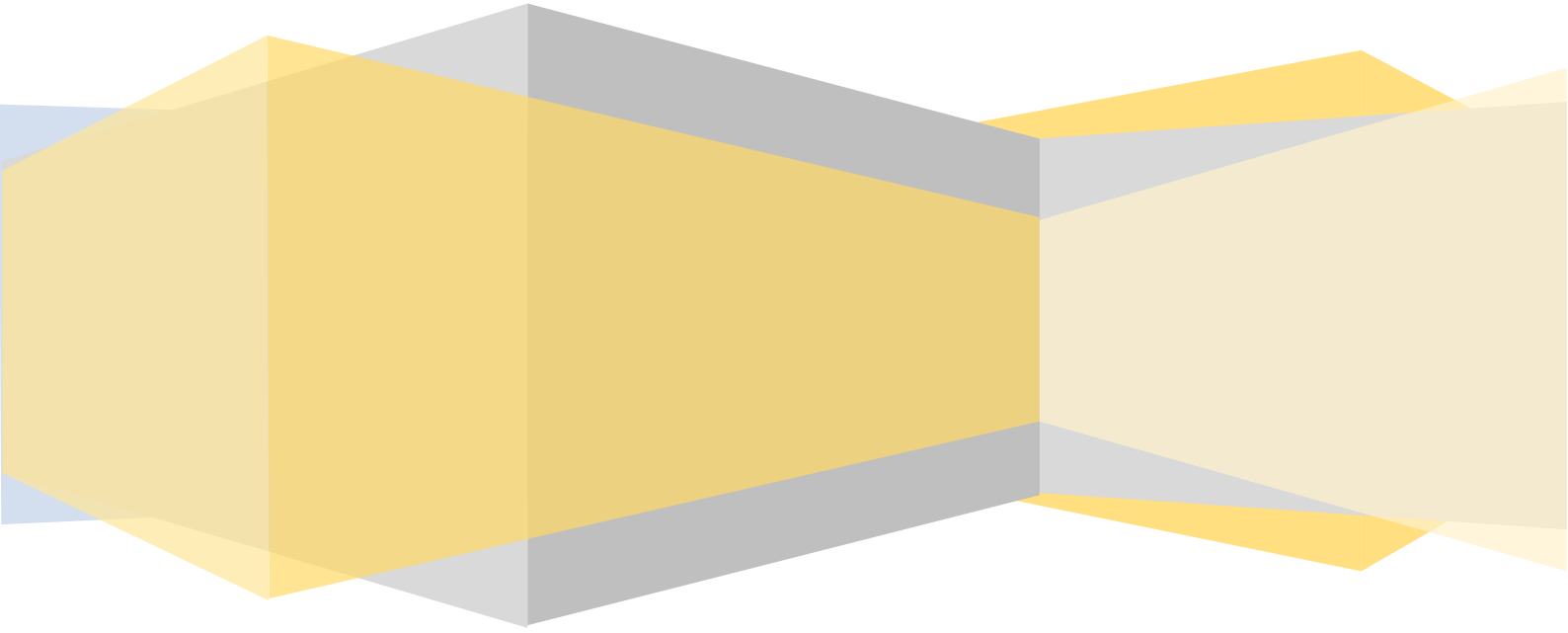
The impact of a SIGN Guideline: SIGN 144 Glaucoma referral and safe discharge



Acknowledgements

This work was a partnership between the Scottish Intercollegiate Guidelines Network (SIGN) and NHS Education for Scotland (NES) optometry department. The authors of this work are Megan Lanigan, Change Manager, SIGN and Lisa Cowan, Senior Postgraduate Optometry Tutor, NES.

The authors would like to thank a number of people instrumental in achieving this work:

- the authors of the three audits
- members of the subgroup charged with undertaking the three-year scoping of SIGN 144, who supported the identification of the primary data to use in this report
- Gillian Bruce, Hugh Russell and Sarah Florida-James who co-facilitated the SIGN workshop at the 2017 NES optometry conference, and
- everyone who contributed feedback as part of all the data collection.

Published September 2018

www.healthcareimprovementscotland.org

Contents

Executive summary 4

Background 5

Introduction 5

Objective 6

Methods 6

Results 8

Discussion 19

Conclusion 20

Recommendations 21

Abbreviations 23

Annex 1 24

Annex 2 25

References 28

Executive summary

SIGN 144 guideline was the first SIGN guideline specific to eye care and prior to this, awareness of SIGN within the optometry profession in Scotland was limited. The development and implementation of the guideline provided both a challenge and an opportunity: to raise awareness of evidence-based practice within optometry, to promote the use of evidence-based guidelines, and to highlight the importance of their use in clinical practice.

Both a facilitated discussion workshop at the NHS Education for Scotland (NES) annual conference for optometrists, and a survey of optometrists who had completed training provided by NES, found that optometrists responded very positively to both the guideline and the training which supported its implementation. Benefits were reported for patients (further monitoring in community rather than needing referral), for practitioners (improved confidence in clinical decision making) and for services (fewer inappropriate referrals to secondary care services).

Audits of glaucoma referrals in locations around Scotland found evidence of changes in referral practice following the guideline. The resulting reduction in first visit discharge rates for patients referred with glaucoma suggests that referrals are more appropriate since the guideline was published. The audits also looked at the information contained within referrals and found improvements in the areas highlighted in the SIGN guideline (applanation tonometry and visual fields).

It is clear that some aspects of the guideline have been implemented more universally than others. For example, while disc damage likelihood scale (DDLS) assessments have increased, many referrals do not include this information and some of the barriers which may have contributed to this were identified (further training needs and perception that the information is not used by secondary care). It seems reasonable to propose that additional targeted training and education on the implementation of the guideline could lead to further improvements in referral accuracy and patient care, which would be welcomed by the optometry profession, and the wider eye care community.

Overall, the guideline appears to have been accepted as a positive move by the optometry profession and has had a positive impact on patient care.

Lisa Cowan
Senior Postgraduate Optometry Tutor, NES

Background

Recently, Healthcare Improvement Scotland introduced an outcomes planning approach to better understand the impact of its work. As a result, SIGN was tasked with looking at the impact of our guidelines; something we had not done in a systematic way before.

In accordance with the outcomes planning approach, we developed a theory of change for the SIGN programme to provide a framework for evaluation. Around the same time the opportunity arose to evaluate the impact of the SIGN guideline on glaucoma. This report describes the pilot project to evaluate the impact of SIGN 144: Glaucoma referral and safe discharge.

Introduction

Glaucoma was the third most common issue that resulted in a risk of sight loss or blindness in Scotland in 2015 (affecting over 50,000 people in Scotland).[1] It also accounts for 20% of referrals from primary to secondary care.[2]

Referral guidelines for glaucoma were proposed and supported as a SIGN guideline topic in 2011. The reasons behind the proposal were:

1. variation in the accuracy of referrals of patients with suspected glaucoma from the community to secondary-eye-care services
2. to decrease false positive referrals to secondary-eye-care services
3. an expected increase in referrals due to an ageing population, and
4. to help inform development of templates for new electronic referral systems.

