pressure remains a major target for glaucoma treatment and monitoring, as it is the only factor that can be regulated[4]. Hence, the need for accurate methods of IOP measurement.

Results revealed that NCT is the most available tonometer representing 60.7% of participants whereas Goldmann applanation tonometer represented only 10.7% of tonometers available in practice. 71.4% of participants also chose NCT as their first-choice tonometer while no participants chose Goldmann applanation tonometer as their first choice. One optometrist stated that they do not have any tonometers in practice. Further analysis in chapter proves that the tonometer availability in practices is not influenced by the mode of practice as explained in the analysis.

These results support the findings of previous research from Ireland[1] which reveal that NCT is the most common tonometer used among optometrists. In addition to the similarities, it must be noted that the results of the Ireland[1] study represented 27% of the optometrists in Ireland whereas these results represent 15% of the optometrist in Trinidad and Tobago.

Among both sets of results, Trinidad and Tobago and Ireland, there are some reasons that NCT is the preferred tonometer. When compared to the Goldmann applanation tonometer, the use of the NCT eliminates the need for topical anaesthesia and fluorescein dye while reducing the risk of corneal abrasion or infection[4]. As seen in the results 50% of optometrists perform tonometry for themselves while 50% delegate to other staff members which partially explains the availability of NCT among practices. It must be noted that amidst the benefits of NCT, the Goldmann applanation tonometer is known as the reference standard for IOP measurement because of its reproducibility and accuracy[11]. Centre corneal thickness is a feature that affects different tonometers in varying degrees. Research[11] suggests that the NCT is affected more by central corneal thickness than the Goldmann applanation tonometer. The NCT tends to overestimate IOP when values are high and underestimate the IOP when values are low [11].

Determining the availability and preference of tonometers effectively evaluated the current practice patterns of glaucoma services in Trinidad and Tobago as it relates to IOP measurement. It also provided an understanding of the availability of tonometers for optometrists in Trinidad and Tobago. Therefore, it can be said that the majority of optometrists have access to tonometers to effectively measure IOP.

Howbeit, for optometrists to advance beyond glaucoma detection to diagnosis, treatment, or management there must be a shift in the general acceptance of the Goldmann applanation tonometer as the gold standard of IOP measurement.

Fundus Evaluation

In glaucoma diagnosis and monitoring the optic disc evaluation is essential as it is the sight of glaucomatous cupping. Results revealed that direct ophthalmoscopy is the most favoured method for fundus examination by 75% optometrist while binocular indirect ophthalmoscopy using a volk lens and a slit lamp is preferred by 21.43% and fundus photo by 3.57%. A binary logistic regression was done to determine if the preference of the fundus examination technique was influenced by the mode of practice or the length of time for an appointment. However, neither of these factors affected the choice of fundus evaluation.

Despite the results, indirect ophthalmoscopy is more sensitive for fundus evaluation. This is because it provides a stereoscopic view allowing for a more accurate assessment of the cup-to-disc ratio[12] and the image produced is less influenced by the patients prescription[1]. Studies suggest that indirect ophthalmoscopy tends to overestimate the cup-to-disc ratio and it is advised to take stereoscopic photos of the optic disc to record glaucoma progression[12].

Similar to the study in Ireland as discussed in the literature review, direct ophthalmoscopy is the most prevalent method of fundus evaluation among optometrists. The research[1] also suggested that optometrists using binocular indirect ophthalmoscopy with slit-lamp had a higher level of false-positive glaucoma referrals. While indirect ophthalmoscopy is a sensitive test it does not guarantee the detection of glaucoma.

Another factor to consider is the optometrist competence in fundus evaluation techniques seen in table 2 in the results. The optometrist had the highest confidence level in direct ophthalmoscopy when compared to indirect ophthalmoscopy methods.

High levels of competence in indirect ophthalmoscopy techniques should be deemed essential for any advancement in the optometrist scope relating to glaucoma.

