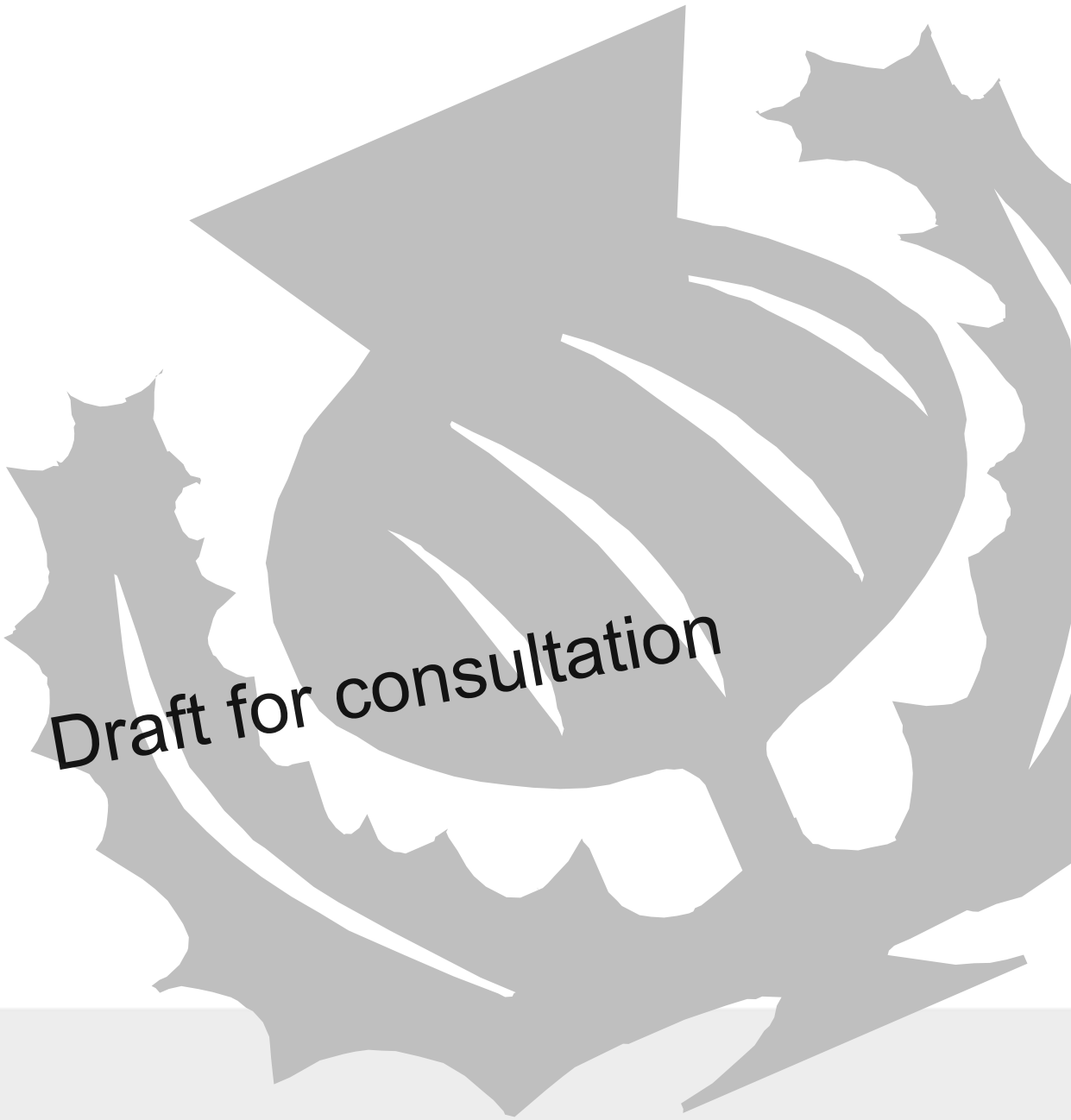
Healthcare Improvement Scotland

SIGN
Scottish Intercollegiate Guidelines Network



Glaucoma Referral and Safe Discharge

A national clinical guideline

National Meeting Draft Final 05 Feb 2014

Evidence

Draft for consultation

Key to evidence statements and recommendations

LEVELS OF EVIDENCE

1^{++}	High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias
1^{+}	Well conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias
1^{-}	Meta-analyses, systematic reviews of RCTs, or RCTs with a high risk of bias
2^{++}	High quality systematic reviews of case control or cohort studies High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal
2^{+}	Well conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal
2^{-}	Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal
3	Non-analytic studies, eg case reports, case series
4	Expert opinion

RECOMMENDATIONS

Some recommendations can be made with more certainty than others. The wording used in the recommendations in this guideline denotes the certainty with which the recommendation is made (the 'strength' of the recommendation).

The 'strength' of a recommendation takes into account the quality (level) of the evidence. Although higher quality evidence is more likely to be associated with strong recommendations than lower quality evidence, a particular level of quality does not automatically lead to a particular strength of recommendation.

Other factors that are taken into account when forming recommendations include: relevance to the NHS in Scotland; applicability of published evidence to the target population; consistency of the body of evidence, and the balance of benefits and harms of the options.

R For '**strong'** recommendations on interventions that '**should**' be used, the guideline development group is confident that, for the vast **majority** of people, the intervention (or interventions) will do more good than harm.

R For '**conditiona**l' recommendations on interventions that should be '**considered**', the guideline development group is confident that the intervention will do more good than harm for **most** patients. The choice of intervention is therefore more likely to vary depending on a person's values and preferences, and so the healthcare professional should spend more time discussing the options with the patient.

GOOD PRACTICE POINTS

✓ Recommended best practice based on the clinical experience of the guideline development group.

Contents

1 Introduction

1.1 THE NEED FOR A GUIDELINE

Glaucoma is an eye disease characterised by a progressive optic neuropathy and associated visual field loss. Glaucoma is the leading cause of irreversible blindness worldwide. In the UK glaucoma is the second most common cause of visual impairment.[1]

Glaucoma can be classified anatomically according to the width of the anterior chamber angle and is either a primary condition or secondary to another systemic or ocular condition.[2]

The incidence of glaucoma in the UK increases with age. Glaucoma affects about 2% of the population aged over 40. It is estimated that over 50% of patients with glaucoma are undiagnosed. [3]

Glaucoma accounts for up to 20% of referrals to secondary eye-care services, the vast majority of which come from community optometrists. Being associated with advancing age, the number of patients requiring glaucoma management is rising as life expectancy increases.[4]

Early identification and referral of patients with ophthalmic pathology and prompt secondary care response facilitates timeous management of the condition with the aim of limiting visual disability.[5,2,6] Population screening is not recommended in the UK.[3]

In one study in England around a third of referrals from optometrists without special interest in glaucoma resulted in discharge at first visit.[4] The Scottish General Ophthalmic Services (GOS) arrangements are unique to Scotland and were implemented in 2006 to facilitate identification of ophthalmic pathology at the earliest opportunity.[7] Examination of accuracy of the referral of glaucoma suspects from the community to secondary eye-care services in line with the GOS has identified both improvements in referral quality associated with the arrangements as well as continuing issues around variation in practice.[8]

1.2 REMIT OF THE GUIDELINE

1.2.1 OVERALL OBJECTIVES

This guideline provides recommendations based on current evidence for best practice in the primary care assessment and referral of patients with suspected glaucoma from the community into secondary eye-care services and the safe discharge of patients from secondary eye-care services back into to community.