The aim of the guideline was to improve referral accuracy and safe discharge for people with glaucoma. This would hopefully lead to a refinement in early identification of people with blinding glaucoma and reduce unnecessary referrals to secondary care.

The development of the guideline began in 2014 and SIGN 144: Glaucoma referral and safe discharge was published in March 2015.[3] The evaluation of impact project began in August 2017.

Objective

The objective was to evaluate the impact on community optometry referrals since publication of SIGN 144: Glaucoma referral and safe discharge.

Methods

This impact assessment pilot was a partnership between SIGN and NES. The methods used in this pilot were iterative rather than planned prospectively as a consequence of taking the opportunity to evaluate the impact of a guideline as it arose. We initially aimed to use an outcomes planning approach for this evaluation. It became clear, however, that some of the data and evidence required along the chain of logic was missing, as the need to collect it as part of this method was introduced after the publication of SIGN 144. Hence, we have also used this pilot to develop a better understanding of what data is needed, and when and how to collect it to support outcome planning and evaluation for future guidelines.

Parallel to this project a small working group of previous SIGN 144 group members was established to oversee a scoping project determining the need to update the guideline. Through this group, we became aware of all of the implementation interventions reported on in this pilot. Figure 1 on page 8 shows the timeline of these interventions in relation to the publication of the guideline.

These were:

- NES training course
- audits, and
- workshop at 2017 NES national optometry conference.

NES training course

The guideline group identified training provision in the use of Spaeth's DDLS as a resource implication of the guideline relevant to implementation. NES subsequently ran 15 training courses in 13 locations between February and October 2016 following the publication of SIGN 144. The course comprised two parts. The first part was a one-hour workshop on pachymetry, allowing attendees the opportunity to practice using a pachymeter to measure corneal thickness and applying this to clinical decision making using example cases. The second part was a 20-minute lecture on how to use the DDLS followed by a 40-minute quiz using stereoscopic disc images and applying DDLS to assess them. Following this, attendees went over their results with an experienced practitioner. Two hundred and ninety-four community optometrists attended this training.

In February 2018, we contacted the course attendees with a set of questions to gain feedback on the impact of the guideline-based training.

Audits

1. Grampian: Referrals to Aberdeen clinic between September and November 2014 and all of September 2016. This clinic services all of the Grampian health board area which includes Aberdeen, Aberdeenshire and Moray. Moray referrals where only included in 2016 data collection.
2. Tayside: Referrals in NHS Tayside between December 2014 and February 2015, April and June 2015 and May and June 2017.
3. Lothian: Referrals to Princess Alexander Eye Pavilion between October and November 2014 and September and October 2016. This clinic services all of the Lothian health board area – Edinburgh, Midlothian and East Lothian, except for West Lothian.

2017 NES annual conference workshop

The aims of the workshop were to:

- evaluate the impact of the SIGN guideline over the last three years
- encourage the use of the SIGN guideline in community practice, and
- get feedback for SIGN around the participants' perspectives of the new evidence identified through the scoping exercise.

The workshop included two presentations and facilitated round-table discussions. During these discussions, we were able to elicit spontaneous qualitative feedback about the impact of the guideline. The conference attendees were all optometrists and chose which workshop to attend during their registration. A small number of workshop attendees were hospital-based optometrists, with the vast majority being community-based optometrists.

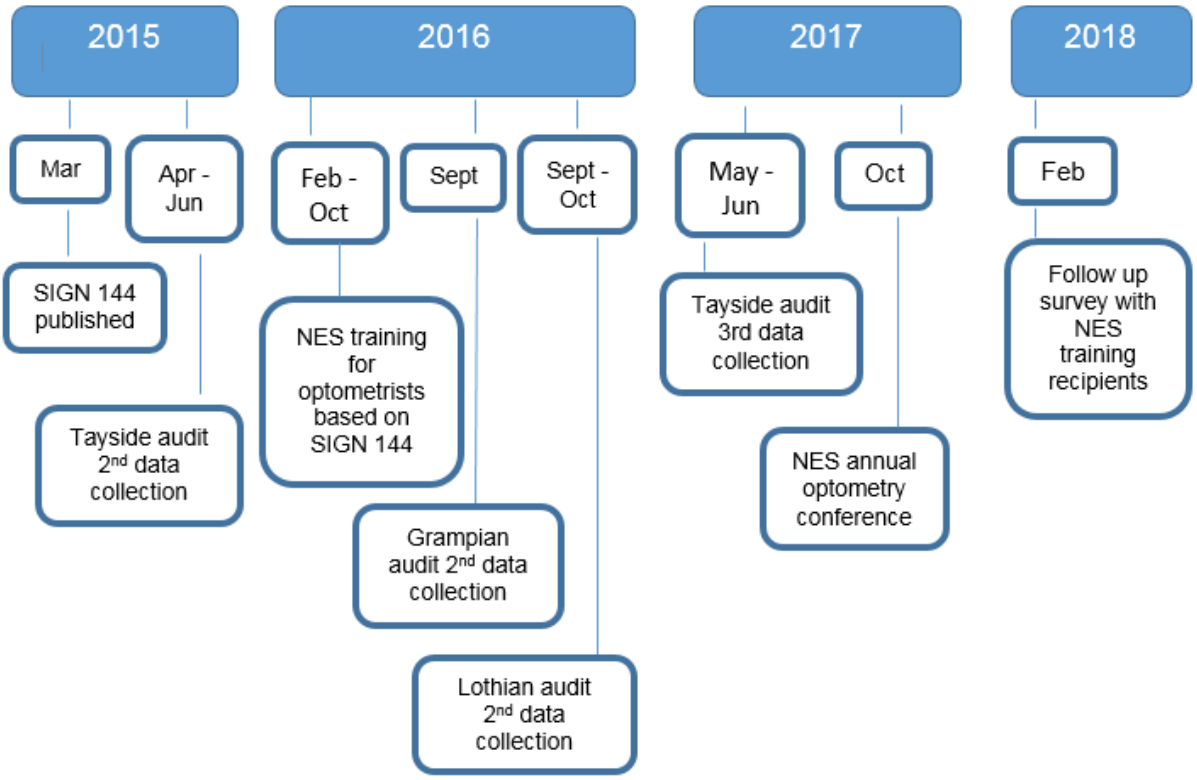


Figure 1: Timeline of SIGN 144 publication and implementation interventions reviewed in this report

Results

The guideline remit included the referral of patients from the community to secondary-eye-care services and the safe discharge of patients from the secondary service back to the community. The data collected from the audits, national conference and training were all related to referrals from community optometrists to secondary care. We were not made aware of any data that related to safe discharges from secondary care to the community.

Over 66,800 copies of SIGN 144 products have been downloaded or distributed in the 21 months since it was published. The products distributed were requested by hospital outpatient departments, GP practices, high street optometrists, a prison, clinical governance teams in all of the NHS territorial boards (except NHS Ayrshire & Arran), as well as NES, Optometry Scotland and private individuals. These downloads and distributions are outlined in Table 1.