Assessing the optometrists' choice method for fundus examination effectively evaluated on the aspect of the current practice patterns of glaucoma services in Trinidad and Tobago. In addition, the ability of the optometrists to perform fundus examination using the necessary equipment were assessed.

Automated Perimetry

Glaucoma progression is also associated with visual field loss, hence the need for visual field monitoring in confirmed or suspected glaucoma cases. Only 32.1% of optometrists had automated perimeters in the practice. The Humphery Visual Analyser is the brand of automated perimeter available to optometrists however, the model was not stated. This finding contrasted with research from Ireland[1] where automated perimeters were available to 87% of optometrists. Practical reasons that may contribute to the lack of automated perimeters include the cost of this equipment and added time required for testing.

The lack of availability of the automated perimeter can affect one's ability to diagnose or monitor glaucoma. This can restrict the scope of optometrist roles as patient's requiring further would have to be referred. There is a need to increase the availability of automated perimeters in practice to properly diagnose or monitor glaucoma cases.

The Use of Specialised Equipment

Based on the results obtained from the data acquired through the questionnaire, the majority of the respondents have some type of specialised equipment in their optometric practice. The main type of specialised equipment available in the practices was optical coherence tomography (OCT) and digital fundus photography in which 75% of respondents stated were available.

The OCT is capable of detecting the early stage of glaucoma by evaluation of the optic nerve through quantitative measures of both the peripapillary retinal nerve fibre layer and the optic nerve head[6]. It is also important to note that vitreous traction, axial length and other ocular pathologies can affect results and lead to misdiagnosis[6]. The OCT is beneficial in detecting early glaucoma in which a study was published in 2014[7] that demonstrates that the OCT screening in African American communities minimized the prevalence of severe vision loss related to glaucoma and also lowered the prevalence of undiagnosed glaucoma.

25% of respondents indicated that they have the gonioscopy lens in their practice. This lens can determine if the angle between the cornea and iris is open or closed by analysing the structures of the anterior chamber angle[8]. The use of the gonioscopy lens in practice allows the examiner to determine the type of glaucoma based on what is seen when viewing the anterior chamber angle and it is an essential test that is done during a glaucoma evaluation for an accurate diagnosis. Other respondents also indicated that they have access to the digital slit lamp camera, 18.8% of respondents and the ultrasound pachymeter, 12.5% of respondents.

To accurately diagnose, manage and monitor glaucoma patients some of the optometrists may need to expand their inventory of specialised equipment such as access to the gonioscopy lens to perform a comprehensive glaucoma eye examination.

It is also important to note that when asked if extra guidance in the operation and analysing of certain equipment would be helpful for the detection of glaucoma, the majority of the respondents agreed that the additional guidance to equipment such as the OCT would be helpful.

Enhanced Glaucoma Services

The majority of respondents, 96.4%, indicated an interest in providing enhanced optometric services for glaucoma and only 1 respondent, 3.6%, did not think there is a need to enhance glaucoma services. Most of the respondents showed interest in monitoring stable glaucoma patients, providing repeated tests for suspected cases and monitoring glaucoma suspects including ocular hypertension. Some respondents also indicated providing medical management for glaucoma patients. Most respondents agreed that advanced education would be necessary for monitoring glaucoma patients as well as suspects and the medical management of glaucoma patients.

Care pathways for referral refinement have been proven effective in reducing the amount of false-positive referrals[9,10]. It is shown that the three main parameters that need to be performed for the referral are intraocular pressure, optic disc assessment and visual field testing[10]. The measurements for intraocular pressure and visual field testing are repeated to increase the referral's positive predictive value, therefore, increasing true-positive referral for glaucoma[10]. The development of hospital-based shared care services with trained optometrists was also proven effective when dealing with an overwhelming amount of glaucoma patients[11]. The trained optometrists were working with a specific worksheet dedicated to the glaucoma assessment where information about the patients' case was represented[11].

For enhanced glaucoma services to be successfully incorporated, the optometrists and ophthalmologists working in Trinidad and Tobago may need to communicate on the appropriate strategies required for smooth monitoring and management of glaucoma patients as well as suspects. This would help adapt proper management as the optometrists would be in contact with the ophthalmologist for appropriate monitoring and management of the glaucoma patients.

