

# Community Eye Health *Journal*

A number of common eye conditions can be detected using a torch. **INDIA**  
DR. SHIVAM MAINI, OPERATION EYESIGHT



## Examining the eye



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All health workers should be able to carry out a good eye examination of the front of the eye. In this issue, we explain how this can be done with limited resources.

Most patients with vision or eye problems will first be seen by a health worker who is not an ophthalmologist. In high-resource countries, this may be a general physician or an optometrist, and in low-resource settings it is more likely to be a community or primary health care worker. These health workers, who have to be able to assess any medical condition, often have limited knowledge and experience with regards to eye diseases, as well as limited equipment with which to examine the eye. This may result in health workers feeling disempowered and unable to help anyone with an eye condition. In practice, a number of common eye diseases can be diagnosed by examination of the eye with a torch and assessment of vision using a visual acuity chart, both of which are inexpensive and easy to use.

The aim of this issue is to support non-specialists to confidently carry out an eye examination.

The first step is to take a history. The presentation of common eye diseases can be usefully divided into four main groups of symptoms:

- 1 Red, sore, painful eye or eyes (including injury to the eye).
- 2 Decreased distance vision in one or both eyes, whether sudden or gradual.
- 3 A reduced ability to read small print or see near objects after the age of 40 years.
- 4 Any other specific eye symptom, such as double vision, swelling of an eyelid, watering or squint.

*Continues overleaf* ►





## About this issue

A number of common eye diseases can be detected by examining the eye with a torch and assessing vision using a visual acuity chart, both of which are relatively inexpensive and easy to find. Carrying out a good eye examination is a skill that is worth practising and doing well, and in this issue we will show you how.

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Deciding which of these main groups of symptoms a patient is complaining of enables us to start thinking about possible different diagnoses.

The second step is to measure the vision in each eye. This is described on page 46 for distance vision and on page 47 for those with difficulties to see for reading. Note: The severity of vision loss is an indicator of how serious the eye condition is.

The third step is to examine the front of the eye using a torch (p. 48). Ask:

- Are the eyes straight? Are the eyelids normal, and do they open and close? Are the eyelashes in place? Any swelling or redness?
- Is the white of the eye white? Any redness, discharge or swelling?
- Is the window of the eye (cornea), clear? Are there any grey or white areas?
- Is the pupil black and round, and does it become smaller in bright light? Is the red reflex present?

If the answer to these questions is 'No', then this can lead to a suspected diagnosis which may be treatable (such as conjunctivitis), or require referral (such as cataract).

There are other examinations that can also be performed with non-expensive equipment, including:

- Examining the optic nerve and retina using the Arclight (p. 49)
- Testing the red reflex (p. 53)
- Measuring intraocular pressure (p. 54)
- Examining visual fields (p. 56)
- Assessing eye alignment and movement (p. 58).

Not every health worker will have the knowledge, experience and equipment to perform all these further examinations; however we hope that this issue of the *Community Eye Health Journal* will provide *all* health workers with the knowledge of how to take an eye history, measure visual acuity and perform a good examination of the external eye with a torch. We hope that this issue will provide you with the knowledge you need to feel confident in your work.

**Community Eye Health Journal**

VOLUME 32 • NUMBER 107 • 2019



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## Putting patients first: how to carry out a patient-centred eye examination



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We can provide better care if we focus on our patients as human beings, not just on their eyes.<sup>1</sup>

### 1 Consider the person as a whole

From when you first meet your patients, notice how they use their vision. Are they able to walk around by themselves? Is there any evidence of pain? What other health conditions or disabilities do they have?

### 2 Establish a good relationship

Greet the person warmly. Introduce yourself by name and explain your role in everyday language, e.g.: "I am here to look at your eye(s) so we can find out what is wrong and how to help you." Speak in a respectful, kind and compassionate manner, and take time to get to know the person as an individual.

### 3 Listen

When you are taking a history, it is very important to listen very carefully; do not interrupt the patient or jump to conclusions. Ask how symptoms affect patients' daily living, and whether they have any concerns or fears, such as a fear of blindness or having eye surgery. Find out what their expectations are about the outcomes of treatment.

### 4 Make the patient comfortable and tell them what you are doing

Before measuring visual acuity or carrying out an examination, tell patients what you will be doing and explain what you would like them to do, e.g., point in the direction of the letters on a tumbling E chart. If it is a longer procedure, talk them through



Explaining visual acuity testing to a patient. PAPUA NEW GUINEA

THERESA GENDE, FRED HOLLOWAY FOUNDATION NEW ZEALAND (W/VISIONFIRST/COMPETITION) CC BY-NC-SA 2.0

the steps, particularly if they cannot see what you are doing. Ensure patients are positioned comfortably and encourage them to tell you if they experience pain or discomfort. Some patients may not feel able to tell you, so check their face periodically for any visible signs of pain and make adjustments as needed.

### 5 Talk about what comes next

Explain whether any further tests are necessary, or whether a referral to a specialist is needed. Tell patients what treatment they might require, including where to get medicine and how to use it. Ask them if they have any questions and ensure that they and their carers/relatives (if appropriate) have all the information they need, such as the address and clinic times if they are referred.

### Reference

- 1 Du Toit R. How to do a person-centred eye health consultation. *Comm Eye Health J* 2015;28(90):36.

### Before carrying out any eye procedure

Wash your hands (and afterwards too)

Use gloves if indicated (e.g., for an invasive procedure or if an eye appears infectious)

Clean or disinfect equipment

Ensure that lighting is appropriate

Clearly explain what you are going to do

Position the patient comfortably.

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Published by the International Centre for Eye Health, London School of Hygiene & Tropical Medicine.

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ISSN 0953-6833.

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The *Community Eye Health Journal* is supported by:





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# How to take a complete eye history

Taking a good history not only helps you to make a diagnosis, it can also help you to understand the impact of the condition on the patient and identify any obstacles to treatment.

It is impossible to over-emphasise the importance of taking a careful history when assessing an eye patient. Taking a good history can help to focus your examination and indicate what investigations are needed. It can also help you to understand the impact of the condition on the patient and pinpoint any difficulties they may have adhering to treatment.

This is also your opportunity to focus on the patient as a person and to form a relationship of trust, respect and mutual understanding.

## How to structure history taking

To ensure you don't miss anything important, structure your history taking carefully. Ask about:

- Personal and demographic data
- Reason for visit or presenting complaint
- History of presenting complaint
- Past eye history
- General medical history
- Family eye history
- Medication history
- Allergy history
- Social history

Each of these is discussed in more detail below.

**Tip:** You can use this bulleted list as a checklist. Copy and keep it where you can see it during history taking to help you to stay on track and ensure that you will not miss anything important.

## Top tips for taking a good history

- Introduce yourself to the patient – this creates a friendly environment.
- Respect the patient's privacy and confidentiality while taking the history
- Ask questions that are direct, simple and clear. Avoid using medical terms and explain things in ordinary language as much as possible.
- Be a good listener. Avoid interrupting or rushing the patient. Show them that you are listening and paying attention: make eye contact as appropriate and ask if you are not sure about something they said. It is often useful to use open questions (e.g., how are you?) and closed questions (e.g., yes/no answers) to help focus the discussion.
- Try to see things from the patient's point of view and make an effort to understand them and their circumstances, especially when these are very different from your own.
- Be aware that patients who are older, or who have disabilities (including hearing impairment, speech difficulties or a learning disability) may need a bit more time or may struggle to express themselves. This may cause them some anxiety, so remain patient and reassure them that you are there to listen.



Make careful notes when you take a history. SOUTH SUDAN

## Personal and demographic data

Ask the patient's personal details:

- Name, for identification, filing and patient follow-up
- Address and mobile phone number, for follow-up and to identify patients from areas with endemic diseases
- Age and gender, for noting down and ruling out any diseases associated with different age groups and/or sex
- Language
- Disability
- Patient's occupation, daily tasks and hobbies.

Understanding a patient's occupation, daily tasks (e.g., looking after grandchildren) and hobbies is helpful for finding out a patient's visual needs and understanding any eye manifestations or symptoms as a result of occupational hazards.

Recording the age, gender, language and disability status of patients allows you to monitor who is, and is not, coming to your eye clinic or hospital. Compare these figures with the population to identify groups that are under-represented, e.g., girls with other disabilities, and plan ways to reach out to them.

## Reason for visit/Presenting complaint

Ask the main reason why the patient has come to seek an eye examination.

Record the main presenting symptoms in the patient's own words and in a chronological order. The four main groups of symptoms are:

- 1 Red, sore, painful eye or eyes (including injury to the eye)
- 2 Decreased distance vision in one or both eyes, whether suddenly or gradually
- 3 A reduced ability to read small print or see near objects after the age of 40 years
- 4 Any other specific eye symptom, such as double vision, swelling of an eyelid, watering or squint.

## History of presenting complaint

This is an elaboration of the presenting complaint and provides more detail. The patient should be encouraged to explain their complaint in detail and the person taking history should be a patient listener. While taking a history of the presenting complaint, it is important to have potential diagnoses in mind. For each complaint, ask about:

- Onset (sudden or gradual)
- Course (how it has progressed)
- Duration (how long)
- Severity
- Location (involving one or both eyes)
- Any relevant associated symptoms
- Any similar problems in the past
- Previous medical advice and any current medication.

## Past eye history

Ask for detail about any previous eye problems

- **History of similar eye complaints** in the past. This is important in recurrent conditions such as herpes simplex keratitis, allergic conjunctivitis, uveitis and recurrent corneal erosions
- **History of similar complaints in the other eye** is important in bilateral conditions such as uveitis, cataract
- **History of past trauma to the eye** may explain occurrence of conditions such as cataract and retinal detachment
- **History of eye surgery.** It is important to ask about any ocular surgery in the past such as cataract extraction, muscle surgery, glaucoma, or retinal surgery
- **Other symptoms.** Ask whether the patient has any other specific eye symptoms.

## General medical history

Ask about any current and past medical conditions. These include conditions such as diabetes, hypertension, arthritis, HIV, asthma and eczema.