Downloads March 15 - Jan 2017						
product	guideline/ pdf	QRG	referral flow chart	disc colour chart	referral letter	patient version
subtotal	37,531	13,295	1,048	1,579	1,276	7,167
Distributed by SIGN March 15 - Jan 17						
subtotal	81	1,319				3,537
Total	**37,612**	**14,614**	**1,048**	**1,579**	**1,276**	**10,704**

Table 1: Downloads and distribution of SIGN 144 products

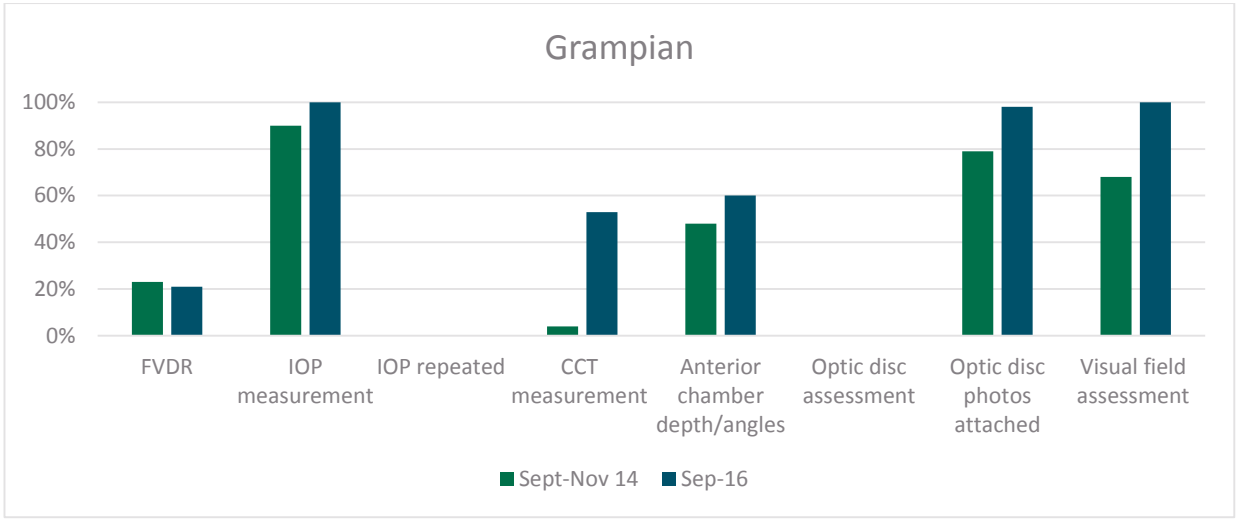
Audits

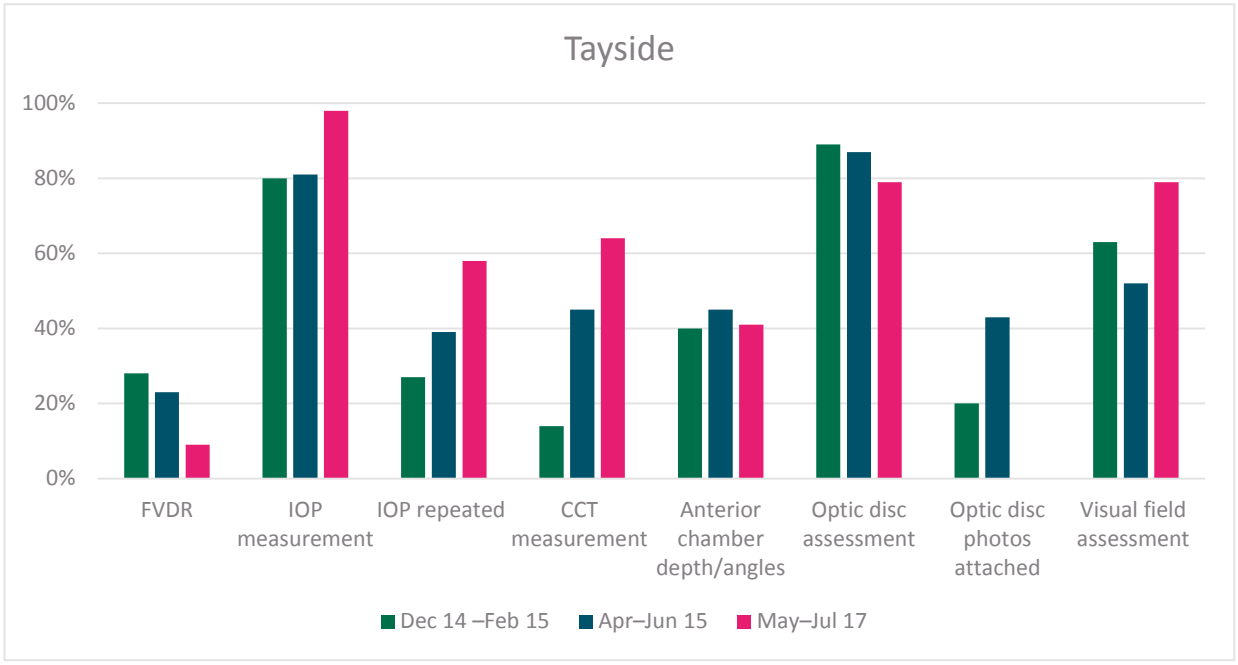
Table 2 shows the link between the guideline and the most commonly collected data items in the three audits we had access to. The table starts with the topic proposal, moving through the guideline development via the key questions and finishing with the support for implementation via the key recommendations and points for audit. All the audits collected different sets of data. SIGN 50: A guideline developer's handbook acknowledges that teams implementing a guideline may only identify certain key recommendations for prioritisation.[4]

We have only reported on those data items mostly consistent across the three audits. For a copy of each audit report please see the SIGN website. The summary of the consistent data items collected by the three audits is shown in Figure 2.

Stage	Aim	Details						
Proposal	The proposal for the guideline set out two main aims.	1) To decrease variation in the accuracy of referrals of patients with suspected glaucoma from the community to secondary-eye-care services.						2) To decrease false positive referrals to secondary-eye-care services.
Key Questions (These inform the systematic literature review of available evidence and the guideline is based on them)	Five of the seven key questions related to how specific assessment techniques, parameters, measurement and reporting might be associated with referral accuracy.	KQ 1) Optic disc assessment techniques and parameters		KQ 2) Intraocular pressure (IOP) assessment techniques	KQ 4) Visual field assessment techniques	KQ 3) Central corneal thickness (CCT) measurement and reporting when provided with IOP	KQ 5) Angle width measurement and reporting	
Key Recommendations (Identified by the guideline group as priorities for implementation)	Two key recommendations and two good practice points related to referral accuracy.	Recommendation relating to recording the narrowest rim/disc ratio and disc size in referrals	Good practice point related to optic disc parameters and whether to refer	Recommendation related to IOP measurement	Good practice point related to visual field tests			
Recommended audit items (Identified by the guideline group)	Two of these related to the good practice points and recommendations listed in the Key Recommendations.	The proportion of referrals from community optometrists to secondary-eye-care services with complete information on IOP, visual fields and optic nerve head assessment						The proportion of false positive glaucoma referrals/ overall referral accuracy
Consistent audit items	These are the data items mostly consistent across all three audits.	Optic disc photos attached to referral		IOP measurement recorded in referral	Visual field assessment included in referral	CCT measurement recorded in referral	Assessment of anterior chamber depth/angles recorded in referral	First visit discharge rates