Recommendations are provided on the investigations required, the frequency of examinations and communication and notification of all the healthcare providers involved in the patient pathway.

The guideline also makes recommendations identifying which patients can be safely followed up in the community thus maximising the potential of the existing GOS arrangements and the electronic connections between community optometry and NHS Health Boards through the Eyecare Integration Project.[9]

The guideline excludes treatment of glaucoma which is covered by NICE CG85.[10]

1.2.2 TARGET USERS OF THE GUIDELINE

This guideline will be of particular interest to community optometrists, general practitioners and hospital based health professionals involved in glaucoma care including ophthalmologists, optometrists, specialist nurses and orthoptists. It will also be of interest to patients and carers.

1.3 STATEMENT OF INTENT

This guideline is not intended to be construed or to serve as a standard of care. Standards of care are determined on the basis of all clinical data available for an individual case and are subject to change as scientific knowledge and technology advance and patterns of care evolve. Adherence to guideline recommendations will not ensure a successful outcome in every case, nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results. The ultimate judgement must be made by the appropriate healthcare professional(s) responsible for clinical decisions regarding a particular clinical procedure or treatment plan. This judgement should only be arrived at following discussion of the options with the patient, covering the diagnostic and treatment choices available. It is advised, however, that significant departures from the national guideline or any local guidelines derived from it should be fully documented in the patient's case notes at the time the relevant decision is taken.

1.3.1 PATIENT VERSION

A patient version of this guideline is available from the SIGN website, www.sign.ac.uk

1.3.2 PRESCRIBING OF LICENSED MEDICINES OUTWITH THEIR MARKETING AUTHORISATION

Recommendations within this guideline are based on the best clinical evidence. Some recommendations may be for medicines prescribed outwith the marketing authorisation (MA) also known as product licence. This is known as 'off label' use.

Medicines may be prescribed off label in the following circumstances:

- for an indication not specified within the marketing authorisation
- for administration via a different route
- for administration of a different dose
- for a different patient population.

An unlicensed medicine is a medicine which does not have MA for medicinal use in humans.

Generally 'off label' prescribing of medicines becomes necessary if the clinical need cannot be met by licensed medicines within the marketing authorisation. Such use should be supported by appropriate evidence and experience.[11]

"Prescribing medicines outside the conditions of their marketing authorisation alters (and probably increases) the prescribers' professional responsibility and potential liability".[11]

The General Medical Council (GMC) recommends that when prescribing a medicine 'off label', doctors should:

- be satisfied that such use would better serve the patient's needs than an authorised alternative (if one exists)
- be satisfied that there is sufficient evidence/experience of using the medicines to show its safety and efficacy, seeking the necessary information from appropriate sources
- record in the patient's clinical notes the medicine prescribed and, when not following common practice, the reasons for the choice
- take responsibility for prescribing the medicine and for overseeing the patient's care, including monitoring the effects of the medicine.

Non-medical prescribers should ensure that they are familiar with the legislative framework and their own professional prescribing standards.

Prior to any prescribing, the licensing status of a medication should be checked in the the summary of product characteristics (SPC).[12] The prescriber must be competent, operate

within the professional code of ethics of their statutory bodies and the prescribing practices of their employers.[13]

1.3.3 ADDITIONAL ADVICE TO NHSSCOTLAND FROM HEALTHCARE IMPROVEMENT SCOTLAND AND THE SCOTTISH MEDICINES CONSORTIUM

Healthcare Improvement Scotland processes multiple technology appraisals (MTAs) for NHSScotland that have been produced by the National Institute for Health and Clinical Excellence (NICE) in England and Wales.

The Scottish Medicines Consortium (SMC) provides advice to NHS Boards and their Area Drug and Therapeutics Committees about the status of all newly licensed medicines and any major new indications for established products.

No SMC advice relevant to this guideline was identified.

2 Key recommendations

The following recommendations were highlighted by the guideline development group as the key clinical recommendations that should be prioritised for implementation.

Proposed key recommendations indicated by a dark band to the left of the recommendation/good practice point.

3

THE SCOTTISH GENERAL OPHTHALMIC ARRANGEMENTS

The NHS (General Ophthalmic Services) (Scotland) amendment regulations 2010 specify the following patient categories and associated tests in relation to eye examination for suspected glaucoma.

The NHS (General Ophthalmic Services) (Scotland) amendment regulations 2010. http://www.sehd.scot.nhs.uk/pca/PCA2010(O)01.pdf revised weblink to be added when available	
Frequency of primary eye examinations	
Patients aged 40 years or over with a family* history of glaucoma *parent, sibling, child	Annually
The additional tests and procedures to be undertaken as part of a primary eye examination depending on the presenting signs and symptoms of the patient.	
Adults aged 40 years and over who have a family history of glaucoma	Intra ocular pressure measurement, automated supra-threshold visual field tests, and assessment of the optic nerve head
Patients with suspect glaucoma or ocular hypertensives	Intra ocular pressure measurement by non-contact or applanation tonometry as appropriate, automated supra-threshold visual field assessments, and assessment of the optic nerve head
The tests and procedures to be undertaken as part of a supplementary eye examination depending on the circumstances of the patient	
Suspect glaucoma, unusual optic disc appearance, or where other retinal or choroidal abnormalities have been detected during the primary eye examination	To include, as required: Repeat of automated visual field assessment by full threshold visual fields Repeat tonometry by applanation Repeat internal examination of the eyes appropriate to the relevant detected or suspected eye abnormality, for example using slit lamp biomicroscopy with condensing lens, repeat digital imaging or scanning which may include mydriasis

4 Risk factors for primary glaucoma

4.1 INTRODUCTION

A detailed history including relevant medical, family or ocular history is undertaken as part of a primary eye examination.[7]

☑ At referral of a patient with suspected glaucoma to secondary eye-care services the optometrist should highlight the presence of any glaucoma risk factors.

4.2 DEMOGRAPHIC AND NON-OCULAR RISK FACTORS

Meta-analyses of the epidemiology of glaucoma provide estimates of the major demographic and non-ocular risk factors for open angle glaucoma as increasing age (from age 40), history in first degree relative, black ethnicity and co-morbid diabetes (Table 1).[1, 3] Key demographic risk factors identified in meta-analysis for angle closure glaucoma include increasing age (from age 40) and female sex (Table2).[14] Estimates vary due to study inclusion criteria. 2++

Table 1 Risk factors associated with primary open angle glaucoma. Estimates from key meta-analyses (95% CI).