5.2 Conclusion

In this research the topic addressed is current practice patterns and attitudes towards enhanced glaucoma services in Trinidad and Tobago.

28 optometrists participated in the questionnaire. This research showed that 96.4% of optometrist have a tonometer available in practice. NCT was the most common and preferred tonometer (60.7%). Direct ophthalmoscopy (75%) was the preferred method of fundus evaluation when compared to binocular indirect ophthalmoscopy using a slit lamp and fundus photography. Participants were also the most confident in direct ophthalmoscopy and least confident in binocular indirect ophthalmoscopy with a condensing lens. Concerning perimetry, only 32.1% of optometrists had access to automated perimeters and the majority had access to specialist equipment in varying degrees. 27 of the 28 optometrists were interested in the enhancement of the optometry practice in different ways.

The four objects and the aim (CHAPTER ONE) of this study were addressed. It can therefore be concluded that the majority of optometrists in Trinidad and Tobago have the necessary equipment to measure IOP and to evaluate the fundus but they lack the equipment to test the visual field.

There is still room for advancement in the availability of equipment for proper detection of glaucoma and hence the enhancement of glaucoma services in Trinidad and Tobago. They expressed interest in providing enhanced optometric services for glaucoma and other conditions but there is a need for advanced education. Overall, there is a desire to increase the scope of optometry.

5.3 Recommendation

- Annual career advancement conferences should be held locally to enlighten optometrists on the need for further education and the available routes they can use to acquire it.

- Government subsidies or specific loans should be made available to encourage optometrists to purchase necessary equipment.

- Specific skills for glaucoma diagnosis should be a prerequisite to employment in optometry positions. Eg: Binocular indirect ophthalmoscopy

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APPENDICES

APPENDIX 1

QUESTIONNAIRE USED FOR DATA COLLECTION

Current practice patterns for glaucoma detection in Trinidad and Tobago and attitudes towards enhancement of glaucoma services.

This online questionnaire is being distributed in support of a research project conducted by Year 3 Optometry students at the University of the West Indies. The purpose of this research project is to investigate the opportunity to enhance the treatment of glaucoma in Trinidad and Tobago by analyzing the optometric equipment and methods used by optometrists in the diagnosis of glaucoma and their attitudes towards the enhancement of glaucoma services. There is minimum risk involved in participating in this study since all the information collected would be anonymous and no personal identification information would be collected. Participants required in this survey are only licensed optometrists working in Trinidad and Tobago. You only have to answer this questionnaire once and it is important to note that your participation in this research project is completely voluntary and you can withdraw from participation at any time. It should also be noted there is neither compensation nor payments for responses for this questionnaire. You would be giving consent by ticking the box below to continue with the questionnaire.

□ I consent to participate in this research study.

□ I do not consent to participate in this study.

The questionnaire should take approximately 10-15 minutes to complete. Read the questions carefully and answer to the best of your ability. All the information gathered would be anonymous and confidential. Thank you for taking the time to participate in this research study. For further information concerning this survey you can email us at amelia.nanansingh@my.uwi.edu.

1. What is your age group:

□21 – 30 □30 – 40 □40 – 50 □50 – 60 □60 – 70 □ >70

2. Gender:

□Male □Female

3. What is your current mode of practice? (choose where you spend the ***majority*** of your week)

□Optometrist in a 'multiple' (E.g more than 2 branches)

□Non owner optometrist is an independent private practice

□Self-employed optometrist owner in an independent private practice

□Locum optometrist

□Academic

□Other (specify)

4. How long is your appointment slot for a routine eye examination?

□15minutes □20minutes □25minutes □30minutes

□45minutes □1 hour □other (specify)

5. Which tonometer/s do you have in the practice?(You can select more than one)

□Goldmann applanation tonometer

□Perkins applanation tonometer

□Table mounted non-contact tonometer

□iCare rebound tonometer

□Pulsair handheld tonometer

□Schiotz tonometer

□Tonopen

□None

□Other (specify)