Table 2: Mapping of guideline development and implementation stages and items for audit





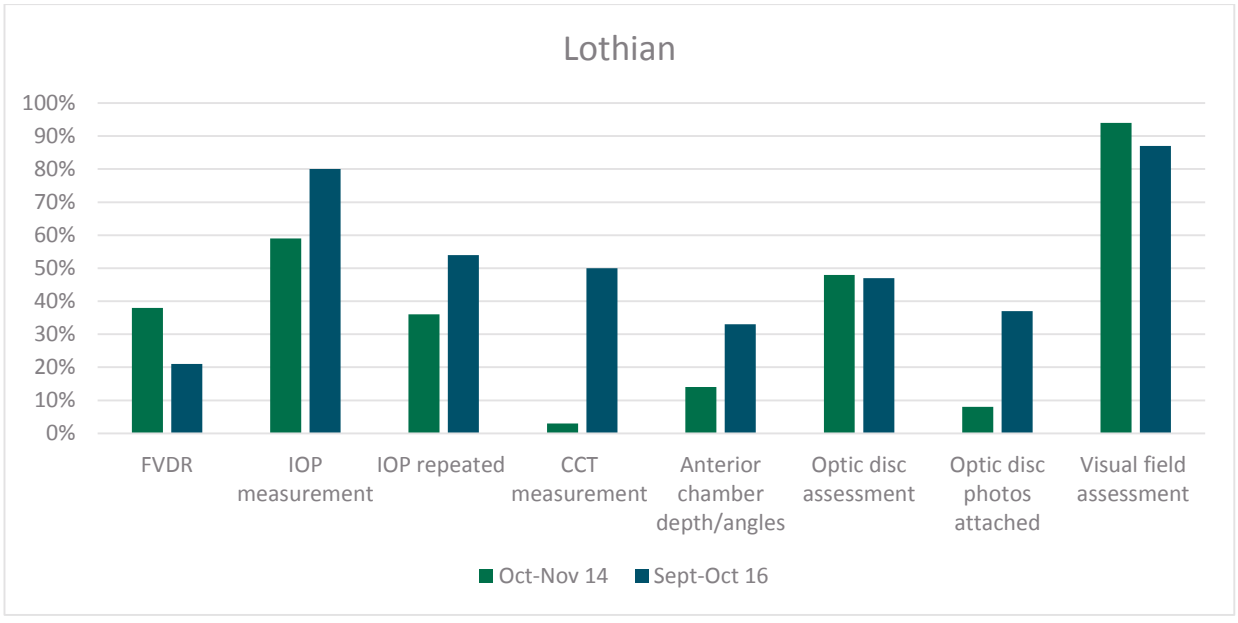


Figure 2: Results of most consistent data items collect in all three audits

All of the audits reported improvements across a range of data items, with a reduction in first visit discharge rates and an increase in recommended parameters measured.[5, 6, 7]

The results of the audits were presented at various meetings. The Tayside audit was discussed at their area optometric committee between the second and third data collection points. The Grampian audit was discussed at their eye health network meeting, which is for community optometrists, between the first and second rounds of data collection and then at the Scottish ophthalmological club (SOC) meeting after the second round of data collection. They also plan to report back to the eye health network meeting now the second round of data collection is complete. The Lothian audit was reported at the conclusion of the audit at a postgraduate meeting at Princess Alexandra Eye Pavilion and at a SOC meeting. The SOC meetings are a mixed audience which includes some hospital and community optometrists.

We were not aware of any audits undertaken by community optometrists to audit their own referral patterns. Anecdotal feedback from community optometrists themselves indicate this could be due to the fact that regular audit in this community is not common and experience of undertaking them may be limited.

National optometry conference

There were two questions posed in the round-table discussions at the national conference workshop. Seventy-six conference attendees were at the workshop:

1. How has the SIGN guideline improved patient care?

Attendees (n=70) reported there were three main ways the SIGN guideline has improved patient care:

- referrals
- decision making, and
- patient management.

They reported that referrals were more appropriate and contained more detail. They felt more confident in their decision making and more confident and more able to manage patients in primary care, rather than referring to secondary care.

2. How has the SIGN guideline affected/impacted your practice?

Responses (n=70) to this question indicated there was one main impact the SIGN guideline has had on their practice, which was to improve referrals by, for example, helping to create a fuller clinical picture and making people think more about their referral decisions.

> *'Easier clinical decision making especially for borderline patients'*
>
> *'Improved information contained in referrals to help secondary care'*
>
> *'Improved confidence in management'*

A further question was asked as part of the NES conference feedback form.

3. Has your knowledge/understanding of SIGN improved as a result of the workshop, if so how?

Of the 57 respondents, 79% reported their knowledge and understanding of SIGN had improved as a result of the workshop. Thirty respondents provided usable examples of how their knowledge or understanding had improved, which included:

- Increased knowledge related to:
  - The guideline and its content = 15
  - The topic more broadly and specific aspects such as a particular assessment or interpretation of results = 6
  - A general refresh = 5

  'Clarification of how to best use the guidelines'

  'Clarification on angle assessment and interpretation'

  'Refreshed my knowledge'

- Increased confidence in applying the guideline = 4

  'I was reassured of format required for record keeping and increased my confidence in appropriate referrals'

  'More confident in using SIGN'