Age	Prevalence % [1]	Age	Prevalence %[3]
≥80	7.8 (5.2-12)		
70-79	5.1 (3.6-7.2)	70	3.3 (2.5 - 4.0)
60-69	3.7 (2.7-5.0)	60	1.4 (1.0 - 1.9)
50-59	2.2 (1.6-3.0)	50	0.9 (0.6 - 1.3)
40-49	1.3 (0.9-1.9)	40	0.3 (0.1 - 0.5)
30-39	1.6 (0.66-3.8)		
Black Race	Age adjusted prevalence %[1]	Odds ratio[1]	Relative risk over-40 years [3]
	7.5 (6.8-8.4)	2.9 (1.4-5.9)	3.8 (2.56-5.64)
Family history in first degree relative	Age- adjusted odds ratio[1]		Age-adjusted relative risk[3]
	3.3 (2.0- 5.6)		3.14 (2.32 - 4.25).
Diabetes	Odds ratio [1]		Relative risk[3]
	1.8 (1.4-2.4)		1.93 (1.38-2.69)
Hypertension	Odds ratio [1]		
	1.8 (1.4-2.3)		
Peripheral vascular disease	Odds ratio [1]		
	2.1 (0.83-5.3)		

Table 2 Risk factors associated with primary angle closure glaucoma. Estimates from key meta-analyses (95% CI).	
Age	Prevalence % [14]
≥70	0.94 (0.63 - 1.35)
60-69	0.20 (0.06 - 0.42)
50-59	0.60 (0.27 - 1.00)
40-49	0.02 (0.00 - 0.08)
Female sex	Female to male ratio[14]
	3.25:1 (1.76 - 5.94)
Eastern Asian ethnicity	Primary angle closure glaucoma prevalence is higher in people of Asian and East Asian descent compared with European descent. [14]

4.3 OCULAR RISK FACTORS FOR GLAUCOMA

4.3.1 RAISED INTRAOCULAR PRESSURE

Ocular hypertension is defined as IOP > 21 mmHg and the absence of clinical signs of glaucoma.[15]

The risk of developing glaucoma increases with increasing IOP. [3] Having a raised IOP, outside the generally agreed population norm (10-21mmHg) is considered to be the most important glaucoma risk factor as it is the only one that can be treated. People with an IOP within the normal range can develop glaucoma. Multifactorial risk prediction models can be used to quantify the risk of disease.

Several studies have identified potential risk factors for the most common type of glaucoma (primary open angle glaucoma), but only three models with risk prediction equation have been derived.[16] These are based on the Ocular Hypertension Treatment study (OHTS)[17] and the European Glaucoma Prevention study (EGPS). [18] The OHTS/EGPS risk model is an equation for predicting the 5-year risk of POAG in adult patients with ocular hypertension. All of the variables included in the model can be routinely collected in clinical practice; age, IOP, Central Corneal Thickness (CCT), vertical cup-to-disc (C/D) ratio and pattern standard deviation (PSD). A simple calculator based on the model is available online and can be freely downloaded, enabling estimation of the 5-year risk of a patient with OHT developing OAG in at least one eye. http://ohts.wustl.edu/risk/calculator.html

The clinical utility of the tool is perceived to be limited as C/D ratio is subjective and not easily quantified. However, in an independent validation of this model in four independent cohorts, the discriminative ability was good, ie the ability of the equation to distinguish between individuals who developed POAG in 5 years and those who did not. Although, in calibration analyses the equation generally overestimated the observed risk of POAG. Based on these data, further research to update the tool to be more applicable for use in clinical care was recommended.[15] NICE in their treatment guideline for OHT stratify glaucoma risk based on age, IOP and CCT.[10]

4.3.2 MYOPIA

Myopia is an important risk factor for open angle glaucoma. A meta-analysis of 11 cross-sectional studies found that individuals with myopia have around double the risk of glaucoma compared to individuals who do not have myopia, OR 1.92. (955 CI 1.54 to 2.38).[19] In a meta-analysis the odds ratio (OR) for presence of glaucoma in high myopia (≥6 diopters) was 5.7 (95%CI 3.1 to11). There is no linear association between risk of glaucoma and degree of myopia.[1, 19]	2+ 3

4.3.4 ANTERIOR CHAMBER DEPTH AND HYPERMETROPIA

A narrative review notes that patients with angle closure glaucoma are more likely to be hypermetropic.[2]	4

4.3.5 EXFOLIATION SYNDROME AND PIGMENT DISPERSION SYNDROME

Narrative reviews note associations between psuedoexfoliation and glaucoma and between pigment dispersion syndrome and glaucoma.[2 20]	4

5 Primary care examination and assessment of patients with ocular hypertension or suspected glaucoma

5.1 GOOD PRACTICE

☑ At referral of a patient with suspected glaucoma to secondary eye-care services the optometrist must indicate findings of tonometry, examination by slit lamp biomicroscopy to include anterior segment, and optic disc and visual field assessment.

☑ Offer patients the opportunity to discuss their diagnosis, prognosis and treatment; and provide them with relevant information in an accessible format at initial and subsequent visits.

5.2 MEASUREMENT OF INTRAOCULAR PRESSURE

A range of tonometers are used in clinical practice. Goldmann applanation tonometry (GAT) is the currently accepted reference standard technique for intra-ocular pressure (IOP) measurement.

No studies were identified comparing GAT with other technologies in terms of referral accuracy or diagnostic accuracy for features suggestive of glaucoma.

A meta-analysis of 99 studies examining the level of agreement of tonometers with GAT identified heterogeneity of effect which was, in part attributed, to variability in the reference standard. There was substantial IOP measurement variability for all tonometers including GAT, both within and between studies. The non-contact tonometer (NCT) (4 studies) and hand-held applanation tonometers (HAT) (26 studies) achieved the measurements closest to the GAT with around 59% and 66% within 2 mmHg respectively and 79% and 85% of measurements within 3 mmHg respectively.[15] 2++

A Health Technology Assessment (HTA) examined the degree of within-patient variability in IOP measurement, using models based on untreated ocular hypertension, and suggested that measurement 'noise' of the order of 3 mmHg could be reduced by taking the average of two or three measurements at a single visit. Measurement at similar times of day on repeat visits may reduce the impact of diurnal variation.[15] 2++

An HTA did not identify any good quality evidence assessing the value of examination of the degree of short or long-term IOP fluctuation as a risk factor for the development or progression of glaucoma.[21] 2++

An HTA did not identify any good quality evidence for the use of a diurnal tension curve (multiple IOP measurements over a minimum of 8 hour period) in glaucoma suspects with single office IOP measurements within the normal range.[21] 2++

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

☑ Current GOS agreements require that for referral purposes, contact tonometry should be performed with Goldmann or Perkins type tonometers. This promotes consistency between primary and secondary care

5.3 MEASUREMENT OF CENTRAL CORNEAL THICKNESS

No evidence was identified as to whether referral accuracy is improved when central corneal thickness (CCT) measurements are provided in addition to IOP measurements in patients with ocular hypertension.