6. Which tonometer is your first choice during a routine eye examination?

□Goldmann applanation tonometer

□Perkins applanation tonometer

□Table mounted non-contact tonometer

□iCare rebound tonometer

□Pulsair handheld tonometer

□Schiotz tonometer

□Tonopen

□None

□Other (specify)

7. How often do you use each tonometer in the practice? (E.g I use Non-contact tonometer 70% of the time, Goldmann applanation 20% and iCare rebound 10 %.)

iCare rebound tonometer-

Table mounted non-contact tonometer-

Goldmann applanation tonometer-

Perkins applanation tonometer-

Pulsair handheld tonometer-

Schiotz tonometer-

Tonopen-

Other-

8. Do you carry out tonometry yourself in the practice or does another member of staff do it?

□I carry out the tonometry

□Another member of staff carry out the tonometry

9. Which of the following techniques is your first choice to examine the fundus during a routine eye exam?

□Direct ophthalmoscopy

□Binocular indirect ophthalmoscopy using a volk lens and slit lamp □Binocular indirect ophthalmoscopy using a condensing lens and headset

□Fundus photography

□Other (specify)

10. How confident are you when performing direct ophthalmoscopy? Select from a scale of 1-5, with 1 being unable to perform the procedure and 5 being very competent when performing the procedure.

□ 1 □ 2 □ 3 □ 4 □ 5

11. How confident are you when performing Binocular indirect ophthalmoscopy using a volk lens and slit lamp? Select from a scale of 1-5, with 1 being unable to perform the procedure and 5 being very competent when performing the procedure.

□ 1 □ 2 □ 3 □ 4 □ 5

12. How confident are you when performing Binocular indirect ophthalmoscopy using a condensing lens and headset? Select from a scale of 1-5, with 1 being unable to perform the procedure and 5 being very competent when performing the procedure.

□ 1 □ 2 □ 3 □ 4 □ 5

13.Do you have an automated perimeter in the practice?

□Yes □No

14. If yes please indicate the type/brand-

15. Do you have access to any of the following specialist equipment in the practice?

□Optical coherence tomography (OCT)

□Digital fundus photography

□Digital slit lamp camera

□GDx (scanning laser polarimetry)

□Gonioscopy lens

□Ultrasound pachymeter

□Pentacam

16. To what extent would you be interested in providing enhanced optometric services for glaucoma? (Select all that apply to you)

□I am interested in providing services to repeat specific tests suspected cases (including Goldmann tonometry, pachymetry, repeat visual field tests)

□I am interested in monitoring glaucoma suspects including ocular hypertension.

□I am interested in monitoring stable glaucoma patients, if any changes are noted these patients would be referred to their ophthalmologist for further treatment.

□I am interested in providing medical management for glaucoma patients.

□I do not think there is any need to enhance the services since it already works well.

17. What is your suggested cost ($TTD) for each appointment for patients requiring repetition of specific test? (Eg: $ 100)

18. What is your suggested cost ($TTD) for each appointment for services based on monitoring ocular hypertension and glaucoma suspects? (Eg: $100)

19. What is your suggested cost ($TTD) for each appointment for shared management of stable glaucoma cases? (Eg: $100)

20. What is your suggested cost ($TTD) for each appointment for the medical management of glaucoma a patient? (Eg: $100)

21. Do you think advanced education is necessary for optometrist inclusion in enhanced glaucoma services? (Monitoring of stable glaucoma patients and glaucoma suspects)

□Yes □No

22. Do you think advanced education is necessary for medical management of glaucoma patients?

□Yes □No

23. Are you interested in any specific area for enhanced optometric services? (Select all that apply to you).

□Pre/post-operative cataract services

□Hospital optometry positions

□Co-management care for diabetic retinopathy

□Independent prescribing

□Expanding paediatric services

□Other (specify)

24. It is difficult to perform repeated tests because of the limited amount of time available during the eye exam.

□Strongly disagree □Disagree □Agree □Strongly agree

□Does not affect my ability to detect glaucoma

25. It is difficult to perform additional tests because of the limited amount of time available during the eye exam.

□Strongly disagree □Disagree □Agree □Strongly agree

□Does not affect my ability to detect glaucoma

26.It is not financially feasible to acquire specialist equipment.