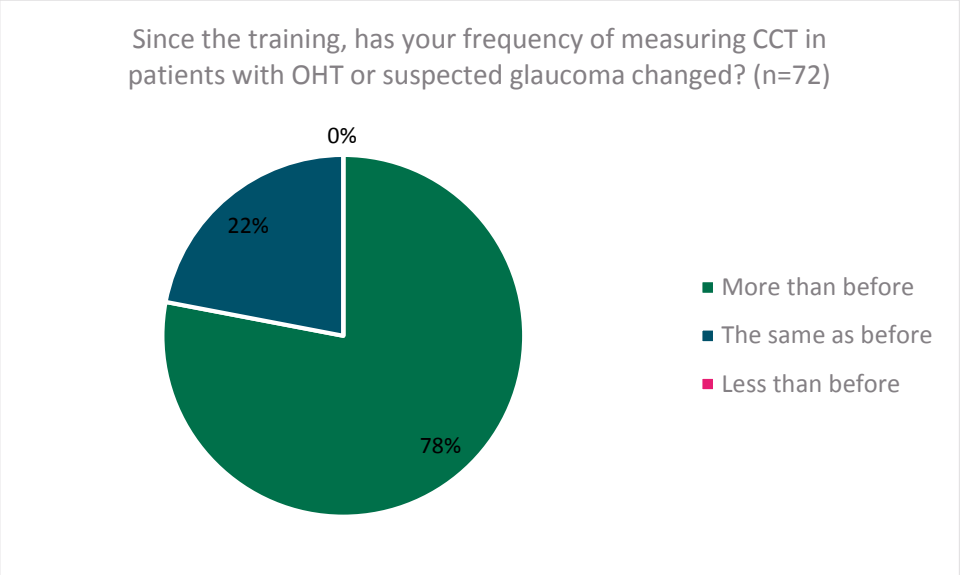
NES training course

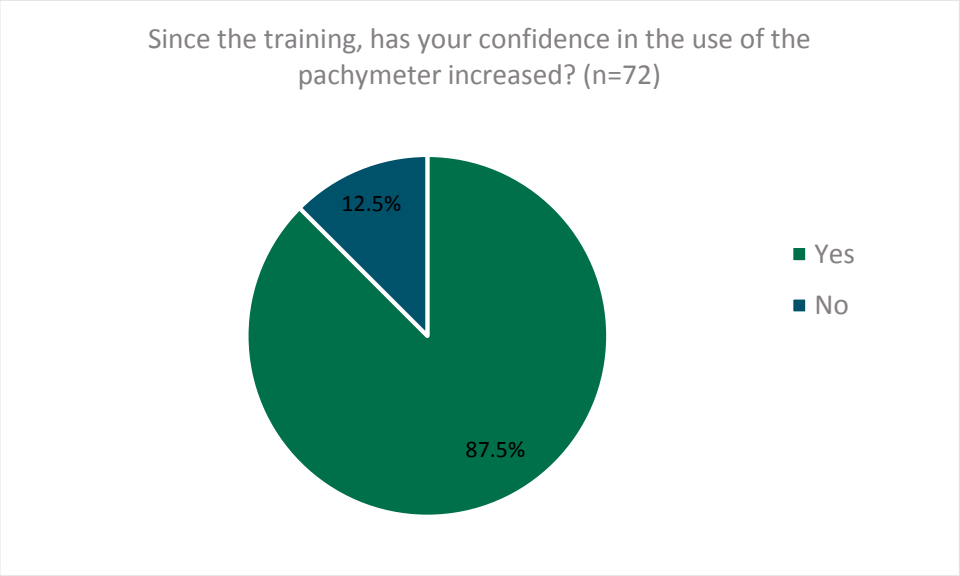
We received 72 responses to the survey sent to the 294 attendees of the 2016 NES training, a response rate of 24%.

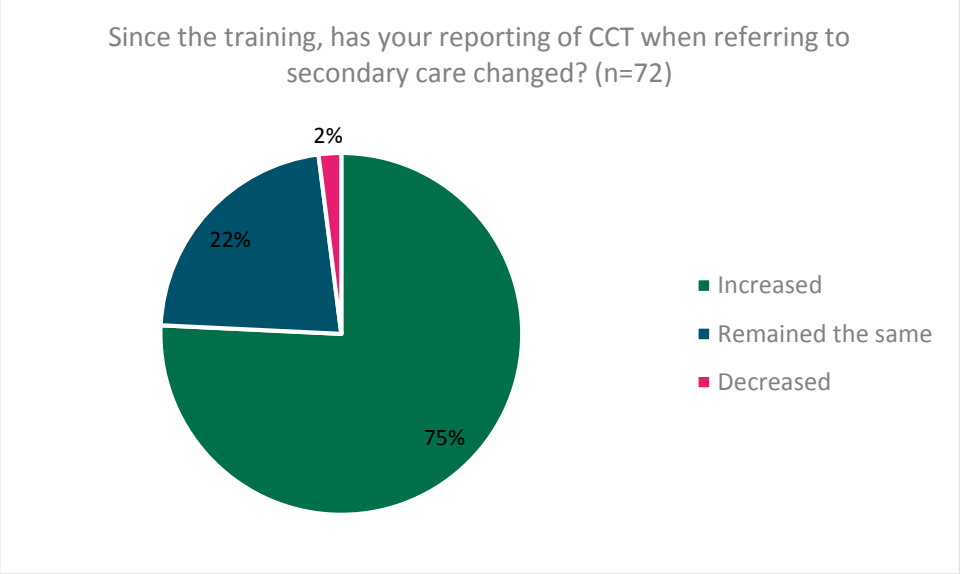
There was a mix of fixed-option and free text questions. The results are presented in three sections:

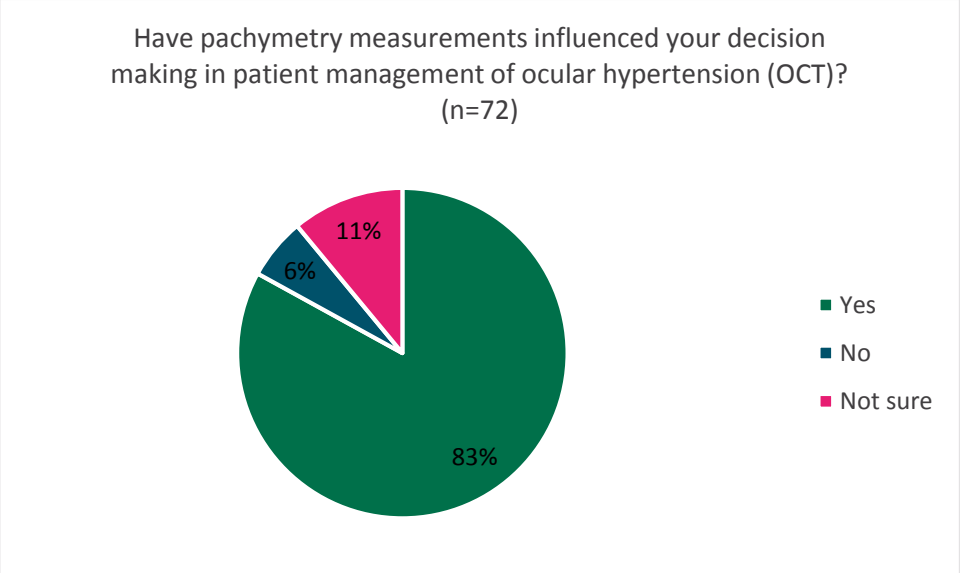
1. Measuring central corneal thickness
2. Measuring the disc
3. Impact of training

Measuring central corneal thickness









If yes, how has (pachymetry) influenced your decision making? (n=52; free text response)

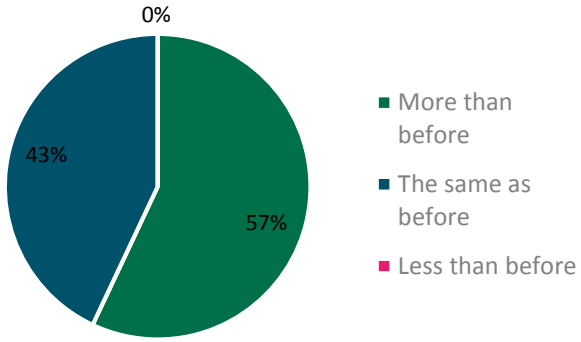
All of the responses to this question commented on the ways that pachymetry (a technique to measure CCT) had positively influenced decision making. There were no negative comments. The majority of feedback related to increased confidence and reassurance to keep patients with higher CCT in practice, who may previously have been referred.