## Family eye history

It is important to ask the patient whether any other member of the family has a similar condition or another eye disease. This can help to establish familial predisposition of inheritable ocular disorders like glaucoma, retinoblastoma or congenital eye diseases, diabetes and hypertension.

## Medication history

Ask about present and past medications for both ocular and medical conditions. Don't overlook any medications that the patient may have stopped taking some time ago. Some medications are important in the etiology of ocular conditions.

It is also helpful to ask whether the patient has been able to use the medication as prescribed (their compliance). If a medication is ineffective, you want to know whether the patient is actually using the medication as prescribed, for example glaucoma medications.

Using your own discretion, it is helpful to find out whether access to medication prescribed is a problem. This helps to ascertain whether cost or other concerns are a potential reason for non-compliance. There could also be practical issues, such as difficulty instilling eyedrops or forgetting to do so.

Do not forget to ask in a non-judgmental way about traditional/herbal medication use.

## Allergies

Ask about any allergies to medications or other substances.

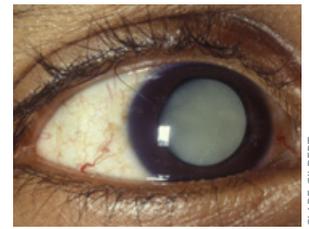
## Social history

- Smoking (amount, duration and type)
- Alcohol (amount, duration and type)

## Birth and immunisation history

For children, the birth history (prematurity) and immunisation status can be important.

**Figure 1** Case scenarios with different presenting complaints



A case of age-related cataract (history of gradual loss of vision)



A case of red eye due to bacterial conjunctivitis



A case of ophthalmia neonatorum (history of purulent discharge in a newborn)

## Letter to the editor



## When something goes wrong

Thank you so much for your courageous coverage of medical error in the most recent issue of the *Community Eye Health Journal*. Inadvertent harm in health care settings can be devastating for patients and caregivers alike. Not too long ago, when I was trained in medicine, disclosure of medical error and apology were discouraged because of the potential for lawsuits. Such an approach disrespected patients and morally harmed caregivers. It was therefore tremendously encouraging to learn that, at least in clinical eye care, disclosure of error and apology are being practiced in hospitals and clinics around the world. A recent account in the Huffington Post by a gynaecologist (<http://bit.ly/Huff-apology>) complements your reporting and highlights the positive impact of disclosing medical error.

When something goes wrong in public health, or global health, offering an apology can be even more difficult. Responsibility is diffuse and causal pathways

are more difficult to discern. There may be fear that acknowledging inadvertent harm could threaten public health programmes that deliver substantial benefits. Consequently, as described in a recent article (<http://bit.ly/glob-apol>), apology in public health is less often the norm. We in public health can be inspired and challenged by the progress made by eye health in acknowledging unintended harm.

Your remarkable coverage of this topic in the *Community Eye Health Journal* has done us all a great service. Indeed, this issue can serve as a model for other fields within health care and across global health. Thank you for so positively advancing the conversation, with extraordinary clarity and forthrightness.

## David Addiss

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**Adapted from:**  
Marsden J, Stevens S,  
Ebri A. How to measure  
distance visual acuity.  
*Comm Eye Health J*  
2014;27(85):16.

Hennely ML. How to  
detect myopia in the  
eye clinic. *Comm Eye  
Health J*  
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# How to measure distance visual acuity

Visual acuity is a measure of the ability of the eye to distinguish the details of objects.

Visual acuity testing is part of every eye examination. It is important that it is done well, and accurately, as an incorrect measurement can lead to inappropriate decisions and management.

It is important to assess visual acuity in a consistent way in order to detect any changes in vision. One eye is tested at a time.

## Equipment

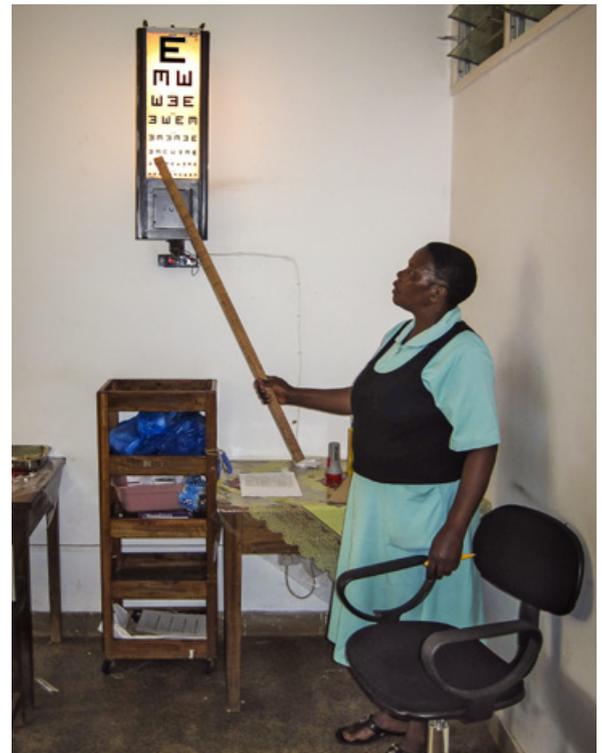
- Multi-letter Snellen chart or tumbling E (or C) chart
- Plain occluder, card or tissue
- Pinhole occluder
- Patient's documentation

## Preparation

- Ensure good natural light or illumination on the chart.
- Explain the test to the patient.
- Tell the patient it is not a test that they have to pass. Tell them not to guess if they cannot see.
- Position the patient, sitting or standing, six metres away from the 6-metre Snellen or tumbling E chart (or 3 metres away from the 3-metre Snellen or E chart).

## Testing and recording visual acuity

- Test the eyes one at a time, usually starting with the right eye, without any spectacles.
- Ask the patient to cover the left eye with the plain occluder, card or tissue.
- Ask the patient to read from the top of the chart and from left to right. For children or adults who cannot read the letters, use a tumbling E or C chart and ask them to point in the direction that the 'legs' of the E (or the opening in the C) are facing. There is a one in four chance that the patient can guess the direction; the patient should therefore correctly indicate the orientation of **most** letters of the same size, e.g., three out of four.
- Record the visual acuity for the examined eye. Visual acuity is expressed as a fraction e.g. 6/18. The top number is the distance the patient is from the chart in metres (6). The bottom number is the **smallest** line on the chart the person can read accurately. For example the 18 line (6/18), or the 6 line (6/6).



HEIKO PHILIPPIN

Visual acuity should be measured from a standard distance, using a standard chart. **TANZANIA**

- Incomplete lines can be added to the last complete line. e.g. 6/12+3, indicating that the patient read the '12' line at 6 metres and three of the letters on the '9' line.

If the patient cannot read the largest (top) letter at 6 metres, either:

- move them closer to the chart, 1 metre at a time, until the top letter can be seen – the VA will then be recorded as 5/60 or 4/60, etc. or
- hold up your fingers at varying distances (5 metres, 4 metres etc. and record the vision as counting fingers (CF) at the maximum distance they can see between 5 and 1 metre, i.e.  
**VA = CF 5m or VA = CF 1m.**

If the patient cannot count fingers at 1 metre, wave your hand and check if he/she can see this. This is recorded as hand movements (HM): **VA = HM.**

If the patient cannot see hand movements, shine a torch in the eye and ask if they can see the light. If they can, record 'perception of light': **VA = PL.** If they cannot see the light, record 'no perception of light': **VA = NPL.**

- After testing and recording the VA for the right eye repeat now for the left eye.
- If the patient wears spectacles for distance vision, now test the VA in each eye with the spectacles on.
- If the visual acuity in either eye is less than 6/6, one can measure the visual acuity with a pin hole (see panel).
- The VA is recorded for each eye in the patient's notes. For example:

Right VA = 6/18 without spectacles  
Right VA = 6/6 with spectacles  
Left VA = HM without spectacles  
Left VA = HM with spectacles

## The pinhole test

Using a pinhole reduces the need to focus the light that enters the eye, and people with a refractive error, such as myopia, can usually see better with the pinhole than without it.

### Steps

- Position the patient 6 metres from the chart.
- Ask the patient to cover one eye with the occluder.
- Position the pin hole over the eye to be tested so they can see the chart through the pinhole.
- Test one eye at a time by following the same procedure used to test visual acuity.

If the person can read more letters with the pinhole than without, they are likely to have a refractive error, such as myopia. All patients (adults and children) whose acuity improves with a pinhole should undergo a full refraction to see whether they require spectacles, and of what power.



**Sue Stevens**  
Former Nursing Advisor: *Community Eye Health Journal*, International Centre for Eye Health, London School of Hygiene & Tropical Medicine, UK.

# How to prescribe spectacles for near vision

Many people aged 40 years and above need near vision spectacles for reading and other essential daily tasks.

As we grow older, the lens loses the ability to focus at close distances. Starting around the age of 40, near vision will slowly become worse, but distance vision will not be affected; this is known as presbyopia.

## Indications

People with presbyopia usually say that their near vision has slowly become worse.

## You will need

- Distance and near vision charts with letters, Es or shapes
- Pinhole (optional)
- A trial set of lenses or a selection of ready-made spectacles (RMS). Most people with presbyopia do not need spectacles with powers of less than +1.00 or more than +3.00. See Table 1 for suggested powers.

## History

Before prescribing spectacles for presbyopia, take a careful history (pp. 44–45) and carry out a comprehensive eye examination to make sure there is nothing else wrong with the person's eyes.

## Examination

### 1 Measure the distance vision in each eye

- If the presenting vision is 6/12 or worse in either eye, find out the cause of poor distance vision before prescribing spectacles for near vision.
- If the distance vision is 6/9 or better in each eye then one can proceed with checking near vision.

### 2 Assess working distance

- The correct power of spectacles for presbyopia depends on the person's age, the distance at which they want to see for near work, and how well they can see.
- Find out the person's working distance; this is the distance at which they would like to do most of their near work (see Figure 1a).
- Ask him or her to hold a near vision chart at the distance they do most near tasks. Around 40 cm is a comfortable distance for most people.