A high quality systematic review and meta-analysis identified strong evidence, that in a multivariate model, CCT is a risk factor for progression of ocular hypertension to primary open angle glaucoma.[15] 2++

A moderate quality systematic review reported inconsistent findings as to the relationship between central corneal thickness and glaucoma prevalence or glaucoma progression but identified consistent evidence that CCT is a risk factor for progression of ocular hypertension to glaucomatous optic neuropathy.[22] 2+

A NICE evidence based guideline notes that CCT can act as a confounder of IOP measurement and is therefore of value in interpreting IOP measurements.[10] There is however no verified algorithm to apply to the relationship between CCT and IOP. [22] 2++

R **CCT should be measured in patients with ocular hypertension and stated alongside the measured IOP results when referring to secondary eye-care services.**

☑ Repeat measurements should be taken on a single occasion. This is an inherent feature of the ultrasound pachymeters which provide a final reading based on an average of measurements. Mean and standard deviation should be recorded and provided in any referral.

☑ The type of pachymeter used should be stated on patient records and referrals.

5.4 ASSESSMENT OF ANTERIOR CHAMBER ANGLE

Gonioscopy is the reference standard for assessment of the anterior chamber angle in patients with suspected glaucoma or OHT. It is not currently practised by all optometrists and requires experience to interpret the angle appearance. Gonioscopy is unsuitable for some patients particularly where there are anxiety or mobility difficulties.

No systematic reviews were identified,

All primary studies identified on assessment of anterior chamber angle were carried out in entirely or predominantly non-caucasian groups including Indian, Korean, Chinese and Malay populations, all of which have higher rates of angle closure than caucasians

Where sensitivity and specificity for detection were reported in comparisons of optical coherence tomography (OCT) with gonioscopy there was generally high sensitivity (84-100%) but low specificity (41-69%).See table 3 and 4. There was variation in the scanning protocols used and issues around the ability of operators to identify the scleral spur as a reference point in the technique. Significant inter-observer variability was reported in identification of angle closure by OCT. For Cirrus this was described as poor to fair (kappa= 0.2-0.4) and iVue described as fair (kappa=0.35-0.47) .[23] 2+ 3

OCT is an evolving technology in terms of anterior angle assessment and is not currently available to all optometrists.

In one study comparing a Van Herick grading method with gonioscopy there was high sensitivity (84.9%) and high specificity (89.6%) for the identification of narrow angle.[24] A second study reported 61.9% sensitivity and 89.3% specificity.[25] In another study there was good agreement between Van Herick and gonioscopy for identification of narrow angles.[26] 2+ 3

R **The Van Herick method should be considered an adequate alternative to gonioscopy to detect narrow anterior chamber angles in patients with ocular hypertension or suspected angle closure. Either technique may be used.**

☑ Due to the low specificity of the OCT, referral to secondary eye-care services should not be based on the results of anterior chamber OCT measurements alone.

Table 3 Studies reporting sensitivity and specificity of OCT compared with gonioscopy

	Sensitivity % (95% CI where available)	Specificity % (95% CI where available)		Ungradeable eyes %
Grewal[27]	Ranged from 64.29-78.57	Ranged from 71.31-88.19	range of measures using different sectors of angle and OCT parameters for cut off	11.67
Khor[28]	84	69		11.9
Lavanya[29]	88.4 (84.9-91.3)	62.9 (60.5-65.2)		10
Narayanaswamy[30]	90.2 (86.9-93.4) 82.5 (78.3-86.7)	77.4 (74.9-79.8) 84 (81.9-86.2)	temporal angle nasal angle	25.2
Nolan[31]	98 (92.2-99.6)	55.4 (45.2-65.2)		8.15 (calculated from 26/319)
Park[26]	100 98	41 55	temporal angle nasal angle	Not reported
Wong[32]	84	58		18.6

Table 4 Studies reporting level of agreement between OCT and gonioscopy			
	Level of agreement (AC1)		Ungradeable eyes %
Perera[33]	0.75 0.74 0.60 0.57	SDOCT Two quadrant ASOCT Two quadrant SDOCT One quadrant ASOCT One quadrant	28.7 (ASOCT) 58.3 (SDOCT)
Quek[23]	0.35 0.50	Cirrus iVue	13.0 (cirrus) 24.6 (iVue)
Sakata[34]	0.45 0.51 0.74 0.75	Superior Inferior Nasal Temporal	16

5.5 OPTIC DISC ASSESSMENT

5.5.1 OPHTHALMOSCOPY

In a meta-analysis of five studies examining the accuracy of ophthalmoscopy for screening for open angle glaucoma the pooled sensitivity was 60% (95% credible interval (CrI) 34 to 82) and the pooled specificity was 94% (95% CrI 76 to 99). [3] | 2++

5.5.2 OPTIC DISC ASSESSMENT

A systematic review examined parameters of optic disc assessment and reported that for a cup to disc ratio of ≥ 0.7 (four studies), the likelihood ratio for primary open angle glaucoma was 14 (95% CI 5.3 to 39). For cup to disc ratio asymmetry ≥ 0.3 (three studies) the likelihood ratio was 7.3 (95%CI 3.3 to 16). The LR associated with presence of disc haemorrhage (five studies) was 12 (95% CI 2.9 to 48). [1] | 2+

While the systematic reviews did not specifically address issues of clinical assessment of optic disc size and morphology, evidence from primary research papers confirmed the importance of disc size measurement in the interpretation of the cup/disc ratio.[35, 36] The size of the disc can be rapidly assessed during slit lamp biomicroscopy and when this is combined with an assessment of the neuroretinal rim morphology, as in Spaeth's disc damage likelihood scale (DDLS), it allows discrimination between glaucomatous and normal discs (compares favourably with HRTII disc assessment).[37-43] | 2+
3

The clinical utility of the ISNT rule (inferior, superior, nasal and temporal) in the diagnosis of glaucomatous neuropathy has been called into question by a number of studies.[44-47] | 3

R **For patients with suspected glaucoma the optic discs should be examined by slit lamp biomicroscopy. The pupil should be dilated unless there is a high risk of angle closure. The vertical optic disc diameter should be measured using the slit beam height. This should be corrected for the magnification of the condensing lens.**

R **Discs should be categorised according to Spaeth's disc damage likelihood scale (DDLS) and this, along with additional indicators of glaucoma, such as optic disc nerve fibre layer haemorrhage and cup/disc ratio asymmetry, should inform the decision to refer for specialist assessment.**

☑ Patients with an optic disc categorised as stage 4 or above on DDLS should be referred for specialist assessment.

☑ Patients with an optic disc nerve fibre layer haemorrhage should be referred irrespective of DDLS stage.

☑ Referral should not be made solely on the basis of apparent violation of the ISNT rule.

