Glaucoma: diagnosis and management

NICE guideline: short version

Draft for consultation, June 2017

This guideline covers diagnosing and managing glaucoma in people aged 18 and over. It aims to address uncertainty and variation in clinical practice by giving clear recommendations on testing for chronic open angle glaucoma and ocular hypertension, and on effective diagnosis, treatment and reassessment to stop these conditions progressing. This has the potential to prevent more people from going blind.

Who is it for?

- Healthcare professionals
- People planning and providing eye care services
- Adults with chronic open angle glaucoma or ocular hypertension, or who are at high risk of developing glaucoma, their families and carers

This guideline will update and replace NICE guideline CG85 (published April 2009).

We have updated or added new recommendations on case-finding, diagnosis, reassessment and treatment.

- You are invited to comment on the new and updated recommendations in this guideline. These are marked as **[2017]**.

You are also invited to comment on recommendations that NICE proposes to delete from the 2009 guideline.

We have not updated recommendations shaded in grey, and cannot accept comments on them. In some cases, we have made minor wording changes for clarification.

See Update information for a full explanation of what is being updated.

This version of the guideline contains the draft recommendations, context and recommendations for research. Information about how the guideline was developed is on the guideline's page on the NICE website. This includes the guideline committee's discussion and the evidence reviews (in the full guideline), the scope, and details of the committee and any declarations of interest.

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Contents

Recommendations

People have the right to be involved in discussions and make informed decisions about their care, as described in your care.

Making decisions using NICE guidelines explains how we use words to show the strength (or certainty) of our recommendations, and has information about prescribing medicines (including off-label use), professional guidelines, standards and laws (including on consent and mental capacity), and safeguarding.

1.1 Case-finding

These recommendations are for primary eye care professionals before referral for diagnosis of chronic open angle glaucoma (COAG) and related conditions, and are separate from a sight test.

1.1.1 Before referral for further investigation and diagnosis of COAG and related conditions, offer all of the following tests:

- visual field assessment using standard automated perimetry (central thresholding test)
- optic nerve assessment using stereoscopic slit lamp biomicroscopy, with pupil dilatation and fundus examination, and spectral domain optical coherence tomography (SD-OCT) if available
- intraocular pressure (IOP) measurement using Goldmann-type applanation tonometry
- peripheral anterior chamber configuration and depth assessments using gonioscopy or, if not available, the van Herick test or SD-OCT. **[2017]**

1.1.2 Do not base a decision to refer solely on IOP measurement using non-contact tonometry. **[2017]**

1.1.3 Do not refer people who have previously been discharged from hospital eye services after assessment for COAG and related conditions unless

clinical circumstances have changed and a new referral is needed. **[2017]**

1.1.4 Before deciding to refer, consider repeating visual field assessment and IOP measurement on another occasion to confirm a visual field defect or IOP of 24 mmHg or more, unless clinical circumstances indicate urgent or emergency referral is needed. **[2017]**

1.1.5 Refer for further investigation and diagnosis of COAG and related conditions, after considering repeat measures as in recommendation 1.1.4, if:

- there is optic nerve head damage on stereoscopic slit lamp biomicroscopy, or
- there is a visual field defect consistent with glaucoma, or
- IOP is 24 mmHg or more using Goldmann-type applanation tonometry. **[2017]**

1.1.6 Provide results of all examinations and tests with the referral. **[2017]**

1.1.7 Advise people with IOP below 24 mmHg to continue regular visits to their primary eye care professional. **[2017]**

These recommendations are for people planning and providing eye care services before referral

1.1.8 People planning and providing eye care services should use a service model that includes Goldmann-type applanation tonometry before referral for diagnosis of COAG and related conditions. **[2017]**

1.1.9 People planning eye care services should consider commissioning referral filtering services (for example, repeat measures, enhanced case-finding, or referral refinement) for COAG and related conditions. **[2017]**

1.2 Diagnosis

1.2.1 To diagnose COAG and related conditions, offer all of the following tests:

- visual field assessment using standard automated perimetry (central thresholding test)
- optic nerve assessment using stereoscopic slit lamp biomicroscopy, with pupil dilatation and fundus examination
- IOP measurement using Goldmann applanation tonometry (slit lamp mounted)
- peripheral anterior chamber configuration and depth assessments using gonioscopy
- central corneal thickness (CCT) measurement. **[2017]**

1.2.2 Adopt professional[1]/ Department of Health[2] guidance to reduce the risk of transmitting infective agents via contact tonometry or gonioscopy. **[2009]**

1.2.3 Use the van Herick peripheral anterior chamber depth assessment if clinical circumstances rule out gonioscopy (for example, when people with physical or learning disabilities are unable to participate in the examination). **[2009]**

1.2.4 Obtain an optic nerve head image at diagnosis for baseline documentation (for example, a stereoscopic optic nerve head picture or SD-OCT). **[2009, amended 2017]**

1.2.5 After referral, consider an early assessment appointment when there is clinical concern based on the information provided. **[2017]**

[1] Royal College of Ophthalmologists (https://www.rcophth.ac.uk/wp-content/uploads/2014/12/2010_PROF_100_-CJD-Guidance-for-Ophthalmologists-joint-statement.pdf).
[2] See https://www.gov.uk/government/publications/guidance-from-the-acdp-tse-risk-management-subgroup-formerly-tse-working-group

1.3 Standard practice for all assessments

1.3.1 Ensure that all of the following are made available at each clinical episode to all healthcare professionals involved in a person's care:

- records of all previous tests and images relevant to COAG and ocular hypertension (OHT) assessment
- records of past medical history which could affect drug choice
- current systemic and topical medication
- glaucoma medication record
- drug allergies and intolerances. **[2009]**

1.3.2 Use alternative methods of assessment if clinical circumstances rule out standard methods (for example, when people with physical or learning disabilities are unable to participate in the examination). **[2009]**

1.3.3 Ensure that all machines and measurement instruments are calibrated regularly according to the manufacturers' instructions. **[2009]**

1.4 Reassessment

Reassessment tests

1.4.1 At each assessment, offer the following tests to people with COAG, people suspected of having COAG and people with OHT:

- Goldmann applanation tonometry (slit lamp mounted)
- van Herick peripheral anterior chamber depth assessment. **[2017]**

1.4.2 When clinically indicated, repeat gonioscopy (for example, where a previous examination has been inconclusive or where there is suspicion of a change in clinical status of the anterior chamber angle). **[2017]**

1.4.3 When clinically indicated, repeat visual field testing using standard automated perimetry (central thresholding test) for people with COAG and those suspected of having visual field defects who are being

investigated for possible COAG (see tables 2 and 3 for recommended reassessment intervals). **[2009, amended 2017]**.