### 3 Measure near vision

- Ask the person to hold the chart at the distance they want to see clearly (the desired working distance) with both eyes open. Ask them to read the smallest line or show the smallest shapes they can see clearly. Write this down as their near visual acuity (e.g., N6 or J6).

- If the person already has spectacles for presbyopia, measure their near vision with these being worn. Write this down as 'near visual acuity with spectacles'
- If the person is able to see N6 or better without any spectacles, they might not need spectacles for presbyopia. If they can see N6 or better with their old spectacles, they might not need new spectacles.

## 4 Identify the correct lens power

- Use the person's age as an idea for what power of near lens they may need. Table 2.

**Table 2** Suggested lens power for different ages

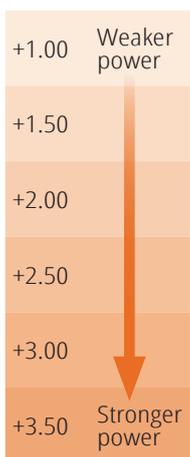
Person's age	Lens power
35 to 45	+1.00
46 to 50	+1.50
51 to 55	+2.00
Over 55	+2.50 or higher

- While the person wears spectacles with the selected power (or trial lenses of the same number), give them the near chart again and ask them to hold it at the desired working distance (Figure 1a). If the person cannot see at least the N6 line, try again with the next stronger power until they can see the N6 line.
- Ask the person to look at the smallest line they can see on the near chart with the near lenses, and then bring the chart closer until the letters become blurred. Hold one hand to mark the nearest distance (Figure 1b), then ask the person to move the chart further away until the letters become blurred. Mark the furthest distance (Figure 1c). This is the range of clear vision available to the person while wearing the selected lens power.
- Ask the person again to hold the chart at their desired working distance. If the range is correct, the working distance should be in the middle of this range, for example at about 40 cm (Figure 1d). This means that a person will be able to see clearly for the same distance in front and behind their working distance.

## 5 Prescribe and dispense spectacles

- Prescribe and give the reading spectacles.
- Ensure that the patient understands they are only for reading and not for seeing in the distance.
- Advise the patient that a good reading light will help to improve their near vision.

**Table 1**  
Suggested lens powers for correction of presbyopia



**Figure 1** Finding the right prescription for presbyopia



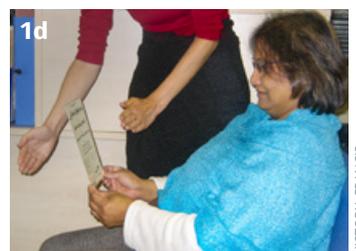
**1a**  
A woman demonstrates her desired working distance



**1b**  
The nearest distance at which the woman can read the smallest line



**1c**  
The furthest distance at which the woman can read the smallest line



**1d**  
The desired working distance is in the middle of this range.



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# How to examine the front of the eye

A number of common eye diseases can be diagnosed by examining the front of the eye using a torch.

## Basic eye examination using a torch

It is important that all health care workers know how to examine the eyes. Use of a slit lamp microscope is a gold-standard method of examining the eye but a basic examination of the front of the eye can be carried out with a torch; if a magnifying loupe is attached to the torch this is helpful but not essential.

A +20 DS lens, if available, can also be used to magnify the anterior eye used in conjunction with the torch.

Figure 1 shows a healthy eye. There are four key parts to examine:

- The eyelids
- The conjunctiva
- The cornea
- The pupil

Only some common conditions, that can be seen using the above basic examination, are discussed below. All signs should be linked to the history of symptoms as this will aid the differential diagnosis. Management of specific conditions is beyond the scope of this article.

## The eyelids - do they look normal?

When examining the eyelids, check that they move normally, are in the correct position, and that there are no swellings or lumps.

Check that:

- The eyelids open and close normally. Ptosis is a term used to describe drooping of the eyelids, and if they



**Figure 1** A healthy eye. The pupil is black, the white of the eye is white (not red), the eyelashes point outwards and the cornea and conjunctiva are clear.

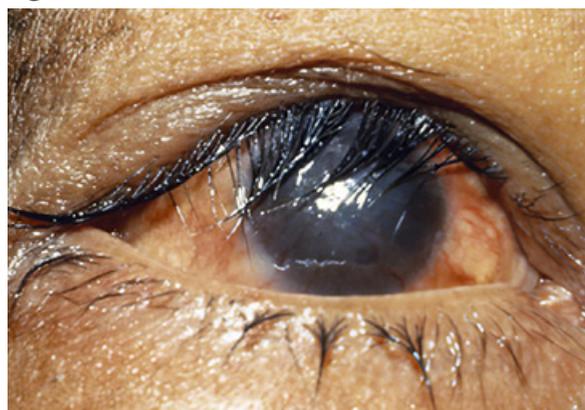
cannot close completely it is called lagophthalmos. If the eyelids cannot close, the patient is at risk of damage to the cornea.

- Neither eye is further forward than the other. When one eye protrudes further forward this is known as proptosis, which is usually a serious condition.
- The eyelashes point away from the eyeball; if they turn in on the eye this is abnormal and is called trichiasis (Figure 2). This can cause corneal scarring and blindness.
- There are no swellings or lumps on the eyelids. A swelling on the eyelid margin can be due to a cyst, called a chalazion (Figure 3), or an infection of an eyelash is called a sty.
- There is no redness or discharge at the eyelid margin, termed blepharitis.

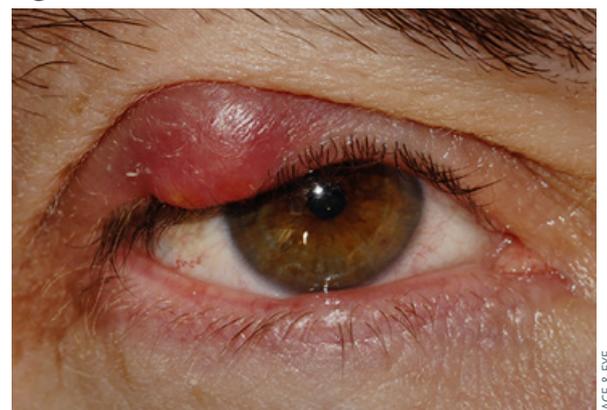
## The conjunctiva - does the white of the eye look white?

The conjunctiva is a transparent layer which extends from the outer edge of the cornea, across the sclera (the white part of the eye) and along the insides of both eyelids. The conjunctiva contains blood vessels and, when there is a problem, the eye will often appear red.

**Figure 2** Trichiasis



**Figure 3** Chalazion



Look for:

- Redness of the conjunctiva (conjunctivitis); this might be due to infection; or allergy.
- Growths or raised fleshy areas, for example a pterygium (Figure 4) which is usually bilateral, involving the cornea; or a tumour (conjunctival carcinoma – see Figure 5);
- Foreign bodies causing irritation and often redness; it may be necessary to invert the eyelid as occasionally a foreign body is under the eyelid.

### The cornea – is it clear?

The cornea is the clear part of the front of the eye. It acts like a window and allows light to get into the eye. To examine the cornea, shine the light from the side. If there is a problem, the cornea may appear cloudy or hazy.

Check that:

- There is no foreign body on the cornea; this is usually unilateral accompanied by pain or discomfort (Figure 6).
- There are no white or grey areas on the cornea; a white or grey area in a red or painful eye is likely to be a corneal ulcer (Figure 7); a white or grey area in a white, non-painful eye is likely to be a corneal scar.

### The pupil – is the pupil black and does it react to bright light?

The pupil is a round opening found in the centre of the iris, which is the coloured ring-like structure inside the eye, behind the cornea. The iris gives the eye its colour.

The pupil regulates the amount of light that goes into the eye; it is small in bright light and large in a dark room.

### The swinging torch test

If the torch is moved from one pupil to another and back again (the swinging torch test), each pupil should become small when the light is shone at it. If this does not happen (i.e., a pupil dilates when the light is swung towards it), this may indicate a relative afferent pupillary defect (RAPD) in that eye. When RAPD is present, this suggests disease of the retina or optic nerve.

Check:

- The colour of the pupil: it should be black. A white or grey pupil may be due to cataract (opacity of the lens).
- The shape of the pupil: it should be circular. An irregular-shaped pupil may be due to injury or inflammation inside the eye (called iritis).
- That the pupil becomes small when a bright light is shone into the eye in a dark room; this indicates that the optic nerve at the back of the eye is working; if the pupil does not become small with a bright light it may be due to damage of the nerve.
- The pupils' reaction to the swinging torch test (see panel above).
- The red reflex – see p. 54.

A careful examination of the front of the eye, using a torch, can help the eye health worker identify abnormalities which can lead to a diagnosis and assist in deciding the best management for the patient.