□Strongly disagree □Disagree □Agree □Strongly agree

□Does not affect my ability to detect glaucoma

27.It is not financially feasible to book patients for repeat testing services.

□Strongly disagree □Disagree □Agree □Strongly agree

□Does not affect my ability to detect glaucoma

28. Insufficient equipment in the work place confines my ability to provide a comprehensive glaucoma exam.

□Strongly disagree □Disagree □Agree □Strongly agree

□Does not affect my ability to detect glaucoma

29.Patients fail to return for necessary follow up eye examinations because they may not view the eye exam as imperative.

□Strongly disagree □Disagree □Agree □Strongly agree

□Does not affect my ability to detect glaucoma

30.Specific glaucoma tests are not available during a routine eye exam and some patients are reluctant to pay the added cost.

□Strongly disagree □Disagree □Agree □Strongly agree

□Does not affect my ability to detect glaucoma

31.It is difficult to monitor patients over time based on their records as they tend visit various practices.

□Strongly disagree □Disagree □Agree □Strongly agree

□Does not affect my ability to detect glaucoma

32. Extra guidance would be useful in the operation of certain equipment and analysing of results. E.g OCT.

□Strongly disagree □Disagree □Agree □Strongly agree

□Does not affect my ability to detect glaucoma

33. I don’t have access to education of glaucoma detection.

□Strongly disagree □Disagree □Agree □Strongly agree

□Does not affect my ability to detect glaucoma

APPENDIX 2

CONSENT FORM FROM ETHICAL APPROVAL APPLICATION

THE UNIVERSITY OF THE WEST INDIES
ST. AUGUSTINE, TRINIDAD AND TOBAGO, WEST INDIES
CAMPUS RESEARCH ETHICS COMMITTEE
TELEPHONE: (1-868) 662-2002 ext. 82755 E-mail: campusethics@sta.uwi.edu

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CONSENT TO PARTICIPATE IN RESEARCH

Complete Protocol Title: Current practice patterns and attitudes to enhanced glaucoma services in Trinidad and Tobago.

Principal Investigator: Mr Niall Farnon

Co Investigator(s): Amelia Nanansingh, Vanessa Lara, ...

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1. Identification of project

a. What is the purpose of this research?
The purpose of this research is to investigate the opportunity to enhance the treatment of glaucoma in Trinidad and Tobago by analyzing the optometric equipment and methods used by optometrists in the diagnosis of glaucoma in Trinidad and Tobago and their attitudes towards advancement in glaucoma services.

b. How long it will take to complete this project?
The proposed timeframe is three months to complete this project.

c. Why am I selected for this research?
You are selected because you are a licensed optometrist working in Trinidad and Tobago and we would like to get your views on this topic.

d. Why is this document for obtaining informed consent important?
It is important because consent to this study is voluntary and you have the right to withdraw at any time.

2. Description of Procedures

a. What am I expected to do in this study?
Read the questions carefully, and answer them to the best of your ability.

b. Which procedures are investigational, which are routine? What is the expected duration, how frequently I have to participate and where will the activities take place?
The questionnaire is only required to be filled in once and will only take 10-15 minutes to complete.

c. How many participants are involved in the study approximately?
186 participants approximately are involved in this study.

3. Risks and Discomforts

a. What are the risks or discomforts that may result from my participation in the study?
There may be a small inconvenience of filling out the questionnaire however this is only required once. Breach of confidentiality is highly unlikely since no personal information will be collected. The data will be stored in a password protected laptop on a password protected file that only the three investigators have access to.

b. What help and treatments are available if any adverse reactions occur? How can I access them? Is there any compensation available if serious adverse effects occur?
It is highly unlikely to have any adverse reactions from filling in the questionnaire.

c. Are there any potentially beneficial treatments or procedures that are withheld for the purpose of the study?
No.