THE DISC DAMAGE LIKELIHOOD SCALE

	Narrowest width of rim (rim/disc ratio)				Examples	
DDLS Stage	For Small Disc <1.50 mm	For Average Size Disc 1.50-2.00 mm	For Large Disc >2.00 mm	1.25 mm optic nerve	1.75 mm optic nerve	2.25 mm optic nerve
1	.5 or more	.4 or more	.3 or more			
2	.4 to .49	.3 to .39	.2 to .29			
3	.3 to .39	.2 to .29	.1 to .19			
4	.2 to .29	.1 to .19	less than .1			
5	.1 to .19	less than .1	0 for less than 45°			
6	less than .1	0 for less than 45°	0 for 46° to 90°			
7	0 for less than 45°	0 for 46° to 90°	0 for 91° to 180°			
8	0 for 46° to 90°	0 for 91° to 180°	0 for 181° to 270°			
9	0 for 91° to 180°	0 for 181° to 270°	0 for more than 270°			
10	0 for more than 180°	0 for more than 270°				

Magnification correction factors for condensing lenses
Volk 60D x0.88
Volk 66D x1.0
Volk 78D x1.2
Volk 90D x1.33

Nikon 60D x1.03
Nikon 90D x1.63

OPTIC DISC PHOTOGRAPHY

In a meta-analysis of six studies examining the accuracy of optic disc photography for screening for open angle glaucoma five studies the pooled sensitivity was 73% (95%CrI 61 to 83) and the pooled specificity was 89% (95% CrI 50-99).[3] 2++

R **The optic discs should be photographed and the images transmitted with the electronic letter of referral which should include measurements of the optic discs.**

☑ Where available, use of stereo photography should be considered.

IMAGING DEVICES

In a meta-analysis of three studies examining the accuracy of HRT II for screening for open angle glaucoma the pooled sensitivity was 86% (CrI 55 to 97) and the pooled specificity was 89% (95%CrI 66 to 98). Regarding imaging of the nerve fibre layer, no studies of optical coherence tomography or GDx met the inclusion criteria. [3] 2++

A systematic review compared a range of imaging devices for assessment of the optic disc in diagnosis of glaucoma, including confocal scanning laser ophthalmoscopy, optical coherence tomography, scanning laser polarimetry. Most of the studies identified included patients with visual field loss. The review concluded that no device was superior to any other.[48] 2++

There is insufficient evidence of the additional clinical utility of OCT or Scanning laser polarimetry in the diagnosis of glaucoma to make any recommendation for the primary care setting.

5.6 VISUAL FIELDS ASSESSMENT

No systematic reviews were identified comparing technologies for visual field assessment with the outcome of referral accuracy in patients suspected as having glaucoma.

A systematic review of studies published up to November 2005 exploring the accuracy of screening tests for open angle glaucoma reported the sensitivities and specificities of frequency doubling technology (FDT), oculokinetic perimetry (OKP) and standard automated perimetry (SAP). Table 5 summarises the pooled sensitivity and specificity of the visual function tests (perimetry). There were few good quality studies for each test and the inclusion of SAP as part of the reference standard introduced potential bias in some cases. Two studies in the review directly compared SAP with FDT C-20-5, with both reporting that FDT had superior sensitivity but poorer specificity than SAP.[3, 49] OKP although promising in a screening setting, is unlikely to be sufficiently sensitive for case detection in an optometric setting. 2++

Table 5 Sensitivity and specificity of visual function tests for detection of open angle glaucoma.[3, 49]			
	Studies/high quality studies	Pooled sensitivity (%) (95%CrI)	Pooled specificity (%) (95%CrI)
FDT C-20-1	3/1	92 (65-99)	94 (73-99)
FDT C-20-5	5/2	78 (19-99)	75 (57-87)
OKP	4/1	86 (29-100)	90 (79-96)
SAP full threshold	5/2	88 (65-97)	80 (55-93)
SAP supra-threshold	9/1	71 (51-86)	85 (73-93)

A narrative review of the effectiveness of visual function tests in diagnosis and monitoring of patients with glaucoma was based on a systematic, but limited, literature search which identified 85 studies. The review concluded that algorithms, such as SITA, have led to visual field tests which provide more reliable information than full-threshold SAP testing in this patient group.[50] 2+

A systematic review in Swedish reported on a range of perimetry techniques in the context of diagnosis and follow up of open angle glaucoma. Only the abstract was reported in English language and it is not possible to fully evaluate the quality of the review. The report concluded that Swedish Interactive Thresholding Algorithm (SITA) programmes for the Humphrey standard automated perimetry have high sensitivity and specificity for diagnosis of glaucoma and describes this as based on only limited scientific evidence.[51] 2++

R **For patients with ocular hypertension or suspected glaucoma standard automated perimetry is recommended for visual field testing. FDT is also acceptable.**

☑ A minimum of two visual field tests using the same programme and perimeter is recommended before referral to secondary eye-care services.

☑ The use of the same technology in the community and secondary eye-care services has benefit in allowing direct comparisons to be made between the visual field plots.

6 Criteria for referral to secondary eye-care services

No systematic review evidence was identified on which to base referral criteria. Good practice is based on clinical experience and informed by the risk of progression across patient groups and clinical findings.

The following good practice is adapted from Guidance on the referral of glaucoma suspects by community optometrists issued by The College of Optometrists and The Royal College of Ophthalmologists and the expertise of the SIGN guideline development group applied within the provisions of the GOS arrangements.[52]

IOP <25 mmHg as sole finding - ocular examination otherwise normal if no other significant glaucoma risk factors present http://ohts.wustl.edu/risk/calculator.html	 monitor in the community
IOP ≥25 mmHg as sole finding – ocular examination otherwise normal	⇨ Refer to secondary eye-care services
☑ **Any IOP + one or more of the following:** ▪ Optic disc signs consistent with glaucoma in either eye. ▪ A visual field defect consistent with glaucoma is detected in either eye. ▪ A shallow peripheral anterior chamber on Van Herick testing consistent with a significant risk of angle closure within the foreseeable future.	⇨ Refer to secondary eye-care services

7 Discharge from secondary eye-care services

7.1 FACILITATING SAFE DISCHARGE

7.1.1 DISCHARGE LETTERS

☑ Discharge letters should include patient demographic information, diagnosis/condition, visual acuity, CCT, IOP, last visual field test, descriptor of optic nerve head, measurement of anterior chamber angle and information on allergies or adverse reactions to medication.

☑ Letters should include instructions on specific indications for re-referral to secondary eye-care services, such as defined IOP and should include contact details for direct re-referral.

☑ Discharge letters should be copied to optometrist, general practitioner and the patient.

A sample discharge proforma adapted from NHS Grampian is in Annex 2.

7.1.2 PATIENT HELD RECORD

No systematic review evidence was identified on the effectiveness of providing a patient held record to individuals diagnosed with or at risk of glaucoma.

Three systematic reviews were identified from other healthcare contexts. One of these was conducted in the context of maternity care[53]. This was considered not applicable, particularly due to the older age group of patients with or at risk of glaucoma.

One systematic review of patient held records in cancer care was identified. This included seven randomised controlled trials and found an absence of effect, although most patients welcomed the intervention.[54] 1++

A third review identified 14, mainly poor quality, studies across a range of chronic conditions including diabetes, rheumatoid arthritis and stroke and found no clear evidence of benefit to introducing a patient held record. Both clinical and process outcomes were examined.[55] 2++

There is no evidence on which to base a recommendation for practice.

7.1.3 NAMED OPTOMETRIST

No applicable systematic review evidence was identified on the effectiveness of specifying a named optometrist when discharging individuals diagnosed with or at risk of glaucoma from an ophthalmic hospital.

Evidence from a synthesis of qualitative studies suggests that patients with chronic conditions value continuity of care providers.[56] 3

☑ For patient safety and continuity of care, discharge of patients from an ophthalmic hospital should be to a named optometrist. Following consultation with the patient this would normally be the referring optometrist. Any treatment plans and follow up schedules should be copied to the patient, patient's general practitioner and referring optometrist.