Figure 4 Pterygium

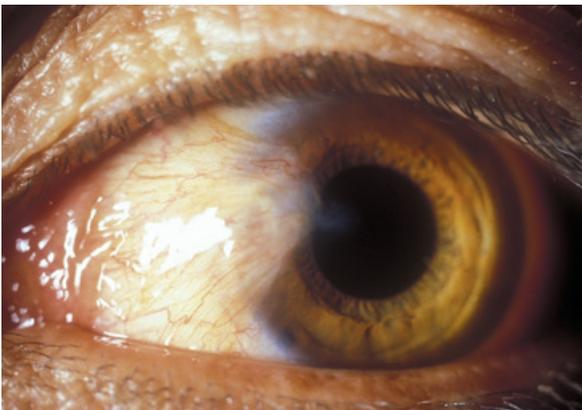


Figure 5 A cancerous growth on the conjunctiva

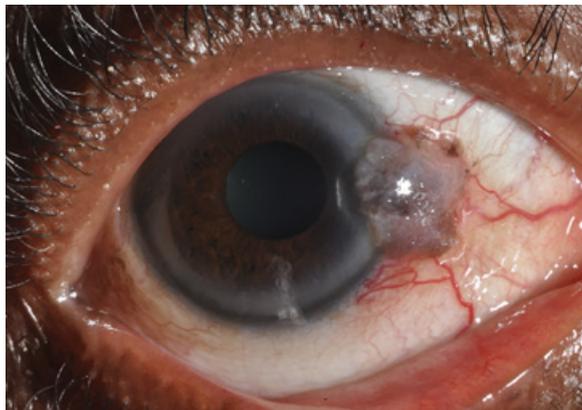


Figure 6 A foreign body on the cornea

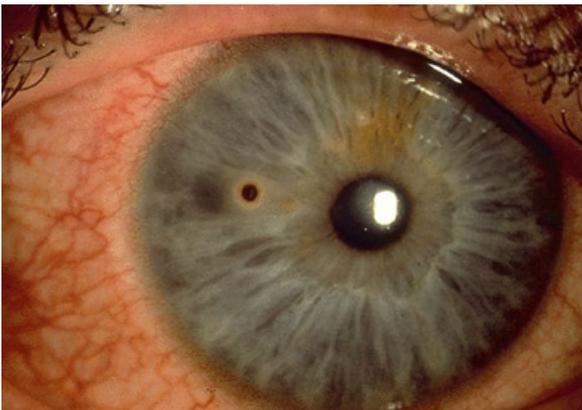
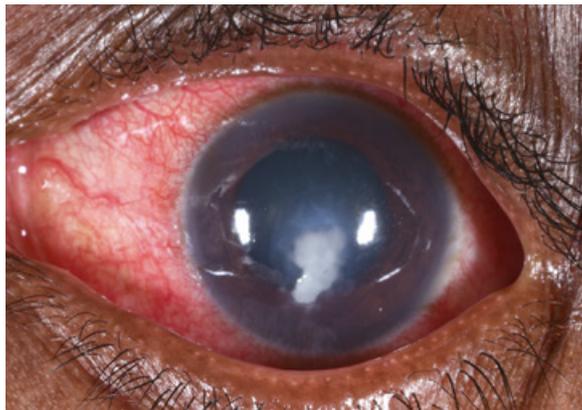


Figure 7 Corneal ulcer



MURRAY MCGAVIN

STEPHEN GICHUJI

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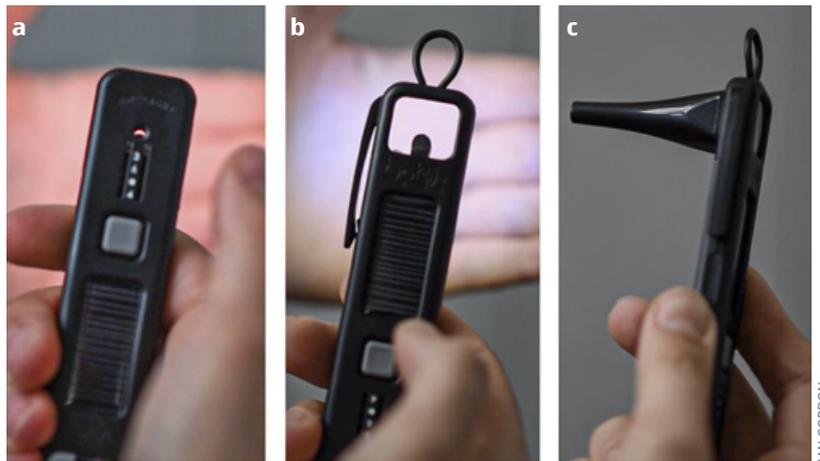
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# The Arclight and how to use it

With hands-on training, mentorship and regular practice the latest Arclight package can be used by primary, mid-level and advanced eye care practitioners to perform comprehensive ophthalmic examinations.



**Figure 1** Direct ophthalmoscope (a), anterior segment loupe (b) and otoscope (c).

## Additional information

The Arclight is available via the IAPB Standard list. Visit <https://iapb.standardlist.org/the-products/arclight-mk3-5-ophthalmoscope-otoscope/>

The manufacturer's website is [www.arclightscope.com](http://www.arclightscope.com)

For training videos and information, visit <http://med.st-andrews.ac.uk/arclight/training/>

The Arclight is a multi-purpose medical diagnostic tool combining direct ophthalmoscopy, anterior segment loupe and otoscope (Figure 1). It was developed to overcome barriers to ownership in low-resource settings<sup>1</sup> and is solar powered, uses long-lasting light-emitting diodes and costs users in low-resource regions around £10 per unit. With hands-on training (Figure 2) and ongoing mentored practice, all the major causes of treatable and preventable blindness can be reliably diagnosed.<sup>2,3</sup> As the Arclight can also be used to examine ears<sup>4</sup> and skin, the device can act as a catalyst to inter-professional education, enabling integration of eye care into universal health coverage.<sup>1,5</sup>

### Anterior segment examination

Using the internally lit 14 dioptre lens, the lids, conjunctiva, cornea and anterior chamber can be examined. The blue light highlights fluorescein staining, which enables epithelial loss and the activity of ulcers to be seen clearly (Figure 3). The headband allows you to conduct a hands-free examination, which simplifies the removal of foreign bodies and aids trachoma tarsal plate examination.<sup>6</sup> Precise differentiation of corneal scarring from cataract can also be achieved, avoiding needless referrals to distant cataract surgery centres.

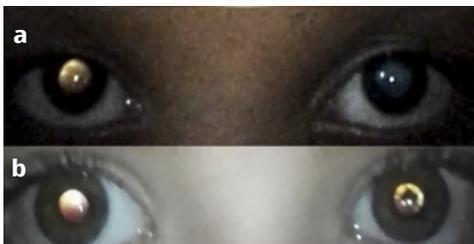
### The red reflex

In children with darker skin and a pigmented fundus, the so-called 'red' reflex appears paler. The reflex can be observed using the direct ophthalmoscope (Figure 4). Media opacity, due to cataract or retinoblastoma,

can be reliably screened for in babies as well as adults.<sup>7</sup> Hold the device at arm's length and illuminate both eyes at the same time (select the brightest light). The examination is best performed in a dimly lit room or, even better, under a black-out cloth. With experience, squint and refractive error can also be identified,<sup>8</sup> which can improve the quality of referral to paediatric services.

### Figure 4

- a) Right eye: normal reflex.  
Left eye: no reflex due to complete cataract  
b) Right eye: normal reflex.  
Left eye: posterior polar cataract



### Figure 2 Hands-on training with simulation tools



### Figure 3 Anterior segment loupe: blue light & fluorescein to highlight ulcers



### Direct ophthalmoscopy

After placing your feet next to the patient in the position you aim to finish, lean back and follow the red reflex in towards the patient's eye on the horizontal plane at 15 degrees temporal (Figure 5). Use the right hand and right eye to examine the patient's right eye and vice versa. This 'flight path' should bring the disc into view. If the disc is not seen, follow the 'arrows' created by the branches of retinal vessels as they point towards the disc.

Assessing the margin, the colour of the neuro-retinal rim and the cup to disc ratio can help to identify raised intraocular pressure, glaucoma and optic atrophy (Figure 6). After examining the four major retinal vessel branches and the surrounding retina, ask the patient to

look at the light. This will bring the central macula (fovea) into view. Macular disease due to infection, diabetes and ageing can now be seen.

### Binocular indirect ophthalmoscopy

Quick and simple binocular indirect ophthalmoscopy can be performed on well dilated patients. By placing the light source of the direct ophthalmoscope directly between the user's eyes, a wide field view of the fundus can be achieved with the addition of a standard condensing lens.

### Mobile phone camera clip

Where diagnostic uncertainty occurs, you can take video by attaching the ophthalmoscope, loupe or otoscope to a mobile phone camera (Figure 6) using a universal clip.<sup>9</sup> This offers the opportunity for a remote second opinion or for documenting clinical signs for later comparison.

### Other tools

To complete a comprehensive ophthalmic examination, the Arclight package comes with several other tools, including a distance/near visual acuity chart and matching card, an engaging 'bird' near target and flashing white-blue 'lure' for children, a red desaturation square and a white target for visual field assessment as well as a ruler, pupillometer and cup to disc ratio gauge.

**Figure 5** Direct ophthalmoscopy: approach from 15 degrees temporal on the horizontal plane to see the optic nerve



PHILLIDSTONE



KIM ALLAN

**Figure 6** Optic nerve examination and imaging with mobile phone clip

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Dr. Ijilmurun, Ulaanbaatar, Mongolia



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# Tips for assessing vision in a baby or child

In babies and young children, early intervention can prevent decades of visual impairment. This article gives tips and advice for a successful eye examination and explains what responses to expect from a healthy baby.



An eye care worker checks a baby's fixation. The baby is looking at her face, which is a reassuring sign.

CLARE GILBERT

## Assessing vision in a baby (0-1 year)

There is no need to be anxious about examining a baby. If the baby is awake and attentive, there is a lot you can find out by asking the parents and simply observing the baby's reactions.

- First ask the parents what they think about their baby's vision.
- Notice how the baby looks at things in the room, such as the window or any lights.
- Watch for eye contact between the baby and parents.
- Does the baby look when someone comes into the room?
- Does the baby respond to silent smiles or to raised eyebrows?
- Do you get eye contact?

You should have realistic expectations about what a baby should be able to do by a certain age. Table 1 shows

when a baby is too young to show a visual response, when the response is likely to develop, and at what age you should be worried if a baby does NOT show the expected response. You can ask the mother or check the baby's responses yourself.

For example, if a baby of about three weeks old does not turn to a diffuse light, such as light coming from a window, you would not necessarily be worried – although you would still believe the parents if they are concerned. On the other hand, if a baby is eight weeks old and does not eventually turn to a diffuse light, then there may be a problem and you should investigate further.

Bear in mind that there can be a lot of variation in babies' development; however, this table should be a helpful guide.