4. Termination of Research

a. Are there any anticipated circumstances under which the study/participation may be terminated by the researchers without regard my consent?
No

5. Benefits

a. What are the benefits to me (and the wider society) by this study?
No compensation is given to participants, however upon completion of this research if change is needed negotiations can be initiated with the Ministry of Health to enhance glaucoma services.

6. Alternatives

a. Does this study involve more than minimal risk? Are there any appropriate alternative procedures or courses of treatment that might be advantageous to me?
No more than minimum risks. There are no alternative procedures.

b. Do I have the right to pursue the alternatives?
Not applicable.

7. Confidentiality

a. How will confidentiality be maintained regarding my data? Who will have access to the data, how the data will be reported and /or published?
The data collected from the questionnaire would be stored in a password protected laptop on a password protected file and only the three investigators will have access to it. The data will be stored for five years and the anonymized results will be part of the final thesis of the research project and may be in a published research paper.

8. Cost and Payments

a. Are there any costs involved and are there any compensations provided?
There will be no cost or compensation in this research study.

9. Freedom to Withdraw

a. Do I have the freedom to withdraw from the study anytime?
Participants reserve the right to withdraw at any time.

b. Will withdrawing from the study have any impact on my treatment?
Not applicable.

10. Opportunity to ask questions

a. Do I have to right to ask questions anytime during the study? Whom should I contact?
Yes participants can ask questions at any time. Contact Amelia Nanansingh using 225-1014. You can also contact a member of the UWI Ethics Committee, Prof. Jerome DeLisle, Chair, Campus Research Ethics, Committee, The UWI, St. Augustine, Email: campusethics@sta.uwi.edu.

CONSENT

I have read and understood this explanation. The researcher has also explained the study to me. I have had a chance to ask questions and have them answered to my satisfaction. I agree to take part in this study. I have not been forced or made to feel like I had to take part.

By signing this document, I agree that I have read and received a copy of this document.

I must sign this Consent Form. I will be given a signed copy of the form to keep.

Print Name of Subject

_____

Signature of Subject Date

INVESTIGATOR'S STATEMENT AND SIGNATURE

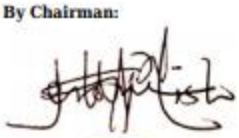
I have explained the purpose of the research, the study procedures, including those that are investigational, the possible risks and discomforts, and the potential benefits, and have answered all questions regarding the study to the best of my ability. In my opinion, the participant understands these issues and has voluntarily agreed to participate in the study.