1.4.4 When clinically indicated, repeat visual field testing using either a central thresholding test or a supra-threshold test for people with OHT and those suspected of having COAG whose visual fields have previously been documented by standard automated perimetry as being normal (see tables 1 and 2 for recommended reassessment intervals). **[2009, amended 2017]**

1.4.5 When a visual field defect has previously been detected, use the same measurement strategy for each visual field assessment. **[2009]**

1.4.6 When clinically indicated, repeat assessment of the optic nerve head (for example, stereoscopic slit lamp biomicroscopy or imaging). **[2017]**

1.4.7 When a change in optic nerve head status is detected by stereoscopic slit lamp biomicroscopy, obtain a new optic nerve head image for the person's records to provide a fresh benchmark for future assessments. **[2009]**

1.4.8 When an adequate view of the optic nerve head and surrounding area is unavailable at reassessment, people should have their pupils dilated before stereoscopic slit lamp biomicroscopy or optic nerve head imaging is repeated. **[2009]**

When to reassess

People with COAG, suspected COAG and OHT

1.4.9 At each assessment, re-evaluate risk of conversion to COAG and risk of sight loss to set time to next assessment. **[2017]**

1.4.10 At each assessment, ask about general health and, if appropriate, adherence to treatment and any side effects. **[2017]**

People with treated OHT (baseline IOP 24 mmHg or more) and a normal optic nerve head and visual field at most recent assessment

1.4.11 For people with treated OHT (baseline IOP of 24 mmHg or more) and a normal optic head and visual field at the most recent assessment:

- use clinical judgement to assess control of IOP and risk of conversion to COAG, and
- reassess according to table 1. **[2017]**

Table 1 Time to next assessment for people being treated for OHT

Conversion from OHT to COAG	Control of IOP	Time to next assessment[1]
Not detected or uncertain conversion	No	Review management plan and reassess between 1 and 4 months
Uncertain conversion	Yes	Reassess between 6 and 12 months
Not detected	Yes	Reassess between 18 and 24 months
Conversion	No or yes	See recommendations on the diagnosis and reassessment of COAG
[1]Use clinical judgement to decide when the next appointment should take place within the recommended interval.		

People with suspected COAG

1.4.12 For people with suspected COAG:

- use clinical judgement to assess control of IOP and risk of conversion to COAG (optic nerve head damage and visual field defect), and
- reassess according to table 2. **[2017]**

Table 2 Time to next assessment for people with suspected COAG

Conversion to COAG	Control of IOP	Time to next assessment[1]
Not detected or uncertain conversion	No	Review management plan and reassess between 1 and 4 months
Uncertain conversion	Yes	Reassess between 6 and 12 months
Not detected	Yes	Reassess between 12 and 18 months
Conversion	No or yes	See recommendations on the diagnosis and reassessment of COAG
[1]Use clinical judgement to decide when the next appointment should take place within the recommended interval.		

People with COAG

1.4.13 For people with COAG:

- use clinical judgement to assess risk of COAG progression to sight loss, and
- reassess according to table 3. **[2017]**

Table 3 Time to next assessment for people with COAG

Progression of COAG	Control of IOP	Time to next assessment[1]
Not detected	No	Review treatment plan and reassess between 1 and 4 months
Uncertain progression or progression	No	Review treatment plan and reassess between 1 and 2 months
Not detected	Yes	Reassess between 12 and 18 months
Uncertain progression or progression	Yes	Review treatment plan and reassess between 2 and 6 months
[1]Use clinical judgement to decide when the next appointment should take place within the recommended interval.		

Discharge back to primary care

1.4.14 Discharge people back to primary eye care services if:

- they were referred for OHT but do not need treatment
- they were referred for suspected COAG but this is no longer suspected.

[2017]

1.4.15 Give a discharge summary to people who have been assessed and discharged to primary care. Send a copy to their GP and, with patient consent, copy the relevant information to the primary eye care professional nominated by the patient. Advise people to take their discharge summary with them when attending future sight tests. **[2017]**

1.5 Treatment

1.5.1 Check that there are no relevant comorbidities or potential drug interactions before offering pharmacological treatment. **[2009]**

Treatment for people with OHT

1.5.2 Offer a generic prostaglandin analogue (PGA)[3] to people with IOP of 24 mmHg or more (OHT) if they are at risk of visual impairment within their lifetime. **[2017]**

1.5.3 Do not offer treatment to people with OHT who are not at risk of visual impairment in their lifetime. Advise people to continue regular visits to their primary eye care professional. **[2017]**

1.5.4 Offer another pharmacological treatment to people with an IOP of 24 mmHg or more who cannot tolerate their current treatment. The first choice should be an alternative generic PGA if available and if this is not tolerated offer a beta-blocker. If none of these options are tolerated offer non-generic PGA, carbonic anhydrase inhibitors, sympathomimetics, miotics or a combination of treatments. **[2017]**

1.5.5 Offer a drug from another therapeutic class (beta-blocker, carbonic anhydrase inhibitor[4] or sympathomimetic) to people with an IOP of 24 mmHg or more whose current treatment is not reducing IOP sufficiently to prevent the risk of progression to sight loss. Topical drugs from different therapeutic classes may be needed at the same time to control IOP. **[2009, amended 2017]**

1.5.6 Refer people whose IOP cannot be reduced sufficiently with pharmacological treatment to prevent the risk of progression to sight loss to a consultant ophthalmologist to discuss other options. **[2009]**

1.5.7 Offer preservative-free eye drops to people who have an allergy to preservatives or people with clinically significant and symptomatic

[3] At the time of consultation (June 2017), not all generic PGAs had a UK marketing authorisation for first-line treatment. The prescriber should follow relevant professional guidance, taking full responsibility for the decision. Informed consent should be obtained and documented. See the General Medical Council's Prescribing guidance: prescribing unlicensed medicines for further information.