**Table 1** Normal visual functioning for a baby

Behaviour	Age Neonate	Age 6 weeks	Age 3 months	Age 4 months	Age 5 months +
Blinks when a light is flashed in their eyes?	Healthy babies will do this. If not, suspect a problem				
Turns to a diffuse light, such a light coming from a window?	May do it	Healthy babies will do this. If not, suspect a problem			
Looks at your face when 10-20 cm away (less than 1 foot)? Any response to silent smiles or eyebrow raising?	Too young	May do it	Healthy babies will do this. If not, suspect a problem		
Eyes fix on, and follow, a dangling ball or toy?	Too young	May do it	Healthy babies will do this. If not, suspect a problem		
Watches an adult at 1.5 metres (5 feet)?	Too young	May do it		Healthy babies will do this. If not, suspect a problem	
Converges accurately? (If you move a toy closer and further away, do the eyes focus on the toy and line up properly?)	Too young	May do it		Healthy babies will do this. If not, suspect a problem	
Blinks in response to a threat? (Any silent, sudden movement close to the face which causes no breeze, e.g., opening your fist very suddenly.)	Too young	Too young	Too young	May do it	Healthy babies will do this. If not, suspect a problem

## Tips for examining a baby

- Try to carry out as much of the examination as possible without touching the baby. Children often resist having their eyes held open, for example.
- Have many toys available. For each new toy, the baby will momentarily hold their eyes steady, allowing a quick examination. If available, use toys which are bright and can flash on and off. A good rule to remember is: “one toy, one look”, as babies can quickly lose interest.
- Don't be embarrassed about making funny noises! These help to attract the baby's attention and keep them interested and calm. Look for good fixation, e.g. on your face.
- In order to perform a more detailed examination of an infant, examine the child while she or he is being bottle fed or breast fed.
- If you are struggling, ask the parent's permission to wrap the baby; the pressure can help babies to feel safe and secure while keeping their hands away from your equipment! To do this, place the baby on a blanket or sheet, hold the arms to the side and the legs straight, and wrap the blanket around the body and arms (Figure 1). Ask the parent to hold the baby. Ask the parent, or a helper, to open one eye at a time by placing a finger very gently on the upper eyelid and easing it upwards; first demonstrate how to do this, using your own eye. Praise and reassure the parents – this may be a very stressful experience for them and their child.

## Assessing vision in a young child (1-5 years)

Children in this age group should have steady eyes, no squint (p. 55), no history of sight difficulties and, if in a good mood, show interest in colourful or interesting objects in the room. They should respond to silent smiles, eyebrow raising, and winking.

Children in this age group should also be able to see objects presented in their peripheral visual field by a colleague while you draw their attention to your face, perhaps by making a funny noise. Cover one eye at a

**Figure 1** Wrapping a baby for an eye examination. This baby found it very comforting and fell asleep!



**Figure 2** Be playful and make a game of the examination



time if the child will allow it and ask them to identify different sized objects or, with older children, letters. Make it a game.

Many children can accurately name colours by the age of three, but many cannot do this until they are older; it is reassuring if they can.

After the age of three, most children can participate in accurate visual acuity, visual field, and colour vision testing when done by someone trained and with age-appropriate equipment.

If you do not have that equipment, or have not been trained to use it, you can still test a child's functional vision using everyday objects, as described above.

## Tips for examining a young child

The tips for examining a baby (above) apply equally well to young children.

In addition:

- Be playful and make a game of the examination (Figure 2). For example, shine a light into the mother's eye first, or pretend you are playing 'hide and seek' or 'peekaboo' when covering one eye.
- Observe children when they don't know they are being observed, for example while you are talking to the mother or taking a history.
- The tip about wrapping up a baby will work for a younger child, but it may be more difficult in an older child. If examination is proving difficult, ask the parents what they think would be appropriate or would work best. For example, parents could hold the child on their lap and wrap their arms around their child in a hug, thereby gently restraining the child's arms.

**“Observe children when they don't know they are being observed, for example while you are talking to the mother or taking a history.”**

### Adapted from:

Baiyeraju A, Bowman R, Gilbert C, Taylor D. Managing eye health in young children. *Comm Eye Health J* 2010;23(72):4-11



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# Testing the red reflex

A red reflex test can detect cataract and retinoblastoma. Both conditions require urgent referral.

## Why is it important to test the red reflex?

The 'red' reflex (which appears paler in children with darker skin and a pigmented fundus) can reveal problems in the cornea, the lens, the vitreous, and the retina. It is particularly useful in young children who are too young to complain of not seeing.

## The possible causes of an abnormal red reflex are:

- Cataract
- Retinoblastoma
- Other uncommon diseases of the vitreous or retina.

## When to test the red reflex for retinoblastoma

It is important to test the red reflex after birth, at the age of six weeks, during routine consultations, or when parents are concerned about the child's vision or the appearance of her or his eyes.

## How to test the red reflex

- The red reflex is much easier to see in a darkened room, so switch off the lights and draw the curtains, or ask the parents and child to go with you into a darkened room.
- Use a direct ophthalmoscope (e.g., an Arclight) with the lens power set at '0'. Make sure the batteries are charged.
- Sit about half a metre (50 cm) away. Hold the ophthalmoscope close to your eyes.
- Encourage the child to look at the light source and direct the light at the child's eyes. You should see an equal and bright reflex from each pupil.
- Pay attention to the colour and brightness of the reflex. It should be identical in both eyes (Figure 1). An absence of a reflex, a difference between the eyes, or an abnormal colour in the pupil (Figures 2–4) may indicate retinoblastoma or another serious eye condition.

To determine whether the red reflex is normal, comparison with the red reflex of a parent may be helpful. If you are not sure whether the reflex is normal, dilate the pupil for a complete examination. **If you are unable to dilate the pupil, refer the child to a specialist.**

## What to do if the red reflex is abnormal

If possible, ask another colleague to check too. If the reflex is abnormal, explain to the parents or carers that their baby/child may have an eye disease that will need to be treated. **Avoid mentioning cancer or removal of the eye.**

Refer the child to a specialist for a complete eye examination. If possible, speak to the eye specialist by phone or text message (SMS) to explain the situation and confirm clinic times and dates.

Refer the baby/child to an eye specialist with an accompanying letter or note. Make sure the parents know where to go and when. Emphasise that they must go in the next few days at the latest.



The red reflex is easier to see in a darkened room. TANZANIA

**Figure 1** The normal red reflex



**Figure 2** Right eye: the normal red reflex. Left eye: the absence of a red reflex is abnormal and could indicate a serious condition. Refer the child to a specialist.



**Figure 3** Right eye: the normal red reflex. Left eye: the wrong colour in a red reflex (here white) could indicate a serious condition. The child in this image has a cataract in the left eye. Refer the child to a specialist.



**Figure 4** Right eye: the normal red reflex. Left eye: the wrong colour in a red reflex (here yellow-white) could indicate a serious condition. The child in this image may have retinoblastoma in the left eye. Refer the child to a specialist urgently.



**Figure 5** Right eye: the normal red reflex. Left eye: the red reflex is less bright and the corneal reflection (white spot on the cornea) is not centred. This is a squint, which may be the result of a serious underlying condition. Refer the child to a specialist.



Adapted from the poster: 'See RED' produced by JR Ainsworth, UK National Retinoblastoma Service, Birmingham, UK and the Childhood Eye Cancer Trust. [www.chect.org.uk](http://www.chect.org.uk). First published in the *Community Eye Health Journal* French edition, Issue 8, 2011.



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# How to check eye alignment and movement

If a child's eyes are not lined up correctly, then the vision in the deviated eye may be reduced permanently. Early detection and referral is essential.

In order to achieve normal binocular vision, the eyes must see well, be aligned (i.e., look in the same direction), and be focused on the same object. To maintain alignment, the eyes must also move in a coordinated manner.

Misalignment of the eyes is called **strabismus** (or **squint**). Misalignment means that the eyes are not lined up to look at the same thing. In strabismus or misalignment, one eye is fixed on what the person intends to look at (the fixing eye) and the other eye is looking at something else (the deviated eye). In young children the brain tends to suppress the image in the deviated eye, while in adults a new squint (misalignment) can cause double vision. If a child has strabismus from a young age and is not treated, the vision in the deviated eye can become permanently reduced; this is called **amblyopia** or 'lazy eye'.

It is therefore very important to detect strabismus as early as possible and to refer the patient to an ophthalmologist or other relevant eye care professional.

### Step 1. Check ocular alignment using a torch

Check the alignment of the eyes. This is performed by comparing the light reflex from the cornea of both eyes. Hold a torch 1 metre in front of the eyes and look for the light reflex on the cornea (Hirschberg test). In the primary gaze (looking straight ahead at the torch light), the light reflexes should be in a symmetrical position on each cornea (Figure 1).

If one eye is turning **out**, this is called exotropia (Figure 2), whereas if the eye is turning **in** it is called esotropia (Figure 3).

### Step 2. Check for abnormal head posture

Look at the patient and see if they hold their head in an abnormal position. In some instances, the person with a strabismus assumes an abnormal position of the head to try to keep the eyes aligned. For example, the child or adult will turn their head or raise or lower the chin to help the eyes to become aligned with what they are looking at.

**Figure 1** Straight eyes. The light reflex is seen in the centre of the pupils in both eyes. Although this boy's eyes tend to look crossed (because he is looking slightly to the left and the bridge of his nose is broad), the light reflexes in the centre of his pupils confirm that his eyes are straight and aligned.



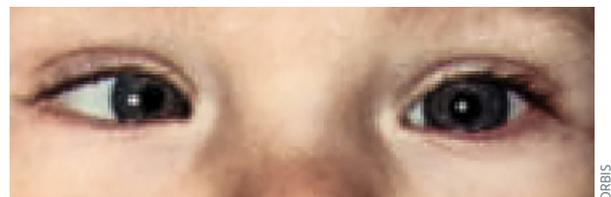
NICK ASTBURY

**Figure 2** Exotropia in the left eye. The light reflex is central in the right eye and over the iris in the left eye.



ORBIS

**Figure 3** Esotropia in the right eye. The light reflex is central in the left eye and over the iris in the right eye.



ORBIS

### Step 3. Do the cover test

If you find that an eye is misaligned, use the cover test to confirm this. For example, say that you have observed the right eye turning in when the patient looks straight ahead (as in Figure 3). If you then cover the left eye (the normal eye), you should see the right eye (the deviated eye) turn towards the front. This confirms that the right eye was not aligned with the left eye when both eyes were open.