7.2 DISCHARGE CRITERIA

No systematic review evidence was identified exploring the clinical effectiveness of different discharge criteria. A systematic review of the organisation of eye care services[57] summarised descriptive studies of shared and delegated care schemes and identified one RCT (n=403) which reported a high level of diagnostic and management clinical concordance between accredited optometrists and consultant ophthalmologists during two years of follow-up of patients with glaucoma or suspected glaucoma.[58] The following good practice points are based on NICE guideline CG58 and the expertise of the SIGN guideline development group applied within the provisions of the GOS arrangements.

☑ Discussion with patients should be central to decisions around discharge from secondary eye-care services and the preferences of the patient should be considered.

☑ The following patient groups may be considered for discharge from secondary eye-care services:

- Patients with untreated ocular hypertension with IOP <25 mmHg and otherwise normal ocular examination and no significant glaucoma risk factors
- Patients with untreated ocular hypertension with IOP ≥25 with perceived low risk of glaucomatous visual disability considering life expectancy
- Patients with primary angle closure, post iridotomy and not on topical medication, where there is no evidence of glaucoma and where there is access to a named optometrist for gonioscopy assessment
- Patients with treated ocular hypertension or glaucoma where the condition is perceived to be stable and where robust arrangements are in place for follow-up and monitoring in the community.

8 Monitoring of at-risk groups

8.1 PATIENTS WITH FAMILY HISTORY OF GLAUCOMA

☑ Where family history of glaucoma in a first degree relative is the sole risk factor identified at routine eye examination the patient should be recalled for review every two years. If additional risk factors are present the patient should be reviewed annually or more frequently depending on clinical judgement.

8.2 PATIENTS WITH OCULAR HYPERTENSION

NICE was unable to identify any clinical or economic evidence on the optimal monitoring interval for patients with ocular hypertension and recommended, as expert opinion that monitoring should be based on risk of conversion to glaucoma.[10] | 4

An evidence synthesis and economic evaluation explored optimal monitoring pathways for people with ocular hypertension. A survey of public preferences for a monitoring service identified the importance of keeping any side effects of treatment to a minimum and highlighted the importance of good communication and understanding of the process. [15]

Modeling suggests that once reliable baseline measures (IOP (treated or untreated) and visual field) are ascertained that there is no clear benefit in intensive monitoring to detect glaucoma. Biennial monitoring, by practitioners experienced in glaucoma, was more cost-effective compared with more frequent monitoring. [15] | 2++

R In the absence of any other glaucoma risk factors in patients with ocular hypertension in isolation, a reliable baseline should be established based on repeated measures of IOP and perimetry. There should then be repeat glaucoma assessment at least every two years.

R The testing process and, if applicable, potential side-effects related to treatment should be fully explained to patients.

8.3 PATIENTS POST PROPHYLACTIC IRIDOTOMY SECONDARY TO PRIMARY ANGLE CLOSURE

Primary angle closure (PAC) is diagnosed as occludable angle, normal optic discs and visual fields and any of the following: peripheral anterior synechiae, elevated intraocular pressure, iris whirling,"glaucomfleken" lens opacities, or excessive pigment deposition on the trabecular surface. PAC with evidence of glaucoma is primary angle closure glaucoma (PACG) [59]

In one observational study conducted in Scotland PACG constituted approximately 23% of all newly diagnosed glaucoma cases.[60]

No systematic reviews or meta-analyses were identified on monitoring of patients with PAC post iridotomy with healthy discs and full visual field.

Three observational studies; a retrospective study from Canada and two small prospective studies from India were identified which provided information on the risk of glaucoma in this patient group.

A retrospective single cohort study (n=257, 469 eyes) examined the risk of IOP elevation and requirement for intervention in patients with iridotrabecular contact or peripheral anterior synechiae who had peripheral iridotomy carried out. There was no recording of clock hour of apposition of the angle and no indentation gonioscopy was performed. At mean follow up of 8.5 years, 38.7% of the eyes had increased IOP and 17.3% required anti-glaucoma treatment.[61] | 3

A small (n=72) prospective single cohort study reported 36.1% of patients with raised IOP and 11.1% with primary angle closure glaucoma after mean follow up of 6.89 years. This study also reported increased risk of raised IOP/glaucoma in older patients, those with higher baseline IOP and longer follow up.[62] | 3

Another small (n=28) prospective single cohort study reported that at five years, 28% of patients had progressed to glaucoma, with or without medications.[63] | 3

No evidence was identified on which to base recommendations around follow-up interval or the most appropriate healthcare setting for monitoring.

R **Patients with primary angle closure who have undergone iridotomy require lifelong monitoring. Monitoring should include gonioscopy alongside measurement of IOP, visual fields and assessment of optic disc changes.**

8.4 PATIENTS WITH OPTIC DISC ANOMALIES

8.4.1 INTRODUCTION

There are a number of common non-glaucomatous optic nerve head anomalies which can resemble glaucomatous disease. Optometrists should follow the relevant clinical guidelines and protocols in keeping with each of these conditions and exercise clinical judgement with regard to ongoing monitoring or referral. It is considered good practice to use digital image capture to monitor for morphological change.

8.4.2 MYOPIC DISCS

No studies were identified which examined the monitoring interval for this group of patients.

☑ Individuals with myopia should be assessed by community optometrists for other risk factors and any other clinical signs suggestive of ocular hypertension or glaucoma. If there are no clinical signs of ocular hypertension or glaucoma the individual can be monitored in the community.

8.4.3 TILTED OPTIC DISC

A review with limited literature search concluded that tilted optic disc is not associated with any increased risk of development of glaucoma.[64] Tilted disc can mimic various types of visual field defect suggestive of normal tension glaucoma in the absence of raised intraocular pressure. Careful interpretation of visual fields is necessary to avoid incorrect diagnosis.[65] The sensitivity and specificity of newer technologies that image the optic nerve head and retinal nerve fibre layer in diagnosis of glaucoma in tilted optic disc is reported to be very low. [66] 3

No studies were identified which examined the monitoring interval for this group of patients.

☑ Healthcare practitioners should be aware that tilted optic disc is not associated with any increased risk of glaucoma. Visual field defect mimicking glaucoma is common in tilted optic disc, but, in contrast to glaucomatous optic damage, the defect is non-progressive.

8.4.4 OPTIC DISC DRUSEN

Optic nerve head drusen (ONHD) can be associated with visual field loss (VFL). A small retrospective cohort study (n=60, 103 eyes) compared rates of visual field loss (VFL) in patients with ONHD with and without ocular hypertension. 90.9% of eyes with OHT had VFL whilst 66.7% of normotensive eyes had VFL (p=0.03). At the same intraocular pressure, eyes with grade III ONHD are at increased risk for VFL when compared with eyes with grade I ONHD.[67] 3

No studies were identified which examined the monitoring interval for this group of patients.

☑ Patients with optic nerve head drusen who are normotensive and show no evidence of glaucoma can be followed up by community optometrists. Patients with optic nerve head drusen, ocular hypertension and field defects require more frequent follow up due to the increased risk of development of glaucoma and should be followed up by secondary eye-care services.