[4] At the time of consultation (June 2017), some carbonic anhydrase inhibitors were licensed for use only when beta-blockers were not tolerated or were contraindicated. The prescriber should follow relevant professional guidance, taking full responsibility for the decision. Informed consent should be obtained and documented. See the General Medical Council's Prescribing guidance: prescribing unlicensed medicines for further information.

ocular surface disease, but only if they are at high risk of conversion to COAG. **[2009, amended 2017]**

Treatment for people with suspected COAG

1.5.8 Do not offer treatment to people with suspected COAG and IOP less than 24 mmHg. Advise people to continue regular visits to their primary eye care professional. **[2017]**

1.5.9 Offer a generic PGA[5] to people with suspected COAG and IOP of 24 mmHg or more, in line with the recommendations on treatment for people with OHT. **[2017]**

Stopping treatment for people with OHT or suspected COAG

1.5.10 Discuss the benefits and risks of stopping treatment with people with OHT or suspected COAG who have both:

- a low risk of ever developing visual impairment within their lifetime
- an acceptable IOP.

If a person decides to stop treatment after this discussion, offer to assess their IOP in 1 to 4 months with further reassessment if clinically indicated. **[2009]**

Treatment for people with COAG

1.5.11 Offer a generic PGA[6] to people with COAG. **[2017]**

1.5.12 Offer people with advanced COAG, surgery with pharmacological augmentation (MMC[7] ~~or 5-FU~~) as indicated. Offer them information on the risks and benefits associated with surgery. **[2009, amended 2017]**

[5] At the time of consultation (June 2017), not all generic PGAs had a UK marketing authorisation for first-line treatment. The prescriber should follow relevant professional guidance, taking full responsibility for the decision. Informed consent should be obtained and documented. See the General Medical Council's Prescribing guidance: prescribing unlicensed medicines for further information.

[6] At the time of consultation (June 2017), not all generic PGAs had a UK marketing authorisation for first-line treatment. The prescriber should follow relevant professional guidance, taking full responsibility for the decision. Informed consent should be obtained and documented. See the General Medical Council's Prescribing guidance: prescribing unlicensed medicines for further information.

1.5.13 Offer people who present with advanced COAG and who are listed for surgery, interim treatment with a generic PGA[8]. **[2009, amended 2017]**

1.5.14 Encourage people to continue with the same pharmacological treatment unless:

- their IOP cannot be reduced sufficiently to prevent the risk of progression to sight loss
- there is progression of optic nerve head damage
- there is progression of visual field defect
- they cannot tolerate the drug. **[2009]**

1.5.15 Ask about adherence to treatment and check the eye drop instillation technique in people with COAG whose IOP has not been reduced sufficiently to prevent the risk of progression to sight loss despite pharmacological treatment. If adherence and eye drop instillation technique are satisfactory offer 1 of the following:

- a drug from another therapeutic class (a beta-blocker, carbonic anhydrase inhibitor[9] or sympathomimetic); topical drugs from different therapeutic classes may be needed at the same time to control IOP
- laser trabeculoplasty
- surgery with pharmacological augmentation (MMC[10] ~~or 5-FU~~) as indicated.

[7] At the time of consultation (June 2017), MMC did not have a UK marketing authorisation for this indication. The prescriber should follow relevant professional guidance, taking full responsibility for the decision. Informed consent should be obtained and documented. See the General Medical Council's Prescribing guidance: prescribing unlicensed medicines for further information.

[8] At the time of consultation (June 2017), not all generic PGAs had a UK marketing authorisation for first-line treatment. The prescriber should follow relevant professional guidance, taking full responsibility for the decision. Informed consent should be obtained and documented. See the General Medical Council's Prescribing guidance: prescribing unlicensed medicines for further information.

[9] At the time of consultation (June 2017), some carbonic anhydrase inhibitors were licensed for use only when beta-blockers were not tolerated or were contraindicated. The prescriber should follow relevant professional guidance, taking full responsibility for the decision. Informed consent should be obtained and documented. See the General Medical Council's Prescribing guidance: prescribing unlicensed medicines for further information.

[10] At the time of consultation (June 2017), MMC did not have a UK marketing authorisation for this indication. The prescriber should follow relevant professional guidance, taking full responsibility for the

If the drug treatment option is chosen, after trying drugs from 2 therapeutic classes, consider offering surgery with pharmacological augmentation (MMC[11] ~~or 5-FU~~) as indicated or laser trabeculoplasty. **[2009, amended 2017]**

1.5.16 Offer surgery with pharmacological augmentation (MMC[12] ~~or 5-FU~~) as indicated to people with COAG who are at risk of progressing to sight loss despite treatment. Offer them information on the risks and benefits associated with surgery. **[2009, amended 2017]**

1.5.17 Consider offering people with COAG who cannot tolerate a treatment:

- a drug from another therapeutic class (a beta-blocker, carbonic anhydrase inhibitor[13] or sympathomimetic) or
- preservative-free eye drops if there is evidence that the person is allergic to the preservative or has clinically significant and symptomatic ocular surface disease

After trying drugs from 2 therapeutic classes, consider offering surgery with pharmacological augmentation (MMC[14] ~~or 5-FU~~) as indicated or laser trabeculoplasty. **[2009, amended 2017]**

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decision. Informed consent should be obtained and documented. See the General Medical Council's Prescribing guidance: prescribing unlicensed medicines for further information.