### Step 4. Check ocular movements and double vision

When checking a person for strabismus, it is necessary to confirm that the eyes can move freely in all directions. There are nine possible positions of gaze, as shown in Figure 4. Check eye movements by holding the patient's head still and asking him or her to follow your finger or a light as you move it from looking in front to each of the nine positions in turn. Note any limitation of movement of one or both eyes.

If a patient complains of double vision (diplopia) then while checking ocular movements, ask the patient if they see one or two torch images in each position of gaze. The gaze of maximal double vision can help identify which muscle and nerve is not working.

### Adapted from:

Helveston EM. Understanding, detecting and managing strabismus. *Comm Eye Health* 2010;23(72):12-14.

Moodley A. Basic clinical examination of a patient with neuro-ophthalmology symptoms. *Comm Eye Health* 2016;29(96):66-67.

**Figure 4** The nine positions of gaze in someone with healthy eyes



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# Measuring intraocular pressure

High intraocular pressure (IOP) is an important warning sign. Left untreated, it can result in irreversible damage to the optic nerve. Patients with suspected high IOP must be referred to an ophthalmologist for a detailed and comprehensive eye examination.



**Figure 1** Palpating the eye carefully can help to identify very high intraocular pressure, a possible sign of glaucoma. TANZANIA

Normal intraocular pressure (IOP) ranges from 12–22 mmHg, on average, but it may be higher if patients have glaucoma, use medication (e.g. steroids) or have recently undergone eye surgery.

The International Agency for the Prevention of Blindness (IAPB) recommends that trained ophthalmic personnel measure IOP using either a Perkins tonometer (used for applanation tonometry) or new technologies such as puff tonometers or the Tonopen.<sup>1</sup>

If these are not available, and if the patient's history or symptoms suggest that the IOP may be high, there are two screening tests that may be useful:

- 1 The fingertip test (digital palpation)
- 2 Schiötz tonometry

## 1. The fingertip test

It is possible to detect very high IOP using your fingertips. The accuracy is better if the examiner is familiar with this examination method, so take time to practice it: first on yourself and then on your colleagues (with their permission).

**Note:** If you do not detect anything abnormal, the eye pressure may still be dangerously high. If the history or symptoms suggest glaucoma, or if the patient is using steroid medication or has recently undergone eye surgery, you must refer them to a centre where their IOP can be accurately assessed.

### Method<sup>2</sup>

- Ask the patient to close her or his eyes and look down.
- Place the tips of both index fingers on the closed upper eyelid. Keeping both fingertips in contact with the upper eyelid, apply gentle pressure through the closed eyelid, first gently pressing on the eye with the right index finger, then with the left, and then with the right again (Figure 1).
- Repeat on the other eye.
- A normal eye should feel a bit like a tomato that is just ripe: not solid, nor very soft.
- It is important to compare the two eyes with one other. An eye with very high IOP will feel abnormally hard and solid.<sup>3</sup>

## 2. Schiötz tonometry<sup>4</sup>

Schiötz tonometry is a more accurate screening test. If Schiötz tonometry indicates a high IOP, the patient should be referred to an ophthalmologist who will be able to confirm the result (using applanation tonometry or equivalent) and begin appropriate management.

**Figure 2** Schiötz tonometer. The pointer should be at '0' when using the 5.5 g weight



NICK ASTBURY

**Figure 3** Position yourself behind the patient with your hands at the same level as their head. The patient is looking at his finger, which is directly above his eyes.



**Figure 4** Gently place the plunger of the Schiötz tonometer on the central cornea



**You will need**

- Schiötz tonometer, weights, and scale card
- Local anaesthetic drops
- Clean cotton wool or gauze swabs
- Isopropyl alcohol (70%), methylated spirit or ready-to-use alcohol wipes

**Preparation**

- Test the tonometer using the spherical mould in the box and the 5.5 g weight. The pointer should swing to '0' immediately (Figure 2).
- Clean the plunger and disc of the tonometer with a gauze or cotton wool swab and the isopropyl alcohol, methylated spirit or alcohol wipes. Wipe dry with a clean dry gauze or cotton wool swab.
- Lie the patient flat with her or his head supported on a pillow.

**Method**

- Wash and dry your hands.
- Position yourself correctly: stand upright, behind the head of the patient, with your hands level with the patient's head. Note the health worker's good posture in Figure 3. Bad posture can affect the reading.
- Instil local anaesthetic eye drops and wait about 30 seconds.
- Ask the patient to look at a fixed object directly above the eyes. The patient's own thumb or finger held directly in front of his or her eyes) and to keep absolutely still.
- With the thumb and index finger of one hand, gently hold open the patient's eyelids, taking care not to put any pressure on the eye (see Figure 4).
- With the other hand, hold the tonometer (with the 5.5 g weight) between the thumb and index finger and place the plunger on the central cornea (see Figure 4).
- Allow the disc to lower gently onto the corneal surface.
- Note the scale reading.

- If the scale reading is '2' or less, remove the tonometer, replace the 5 g weight with the 7.5 g weight and repeat the procedure.
- Note the scale reading again and remove the tonometer.
- Tell the patient not to rub the eye – the anaesthetic will last for about five minutes.
- Clean and dry the tonometer head.
- Repeat the whole procedure for the other eye.
- Clean and dry the tonometer again and store it safely in the box.
- Using the scale card, convert the noted scale readings and record the pressure in the patient's records.

**References**

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**Table 1** Scale card for ocular pressure

Scale reading	Ocular pressure, mm HG		
	5.5 g weight	7.5 g weight	10.0 g weight
3.0	24.4	35.8	50.6
4.0	20.6	30.4	43.4
5.0	17.3	25.8	37.2
6.0	14.6	21.9	31.8
7.0	12.2	18.5	27.2
8.0	10.2	15.6	23.1
9.0	8.5	13.1	19.6
10.0	7.1	10.9	16.5



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# Examining visual fields

Basic visual field testing only takes a few minutes, but can help to detect glaucoma and macular disease.

Examining visual fields is important for the detection of glaucoma, macular disease and neurological conditions such as stroke, and is an integral part of a full ophthalmic evaluation. In this article, we describe how to detect visual field defects using confrontation visual field testing and an Amsler Grid, neither of which requires expensive equipment.

Early (or even moderate) visual field defects often go unnoticed, particularly if only one eye is affected. The images in Figure 2 represent what a scene may look like to someone with different visual field defects in each eye. The left eye has inferior field loss, and the right eye has superior field loss. Because the defects do not overlap, the field defects will not be apparent when the scene is viewed with both eyes together.

Useful questions to ask are:

- Have you noticed if any part of your vision is missing in either eye?
- Have you noticed any gaps in your vision?
- If you close each eye in turn, does what you see differ from one eye to the other?

In addition, it is essential to enquire about past ophthalmic and medical history, concentrating on family history and whether there are any additional ophthalmic or neurological symptoms.

## Confrontation visual field testing

Confrontation visual field testing only takes a few minutes and can provide useful information. Prepare



**Figure 1** Testing visual fields to confrontation. The examiner's left eye is closed, so he can compare the field of his right eye with the field of the patient's left eye.

by testing yourself first so that you can become familiar with the range and limitations of your own field of vision and locate your blind spot in each eye. A defect is detected when you show a target and the patient does not react, even though it is at the same distance from you and the patient. The assumption is that you, as the examiner, have normal visual fields. This is another reason why you should undergo visual field testing yourself first.

During the examination, first test the binocular visual field (with both eyes open) and then test each eye separately. You will need a target: this can be a finger that waves, or curls and uncurls, or a pen with a red top.

## Confrontation testing with both eyes

Ask the patient to stare directly and steadily into your eyes. Staring can cause embarrassment or awkwardness, so allow the patient to rest and try again if they find it difficult to look at you directly. Check that the patient can look steadily at your eyes while you look steadily at theirs. Ask the patient whether any part of your face is missing or indistinct.

**Figure 2** The left eye has inferior field loss (a), and the right eye has superior field loss (b). Because the defects do not overlap, they will not be apparent when the scene is viewed with both eyes together (c).



- 1 Check the patient's left hemi-field by making a fist with your right hand and holding it in their left hemi-field, at eye level, just to the right of your face. Making sure that the patient is still holding your gaze, raise one to four fingers and ask how many fingers can be seen. To test the upper and lower quadrants, move your hand up and to the right, and down and to the right, repeating the test at various points. This simple finger-counting test is particularly useful for detecting visual field loss due to neurological problems (such as strokes), but is only useful for patients with glaucoma when the visual field loss is severe.
- 2 To test the patient's right hemi-field and upper and lower quadrants, repeat the finger-counting test using your left hand, starting just to the left of your face and moving up and left and then down and left.

### Testing each eye to confrontation

- 1 Ask the patient to cover their own eye with the palm of their hand (not their fingers, as it is easy to peep between fingers). Remember that you should close your eyes in turn too, so that you are comparing the field in your right eye with the field of the patient's left eye, for example (Figure 1).
- 2 Do the finger counting test first (static testing). Be sure to test on both the left and the right for **each eye tested**.
- 3 Next, bring your target finger from the far periphery in towards the central region (kinetic testing).

Ask the patient to say when they first see the target. Repeat from several different directions, ensuring that the full 360° for each eye is tested. The examiner should remember to perform kinetic testing at a speed appropriate for the patient's responses.