9 Provision of information

9.1 INTRODUCTION

Among the public in general and even among patients, glaucoma is not a well understood condition and this lack of knowledge and understanding of the condition and its management can often mean that patients are not able to fully engage with their diagnosis and treatment. To optimise their prognosis and help maximise the retention of useful sight and maintain quality of life for as long as possible it is therefore important that patients are fully involved. They need to understand the issues involved in both their condition and it's treatment and be sufficiently informed to be able to fully participate in the decision making process involved to successfully manage their condition through a lifetime of care.

Patient friendly information delivered at appropriate points in the patient journey with time given for counselling helps to ensure understanding. In addition, tutoring in eye drop technique with appropriate aids where necessary may improve patient adherence with therapy and thereby enhance the chances of successful outcome over the long term.

This section reflects the issues likely to be of most concern to patients and their carers. These points are provided for use by health professionals when discussing glaucoma with patients and carers and in guiding the production of locally produced information materials

9.2 KEY MESSAGES FROM PATIENTS WITH GLAUCOMA

A focus group was held in September 2013 with patients who have glaucoma. The aim of the focus group was to hear about their experiences of services in relation to information provision. Eight people took part, six males and two females. The key messages are highlighted in the checklist below which also incorporates relevant points from NICE CG85.[1]

CHECKLIST FOR PROVISION OF INFORMATION

This section gives examples of the information patients/carers may find helpful at the key stages of the patient journey. The checklist is neither exhaustive nor exclusive.

Initial presentation and referral
• Advise patients of the need for referral to a specialist and of expected waiting times • Offer the patient an explanation as to the nature of glaucoma and what to expect at the appointment with the specialist • Reassure the patient that if the diagnosis is confirmed early intervention can help preserve useful sight and with modern effective treatments patients are able to enjoy a good quality of life • Highlight importance of attending the appointment • Advise patients not to drive to the appointment due to likelihood of pupil dilation and to take along a carer/friend/family member with them if possible • Suggest that patients to note down any questions and concerns they may wish resolved at the meeting
Secondary eye-care services
• Explain procedures to the patient appropriately and ensure comprehension • Discuss the importance of monitoring progression of glaucoma and emphasise that although sight lost with glaucoma cannot be recovered, adherence to treatment can preserve remaining sight. • Allow sufficient time for answering any questions patients and carers may have eg: - What does glaucoma mean? - What type of glaucoma do I have? - Will I go blind? - Will I need to stay in hospital? - Can I still drive? (DVLA requirements) • Explain Certificate of Blindness or Defective Vision and it's implications (where appropriate) • Consolidate verbal information on glaucoma and medication use with written information. • Point out that that glaucoma often runs in families and that close family members aged over the age of 40 may wish to be tested for the condition as early detection and treatment can preserve useful sight and quality of life.
Discharge into community
• Provide patients with a copy of their discharge letter and clear information on who to contact should they have any concerns. • Provide patient with written information on their condition • Allow sufficient time to discuss the following: - Cleansing eyes and general eye hygiene - How and when to take medication - Tuition and practice in the most appropriate instillation technique for each patient including punctal occlusion and use of devices and eye drop aids where necessary - Side effects from medication - Storing medication

- Advise self-carers of local support available and how to access this
- Provide patients with information on issues regarding driving with glaucoma explaining DVLA requirements
- Emphasise the importance of attending follow-up appointments
- Provide patients with information on eye hygiene
- Advise patients to make a note of any questions they have and take with them to follow-up appointments

9.3 SOURCES OF FURTHER INFORMATION

NATIONAL ORGANISATIONS

IGA - International Glaucoma Association
Woodcote House, 15 Highpoint Business Village Henwood Ashford Kent TN24 8DH
Helpline Tel: 01233 64 81 70

Fax: 01233 64 81 79

www.glaucoma-association.com/

Email: info@iga.org.uk

A UK charity which works to prevent glaucoma blindness by providing information, literature and advice

NHS Inform
Website: www.nhsinform.co.uk/
The organisation provide quality-assured health information for the public.

Sightline
Website: www.sightlinedirectory.org.uk

Sightline is an online directory of services and organisations that help blind and partially sighted people in the UK.

10 Implementing the guideline

10.1 IMPLEMENTATION STRATEGY

Implementation of national clinical guidelines is the responsibility of each NHS Board and is an essential part of clinical governance. Mechanisms should be in place to review care provided against the guideline recommendations. The reasons for any differences should be assessed and addressed where appropriate. Local arrangements should then be made to implement the national guideline in individual hospitals, units and practices.

Implementation of this guideline will be encouraged and supported by SIGN. The implementation strategy for this guideline encompasses the following tools and activities.

NOT AVAILABLE IN THIS DRAFT

10.2 RESOURCE IMPLICATIONS OF KEY RECOMMENDATIONS

Short summary of the budget impact report if there is one.

NOT AVAILABLE IN THIS DRAFT

Recommendation		section
R	**Recommendation**	2.1
R	**Recommendation**	
R	**Recommendation**	

10.3 AUDITING CURRENT PRACTICE

NOT AVAILABLE IN THIS DRAFT

A first step in implementing a clinical practice guideline is to gain an understanding of current clinical practice. Audit tools designed around guideline recommendations can assist in this process. Audit tools should be comprehensive but not time consuming to use. Successful implementation and audit of guideline recommendations requires good communication between staff and multidisciplinary team working.

The guideline development group has identified the following as key points to audit to assist with the implementation of this guideline:

10.3.1 LIFESTYLE ISSUES

R **Recommendation.**

R **Recommendation.**

10.3.2 TREATMENT

R **Recommendation.**

R **Recommendation.**

11 The evidence base

11.1 SYSTEMATIC LITERATURE REVIEW

The evidence base for this guideline was synthesised in accordance with SIGN methodology. A systematic review of the literature was carried out using an explicit search strategy devised by a SIGN Information Officer. Databases searched include Medline, Embase, Cinahl, PsycINFO and the Cochrane Library. The year range covered was XXXX-YYYY. Internet searches were carried out on various websites including the US National Guidelines Clearinghouse. The main searches were supplemented by material identified by individual members of the development group. Each of the selected papers was evaluated by two members of the group using standard SIGN methodological checklists before conclusions were considered as evidence.