A smaller group mentioned having a lower threshold for referring patients with low CCT.

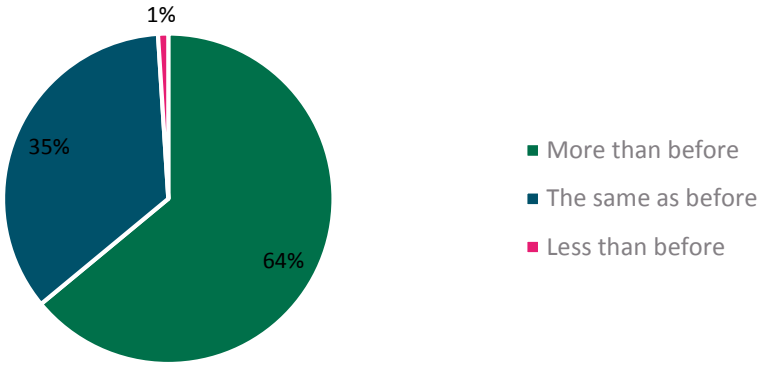
> *'more confident monitoring patient with high IOPs'*
>
> *'more confident in making accurate referrals'*
>
> *'less likely to refer borderline cases'*

Measuring the disc

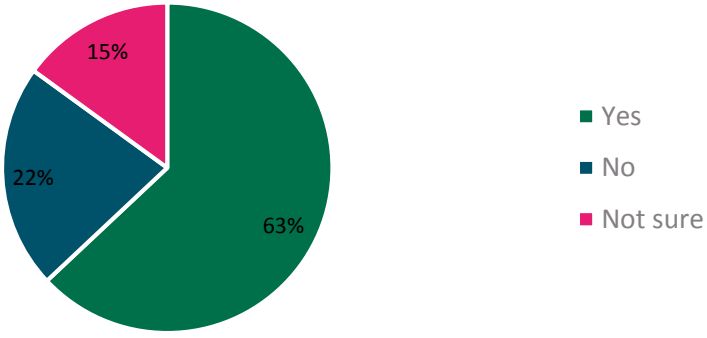
Since the training has the frequency that you measure optic disc size changed? (n=72)



Since the training has the frequency that you measure the narrowest disc rim:disc ratio (ie, assess DDLS grade) in OHT or suspect glaucoma changed? (n=72)



Have DDLS/optic disc size measurements influenced your decision making in patient management of suspect glaucoma and ocular hypertension? (n=72)



If yes, how does DDLS/disc size influence your decision making? (n=50; free text response)

Of the 50 responses to this question, the majority commented about it aiding decision making, being more suspicious of small discs, and improving referral quality.

> *'Have referred more at risk smaller discs'*
>
> *'It has helped me to manage the patient, ie whether they need onward referral or continued to be monitored in the community'*
>
> *'…concentrates observation on the rim rather than the disc as a whole'*

However, some respondents noted remaining doubts and challenges.

> *'I am still not too confident on relying solely on DDLS/disc size'*
>
> *'Unfortunately, the slit lamp in the practice where I work does not have any facility to measure the disc height making accurate DDLS impossible'*
>
> *'Find it confusing and difficult to put into practice.'*

Impact of training

What has been the impact on your practice of the training? (n=56; free text response)

The majority of comments were very positive, with the main themes being:

- improved referral quality
- improved decision making in glaucoma cases, and
- retention of patients in the community who would previously have been referred.

> *'Increased confidence in referring and monitoring'*
>
> *'Referring/ not referring with more confidence.'*
>
> *'I feel more confident in my decision making and management of the patient'*

A couple of comments highlighted a slight tension between spectacle sales and best clinical practice. Following the guidelines can take more supplementary appointments which, for community optometrists, while funded for the appointment, do not generally generate sales of spectacles. An increasing level of supplementary (follow up) appointments can be seen as having a negative commercial impact on a practice.

> *'I feel we're providing patients with a better service. However, it does increase the amount of supplementary appointments in the diary which annoys Managers trying to make money! This is where diary management is important.'*

What has been the impact on your patients of the training? (n=55; free text response)

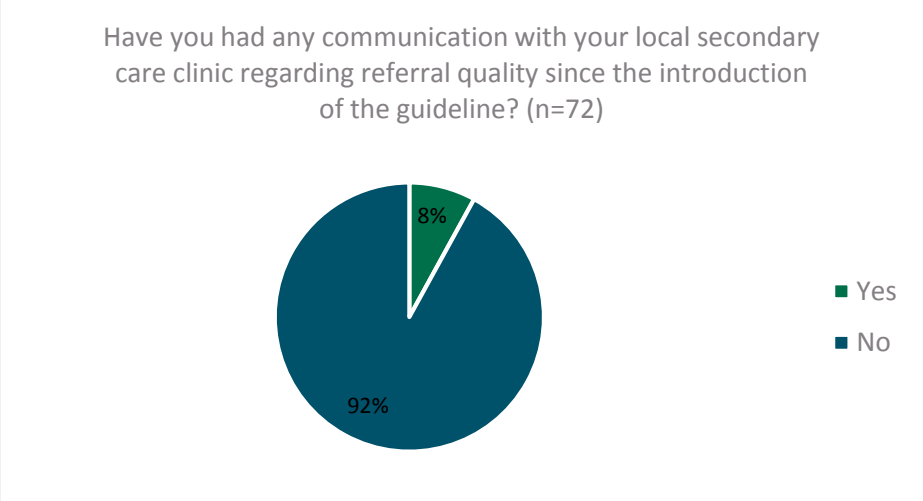
Some of the responses to this questions were similar themes to previous free text responses such as improved referral quality, leading to less unnecessary referrals, and acknowledging both the patient anxiety and cost/resource implications of unnecessary referrals.

There was also some mention of an improved level of care for those retained in optometric practice due to better understanding of the conditions and being able to provide explanations to patients.

> *'Patients are much happier to be monitored in the community, less travel - more convenient.'*
>
> *'I feel I am more likely to detect early glaucomatous changes'*
>
> *'Better understanding of why their IOPs are elevated and how we manage these situations'*
>
> *'I have had no falsely referred patients that I am aware of since this training and I feel with the guidelines to adhere to they benefit from confident decisions whether to refer or not to a specialist.'*

A few were unsure or did not feel that there had been much/any impact, but did not elaborate further.

Communication with secondary care



When asked if they had any other comments 28 replied. These comments mostly echoed previous topics raised in other questions about requests for follow up, refresher training and requests for training on gonioscopy (used to assess anterior chamber angle). The guideline recommended either the Van Herick method or gonioscopy to assess anterior chamber angle. Gonioscopy is not practiced by all community optometrists and requires specialist equipment and experience to interpret the results. The inclusion of it in a SIGN recommendation, as an option for assessment, provided the platform for more conversations about its use.