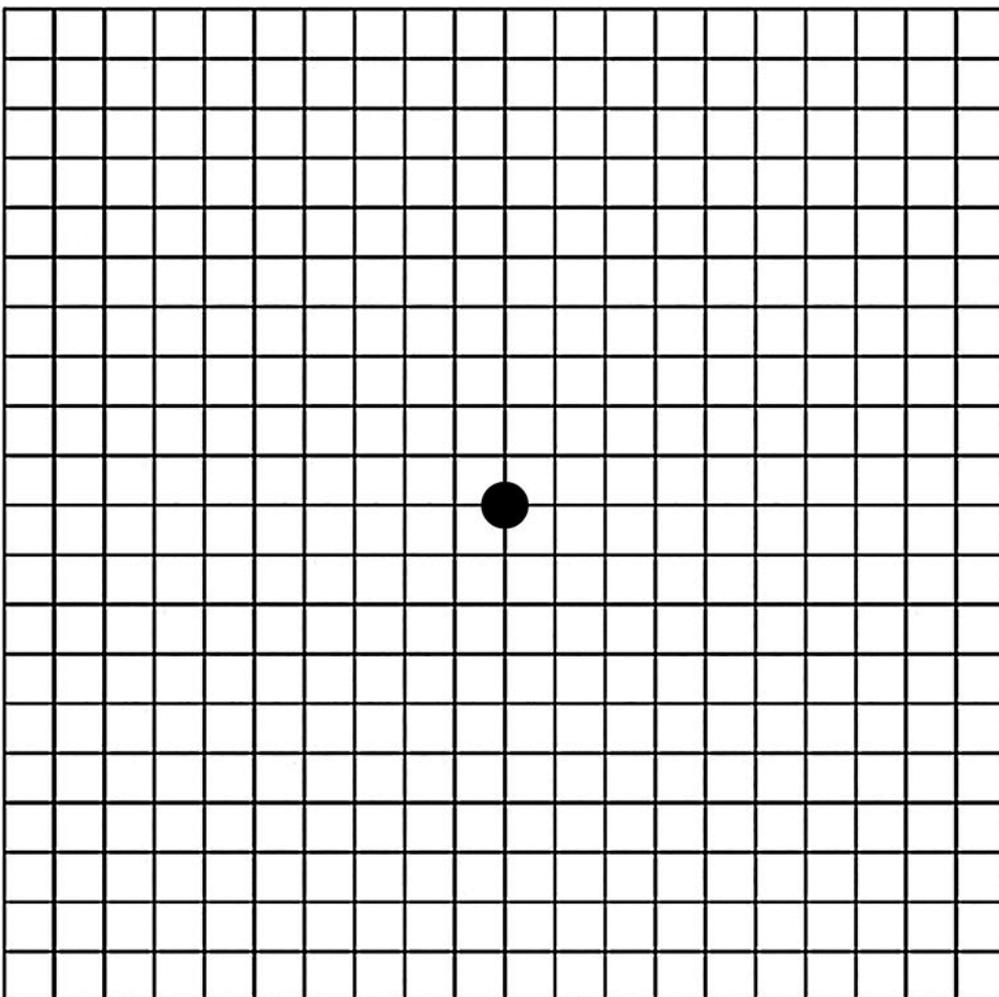
- 4 Next, test the peripheral (outer) field preferably with a white target (this can be a pin or eye drop bottle lid) and then test the central (inner) field with a red target (eye drop bottle lid or the top of a pen. Testing with these targets gives more accurate results than testing with fingers and can detect earlier visual field loss. In addition, red-headed targets can be used to test for red-desaturation. A sign of early optic nerve disease.

### Amsler chart testing

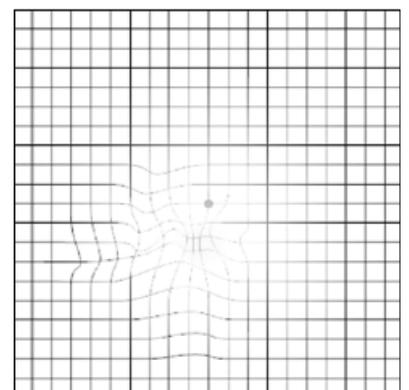
A printed grid, known as an Amsler grid (Figure 3) can be used to detect abnormalities in the central field as well as paracentral defects (fairly common in patients with glaucoma).

Test one eye at a time, correcting for any near refractive errors. Ask patients to hold the chart at a comfortable reading distance from their uncovered eye, and stare at the central spot of the grid. Ask them to identify and then point to any areas where the grid is missing or distorted. Missing areas may suggest paracentral glaucomatous visual field loss, whereas distortion is more common with macular disorders.

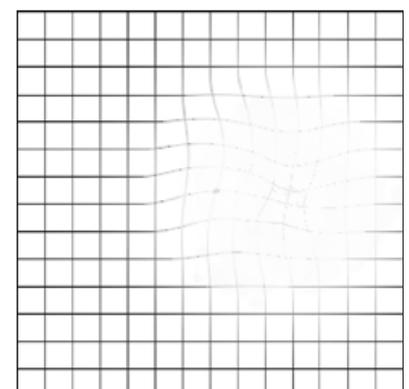
**Figure 3** Amsler grid, used to check distortion of central vision



**Figure 4** Amsler grid when viewed by someone with a problem with their central visual field (a and b)



**4a** Small scotoma (defect within a field of vision) below central fixation, with surrounding distortion



**4b** Large scotoma encroaching on central fixation with some distortion

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# Beyond VISION 2020: universal eye health coverage and the elimination of trachoma

The WHO World Report on Vision provides a strategic path to achieve sustainable eye health systems and universal eye health coverage.

On 18 February 1999, the World Health Organization (WHO) and the International Agency for the Prevention of Blindness (IAPB) launched **VISION 2020: The Right to Sight**. This global initiative was created to eliminate causes of avoidable blindness by the year 2020.

VISION 2020 aims to build comprehensive and sustainable eye health systems by integrating existing health services and ensuring high quality universal eye care. VISION 2020 has three key objectives: 1) the control of diseases that affect eye health; 2) the development of human resources; and 3) the provision of appropriate technology and infrastructure.

Trachoma, the world's leading infectious cause of blindness, is one of the priority diseases targeted by VISION 2020. There has been significant advancement towards elimination since the launch of VISION 2020. In June 2019, **WHO announced a 91% global reduction** in the number of people at risk of trachoma, from 1.5 billion in 2002 to 142.2 million today. During the same period, the number of people requiring surgery for trachomatous trichiasis (TT), the late blinding stage of trachoma, reduced from 7.6 million to 2.5 million – a 68% reduction. Nine countries across all endemic WHO regions have also been validated for achieving elimination.

Progress towards VISION 2020's mission and objectives include:

## 1. Raising support for comprehensive and sustainable eye health systems

VISION 2020 has led several initiatives that have raised the profile of avoidable blindness. Four World Health Assembly (WHA) resolutions have been adopted since 2003, including WHA resolution 66.4 **Universal Eye Health: A global action plan 2014 – 2019**, which have reinforced WHA Resolution 51:11 calling for the global elimination of trachoma. WHA resolutions aim to support UN member states to achieve global vision targets, including universal access to comprehensive eye care services.

## 2. Robust evidence to support disease elimination efforts

International commitments and increased investment led to the largest ever infectious disease survey – the **Global Trachoma Mapping Project (GTMP)**. From 2012–2016, GTMP screened over 2.6 million people for trachoma across 29 countries and identified areas



**Women in Napak, Uganda, after trichiasis surgery at a camp set up by the local health department in collaboration with Sightsavers as part of The Queen Elizabeth Diamond Jubilee Trust Trachoma Initiative, with support from UK Aid.**

where interventions needed to be scaled up. Since 2016, **Tropical Data** has supported health ministries through the full survey process - from planning and protocol development to application of the survey outputs. Data collected by GTMP and Tropical Data have mobilised resources to scale up all components of the WHO-endorsed SAFE strategy (surgery, antibiotics, facial cleanliness, environmental improvements) and have contributed to **over 566 million doses of antibiotics being distributed and nearly 1.5 million TT operations being conducted** since 2011.

## 3. Improved human resources, infrastructure and technology for eye health

In recent years, programmes have included strategies to **effectively use limited human resources** in resource-poor settings.<sup>1</sup> In Kenya, Tanzania and Chad, national programmes are upskilling ophthalmic nurses and ophthalmic clinical officers to carry out and manage TT operations. In Ethiopia, **which accounts for 44% of the global burden of trachoma**, the national programme is training general health workers to provide eye care services, including TT surgery, in order to improve coverage rates. Furthermore, new innovations, such as the TT tracker, is **helping national programmes to track surgical performance** for individual surgeons, so supervisors know when enhanced supervision or additional training is needed.<sup>2</sup>

## Conclusion

With VISION 2020 coming to an end next year, the eye health sector can celebrate advancements towards building sustainable eye health systems. The WHO World Report on Vision, published in October 2019, provides a strategic path to progress towards objectives set by VISION 2020. However, to achieve targets, trachoma interventions must be included in national eye health care plans and health systems must be equipped to deliver comprehensive eye health care for entire populations, including people with disabilities and other hard to reach populations.

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**Thank you**

to Tijssen Foundation and the Peek Vision Foundation ([www.peakvision.org](http://www.peakvision.org)) for funding the development of the *Community Eye Health Journal* app.

**Ophthalmologists from Kenya and India studying at the London School of Hygiene & Tropical Medicine.**

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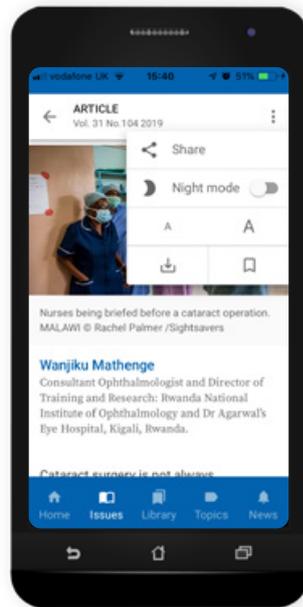
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**Figure 1** The three dots top right open up a menu where you can share, improve visibility and download or bookmark articles.

To save any image to your camera roll, tap and hold the image until the option appears.

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Here you can create and name your own folders to organise your content, e.g. for outreach visits, teaching or patient education. To access your library, you will be asked to create a free and secure account using an email address and a password of your own choosing. Everything you have downloaded and organised in your folders will always be accessible, even if you change devices or lose a device. You can also log into your library account on multiple devices, including your mobile, tablet or computer.