Signature of Person conducting the informed consent discussion Date

Role of person named above in the research project

Signature of Second Witness Date

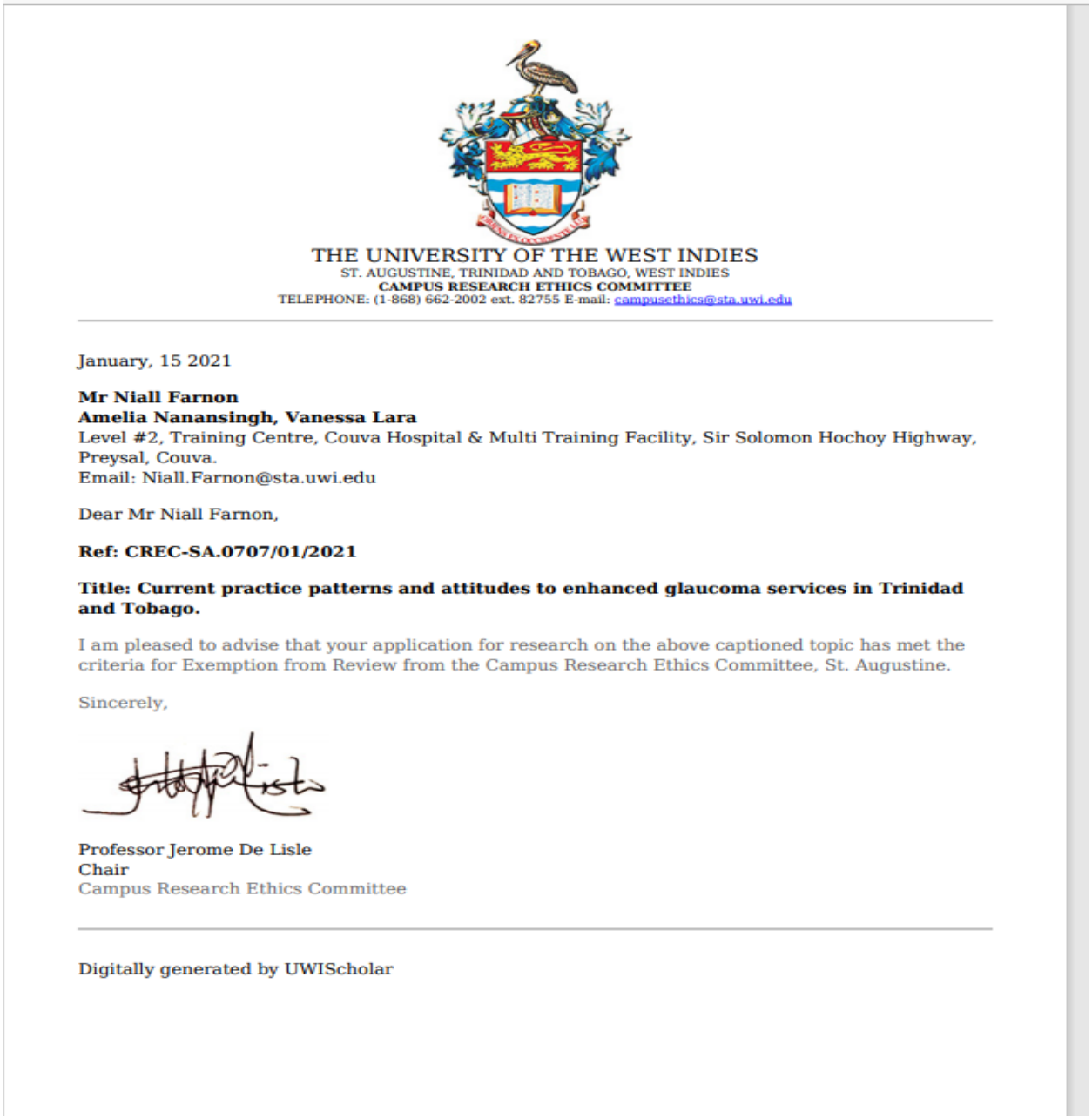
By Chairman:



This document was approved by Campus Ethics Committee on:
January, 15 2021
This document expires on:
January, 15 2022

APPENDIX 3

EXEMPTION LETTER FROM ETHICAL APPROVAL



THE UNIVERSITY OF THE WEST INDIES
ST. AUGUSTINE, TRINIDAD AND TOBAGO, WEST INDIES
CAMPUS RESEARCH ETHICS COMMITTEE
TELEPHONE: (1-868) 662-2002 ext. 82755 E-mail: campusethics@sta.uwi.edu

January, 15 2021

Mr Niall Farnon
Amelia Nanansingh, Vanessa Lara
Level #2, Training Centre, Couva Hospital & Multi Training Facility, Sir Solomon Hochoy Highway, Preysal, Couva.
Email: Niall.Farnon@sta.uwi.edu

Dear Mr Niall Farnon,

Ref: CREC-SA.0707/01/2021

Title: Current practice patterns and attitudes to enhanced glaucoma services in Trinidad and Tobago.

I am pleased to advise that your application for research on the above captioned topic has met the criteria for Exemption from Review from the Campus Research Ethics Committee, St. Augustine.

Sincerely,

Professor Jerome De Lisle
Chair
Campus Research Ethics Committee

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