Gonioscopy use would increase the optometrist's skills, enhance service provision and provide additional detail for assessment and diagnosis.

Discussion

Improving the accuracy of referrals and decreasing first visit discharge rates (FVDR) were two of the four aims for SIGN 144. It appears from the audit data that there has been an improvement in the completeness of referrals from community optometrist to secondary care and a decrease in the number of FVDR since the introduction of the guideline.

Some locations already had referrals with higher rates of completeness and thus the improvements were minimal compared to those that started with referrals of varying or lower rates of completeness.

Three quarters of the training survey respondents reported they had increased their measurement and reporting of CCT. The inclusion of CCT measurement in the referral was also one of the components that showed the most improvement across all three audits. However, despite this improvement and reported change, the inclusion of this measurement in the referral is still only occurring for 50–64% of patients. It is unclear why this measurement, whilst improved, is still not routinely included in referrals and if there might be any barriers to this.

The main challenge when reviewing the audit data was the variability of data items collected by the three sites. If there was a co-ordinated and standardised approach to this data collection, it could lead to more data being available and more reliable information to review.

Further improvement could still be achieved regarding the level of referral completeness. For those that have not already done so we would encourage communication between hospital clinics and their local community optometrist to discuss where the improvements are needed, based on the audit outcomes.

The positive signs of impact evidenced in the audit data, as well as the areas for further improvement, were reflected in the conclusions by the audit authors.

The conference and training data both showed community optometrists reporting increased confidence in their decision making and patient management since the introduction of the guideline and related training. They were more confident about which patients to refer to secondary care and which to manage themselves. They also reported they felt their referrals had improved.

The training course data also showed that since the guideline-based training, respondents have increased their measurement and reporting.

The feedback from the training course attendees was helpful in targeting future training in the areas of:

- alternative strategies where equipment does not allow for disc height measurement
- clarifying the purpose of DDLS (such as to give a quantifiable threshold for referral to be considered), and
- further opportunities for training and practice to allow people to build confidence in the technique.

All the information we had access to as part of this project was highlighted to us by clinicians who were members of the guideline development group for SIGN 144. In fact, almost all the interventions to support implementation, such as the NES training and the audits, involved guideline group members.

As previously mentioned, despite the initial plan, an outcomes planning approach was not used for this impact assessment. At the conclusion of this pilot, an after action review was completed by SIGN to reflect on the process and develop a more standardised approach to this work for the future. This has included the identification of data and evidence that needs to be collected during guideline development to ensure the ability to assess and report several years after the guideline publication. The outcomes of this review have been reported internally.

Conclusion

We took the opportunity to work with NES to assess the impact of SIGN 144 based on feedback that was known to the small working group from the original guideline group. This pilot project also provided a learning opportunity for SIGN about what is required to be able to plan, deliver and then report using an outcomes planning approach.

We reviewed data from several audits, round-table discussions at a NES national conference and feedback from attendees of NES training events. Whilst we feel this feedback does show some evidence of the impact of the guideline, given the non-standardised approach there are limitations regarding the conclusions that can be drawn from this work.

The group that proposed SIGN 144 had the aim ‘to improve referral accuracy and safe discharge for people with glaucoma.’ Based on the data collected, there is some evidence that, since the introduction of SIGN 144, referrals from community optometrist to secondary-eye-care services have improved. This has resulted in fewer unnecessary referrals to secondary-eye-care services, freeing up this service for those who really need it and enabling patients to be cared for longer in the community. This suggests that the guideline has had some influence in addressing two of the four reasons for its creation:

1. variation in the accuracy of referral of patients with suspected glaucoma from the community to secondary-eye-care services, and

2. to decease false positive referrals to secondary-eye-care services.

In order to capitalise on the repeated improvements, better communication could lead to further success. In the training course survey, 92% of respondents reported they had had no communication with their local secondary care clinic. The audit data is being collected in secondary care and it needs to be shared with the relevant community optometrists. Currently, we know the opportunities for community optometrists to receive feedback on their referrals is limited, and we would encourage people to look for opportunities to share information locally between secondary and community practitioners.

Influencing the success of the impact of the guideline has been the delivery of some of the implementation interventions recommended in the guideline, namely training and audit. SIGN 144 guideline group members were involved in almost all of these interventions.

We came across the three audits opportunistically as part of a related piece of work. If a standardised data set was agreed and if it was being collected routinely and shared in a co-ordinated way, this information could help to spread the learning and further improve practice.

Based on this pilot we have made several recommendations to further support the implementation and impact of SIGN 144.

Recommendations

1. Community optometrists and secondary-eye-care service-based ophthalmologists should look for opportunities locally to build better links for sharing information and improving communication across the interface.
2. Authors of any secondary care-based audits related to SIGN 144 should ensure their results are shared with their local community optometrists to aid learning from the audit.
3. A copy of the secondary-eye-care clinic letter that is sent to the GP after a clinic appointment should be sent to the referring optometrist to aid communication and learning.
4. Community optometrists should continue to review the completeness of their referrals and in particular ensure that CCT measurement and anterior chamber assessment details are included.
5. NES should further explore additional training for optometrists, including:
    - gonioscopy use,
    - what to do if equipment does not allow for disc height measurement,
    - clarity on the purpose of DDLS, and
    - basic quality improvement skills such as audit.
6. SIGN should use the channels suggested during the NES annual conference to share further news or updates related to the guideline.

7. SIGN should consider developing an audit template that includes a minimum data set if key points for audit are defined in any future guidelines. A consistent, minimum data set would make it easier to review audit work across the country.

Abbreviations

CCT Central corneal thickness

DDLS Disc damage likelihood scale

FVDR First visit discharge rates

IOP Intraocular pressure

OHT Ocular hypertension

Annex 1

Key questions used to develop SIGN 144

Key question	See guideline section
1. In adult patients where the optometrist suspects glaucomatous disease at eye examination, which optic disc assessment techniques and parameters are associated with the greatest referral accuracy or diagnostic accuracy for symptoms suggestive of glaucoma? *Consider*: fundoscopy versus fundoscopy with dilation versus digital imaging (including stereophotography, monophotography, optical coherence tomography, scanning laser polarimeter, Heidelberg retinal tomograph scanning laser ophthalmoscopy/retinal nerve fibre imaging).	4.5
2. In adult patients where the optometrist suspects glaucomatous disease at eye examination, which techniques for assessment of intraocular pressure are associated with greatest referral accuracy? *Consider:* Goldmann applanation tonometer, non-contact tonometry, hand-held applanation tonometers, Perkins. Single readings versus repeat. Diurnal variation and variation within settings.	4.2
3. In adult patients where the optometrist suspects ocular hypertension at eye examination, does measurement and reporting of central corneal thickness improve referral accuracy when provided in addition to intraocular pressure? Which method of pachymetry should be used?	4.3
4. In adult patients where the optometrist suspects glaucomatous disease at eye examination, which visual field assessment techniques are associated with the greatest referral accuracy or diagnostic accuracy for symptoms suggestive of glaucoma? *Consider:* threshold automated perimetry, repeated testing, standard automated perimetry, short-wavelength automated perimetry, matrix frequency doubling technology, Swedish Interactive Thresholding Algorithm, Dicon, Henson, Humphrey.	4.6
5. In adult patients where the optometrist suspects ocular hypertension at eye examination, does measurement and reporting of angle width improve the referral accuracy? Which method of angle-width assessment should be used? *Consider:* Gonioscopy, Van Herick, Redmond Smith, anterior segment optical coherence tomography.	4.4

Annex 2

Key recommendations from SIGN 144

Measurement of intra ocular pressure

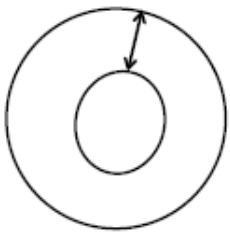
R For patients with ocular hypertension or suspected glaucoma a reliable baseline measure of intraocular pressure is required. A minimum of two intraocular pressure readings on a single occasion using the same tonometer is recommended. The type of tonometer and the time of measurement should be specified in any referral to secondary-eye-care services.