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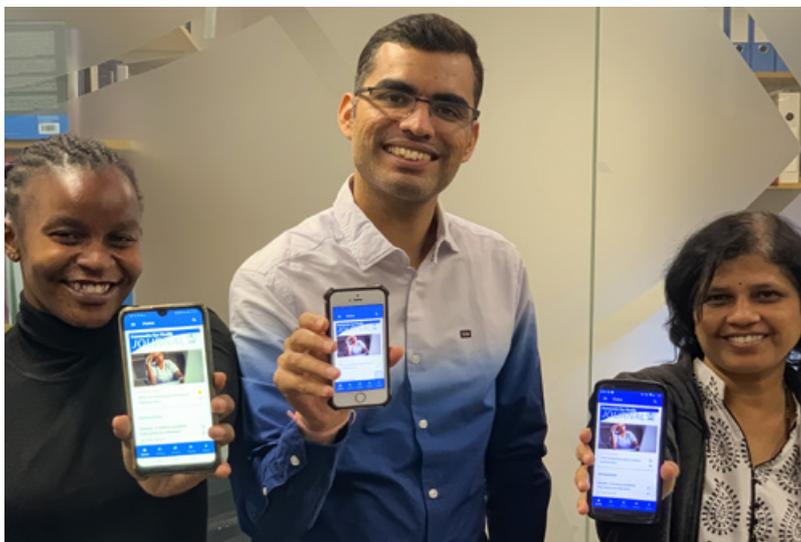
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ROWULO FABUNAN, ICEH

# Test your knowledge and understanding

This page is designed to help you to test your own understanding of the concepts covered in this issue, and to reflect on what you have learnt.



NIRANJAN GAIRE, CHHANDA (KALE-BABU) NARAYANI EYE HOSPITAL

You can detect many eye conditions using a simple torch. **NEPAL**

We hope that you will also discuss the questions with your colleagues and other members of the eye care team, perhaps in a journal club. To complete the activities online – and get instant feedback – please visit [www.cehjournal.org](http://www.cehjournal.org)

**Answer TRUE or FALSE for every part of all questions.**

### Question 1

The following eye examinations can be performed by a trained eye health worker (who is not a doctor) who has suitable equipment:

- a. Measurement of visual acuity
- b. Indirect ophthalmoscopy
- c. Refraction for presbyopia
- d. Measurement of intraocular pressure using a Schiötz tonometer
- e. Examination of the visual fields

### Question 2

The following can be performed using a torch:

- a. Examination of the pupil light reflex
- b. Examination of the conjunctiva
- c. Diagnosis of trichiasis
- d. Examination of the optic disc
- e. Examination of the cornea for a foreign body

### Question 3

The Arclight:

- a. Requires batteries
- b. Costs about £30
- c. Can be used to examine the optic disc
- d. Can only be used by doctors
- e. Can be used to examine the ears

### Question 4

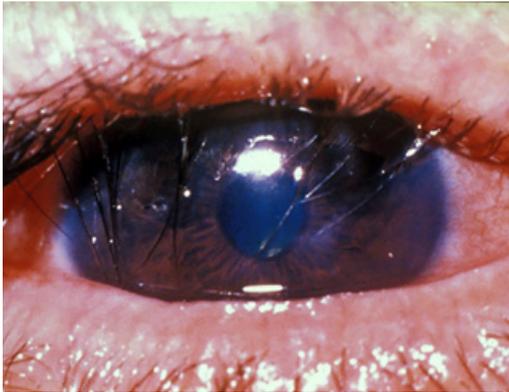
Which of the following statements are TRUE ?

- a. A baby with a white pupil should be referred immediately
- b. Reading glasses can be given to a 50-year-old patient with 6/60 vision in both eyes
- c. A 50-year-old patient who has an in-turned eye on cover test and complains of double vision probably has a squint from childhood
- d. A patient who complains of sudden unilateral painless loss of vision should have their pupil reactions tested and fundi examined following dilation of the pupils
- e. Community health workers must refer all eye patients to a specialist

## ANSWERS

1. a, c, d and e are TRUE. Indirect ophthalmoscopy is usually done by ophthalmologists.  
 2. d, is FALSE. a, b, c and e are TRUE.  
 3. c and e are TRUE. a, b and d are FALSE. It is solar powered and costs about £10 (US \$13). It can be used by any trained health worker.  
 4. a. TRUE. It may be cataract or retinoblastoma, both of which require urgent specialist attention. b. FALSE. The cause of poor distance vision needs to be found before considering giving reading glasses. c. FALSE. Double vision implies a recent muscle or nerve problem, e.g. sixth nerve palsy. d. TRUE. Sudden vision loss in a non-painful eye may be due to diseases of the retina or optic nerve. e. FALSE. A community health worker can be trained to carry out a basic eye examination and diagnose and treat common eye conditions such as conjunctivitis.

## Picture quiz



ICEH

### Question 1

What do you notice about each of the following?

- Eyelids
- Conjunctiva
- Cornea
- Pupil

Note: the dense white oval mark at 12 o'clock on the pupil margin is a reflex from the flash of the camera.

### Question 2

What is the diagnosis?

### Question 3

What disease is likely to cause this?

### Question 4

What is the name of the public health strategy to eliminate blindness from this disease?

## ANSWERS

- What can you see?  
a) Eyelids: turning in of the upper eyelashes  
b) Conjunctiva: it is red  
c) Cornea: there is a small grey-white opacity at 4 o'clock near the pupil edge; the rest of the visible cornea is clear  
d) Pupil: it looks normal.
- What is the diagnosis? Trichiasis.
- What disease is likely to cause this? Trachoma.
- What is the name of the public health strategy to eliminate blindness from this disease? The SAFE strategy (S for surgery to treat trichiasis, A for antibiotics to clear infection, F for facial cleanliness and hand hygiene to help reduce transmission and E for environmental improvement (for access to water and sanitation).

## Inaugural World Ophthalmic Nursing Forum



The World Ophthalmic Nursing Forum will offer nurses the opportunity to meet and network with a wide range of colleagues from across globe. It is free for nurses who register to attend the IAPB Global Assembly in Singapore from 12-14 October 2020. Find out more: email [communications@iapb.org](mailto:communications@iapb.org) or visit [IAPB.org/GA2020](http://IAPB.org/GA2020)

## Egypt carries out first trachoma intervention since 2001

Egypt distributes antibiotics to over 300,000 people to prevent and treat trachoma. Egypt has conducted its first mass drug administration (MDA) since 2001, giving it to over 300,000 people to prevent and treat trachoma. Read more at [www.cehjournal.org/NAME-OF-ARTICLE](http://www.cehjournal.org/NAME-OF-ARTICLE)

## Cataract surgeons needed

Are you a practicing ophthalmologist cataract surgeon interested in improving cataract surgical outcomes? The BOOST app will help you to capture key cataract outcome data and produce simple, engaging reports that can help you improve outcomes. To help us test the app, email [BOOST@hollows.org](mailto:BOOST@hollows.org) or read more at [www.cehjournal.org/NAME-OF-ARTICLE](http://www.cehjournal.org/NAME-OF-ARTICLE). The deadline is **30 December**.



## Paediatric cataract surgery video now online

Highly respected paediatric ophthalmologist Albrecht Hennig has made a valuable teaching video about cataract surgery in children, based on technique he perfected while working in Nepal and performing cataract surgery on thousands of children. Watch it on YouTube: <https://youtu.be/exYK409KgL8>

## Courses

### MSc Public Health for Eye Care, London School of Hygiene & Tropical Medicine, London, UK

Fully funded scholarships are available for Commonwealth country nationals. For more information visit [www.lshtm.ac.uk/study/masters/mscphec.html](http://www.lshtm.ac.uk/study/masters/mscphec.html) or email [romulo.fabunan@lshtm.ac.uk](mailto:romulo.fabunan@lshtm.ac.uk)

### Small Incision Cataract Surgery Training at Lions Medical Training Centre in Nairobi, Kenya

Courses begin every six weeks and cost US \$1,000 for training and approximately US \$1,000 for accommodation. Email [training@lionsloresho.org](mailto:training@lionsloresho.org) or call/message +254 728 970 601 or +254 733 619 191.

### Free online courses

The ICEH Open Education for eye care programme offers a series of online courses in key topics in public health eye care. All the courses are free to access. More free courses coming! Certification also available. For more information visit <http://iceh.lshtm.ac.uk/oer/>

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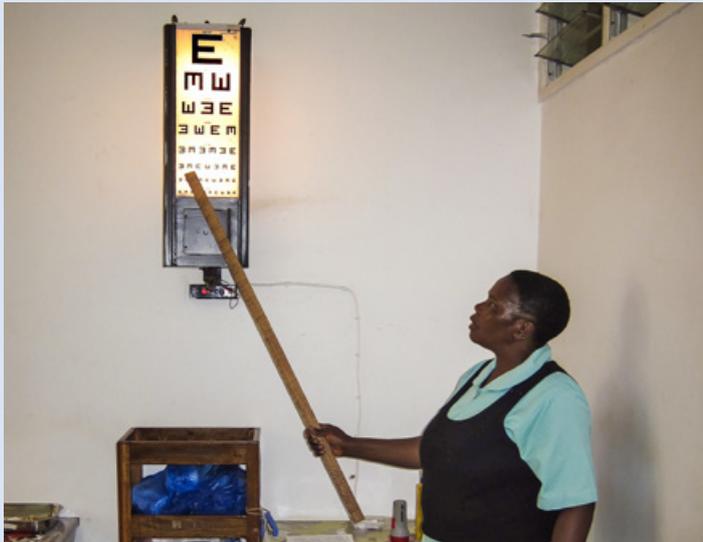
## Next issue



ALLEN FOSTER

The next issue is on the theme **Viral infections and the eye** and it will be available on our app and online only

# Key community eye health messages



HEIKO PHILIPPIN

**The visual acuity should be measured in each eye for all patients complaining of eye problems**



DR. SHIVAM MAINI, OPERATION EYESIGHT

**How to examine the eyelids, conjunctiva, cornea and pupils with a torch should be taught to all health workers**



TERRY COOPER

**The Arclight costs about £10, is solar powered and is very useful for examining the front of the eye, optic disc and central retina**