11.2 RECOMMENDATIONS FOR RESEARCH

The guideline development group was not able to identify sufficient evidence to answer all of the key questions asked in this guideline (see Annex #). The following areas for further research have been identified:

- NOT AVAILABLE IN THIS DRAFT

11.3 REVIEW AND UPDATING

This guideline was issued in 2014 and will be considered for review in three years. Any updates to the guideline in the interim period will be noted on the SIGN website: www.sign.ac.uk

12 Development of the guideline

12.1 INTRODUCTION

SIGN is a collaborative network of clinicians, other healthcare professionals and patient organisations and is part of Healthcare Improvement Scotland. SIGN guidelines are developed by multidisciplinary groups of practising clinicians using a standard methodology based on a systematic review of the evidence. Further details about SIGN and the guideline development methodology are contained in "SIGN 50: A Guideline Developer's Handbook", available at **www.sign.ac.uk**

12.2 THE GUIDELINE DEVELOPMENT GROUP

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Dr Lorna Thompson	*Programme Manager, SIGN*

The membership of the guideline development group was confirmed following consultation with the member organisations of SIGN. All members of the guideline development group made declarations of interest. A register of interests is available in the supporting material section for this guideline at **www.sign.ac.uk**

Guideline development and literature review expertise, support and facilitation were provided by the SIGN Executive. All members of the SIGN Executive make yearly declarations of interest. A register of interests is available on the contacts page of the SIGN website **www.sign.ac.uk**

Lesley Forsyth	*Events Coordinator*
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Stuart Neville	*Publications Designer, SIGN Executive*
Gaynor Rattray	*Guideline Co-ordinator, SIGN Executive*

12.3 ACKNOWLEDGEMENTS

SIGN is grateful to the following former members of the guideline development group and

others who have contributed to the development of the guideline.

Title and full name	*Job title, Work place, City*

12.4 CONSULTATION AND PEER REVIEW

12.4.1 NATIONAL OPEN MEETING

A national open meeting is the main consultative phase of SIGN guideline development, at which the guideline development group presents its draft recommendations for the first time. The national open meeting for this guideline was held on ... and was attended by XX representatives of all the key specialties relevant to the guideline. The draft guideline was also available on the SIGN website for a limited period at this stage to allow those unable to attend the meeting to contribute to the development of the guideline.

12.4.2 SPECIALIST REVIEWERS INVITED TO COMMENT ON THIS DRAFT

or

10.4.2 SPECIALIST REVIEW

This guideline was also reviewed in draft form by the following independent expert referees, who were asked to comment primarily on the comprehensiveness and accuracy of interpretation of the evidence base supporting the recommendations in the guideline. The guideline group addresses every comment made by an external reviewer, and must justify any disagreement with the reviewers' comments. All expert referees made declarations of interest and further details of these are available on request from the SIGN Executive.

SIGN is very grateful to all of these experts for their contribution to the guideline.

Title and full name	*Job title, Work place, City*
Title and full name	*Job title, Work place, City*
Title and full name	*Job title, Work place, City*
Title and full name	*Job title, Work place, City*
Title and full name	*Job title, Work place, City*

12.4.3 SIGN EDITORIAL GROUP

As a final quality control check, the guideline is reviewed by an editorial group comprising the relevant specialty representatives on SIGN Council to ensure that the specialist reviewers' comments have been addressed adequately and that any risk of bias in the guideline development process as a whole has been minimised. The editorial group for this guideline was as follows. All members of the SIGN Editorial group make yearly declarations of interest and further details of these are available on request from the SIGN Executive.

Dr Keith Brown	*Chair of SIGN; Co-Editor*
Dr Roberta James	*SIGN Programme Director; Co-Editor*
Dr Sara Twaddle	*Director of SIGN; Co-Editor*

Abbreviations

To be completed at next draft

CI	confidence interval
CrI	credible interval
GAT	Goldmann applanation tonometry
HAT	hand-held applanation tomometer
HTA	health technology assessment
IOP	intra-ocular pressure
NCT	non-contact tonometry
SIGN	Scottish Intercollegiate Guidelines Network

Annex 1
Key questions used to develop the guideline

This guideline is based on a series of structured key questions that define the target population, the intervention, diagnostic test, or exposure under investigation, the comparison(s) used and the outcomes used to measure efficacy, effectiveness, or risk. These questions form the basis of the systematic literature search.

Key question	*See guideline section*
1. In adult patients where optometrist suspects glaucomatous disease at eye examination, which optic disc assessment techniques and parameters are associated with greatest referral accuracy or diagnostic accuracy for symptoms suggestive of glaucoma? *Consider*: fundoscopy versus fundoscopy with dilation versus digital imaging (including stereophotographic/monophotographic optical coherence tomography, scanning laser olarimeter, Heidelberg retinal tomograph scanning laser ophthalmoscopy / retinal nerve fibre imaging).	5.5.2
2. In adult patients where optometrist suspects glaucomatous disease at eye examination, which techniques for assessment of intraocular pressure are associated with greatest referral accuracy or diagnostic accuracy for symptoms suggestive of glaucoma? *Consider:* Goldmann applanation tonometer, non-contact tonometry, hand-held applanation tonometers, Perkins. Single readings versus repeat. Diurnal variation and variation within settings.	5.2
3. In adult patients where optometrist suspects ocular hypertension at eye examination, does measurement and reporting of central corneal thickness improve referral accuracy when provided in addition to intra-ocular pressure? Which method of pachymetry should be used?	5.3
4. In adult patients where optometrist suspects glaucomatous disease at eye examination, which visual field assessment techniques are associated with 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 Threshold Algorithm, Dicon, Henson, Humphrey.	5.6
5. In adult patients where optometrist suspects ocular hypertension at eye examination, does measurement and reporting of angle width improve referral accuracy. Which method of angle width assessment should be used?	5.4

Consider: Gonioscopy, Van Herick, Redmond Smith, anterior sector optical coherence tomography

At what interval and in which setting should monitoring of the following patients groups be conducted:

a. Patients diagnosed with glaucoma
b. Patients with family history of glaucoma in first degree relative
c. Patients with ocular hypertension
d. Patients post prophylactic iridotomy
e. Patients with isolated field defects
f. Patients with myopia
g. Patients with optic disc drusen
h. Patients with tilted discs

8

Consider: Risk of glaucoma diagnosis, progression of disease, waiting times, patients satisfaction, healthcare professional satisfaction.

6. In adult patients discharged from secondary care what is the evidence for the following interventions in facilitating safe discharge
    a. Provision of a patient held record
    b. Identification of a names optometrist

7.1.2
7.1.3

Consider: progression of disease, patient satisfaction, healthcare professional satisfaction

Annex 2 Sample discharge letter

NHSScotland Glaucoma Discharge Form

Dear Optometrist, Date: .. /../20..

Name:	DOB:
Address	CHI Number

The above named patient has been discharged from .....

The findings from their last examination (Date……) are:

	Right Eye		Left Eye	
Diagnosis and date of diagnosis				
Visual acuity				
Ocular medication				
Central corneal thickness				
Gonioscopy	Open ☐	Closed ☐	Open ☐	Closed☐
Intraocular Pressure (mmHg (average of 2 measures), time; tonometer type)				
Glaucoma surgery or Laser procedures (procedure and date)				
Optic nerve (Disc Damage Likelihood Scale)				
Consider including digital images				
Visual Fields (Date, Technology and Global Index)				
Consider including visual field plots				
Comments eg medication allergies/adverse reactions				

I would be grateful if you could monitor this patient at the following review interval;.....

Please re-refer if:

- Intraocular pressure exceeds .....mmHg (repeatable)
- change in optic disc appearance or
- a new repeatable visual field defect.

If you require any further information (or if at a future date you feel further Glaucoma assessment is necessary) please contact .....(add tel and email)

Yours sincerely,
Discharge clinician (contact details – tel, email)
CC General Practitioner, Patient

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