Optic disc assessment

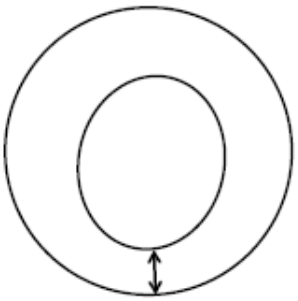
R The narrowest rim/disc ratio and disc size should be recorded and considered alongside additional indicators of glaucoma, such as optic disc nerve fibre layer haemorrhage and cup/disc ratio asymmetry, when assessing the need for referral to secondary-eye-care services.

√ Patients with the following optic disc parameters should be considered for referral to secondary eye-care services:

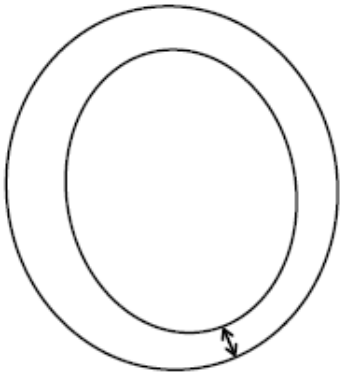
- small discs (<1.5 mm in diameter) where the narrowest rim/disc ratio is <0.3



- medium discs (1.5–2.0 mm in diameter) where the narrowest rim/disc ratio is <0.2



- large discs (>2.0 mm in diameter) where the narrowest rim/ disc ratio is <0.1



These parameters correspond to Spaeth's disc damage likelihood scale stage 4 or greater.

Visual field assessment

√ A minimum of two visual field tests with consistent findings is recommended before referral to secondary-eye-care services. One test may suffice if the result is unequivocal.

Criteria for referral to secondary-eye-care services

√ Irrespective of intraocular pressure, patients with one or more of the following findings should be referred to secondary-eye-care services:

- optic disc signs consistent with glaucoma in either eye

- a reproducible visual field defect consistent with glaucoma in either eye
- risk of angle closure (occludable angle)
    - using Van Herick technique, if the peripheral anterior chamber width is one quarter or less of the corneal thickness
    - using gonioscopy, if ≥270 degrees of posterior pigmented trabecular meshwork is not visible.

√ Patients who have ocular hypertension with intraocular pressure >25 mm Hg may be considered for referral to secondary-eye-care services irrespective of central corneal thickness.

√ Patients who have ocular hypertension with intraocular pressure <26 mm Hg and central corneal thickness <555 micrometers should be referred to secondary-eye-care services if they are aged ≤65.

√ Patients who have ocular hypertension with intraocular pressure <26 mm Hg and central corneal thickness ≥555 micrometers may be monitored in the community.

Discharge from secondary-eye-care services

√ When a patient is discharged from secondary-eye-care services the responsibility for patient care is transferred to the optometrist.

√ Local arrangements for follow up and monitoring in the community should include protocols for communicating with patients who do not attend, or do not respond to invitations to make appointments, and for liaison with general practice and secondary-eye-care services.

√ The following groups may be considered for discharge from secondary-eye-care services where robust local arrangements are in place for follow up and monitoring in the community. Patients with:

- untreated ocular hypertension where intraocular pressure is <26 mmHg, CCT is ≥555 micrometers and ocular examination is otherwise normal
- untreated ocular hypertension with intraocular pressure >25 mm Hg with otherwise normal ocular examination and a low lifetime risk of glaucomatous visual disability
- treated ocular hypertension where re-referral criteria are documented.

√ Patients with primary angle closure who have had prophylactic iridotomy may be considered for discharge from secondary-eye-care services if they:

- have confirmed open angle
- are not on topical medication
- have no evidence of glaucoma.

√ Patients with treated glaucoma should normally be monitored in secondary-eye-care services.

Discharge to a locally accredited glaucoma optometrist may be considered at the discretion of the consultant ophthalmologist where this is in the best interests of the patient. Robust local arrangements for follow up and monitoring should be in place and the frequency of monitoring and criteria for re-referral should be individualised.

Monitoring patients with ocular hypertension

R For patients with ocular hypertension, treated or untreated, a reliable baseline based on repeated measurement of IOP and perimetry should be established. Repeat glaucoma testing every two years is recommended.

References

1. Royal National Institute of Blind People. Site Loss Data Tool. 2018 [cited 2018 Aug 09]; Available from: http://www.rnib.org.uk/professionals/knowledge-and-research-hub/key-information-and-statistics/sight-loss-data-tool.
2. Davey CJ, Green C & Elliott DB. Assessment of referrals to the hospital eye service by optometrists and GPs in Bradford and Airedale. *Ophthalmic Physiol Opt* 2011, **31:** 23–28.
3. Scottish Intercollegiate Guidelines Network. Glaucoma referral and safe discharge: a national clinical guideline. 2015 [cited 2018 Aug 09]; Available from: http://www.sign.ac.uk/assets/sign144.pdf.
4. Scottish Intercollegiate Guidelines Network. A guideline developers' handbook. 2015 [cited 2018 Aug 09]; Available from: http://www.sign.ac.uk/assets/sign50_2015.pdf
5. Lawrie RE, Ah-See KL, Roberts DC, Gillian SN. The impact of SIGN 144 guideline and education on glaucoma referrals in Tayside: A closed loop audit. 2017 [cited 2018 Aug 09]; Available from: https://www.sign.ac.uk/sign-144-glaucoma-referral-and-safe-discharge.html
6. Byrne P, Lwin K, Chua K, Yin K, Kumarasamy M. Audit on glaucoma referrals 2016. 2016 [cited 2018 Aug 09]; Available from: https://www.sign.ac.uk/sign-144-glaucoma-referral-and-safe-discharge.html
7. Sii Siaw Zhen S, Nasser A, Cheng Yi L, Agarwal PK. A retrospective study on the impact of SIGN glaucoma guidelines on quality of referrals from community optometrists in regional eye centre in Scotland. 2018 [cited 2018 Aug 09]; Available from: https://www.sign.ac.uk/sign-144-glaucoma-referral-and-safe-discharge.html