[11] At the time of consultation (June 2017), MMC did not have a UK marketing authorisation for this indication. The prescriber should follow relevant professional guidance, taking full responsibility for the decision. Informed consent should be obtained and documented. See the General Medical Council's Prescribing guidance: prescribing unlicensed medicines for further information.

[12] At the time of consultation (June 2017), MMC did not have a UK marketing authorisation for this indication. The prescriber should follow relevant professional guidance, taking full responsibility for the decision. Informed consent should be obtained and documented. See the General Medical Council's Prescribing guidance: prescribing unlicensed medicines for further information.

[13] At the time of consultation (June 2017), some carbonic anhydrase inhibitors were licensed for use only when beta-blockers were not tolerated or were contraindicated. The prescriber should follow relevant professional guidance, taking full responsibility for the decision. Informed consent should be obtained and documented. See the General Medical Council's Prescribing guidance: prescribing unlicensed medicines for further information.

[14] At the time of consultation (June 2017), MMC did not have a UK marketing authorisation for this indication. The prescriber should follow relevant professional guidance, taking full responsibility for the decision. Informed consent should be obtained and documented. See the General Medical Council's Prescribing guidance: prescribing unlicensed medicines for further information.

1.5.18 After surgery offer people with COAG whose IOP has not been reduced sufficiently to prevent the risk of progression to sight loss 1 of the following:

- pharmacological treatment; topical drugs from different therapeutic classes may be needed at the same time to control IOP
- further surgery
- laser trabeculoplasty or cyclodiode laser treatment. **[2009, amended 2017]**

1.5.19 Offer people with COAG who prefer not to have surgery or for whom surgery is not suitable:

- pharmacological treatment; topical drugs from different therapeutic classes may be needed at the same time to control IOP
- laser trabeculoplasty or cyclodiode laser treatment. **[2009, amended 2017]**

1.6 Organisation of care

1.6.1 Refer people with suspected optic nerve damage or repeatable visual field defect, or both, to a consultant ophthalmologist for consideration of a definitive diagnosis and formulation of a management plan. **[2009]**

1.6.2 Diagnosis of OHT and suspected COAG and formulation of a management plan should be made by a suitably trained healthcare professional with:

- a specialist qualification (when not working under the supervision of a consultant ophthalmologist) and
- relevant experience. **[2009]**

1.6.3 Be aware that holding an independent or non-medical prescribing qualification alone (without a specialist qualification relevant to the case complexity of glaucoma being managed) is insufficient for managing glaucoma and related conditions. **[2017]**

1.6.4 Healthcare professionals involved in the diagnosis of OHT and COAG suspect status and preliminary identification of COAG should be trained in case detection and referral refinement and be able to identify abnormalities based on relevant clinical tests and assessments. They should understand the principles of diagnosis of OHT and COAG and be able to perform and interpret all of the following:

- medical and ocular history
- differential diagnosis
- Goldmann applanation tonometry (slit lamp mounted)
- standard automated perimetry (central thresholding test)
- central supra-threshold perimetry
- stereoscopic slit lamp biomicroscopic examination of anterior segment
- examination of the posterior segment using a slit lamp binocular indirect ophthalmoscopy
- gonioscopy
- van Herick peripheral anterior chamber depth assessment
- CCT measurement. **[2009]**

1.6.5 People with OHT, suspected COAG or COAG should have monitoring and treatment from a trained healthcare professional who has all of the following:

- a specialist qualification (when not working under the supervision of a consultant ophthalmologist)
- relevant experience
- ability to detect a change in clinical status. **[2009]**

1.6.6 Healthcare professionals involved in the monitoring and treatment of OHT, suspected COAG and established COAG should be trained to make management decisions on all of the following:

- risk factors for conversion to COAG
- coexisting pathology
- risk of sight loss

- monitoring and detecting a change in clinical status (for example, visual field changes, stereoscopic slit lamp biomicroscopic examination of anterior segment and posterior segment)
- pharmacology of IOP-lowering drugs
- treatment changes for COAG, suspected COAG and OHT (with consideration given to relevant contraindications and interactions). **[2009]**

1.6.7 People with a confirmed diagnosis of OHT or suspected COAG and who have an established management plan may have monitoring (but not treatment) from a suitably trained healthcare professional with knowledge of OHT and COAG, relevant experience and ability to detect a change in clinical status. The healthcare professional should be able to perform and interpret all of the following:

- Goldmann applanation tonometry (slit lamp mounted)
- standard automated perimetry (central thresholding test)
- central supra-threshold perimetry (this visual field strategy may be used for monitoring OHT or suspected COAG when the visual field is normal)
- stereoscopic slit lamp biomicroscopic examination of the anterior segment
- van Herick peripheral anterior chamber depth assessment
- examination of the posterior segment using slit lamp binocular indirect ophthalmoscopy. **[2009]**

1.6.8 Healthcare professionals who diagnose, treat or monitor independently of consultant ophthalmologist supervision should take full responsibility for the care they provide. **[2009]**

1.7 Providing information

1.7.1 Offer people the opportunity to discuss their diagnosis, prognosis and treatment, and provide them with relevant information in an accessible format at initial and subsequent visits. This may include information on the following:

- their specific condition (OHT, suspected COAG and COAG), its life-long implications and their prognosis for retention of sight
- that COAG in the early stages and OHT and suspected COAG are symptomless
- that most people having treatment for COAG will have good quality of life and not go blind
- that once lost, sight cannot be recovered
- that glaucoma can run in families and that family members may wish to be tested for the condition
- the importance of the person's role in their own treatment – for example, the ongoing regular application of eye drops to preserve sight
- the different types of treatment options, including mode of action, frequency and severity of side effects, and risks and benefits of treatment, so that people are able to take an active part in decision-making
- how to apply eye drops, including technique (punctal occlusion and devices) and hygiene (storage)
- the need for regular monitoring as specified by the healthcare professional
- methods of investigation during assessment
- how long each appointment is likely to take and whether the person will need any help to attend (for example, driving soon after pupil dilatation would be inadvisable)
- the eye clinic liaison officer (ECLO)
- support organisations and support groups
- compliance aids (such as dispensers) available from their GP or community pharmacist
- Letter of Vision Impairment (LVI), Referral of Vision Impairment (RVI) and Certificate of Vision Impairment (CVI), registration
- Driver and Vehicle Licensing Agency (DVLA) regulations. **[2009, amended 2017]**

Terms used in this guideline

COAG and related conditions

These include COAG, OHT and suspected COAG.

Enhanced case-finding

Enhanced community case-finding services use slit lamp mounted Goldmann applanation tonometry, dilated slit lamp indirect biomicroscopy and other tests deemed necessary by the healthcare professional.

Hospital-based triage

A hospital-based risk assessment shortly after referral. Initial tests are performed to determine what happens next. For example, people at a low risk following initial testing by a nurse or technician may be discharged whereas those at higher risk may be directed to a more senior member of the assessment and diagnostic team, such as a consultant ophthalmologist.

Primary eye care professionals

These include optometrists, GPs with a special interest in ophthalmology and community orthoptists.

Referral filtering

A general term for any type of accuracy checking before referral to hospital eye services. Referral filtering may take the form of ‘repeat measures’, ‘enhanced case-finding’, ‘referral refinement’, ‘hospital-based triage’ or ‘administrative paper-based triage’.

Referral refinement

A 2-tier assessment in which initial evidence of abnormality found during case-finding or screening is validated by an enhanced assessment, which adds value beyond that achieved through a simple 'repeat measures' scheme. A referral refinement service performs tests to diagnose OHT and suspected COAG and interprets the results in the light of clinical findings. Specialist practitioners who deliver this service independently have the qualifications and experience set out in the recommendations on Organisation of care. Practitioners providing a referral

refinement service should be qualified to make a diagnosis of OHT and suspected glaucoma, and to carry out gonioscopy to exclude angle-closure glaucoma.

Repeat measures

The repeated measurement of parameters related to the diagnosis of glaucoma. A simple repeat measures scheme may involve repeat measurement of IOP only. Other repeat measures schemes may also include repeated measurement of visual fields and other relevant ocular parameters when clinically necessary.

Sight loss

Sight loss in glaucoma is visual damage that manifests as blind spots in the field of vision. Early on these are mostly asymptomatic with many people being unware of a problem. Sight loss may progress and become symptomatic and eventually cause visual impairment.

Sight test

A sight test determines whether or not a person has a sight defect, and if so what is needed to correct, remedy or relieve it. An optometrist performing a sight test has to conduct the examinations specified in the Sight Testing (Examination and Prescription) (No 2) Regulations 1989. These include an internal and external examination of the eyes and any other examinations needed to detect signs of injury, disease or abnormality in the eye or elsewhere.

Visual impairment

A severe reduction in vision, which cannot be corrected with standard glasses or contact lenses and reduces a person's ability to function in a visual environment.

Putting this guideline into practice

[This section will be completed after consultation]

NICE has produced tools and resources [link to tools and resources tab] to help you put this guideline into practice.

[Optional paragraph if issues raised] Some issues were highlighted that might need specific thought when implementing the recommendations. These were raised during the development of this guideline. They are:

- [add any issues specific to guideline here]
- [Use 'Bullet left 1 last' style for the final item in this list.]

Putting recommendations into practice can take time. How long may vary from guideline to guideline, and depends on how much change in practice or services is needed. Implementing change is most effective when aligned with local priorities.

[Clinical topics only] Changes recommended for clinical practice that can be done quickly – like changes in prescribing practice – should be shared quickly. This is because healthcare professionals should use guidelines to guide their work – as is required by professional regulating bodies such as the General Medical and Nursing and Midwifery Councils.

Changes should be implemented as soon as possible, unless there is a good reason for not doing so (for example, if it would be better value for money if a package of recommendations were all implemented at once).

Different organisations may need different approaches to implementation, depending on their size and function. Sometimes individual practitioners may be able to respond to recommendations to improve their practice more quickly than large organisations.

Here are some pointers to help organisations put NICE guidelines into practice:

1. **Raise awareness** through routine communication channels, such as email or newsletters, regular meetings, internal staff briefings and other communications with all relevant partner organisations. Identify things staff can include in their own practice straight away.

2. **Identify a lead** with an interest in the topic to champion the guideline and motivate others to support its use and make service changes, and to find out any significant issues locally.

3. **Carry out a baseline assessment** against the recommendations to find out whether there are gaps in current service provision.

4. **Think about what data you need to measure improvement** and plan how you will collect it. You may want to work with other health and social care organisations and specialist groups to compare current practice with the recommendations. This may also help identify local issues that will slow or prevent implementation.

5. **Develop an action plan**, with the steps needed to put the guideline into practice, and make sure it is ready as soon as possible. Big, complex changes may take longer to implement, but some may be quick and easy to do. An action plan will help in both cases.

6. **For very big changes** include milestones and a business case, which will set out additional costs, savings and possible areas for disinvestment. A small project group could develop the action plan. The group might include the guideline champion, a senior organisational sponsor, staff involved in the associated services, finance and information professionals.

7. **Implement the action plan** with oversight from the lead and the project group. Big projects may also need project management support.

8. **Review and monitor** how well the guideline is being implemented through the project group. Share progress with those involved in making improvements, as well as relevant boards and local partners.

NICE provides a comprehensive programme of support and resources to maximise uptake and use of evidence and guidance. See our into practice pages for more information.

Also see Leng G, Moore V, Abraham S, editors (2014) Achieving high quality care – practical experience from NICE. Chichester: Wiley.

Context

The scope of this guideline on the diagnosis and management of chronic open angle glaucoma has been extended to cover referral. This includes the most effective

service models for referral filtering schemes (repeat measures, enhanced case-finding and referral refinement), the tests to be used for finding people with chronic open angle glaucoma, suspected chronic open angle glaucoma and ocular hypertension, and thresholds for onward referral. We have also updated the recommendations on tests for diagnosis and reassessment, pharmacological treatments for lowering intraocular pressure and preservation of visual field, and intervals for clinical review and reassessment.

The guideline emphasises reassessment for glaucoma and related conditions with a view to encouraging flexible clinical judgement about the frequency of reassessment and stopping treatment when the patient agrees that the perceived risk to a sighted lifetime is low.

In line with other NICE guidelines, the guideline does not cover population-based screening programmes.

More information

[The following sentence is for post-consultation versions only – editor to update hyperlink with guideline number]You can also see this guideline in the NICE pathway on [pathway title].

To find out what NICE has said on topics related to this guideline, see our web page on [developer to add and link topic page title or titles; editors can advise if needed].

[The following sentence is for post-consultation versions only – editor to update hyperlink with guideline number]See also the guideline committee's discussion and the evidence reviews (in the full guideline), and information about how the guideline was developed, including details of the committee.

Recommendations for research

The guideline committee has made the following recommendations for research.

1 Risk tools to identify risk of developing COAG

What is the predictive value of risk tools for identifying people in the community who are at increased risk of developing chronic open-angle glaucoma (COAG)?

Why this is important

Most cases of COAG are first detected by case-finding in community optometry after a sight test (with or without repeat measures, enhanced case-finding, or referral refinement). Identifying at case-finding which people are at high risk of conversion to COAG is important for guiding decisions about monitoring, treatment and referral. However, current evidence on the sensitivity and specificity of risk tools for developing COAG is of moderate-to-low quality, with all studies having a high or very high risk of bias. There was no evidence on cost effectiveness.

2 Risk tools to identify risk of sight loss

What is the predictive value of risk tools for identifying people with chronic open angle glaucoma (COAG) who are at an increased risk of sight loss?

Why this is important

A risk tool that identifies people with COAG who are at risk of progression to sight loss would be useful for both patients and healthcare professionals. People at higher risk of sight loss could have more frequent testing and perhaps more intensive treatment, whereas people at lower risk could have less frequent assessments and potentially less intensive treatment.

3 Treatment for people with an IOP of 22 or 23 mmHg

What is the clinical and cost effectiveness of treating an intraocular pressure (IOP) of 22 or 23 mmHg?

Why this is important

The only proven intervention for preventing and controlling glaucoma is lowering IOP. It has been widely accepted that the upper limit of statistically normal IOP is 21 mmHg. This was also accepted as the threshold for treatment and most treatment studies aimed to achieve this target or a reduction in IOP of between 25% and 35% from baseline. However, more recently the Ocular Hypertension Treatment Study

(OHTS) enrolled people with an IOP between 24 mmHg and 32 mmHg but without glaucomatous optic nerve damage to receive treatment or no treatment. The results showed a reduction in 5-year incidence of very early glaucoma (either optic disc or visual field changes) from 9.5% in people not receiving treatment to 4.4% in those having treatment. This leaves an area of uncertainty about treatment for people with an IOP above 21 mmHg but below 24 mmHg. There are about 1.8 million people in the UK with an IOP of 22 or 23 mmHg. The costs associated with management in these people are sufficient to make this question of national importance.

Update information

October 2017

This guideline is an update of NICE guideline CG85 (published April 2009) and will replace it.

New recommendations have been added for case-finding, diagnosis, reassessment and treatment.

These are marked as:

- **[2017]**.

NICE proposes to delete some recommendations from the 2009 guideline, because either the evidence has been reviewed and the recommendations have been updated, or NICE has updated other relevant guidance and has replaced the original recommendations. Recommendations that have been deleted or changed sets out these recommendations and includes details of replacement recommendations. Where there is no replacement recommendation, an explanation for the proposed deletion is given.

Where recommendations are shaded in grey and end **[2009]**, the evidence has not been reviewed since the original guideline.

Where recommendations are shaded in grey and end **[2009, amended 2017]**, the evidence has not been reviewed but changes have been made to the recommendation wording that change the meaning (for example, because of equalities duties or a change in the availability of medicines, or incorporated

guidance has been updated). These changes are marked with yellow shading, and explanations of the reasons for the changes are given in 'Recommendations that have been deleted or changed' for information.

See also the original NICE guideline and supporting documents.

Recommendations that have been deleted or changed

Recommendations to be deleted

Recommendation in 2009 guideline	Comment
Repeat CCT measurement as necessary (for example, following laser refractive surgery or at onset or progression of corneal pathology). (1.2.2)	This recommendation has been deleted because the committee agreed that this is already widely accepted as common practice and treatment decisions are no longer based on CCT in this guideline.

1 Amended recommendation wording (change to meaning)

Recommendation in 2009 guideline	Recommendation in current guideline	Reason for change
Obtain an optic nerve head image at diagnosis for baseline documentation. (1.1.4)	Obtain an optic nerve head image at diagnosis for baseline documentation (for example, a stereoscopic optic nerve head picture or OCT). (1.2.4)	Clarification added that this image may be acquired by a stereoscopic optic nerve head picture (leaving it open to either biomicroscopy slit lamp examination or stereo photography) or OCT, whichever is more readily available at the time of diagnosis.
Offer standard automated perimetry (central thresholding test) to all people who have established COAG and those suspected of having visual field defects who are being investigated for possible COAG. People with diagnosed OHT and those suspected of having COAG whose visual fields have previously been documented by standard automated perimetry as being normal may be monitored using supra-threshold perimetry (see tables 4 and 5 for recommended monitoring intervals). (1.2.5)	When clinically indicated, repeat visual field testing using standard automated perimetry (central thresholding test) for people with COAG and those suspected of having visual field defects who are being investigated for possible COAG (see tables 2 and 3 for recommended reassessment intervals). (1.4.4)	The original recommendation contained 2 separate instructions (1 for people with established COAG and those having initial investigation for possible COAG, and 1 for follow-up of people with an established diagnosis of suspected COAG or OHT). These 2 instructions have now been separated into 2 recommendations to improve clarity.
Offer standard automated perimetry (central thresholding test) to all people who have established COAG and those suspected of having visual field defects who are being investigated for possible COAG. People with diagnosed OHT and those suspected of having COAG whose visual fields have previously been documented by standard automated perimetry as being normal may be monitored using supra-	When clinically indicated, repeat visual field testing using either a central thresholding test or a supra-threshold test for people with OHT and those suspected of having COAG whose visual fields have previously been documented by standard automated perimetry as being normal (see tables 1 and 2 for recommended reassessment intervals). (1.4.5)	As above, the original recommendation contained 2 separate instructions (1 for people with established COAG and those having initial investigation for possible COAG, and 1 for follow-up of people with an established diagnosis of suspected COAG or OHT). These 2

threshold perimetry (see tables 4 and 5 for recommended monitoring intervals). (1.2.5)		instructions have now been separated into 2 recommendations to improve clarity. The original recommendation was suggesting that for people with OHT and COAG suspects with normal visual fields, it would be acceptable to use the supra-threshold test as opposed to the superior central thresholding test (CTT) recommended for those with established COAG. However the committee wished to clarify that the CTT is also an option for this population if it is clinically available.
Offer alternative pharmacological treatment (a prostaglandin analogue, beta-blocker, carbonic anhydrase inhibitor or sympathomimetic) to treated people with OHT or suspected COAG whose IOP cannot be reduced sufficiently to prevent the risk of progression to sight loss. More than one agent may be needed concurrently to achieve target IOP. (1.3.5)	Offer a drug from another therapeutic class (beta-blocker, carbonic anhydrase inhibitor or sympathomimetic) to people with an IOP of 24 mmHg or more whose current treatment is not reducing IOP sufficiently to prevent the risk of progression to sight loss. Topical drugs from different therapeutic classes may be needed at the same time to control IOP. (1.5.5)	Clarification that the drug should be from another therapeutic class when switching to another monotherapy and when adding another drug. This clarification was considered important because committee members were aware of inappropriate switching through multiple examples of drugs from the same class (for example, multiple PGA switches).
Offer a preservative-free preparation to people with OHT or suspected COAG and an allergy to preservatives only if they are at high risk of conversion to COAG (IOP more than 25 and up to 32 mmHg and	Offer preservative-free eye drops to people who have an allergy to preservatives or people with clinically significant and symptomatic ocular surface disease, but only if they are at high risk of conversion to COAG. (1.5.7)	High risk of conversion is no longer defined in the guideline by IOP and CCT so these parameters have been removed from the recommendation.

CCT less than 555 micrometres, or IOP more than 32 mmHg). (1.3.7)		Treatment adherence may be significantly affected by both allergic and non-allergic reactions (preservative toxicity). Preservative toxicity is a particular problem for people with ocular surface diseases so this group was added to the recommendation.
Offer people with advanced COAG surgery with pharmacological augmentation (MMC or 5-FU)[4] as indicated. Offer them information on the risks and benefits associated with surgery. (1.4.3)	Offer people with advanced COAG, surgery with pharmacological augmentation (MMC) as indicated. Offer them information on the risks and benefits associated with surgery. (1.5.12)	5FU is no longer used as standard practice during surgical treatment and postoperative care.
Offer people who present with advanced COAG and who are listed for surgery interim treatment with a prostaglandin analogue. (1.4.4)	Offer people who present with advanced COAG and who are listed for surgery, interim treatment with a generic PGA. (1.5.13)	Generic PGAs are now recommended in the guideline for first-line treatment.
Check the person's adherence to their treatment and eye drop instillation technique in people with COAG whose IOP has not been reduced sufficiently to prevent the risk of progression to sight loss despite pharmacological treatment. If adherence and eye drop instillation technique are satisfactory offer one of the following: • alternative pharmacological treatment (a prostaglandin analogue, beta-blocker, carbonic anhydrase inhibitor or sympathomimetic); more than one agent may be needed concurrently to achieve target IOP • laser trabeculoplasty • surgery with pharmacological	Ask about adherence to treatment and check the eye drop instillation technique in people with COAG whose IOP has not been reduced sufficiently to prevent the risk of progression to sight loss despite pharmacological treatment. If adherence and eye drop instillation technique are satisfactory offer 1 of the following: • a drug from another therapeutic class (a beta-blocker, carbonic anhydrase inhibitor or sympathomimetic); topical drugs from different therapeutic classes may be needed at the same time to control IOP • laser trabeculoplasty • surgery with pharmacological	Clarification that the drug should be from another therapeutic class when switching to another monotherapy and when adding another drug. 5FU is no longer used as standard practice during surgical treatment and postoperative care.

augmentation (MMC or 5-FU[4]) as indicated. If the pharmacological treatment option is chosen, after trying two alternative pharmacological treatments consider offering surgery with pharmacological augmentation (MMC or 5-FU[4]) as indicated or laser trabeculoplasty. (1.4.6)	augmentation (MMC) as indicated. If the drug treatment option is chosen, after trying drugs from 2 therapeutic classes, consider offering surgery with pharmacological augmentation as indicated or laser trabeculoplasty. (1.5.15)	
Offer surgery with pharmacological augmentation (MMC or 5-FU[4]) as indicated to people with COAG who are at risk of progressing to sight loss despite treatment. Offer them information on the risks and benefits associated with surgery. (1.4.7)	Offer surgery with pharmacological augmentation (MMC) as indicated to people with COAG who are at risk of progressing to sight loss despite treatment. Offer them information on the risks and benefits associated with surgery. (1.5.16)	5FU is no longer used as standard practice during surgical treatment and postoperative care.
Consider offering people with COAG who are intolerant to a prescribed medication: •alternative pharmacological treatment (a prostaglandin analogue, beta-blocker, carbonic anhydrase inhibitor or sympathomimetic) or •a preservative-free preparation if there is evidence that the person is allergic to the preservative. After trying two alternative pharmacological treatments consider offering surgery with pharmacological augmentation (MMC or 5-FU[4]) as indicated or laser trabeculoplasty. (1.4.8)	Consider offering people with COAG who cannot tolerate a treatment: • a drug from another therapeutic class (a beta-blocker, carbonic anhydrase inhibitor or sympathomimetic) or • preservative-free eye drops if there is evidence that the person is allergic to the preservative or has clinically significant and symptomatic ocular surface disease After trying drugs from 2 therapeutic classes, consider offering surgery with pharmacological augmentation (MMC) as indicated or laser trabeculoplasty. (1.5.17)	Clarification that the drug should be from another therapeutic class when switching to another monotherapy. Treatment adherence may be significantly affected by both allergic and non-allergic reactions (preservative toxicity). Preservative toxicity is a particular problem for people with ocular surface diseases so this group was added to the recommendation. 5FU is no longer used as standard practice during surgical treatment and postoperative care.
After surgery offer people with COAG whose IOP has not been reduced sufficiently to prevent the risk of progression to sight loss one	After surgery offer people with COAG whose IOP has not been reduced sufficiently to prevent the risk of progression to sight loss 1 of	Clarification that the drug should be from another therapeutic class when switching to another

of the following: •pharmacological treatment (a prostaglandin analogue, beta‑blocker, carbonic anhydrase inhibitor or sympathomimetic); more than one agent may be needed concurrently to achieve target IOP •further surgery •laser trabeculoplasty or cyclodiode laser treatment. (1.4.9)	the following: • pharmacological treatment; topical drugs from different therapeutic classes may be needed at the same time to control IOP • further surgery • laser trabeculoplasty or cyclodiode laser treatment. (1.5.18)	monotherapy and when adding another drug.
Offer people with COAG who prefer not to have surgery or who are not suitable for surgery: •pharmacological treatment (a prostaglandin analogue, beta‑blocker, carbonic anhydrase inhibitor or sympathomimetic); more than one agent may be needed concurrently to achieve target IOP •laser trabeculoplasty or cyclodiode laser treatment. (1.4.10)	Offer people with COAG who prefer not to have surgery or for whom surgery is not suitable: • pharmacological treatment; topical drugs from different therapeutic classes may be needed at the same time to control IOP • laser trabeculoplasty or cyclodiode laser treatment. (1.5.19)	Clarification that the drug should be from another therapeutic class when switching to another monotherapy and when adding another drug.
Offer people the opportunity to discuss their diagnosis, prognosis and treatment, and provide them with relevant information in an accessible format at initial and subsequent visits. This may include information on the following: • their specific condition (OHT, suspected COAG and COAG), its life-long implications and their prognosis for retention of sight • that COAG in the early stages and OHT and suspected COAG are symptomless • that most people treated for COAG will not go blind • that once lost, sight cannot be recovered	Offer people the opportunity to discuss their diagnosis, prognosis and treatment, and provide them with relevant information in an accessible format at initial and subsequent visits. This may include information on the following: • their specific condition (OHT, suspected COAG and COAG), its life-long implications and their prognosis for retention of sight • that COAG in the early stages and OHT and suspected COAG are symptomless • that most people having treatment for COAG will have good quality of life and not go blind	Amended to indicate that patient information should also include: • reassurance that most people having treatment for COAG will have a good quality of life • reference to the eye clinic liaison officer (ECLO) as these now available in many clinics •reference to support organisations.

• that glaucoma can run in families and that family members may wish to be tested for the disease • the importance of the person's role in their own treatment – for example, the ongoing regular application of eye drops to preserve sight • the different types of treatment options, including mode of action, frequency and severity of side effects, and risks and benefits of treatment, so that people are able to be active in the decision-making process • how to apply eye drops, including technique (punctal occlusion and devices) and hygiene (storage) • the need for regular monitoring as specified by the healthcare professional • methods of investigation during assessment • how long each appointment is likely to take and whether the person will need any help to attend (for example, driving soon after pupil dilatation would be inadvisable) • support groups • compliance aids (such as dispensers) available from their GP or community pharmacist • Letter of Vision Impairment (LVI), Referral of Vision Impairment (RVI) and Certificate of Vision Impairment (CVI) registration • Driver and Vehicle Licensing Agency (DVLA) regulations. (1.6.1)	• that once lost, sight cannot be recovered • that glaucoma can run in families and that family members may wish to be tested for the condition • the importance of the person's role in their own treatment – for example, the ongoing regular application of eye drops to preserve sight • the different types of treatment options, including mode of action, frequency and severity of side effects, and risks and benefits of treatment, so that people are able to take an active part in decision-making • how to apply eye drops, including technique (punctal occlusion and devices) and hygiene (storage) • the need for regular monitoring as specified by the healthcare professional • methods of investigation during assessment • how long each appointment is likely to take and whether the person will need any help to attend (for example, driving soon after pupil dilatation would be inadvisable) • the eye clinic liaison officer (ECLO) • support organisations and support groups • compliance aids (such as dispensers) available from their GP or community pharmacist • Letter of Vision Impairment (LVI), Referral of Vision Impairment (RVI) and Certificate of Vision Impairment (CVI), registration • Driver and Vehicle Licensing Agency (DVLA) regulations. (1.7.1)	

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2 ISBN: