

## Non-communicable eye diseases: facing the future



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The World Health Assembly, which met in May 2013, adopted a new global programme document entitled 'Universal eye health: a global action plan 2014–2019'. The World Health Assembly is attended by ministerial delegations of all World Health Organization (WHO) Member States every year, and is where issues of major global public health importance are discussed. The global programme document was first drafted as part of an open, participatory process and was then discussed by the WHO Member States at the meeting. It states the major priorities for the global prevention of blindness efforts for the next five years.



**Diseases at the back of the eye are affecting older people in low-income countries**

Cataract and uncorrected refractive errors remain by far the leading causes of visual impairment. However, several other eye conditions have emerged as significant

threats to people's vision – those which are non-communicable (or chronic) and which become more prevalent with ageing. They are:

- diabetic retinopathy (DR)
- glaucoma
- age-related macular degeneration (AMD).

These diseases all affect the back of the eye. What they have in common is that they are incurable and require ongoing management (unlike cataract or refractive error, for which surgery or a pair of spectacles can restore vision).

Over the last two decades, these non-communicable eye diseases (NCEs) have become much more significant.

**1** As a result of health care initiatives, the proportion of people blind due to infectious eye diseases has decreased dramatically from 20% to 2%

over the last three decades; the proportion due to other eye conditions (including NCEs) has therefore increased.

**2** People are living longer (the demographic transition) and their diet and lifestyles are changing (the epidemiological transition), leading to an increase in NCEs.

The **demographic transition** (the fact that more people are living longer) is taking place due to better nutrition, a safer and healthier environment, improved hygiene and improved health services. Because DR, glaucoma and AMD mainly affect people over the age of 50, the demographic transition has resulted in an increase in the number of people affected by these conditions.

*Continues overleaf* ➤

### ABOUT THIS ISSUE



**Elmien Wolvaardt Ellison**  
Editor: *Community Eye Health Journal*.

There have been many successes in the fight against avoidable blindness, and it is encouraging to note the reduction in the number of people visually impaired or blind due to infectious diseases. With these successes, however, come new challenges – one of which is the increase in non-communicable diseases at the back of the eye. Although these diseases are certainly complex and difficult to deal with clinically, the challenges we face are about more than that – they involve both the patient (in terms of their acceptance of, and compliance with, treatment) and the eye health system: that is, everyone and everything involved in eye health delivery. In this issue we will be looking at the clinical challenges, new developments such as anti-VEGF drugs, and the health system. Our next issue (Issue 88) will address patient behaviour.

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## EDITORIAL *Continued*

High-income countries have already experienced this transition. Middle-income countries are rapidly undergoing this change, whereas it is just starting to happen in low-income countries.

The **epidemiological transition** means a change in population health due to changes in lifestyle. Non-communicable diseases, particularly cardiovascular disease and diabetes (with its complications, including diabetic retinopathy) are increasing because of changes in how people live. People are less active, eat more and eat less healthily – mainly as a result of urbanisation. Smoking, a risk factor for AMD, remains prevalent in many populations.

As with the demographic transition, the epidemiological transition has already occurred in high-income countries. Middle-income countries (mainly in Asia and Latin America) are currently undergoing this transition, and it is already starting to become noticeable in low-income countries.

### Will we be able to cope with these diseases?

In many high-income countries, progress has been made in the provision of services for the prevention, early detection and management of DR,

glaucoma and AMD. The countries that have been successful at dealing with these diseases have done so by providing comprehensive eye care services that are integrated into national health systems.

### 'Mainly due to urbanisation, people are less active, eat more and eat less healthily'

In addition, to enhance the quality of life and promote the independence and inclusion of people with permanent, severe vision loss, they have prioritised the provision of low vision services and rehabilitation. Most low-income countries, and some middle-income countries, however, are not able to

provide adequate services to prevent and manage these diseases. There is a shortage of eye care professionals and many of these do not have the level of skill and resources needed to effectively handle these eye conditions. In addition, many eye health services in these countries lack an interdisciplinary, patient-centred approach, which is critical for the successful management of NCDs.

### What is the way forward?

The WHO Global Action Plan is structured along three objectives, all of which relate to NCDs in the following ways:

- 1 **Advocacy based on evidence.** There is an urgent need for advocacy about NCDs at both global and local levels



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**The World Health Assembly opens in Geneva**

(in other words, arguing on behalf of NCEDs so that these diseases, and the people affected by them, get the attention they deserve).

- 2 Policy.** There are areas that need to be addressed at policy level, for example: universal access through health insurance; development of sufficient and adequately trained human resources for eye health; provision of comprehensive eye care; sustainable financing of eye care; provision of essential eye medicines; and monitoring of the key eye health indicators.
- 3 Multi-sectoral engagement.** This refers to the engagement between the health sector and non-health sectors. Multi-sectoral engagement, for example with education, environment, agriculture, transport, trade etc. is particularly important for reducing the risks of diabetes, and therefore the risk of DR.

### What are the priorities for action?

We now need to prepare to deal with NCEDs. Our chances of success depend on the availability of committed, sufficiently trained eye care professionals who have the equipment they need and are working within an adequate infrastructure. This means that eye health professionals must be trained to provide comprehensive eye examinations and be confident in managing NCEDs, including the provision of patient counselling.

In order to use the available eye care professionals efficiently, it is necessary that they work in teams. The composition of the team and the distribution of tasks

among team members depend on local and/or national regulations.

The necessary equipment and infrastructure (including good record-keeping processes) need to be put in place so that, once trained, eye care providers can examine patients, manage them, and follow them up.

With NCEDs, the need for appropriate and often life-long follow-up means that eye care providers must be able to make informed clinical decisions. These decisions will have a major long-term impact on patients, both in terms of their time and compliance with the treatment regime, and in terms of the lifelong costs of managing their condition. Establishing health insurance-based financing of health care – which includes eye care –

appears to be the optimal way to prevent vision loss in those individuals who may not be able to afford out-of-pocket payments.

Patients must be able to comply with the treatment regimes, which means that the medicines they need have to be available and affordable. This means that the procurement and distribution logistics of eye medicines may require review. One can learn from approaches implemented by large intervention programmes for HIV/AIDS, TB and malaria, using bulk purchasing to drive prices down and to ensure quality control and standardisation.

Many individuals affected by NCEDs will need low vision services at some point during their lives, but the availability and affordability of these services have been neglected. Even in high-income countries, there may be uneven coverage of the population: most low vision services are provided in urban areas, resulting in limited access for some. Adequate low vision and rehabilitation services should therefore be a significant part of comprehensive eye care. Once people have lost their sight due to an NCED, there is usually no way to restore vision, so rehabilitation and low vision are currently the only remaining intervention.

*Universal eye health: a global action plan 2014–2019*, as endorsed by the World Health Assembly in 2013, now serves as a road map for the development of comprehensive eye care services integrated into national health systems. Attainment of universal access to eye health will not be possible without adequate attention to the development of eye care services addressing NCEDs.

#### Further reading

Universal eye health: a global action plan 2014–2019  
<http://www.who.int/blindness/actionplan/en/>

### WHO Global Action Plan

*“Substantial reduction of avoidable visual impairment depends on progress in other global health and development agendas, such as the development of comprehensive health systems, human resources for health development, improvements in the area of maternal, child and reproductive health, and the provision of safe drinking water and basic sanitation. Eye health should be included in broader non-communicable and communicable disease frameworks, as well as those addressing ageing populations. The proven risk factors for some causes of blindness (e.g. diabetes mellitus, smoking, premature birth, rubella and vitamin A deficiency) need to be continuously addressed through multi-sectoral interventions.”*

– *Universal eye health: a global action plan 2014-2019*



# Anti-VEGF drugs in the prevention of blindness

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Disorders of the blood vessels in the retina are responsible for some of the most common causes of blindness in the world. These include:

- retinopathy of prematurity (an important cause of blindness in children in middle-income countries)
- diabetic retinopathy (the most common cause of blindness in the working-age population of industrialised countries)
- age-related macular degeneration (the third most common cause of blindness in the world).

All of these conditions are caused partly by over-production of a protein called vascular endothelial growth factor (VEGF). This protein was discovered in the 1980s and is important in the growth and development of blood vessels. VEGF production is increased by hypoxia (a lack of oxygen). So, if a tissue is not getting enough oxygen, it will produce more VEGF, which will stimulate the growth of additional blood vessels to provide more oxygen. This is beneficial in the heart muscle, or in a growing baby; however, in the eye it can be harmful.

The effects of VEGF may be summarised as:

- Increased permeability of existing blood vessels, causing them to leak.
- Growth of new blood vessels, which may bleed or leak fluid and proteins.

In the eye, both can lead to retinal damage.

Normal retinal capillaries (very fine blood vessels in the retina) are sealed thanks to tight junctions between the cells making up the capillary walls. This means that large molecules, such as proteins and lipids, cannot leak out of these retinal capillaries into the retina. In the presence of excessive VEGF, however, the capillaries start to leak and large molecules form exudates and escape into the retina, causing oedema in the surrounding tissues. If this affects the macula, then the central vision will be reduced. This is what causes diabetic macular oedema.

Excessive VEGF also causes the growth of new, abnormal retinal blood vessels and capillaries. These do not grow within the retina, where they might be useful.

Instead, the abnormal capillaries grow out from the retina onto the surface of the vitreous, where the vitreous touches the retina. This happens in proliferative diabetic retinopathy and retinopathy of prematurity. The new vessels are fragile and prone to tearing. When a new vessel is torn, it bleeds, causing vitreous haemorrhage. As the vitreous contracts, the new vessels pull on the retina, causing a traction retinal detachment. If the detachment includes the macula, vision will be impaired.

In the presence of excessive VEGF, new vessels can also grow out from the choroid (the layer immediately under the retina). These new vessels grow into the space between the retina and the choroid, usually just under the retinal pigment epithelium. The new vessels leak exudates formed of fluid or blood, causing oedema; eventually a fibrous scar is formed that destroys the photoreceptor cells at the centre of the macula. This is what happens in exudative (or 'wet') age-related macular degeneration (AMD).

Because of these very damaging effects in the eye, researchers have been working for years to find a way to block the activity of VEGF in the eye.

## Anti-VEGF drugs

VEGF has many beneficial effects in the rest of the body. Therefore, any anti-VEGF drug has to be given by a route that gives the maximum effect in the eye, but little or no effect elsewhere. In practice, this means it must be injected into the eye (intraocular injection). This carries a number of risks, and it is thought that about 1 in every 1,000 injections has a serious complication such as cataract, vitreous haemorrhage, retinal detachment, or infection. Each injection must be handled with appropriate sterilisation and aseptic technique (see page 47).

The two most widely used drugs at present are Lucentis (ranibizumab) and Avastin (bevacizumab). Both drugs are monoclonal antibodies that bind to all three forms of VEGF. They are very similar drugs (see page 48), but Lucentis is a smaller molecule and is believed to bind VEGF in the eye with greater affinity. Lucentis is intended purely for intraocular injection, and each vial can only be used for one patient. Avastin was intended to be given intravenously as an anti-cancer drug, and comes in vials of 100 mg.

As the dose required for intravitreal

injection is only 2.5mg, one vial of 100 mg of Avastin can be used to treat 40 patients, provided that you have the necessary skills and facilities to prepare sterile injections for intraocular injection. In the United Kingdom, the British National Formulary gives a net price of £242\* for a 100 mg vial of Avastin, (containing 40 doses). The British National Formulary gives a net price of £742\* for a single 2.5 mg dose of Lucentis. This means that a single dose of Avastin can work out to be over 100 times cheaper than a single dose of Lucentis (provided that you have the skills and facilities, as stated above). [\*Note: The actual prices of drugs vary considerably due to local purchasing arrangements, and may be very different from the net prices quoted above. These are taken from the British National Formulary, and only give an indication of the relative costs of the drugs.]

The most recently approved drug is aflibercept (also known as Eylea). This is an artificial protein that contains the VEGF receptor molecules that are normally attached to cell membranes. The VEGF binds to these receptors and is trapped and rendered harmless. Aflibercept seems to be as effective as Avastin and Lucentis, but may be given less frequently. In the British National Formulary, a single dose has a net price of £816.

## Side-effects

VEGF is important for the growth of new blood vessels. Although the dose of anti-VEGF needed to treat eye diseases is very small, it has been shown to reduce the level of VEGF in the bloodstream. This means that there is a theoretical risk that, in adults, anti-VEGF drugs may increase the risk of cardiovascular disease, including heart attacks and strokes. However, clinical trials have not shown conclusive evidence of an increased risk of cardiovascular disease in patients treated with anti-VEGF drugs compared to those given sham injections.

In babies and young children, VEGF is essential for the growth of blood vessels and normal growth and development of many other organs including the lungs, kidney and brain. This is one of the reasons why anti-VEGF drugs are absolutely contra-indicated in pregnancy. Women of childbearing age should have a pregnancy test prior to starting treatment, and must avoid pregnancy during treatment. Although Avastin has been

used in the management of retinopathy of prematurity, its use is controversial, because of the potential for serious adverse effects when used in young babies (see panel on page 46).

In practice, the major adverse effects of these drugs appear to be associated with the intraocular injection rather than the active drug.

### Treatment regimes in adults

Regardless of the treatment indication, there are essentially two regimes for administering anti-VEGF drugs: **continuous** and **intermittent/as required** (or *pro re nata*, **PRN** for short).

Most of the initial trials were done as a **continuous** regime, with regular monthly injections over the course of 2 years, i.e. patients would have 24 injections in total. These trials showed that treatment delivered in this way was effective, but it is also expensive and inconvenient for both the patient and the health care provider.

A number of other trials have examined **PRN** regimes. These are all fairly similar and consist of three injections given over 3 months, followed by review. At this point the patient may:

- be much better, in which case no additional treatment is needed
- have no improvement at all, in which case further treatment is futile
- have some improvement, which would justify further injections.

Even among those patients who do very well, and do not require more than three injections initially, many will relapse and require further injections in the future.

This means they must be regularly reviewed in the clinic, i.e. every 1–2 months, which involves testing of visual acuity and/or retinal thickness. If patients' visual acuity is lower by one or more lines, or if they develop worsening macular oedema, they need a further injection of anti-VEGF.

Trials of this dosing regime for AMD and diabetic macular oedema have shown that an average of seven injections are required in the first year of treatment and that outcomes are as good as for regular monthly injections. The trials used as their indication for re-treatment with anti-VEGF either a reduction in visual acuity or an increase in retinal thickness (measured using optical coherence tomography [OCT]); both were assessed at each visit.

While visual acuity is easily measured, retinal thickness can only be measured accurately by OCT. These machines are costly and will only be available in major

Continues overleaf ►

## FROM THE FIELD

# Use of anti-VEGF drugs at the Instituto de la Visión de Montemorelos



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## 1 Which anti-VEGF agents do we use?

We use bevacuzimab (Avastin) – the dose used is 2.5 mg (0.1 ml). This anti-VEGF agent is used because of its:

- proven efficacy and effectiveness (CATT & IVAN studies)
- low cost, making it affordable for our patients.

## 2 What are the indications?

- Vitreous haemorrhage secondary to proliferative diabetic retinopathy – particularly when there has been no previous laser.
- Prior to vitrectomy for proliferative diabetic retinopathy.
- Clinically significant macular oedema due to diabetic retinopathy.
- Macular oedema secondary to branch or central retinal vein occlusion.
- Exudative age-related macular degeneration.
- Neovascular glaucoma.

## 3 Who gives the injections?

Intra-vitreous injections are always given by an ophthalmologist, for example:

- retina specialists
- retina subspecialty trainees
- ophthalmology residents in the retinal service.

## 4 Are anti-VEGF agents used without OCT?

Anti VEGF agents are used without OCT in selected cases:

- vitreous haemorrhage secondary to proliferative diabetic retinopathy – particularly when there has been no previous laser
- prior to vitrectomy for proliferative diabetic retinopathy
- clinically significant macular oedema due to diabetic retinopathy
- neovascular glaucoma.



Anti-VEGF injections are given in a clean room

## 5 What are the outcomes?

Clinical experience has been very positive and we believe this is a cost-effective treatment for our patients.

### Vitreous haemorrhage secondary to proliferative diabetic retinopathy:

We have been pleased with our results. Anti-angiogenic therapy reduces the vitreous haemorrhage in many patients with diabetic retinopathy, allowing us to apply laser and avoid vitrectomy surgery.

### Prior to vitrectomy for proliferative diabetic retinopathy:

Application 3–5 days before surgery reduces the risk of intra-operative and post-operative bleeding.

**Neovascular glaucoma:** In these patients, we are careful to avoid further increases in the IOP. When the rubeosis regresses we apply pan-retinal laser, giving us more control of the iris neovascularisation.

### Clinically significant macular oedema:

In clinically significant macular oedema due to diabetic retinopathy, we normally apply three doses of Avastin with 1-month intervals between injections. After the last injection, a macular OCT is requested and, if the oedema has decreased, we apply focal laser.

### Age-related macular degeneration (AMD):

In patients with exudative AMD, an injection is given every month for several months to improve visual acuity and to control the disease, following the 'treat and extend' protocol.

Pedro A. Gomez Bastar

cities in low- and middle income countries. We don't yet know how effective PRN treatment might be when retreatment is guided by visual acuity alone, as both visual acuity and retinal thickness were measured at each visit in these trials.

Although intermittent regimes reduce the number of injections, patients still have to be reviewed every 1–2 months, which leads to very busy clinics; this is also a significant burden for the patients and for their families.

## Which diseases can be treated?

### Age-related macular degeneration

Lucentis, Avastin and Eyelea are equally effective in exudative AMD. There appears to be little difference between monthly and PRN dosing. The average (mean) improvement in vision is about 1–2 lines, and about one-third of patients will improve by three or more lines. With a PRN regime, an average of seven injections will be required in the first year. Most of these trials excluded eyes with a vision of less than 6/96 (4/60), and treatment is unlikely to be effective in advanced exudative AMD with sub-macular scarring or a vision of 'counting fingers' or 'hand movement'. Unfortunately, exudative AMD often co-exists with atrophic ('dry') AMD, and the anti-VEGF drugs only treat the exudative component. With longer follow-up (over 2 years), atrophic AMD may cause a gradual loss of vision despite effective anti-VEGF treatment.

### Diabetic macular oedema

Once again, there seems to be little difference between the different anti-VEGF drugs. All three are effective at

treating diabetic macular oedema, and the average improvement in vision is about 1.5 lines. Roughly 25% of patients will have their visual acuity improve by three or more lines and 50% by two or more lines. An average of seven injections will be required in the first year of treatment with a PRN regime.

Not all patients with diabetic macular oedema need to be treated with anti-VEGF. Laser treatment still has an important role: macular oedema which does not involve the fovea is best treated with laser. These patients will normally have good vision, and the laser will help to preserve it. Moreover, laser is usually effective with a single treatment, which is much easier for the patient than repeated monthly injections.

If new vessels are present, they should be given pan-retinal laser treatment first, before any macular oedema is treated using anti-VEGF. This is because anti-VEGF makes the new vessels regress very quickly. As the treated vessels become fibrotic, they contract, which can cause a retinal detachment.

### Retinal vein occlusion

There is good evidence from clinical trials that all three anti-VEGF drugs will reduce the risk of loss of vision following central retinal vein occlusion. About 50% of patients will gain three or more lines, with a mean improvement of about two lines. There is also a reduced risk of rubeosis and secondary glaucoma with anti-VEGF treatment.

Lucentis has been shown to improve outcomes after branch retinal vein occlusion as well. However, as many of these patients will improve spontaneously, this evidence is not quite as strong.

In summary, anti-VEGF drugs are probably the most significant advance in ophthalmology in the last decade. They have enabled us to treat what were previously untreatable conditions. They are not a perfect solution, however.

- They do not cure the underlying problem, so repeated treatment is necessary and most patients will require a lifetime of regular monitoring.
- The drugs are expensive, and even high-income countries have struggled with the costs and logistics of delivering thousands of intraocular injections every year.
- Although anti-VEGF drugs are the most effective treatment for many retinal diseases, the visual improvement is modest, averaging about two lines of vision. Relatively few patients will regain normal vision.
- Patients who present late, with very advanced disease and a visual acuity of less than 3/60, may not benefit from treatment.
- Most PRN treatment regimes rely on OCT imaging, which is rarely available in low and middle income countries. We have little information on the use of anti-VEGF in this setting, and we cannot be sure that the good results achieved in Europe and North America will be replicated in Africa, India, or China.

Despite these reservations, anti-VEGF drugs are going to play an increasing role in the prevention of blindness worldwide. As the global population ages, and becomes more overweight, both AMD and diabetic retinopathy will become more common. The drugs will become cheaper, and we may find better ways of monitoring treatment so that expensive OCT is no longer essential.

## Anti-VEGF treatment for acute ROP – *not yet recommended!*



**Clare Gilbert**

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There are several reasons why anti-VEGF agents are not recommended for acute, severe retinopathy of prematurity (ROP).

- There has only been one randomised trial, which compared laser with Avastin (bevacizumab) for Type 1 ROP. It was only more effective in preventing early recurrence of severe disease in Zone 1 (posterior), but the recurrence rate in the laser arm was worse than would be expected based on other studies. More babies died in the anti-VEGF arm of the trial, but the

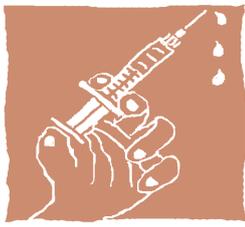
difference was not statistically significant.

- There are major concerns about the short- and long-term impact of anti-VEGF agents on the lung, kidneys and brain of a baby.
- Follow-up studies, using fluorescein angiography, indicate that normal retinal vascularisation may not take place after administration of bevacizumab, with extensive areas of non-perfusion months after treatment.
- There are an increasing number of case reports which show that, although Avastin can lead to regression of ROP in the short term, the ROP can recur months later. This means that an acute disease with a known natural history has the potential to become a chronic

disease with an unknown and unpredictable natural history.

- Some surgeons use Avastin for Stage 4a or 4b ROP prior to surgery. This can make the surgery easier, but there is still the risk of systemic complications.

The leaking capillaries present in eyes with retinopathy increase the risk of large molecules (e.g. anti-VEGF drugs injected into the eye) entering the systemic circulation, and so the systemic safety of these drugs is important, particularly in preterm infants. If anti-VEGF drugs seem to be the only option to preserve sight when extensive laser has failed, or the infant is too sick for laser, this treatment can be offered, but **only** after parents have been fully informed of the possible consequences.



# Intravitreal injection technique

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This article describes how to give an intravitreal injection of an anti-VEGF drug.

At present, the majority of intravitreal injections are administered by doctors; however, experience in the UK has shown that trained nurses can give these injections as safely as ophthalmologists.

The single most important thing to remember is that an intravitreal injection is an intraocular operation, and should be treated equally seriously. The most devastating complication is endophthalmitis, and you must take every possible precaution to prevent infection.

## Setting

Intravitreal injections should be given in a clean room. A clean room is a room dedicated to intraocular injections or other sterile interventions. The most important point is that a clean room should never be used for unsterile or dirty procedures, such as draining an abscess or cleaning infected wounds. The room should be cleaned before use to the same standard as an operating theatre. Injections can be given in an operating theatre, but operating theatre protocols mean that it can take 15 minutes to prepare the patient and make the necessary checks, which may be an inefficient use of staff time.

You need a good light, so that you can see what you are doing. The patients should be lying flat on a comfortable couch or bed, which should be high enough for you to give the injections without bending over.

## Equipment

- Anti-VEGF drug
- Syringe – usually 1 ml as only a very small volume (0.05–0.1 ml) is injected
- Large bore needle – for drawing up the drug
- 30g needle – for giving injection
- 5% (aqueous) povidone iodine solution for disinfection of skin and conjunctiva
- Local anaesthetic drops
- Topical antibiotic drops
- Sterile cotton buds
- Sterile gloves
- Drapes
- Eyelid speculum
- Calliper or other measuring device

## Procedure

- Most patients will be understandably nervous about the prospect of having a

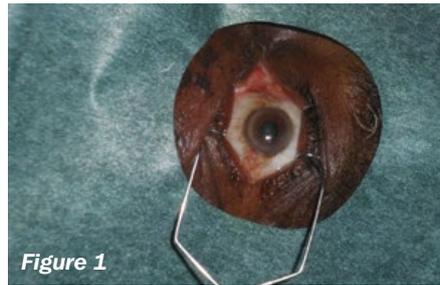


Figure 1

Abba Hydera



Figure 2

Abba Hydera



Figure 3

Abba Hydera

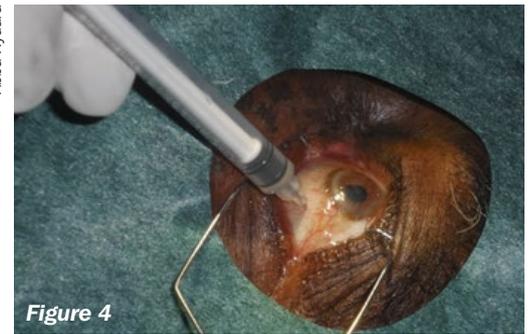


Figure 4

Abba Hydera

needle stuck into their eye. You must provide sensible reassurance, and explain every step of the procedure so that your patient knows exactly what is going to happen next.

- Before you do anything to your patient, check the notes and prescription. You cannot see which eye needs to be treated so make sure that you are planning to inject the correct eye with the right drug. It is advisable to mark the eye to avoid any possible confusion.
- Once the patient is lying down comfortably, scrub your hands and put on sterile gloves. Some people will wear a sterile gown, but this is not essential.
- Instil some local anaesthetic drops. I usually put drops in both eyes, as the iodine solution is very irritant and may go into the other eye.
- The drops take a few minutes to work, so draw up the anti-VEGF while you are waiting. Use a sterile technique to draw up 0.1 ml into the 1 ml syringe, using a large bore needle. Empty the air from the syringe and fit the 30G needle on the syringe. Eject the surplus drug until there is 0.05ml left in the syringe.
- Use the 5% aqueous povidone iodine solution to clean and disinfect the eye to be injected. Wipe the skin around the eye and ensure that the solution goes into the conjunctival sac so that it also disinfects the surface of the eye. Leave the eye for a minute or so for the solution to work.
- Instil some topical antibiotic drops (the patient must complete the course).
- Dry the skin around the eye to remove excess povidone iodine and place a sterile drape over your patient's face so

that only the eye to be treated is visible. Arrange the drape so that it does not obstruct your patient's breathing.

- Insert the speculum to hold the eye open (Figure 1).
- I usually place a swab soaked in local anaesthetic over the site of the injection and hold it in place for one minute (Figure 2)
- Using the measuring calliper or some other measuring device (Figure 3), measure a safe distance behind the limbus in the inferotemporal quadrant. In patients who have had cataract surgery, this is 3.5 mm. In patients who are phakic and still have their own lenses, it is 4 mm.
- Warn the patient that you are about to inject, insert the needle quickly and inject the drug (Figure 4), then remove the needle. Tell your patient it is all over!
- Instil more topical antibiotic drops, and check that the patient's vision is unaffected. Sometimes injection of even a small volume of fluid will cause a sharp rise in intraocular pressure. If this happens, the patients will notice a loss of vision. The best treatment is to do an immediate paracentesis to release aqueous from the anterior chamber. If this is not possible, however, ocular massage will usually lower the IOP. In patients who are at high risk from an elevation of IOP (e.g. people with severe glaucoma), it is sensible to do ocular massage before giving the injection.
- You should prescribe topical antibiotic drops for 4 days after the injection. You must also make follow-up arrangements, either for another injection, or to be reviewed in the clinic.



# Anti-VEGF drugs: evidence for effectiveness



## Jennifer Evans

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Anti-vascular endothelial growth factors (anti-VEGF) are targeted biological drugs (e.g. monoclonal antibodies) that prevent the growth of new vessels by inhibiting VEGF. VEGF is a cytokine (cell-signalling protein) that promotes the growth of, and leakage from, new vessels. Currently there are three anti-VEGF drugs licensed for use in eye disease: pegaptanib, aflibercept, ranibizumab and one that is not licensed but is commonly used off-label (bevacizumab).



THE COCHRANE COLLABORATION®

Cochrane reviews are summaries of the evidence for an effect of an intervention prepared using transparent methods that aim to reduce the risk of bias. Three features distinguish Cochrane reviews from most other systematic reviews.

- 1 The publication of a protocol.
- 2 The use of systematic and exhaustive searches of the literature.
- 3 Regular updating of reviews.

There are currently nine reviews and protocols in The Cochrane Library (<http://www.thecochranelibrary.com/view/0/index.html>) which addresses the effects of anti-VEGF on specific eye diseases, including one about the systemic safety of ranibizumab and bevacizumab.

This article summarises the current Cochrane reviews on proliferative (neovascular) age-related macular degeneration (AMD)<sup>1</sup>, diabetic macular oedema (DMO)<sup>2</sup> and safety.<sup>3</sup>

## Participants

People enrolled in the AMD trials included in these reviews had moderate visual loss and did not have large sub-retinal haemorrhages. In real life, patients may present with more advanced disease and severe visual loss. DMO was diagnosed clinically, and OCT was usually used to confirm macular involvement. Similarly, people who enrolled in the DMO studies also had moderate visual loss.

## Effects of anti-VEGF on vision

People treated with any of the anti-VEGF agents in clinical trials more often experienced improved vision, less often lost vision, and were less likely to be legally blind than participants treated with control interventions after 1 year of treatment.

In the majority of trials of anti-VEGF for proliferative AMD, people receiving anti-VEGF were between three and ten times more likely to gain 15 or more letters of visual acuity at 1 year after treatment, and this benefit was seen at 2 years as well. They were also 80% less likely to lose 15 or more letters of visual acuity at 1 year. There were measureable benefits on quality of life.

In the DMO trials, anti-VEGF treatment was compared with laser. People receiving anti-VEGF were approximately four times more likely to gain 15 or more letters of visual acuity at 1 year compared to people who received laser treatment. They were approximately 90% less likely to lose 15 or more letters of visual acuity in one year.

Participants treated with anti-VEGF showed improvements in the structure of the back of the eye, for example central macular thickness.

## Adverse events

Inflammation and increased pressure in the eye were the most common vision-related adverse events with anti-VEGF. Endophthalmitis was reported in fewer than 1% of anti-VEGF-treated participants.

The findings on the systemic safety of ranibizumab and bevacizumab were similar; however, at the moment, most of the evidence available is for AMD, and relatively few trials have addressed this

comparison for DMO.

In the AMD and DMO reviews, the evidence was judged to be of a high quality overall.

## Systemic safety of ranibizumab and bevacizumab

One further Cochrane review has compared the systemic safety of ranibizumab and bevacizumab for neovascular AMD.<sup>2</sup> In terms of systemic safety, current published and unpublished randomised controlled trials found no evidence of any difference between the two interventions.

However, the studies to date cannot definitely exclude the possibility that either treatment is more (or less) associated with harmful effects.

## Future research directions

Future research should investigate effectiveness under real-world monitoring and

treatment conditions, particularly for AMD. It is possible that the same benefits may not be achieved in resource-constrained settings or in low- and middle-income countries (LMIC) where intensive diagnostic follow-up is difficult and under-treatment may be more likely than in industrialised countries. Differences between drugs are also of interest, especially comparing low cost off-label bevacizumab to licensed drugs in diabetic retinopathy and DMO. This is an important public health issue in LMIC, since efficacy has been demonstrated to be similar for AMD. For all these drugs and indications, safety in high-risk populations, particularly regarding cardiovascular risk, proved to be good, but has to be investigated further.

**‘Participants treated with anti-VEGF showed improvements in the structure of the back of the eye’**

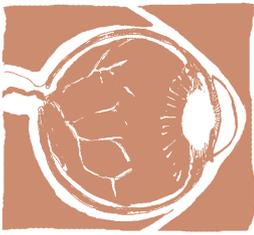
Wanjiku Mathenge



Commonly used anti-VEGF drugs

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AMD

# Age-related macular degeneration



**Wanjiku Mathenge**

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## What is AMD?

Age-related macular degeneration (AMD) is a disease of the retina that usually develops in people aged 60 years and older. It affects about 8.7% of the world's population and is the leading cause of blindness among people aged 50 and older in industrialised countries.<sup>1</sup>

AMD affects the macula. When it becomes advanced, it destroys the central vision we use to look straight ahead. This is necessary for recognising faces, reading books or using mobile phone screens, watching television, sewing, preparing food, driving, safely navigating stairs and performing other daily tasks we take for granted. If the macula is damaged, the picture is there but the fine points are not clear.

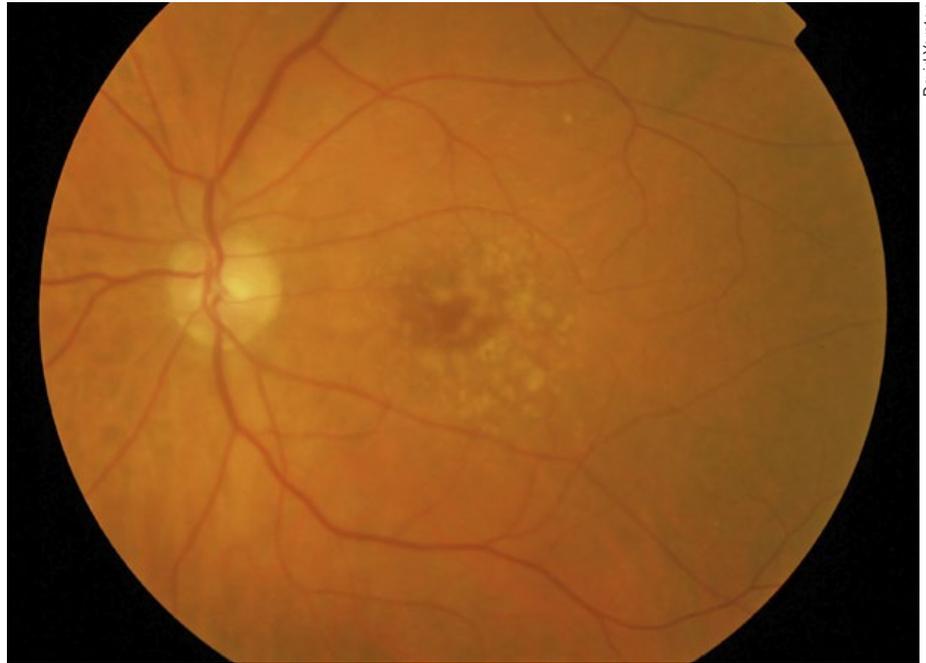
Fortunately, the peripheral vision remains intact. This means that some patients with AMD will retain some independence, and eye workers should reassure them that peripheral vision will not be lost, even if no treatment is possible.

## Is it increasing in low- and middle-income countries?

A recent review of the global prevalence of AMD shows that the number of people with AMD in 2020 is projected to be 196 million, which will increase to 288 million in 2040.<sup>1</sup> Studies of AMD in low- and middle-income countries have shown that, in contrast to what was originally thought, AMD is not rare in Asian and African populations but is instead a significant contributor to blindness. Table 1 shows the prevalence from some recent studies involving different ethnic groups.

## Classification

AMD can be classified as either early-stage or late-stage. In the early stage, AMD is characterised by atrophy or hyper-



David Yorston

**Early AMD.** There are irregular pale dots at the macula, which are called drusen. They are caused by a build-up of waste products from photoreceptor metabolism. Although drusen are associated with AMD, most patients with drusen will not develop severe AMD

trophy of the retinal pigment epithelium (RPE) underlying the central macula, as well as drusen deposition. (Drusen are deposits of extracellular material lying between the basement membrane of the RPE and the inner collagen layer of Bruch's membrane beneath the RPE.)

The early stages of AMD may progress to either atrophic ('dry') or exudative ('wet') AMD. It is these advanced stages that are associated with vision impairment.

In **atrophic AMD** there is atrophy of the central macula, with gradual destruction of the RPE and the photoreceptors.

In **exudative AMD**, abnormal choroidal vessels/capillaries (pathologic choroidal neovascular membranes) develop under the macula, leak fluid and blood, and, ultimately, cause a central fibrous sub-retinal scar, with destruction of

the photoreceptors and retinal pigment epithelium. Approximately 10–20% of patients with atrophic AMD can progress to the exudative form.

## Risk factors

Susceptibility to AMD is influenced by increasing age, smoking and family history. Smoking is the most consistent risk factor associated with advanced AMD in the majority of the prevalence studies.

Several genetic variants that influence susceptibility to AMD have recently been identified. People who have one or more of these genetic variations are at particularly high risk of developing AMD if they also smoke.

Three types of nutritional factors have been investigated for their potential protection against eye ageing: antioxidants (mainly zinc and vitamins C and E),

*Continues overleaf* ➤

**Table 1. Prevalence of AMD in recent studies**

Author; Study	Dates and country	Number of subjects (N); age	Prevalence of late AMD (%)
La; Korean National Health and Nutrition Survey	2008–2011, Korea	N = 14,352; ≥ 50 years	0.6
Mathenge; Nakuru Posterior Segment Eye Study	2007–2008, Kenya	N = 3,304; ≥ 50 years	1.2
Kawasaki; Funagata Study	2000–2002, Japan	N = 1,037; ≥ 55 years	0.8
Krishnan; INDEYE	2005–2007, India	N = 4,266; ≥ 60 years	1.2
Korb; European cohort: Gutenberg Health Study	2007–2012, Germany	N = 4,340; 35–74 years	0.2

the carotenoids lutein and zeaxanthin and omega-3 polyunsaturated fatty acids. Unfortunately, the results of supplementation have been disappointing, as large doses must be taken daily for the remainder of the patient's life and the benefit, if any, is small.

## How it presents

AMD occurs in both eyes, but it is often asymmetric. In the early stage, patients are often without symptoms, or sometimes they notice mild symptoms such as minimally blurred central visual acuity, reduced contrast, changes in the way colour is seen, and mild metamorphopsia (distortion of visual images).

Patients who develop atrophic AMD may notice a scotoma (blind spot), which slowly enlarges over months or years before becoming stable. This particularly affects reading.

Patients with exudative AMD typically describe painless progressive blurring of their central visual acuity, which usually

occurs quite rapidly, over a few weeks. Patients also report relative or absolute central scotomas, metamorphopsia and difficulty with reading.

The natural history of exudative AMD or occasionally atrophic AMD results in a stable central scotoma in which the visual acuity falls below the reading level and the legal driving level. With exudative AMD, the visual outcome can be much worse. However, peripheral vision is usually retained.

## At the district level

With the advent of effective therapy for the neovascular form of AMD, early diagnosis and treatment is recommended and there is increased emphasis on patient self-screening for the early symptoms of disease. The most important preventive measure is to stop smoking.

If a patient over the age of 60 years presents with any symptoms of AMD, visual acuity should be tested and recorded. At the primary level, all patients with reduced vision should be referred to the eye clinic for further assessment. At the district hospital, the macula can be examined for the presence of drusen (see image on page 49) or pigment changes at the macula. Drusen can be seen as pale yellow deposits. If these are present then an Amsler grid test may be carried out.

The Amsler grid is a test that can be used in clinics to screen people over 60 years of age. It can also be taught to patients with early AMD for self-testing. An Amsler grid consists of straight lines, with a reference dot in the centre. Each eye is tested separately. The patient is advised to hold the chart at the normal reading distance and to cover one eye. While focusing only on the central dot, the patient describes whether she or he sees any distortions in the grid pattern. Someone with macular degeneration may see some or all of the following:

- Straight lines that appear wavy or bent
- Boxes that differ in size or shape from the others
- Lines that are missing, blurry or discoloured
- Dark areas at the centre of the grid.

Patients with an abnormal Amsler grid test should be referred to an ophthalmologist.

## Investigations

The ophthalmologist's initial examination of patients with signs and symptoms of AMD should include visual acuity testing and a thorough stereo examination of the macula using a biomicroscopy lens (60–90D). This is often followed by imaging studies such as:

- **Stereo colour photography of the fundus:** for establishing, documenting,

and tracking the exact size of the lesion.

- **Fundus fluorescein angiography (FFA):** the gold standard for diagnosing choroidal new vessels (CNV) due to AMD. Facilities performing FFA must have an emergency care plan and a protocol to minimise the risk and to manage any complications.
- **Optical coherence tomography (OCT):** excellent at detecting increased retinal thickness due to leakage from the abnormal vessels. This is a simpler, faster and safer investigation than FFA, but OCT machines are still very expensive.

## Management

Until recently, ophthalmologists used laser destruction of abnormal vessels/capillaries as the primary treatment for exudative AMD.<sup>2</sup> These procedures included thermal laser photocoagulation and later the inclusion of intravascular photosensitisers such as verteporfin used in photodynamic therapy. However, at best these treatments slowed progression of the condition. They were not expected to lead to any improvement in vision.

The treatment of exudative AMD changed dramatically with the advent of vascular endothelial growth factor (VEGF) inhibitors (see articles on pages 44–48). Pharmaceutical drugs have been developed to block or neutralise VEGF in patients with AMD. These include pegaptanib (Macugen), ranibizumab (Lucentis), bevacizumab (Avastin), and aflibercept (Eylea). These are given as intravitreal injections and several doses are needed. They have been shown to stabilise vision in most patients with exudative AMD, and many patients will experience a significant improvement in visual acuity.<sup>3</sup>

There are no effective treatments for atrophic AMD at present. Patients should be reassured that progression is usually slow and they are likely to retain their independence even if reading vision is compromised. Other useful interventions may include smoking cessation, rehabilitation and low vision aids. The latter two are important in improving patients' quality of life, and health workers should make patients aware of these options and how to access them.

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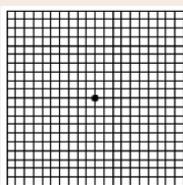
## Using the Amsler grid for self-testing

The Amsler grid can be given to patients with early AMD (and any other patients over 60 years of age) for self-testing.

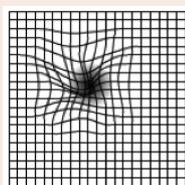
The Amsler grid can help the person spot macular defects early and tell their eye care worker about any increase in the distortion they see (which indicates increasing damage). Those reporting distortion should visit an ophthalmologist for further tests. If someone has a normal test, they should continue testing at regular intervals.

If an Amsler grid is unavailable, people can test themselves for distortion by looking at a straight edge or a right angle, such as a door frame or window, with one eye at a time. If they notice any distortion, they should contact their nearest eye care or health care worker and request referral to an ophthalmologist.

Early detection of wet AMD is critical because treatment, when indicated, is most successful when performed before damage occurs.



NORMAL



AMD



# Getting ready to cope with non-communicable eye diseases



**Clare Gilbert**

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**Serge Resnikoff**

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Over the last few decades, the main focus of eye care in low- and middle-income countries has been on the two most common causes of visual impairment: cataract and refractive errors. Although there are certainly challenges involved in providing high quality services at a scale that is able to meet the need, these two conditions are straightforward to manage. Screening is not required (apart from children with refractive errors), as both conditions are associated with a loss of vision. Patients are usually very happy with the outcome (surgery or spectacles) and minimal follow-up is needed.

Providing services for non-communicable eye diseases (NCEs), however, is far more challenging and complex. To prevent visual loss from diabetic retinopathy, glaucoma and retinopathy of prematurity, for example, the disease must be detected before people themselves notice a problem. This requires screening or other approaches to case finding. Treatment to prevent sight loss needs to be given early, which means patients must be counselled (i.e., informed about their options and supported to make the decision that is right for them). Long-term follow-up is essential, for example for glaucoma, diabetic retinopathy (DR), and age-related macular degeneration (AMD).

## How can we respond?

In order to offer adequate services for NCEs, the whole health system – as it applies to eye health – must be considered. The World Health Organization says the following about health systems: ‘A good health system delivers quality services to all people, when and where they need them.’

All organisations and agencies whose purpose is to improve health are part of the health system in a country; this includes government health services as well as those provided by not-for profit providers and the private, for-profit, sector – whether in the community or at

primary, secondary/district or tertiary level.

The six building blocks of the health system are:

- leadership and governance
- the health workforce
- technology, equipment, infrastructure, and medicines
- health financing
- health management information systems
- service delivery.

In order to cope with NCEs, the following is required at each of the six building blocks.

### Leadership and governance

- Evidence-based clinical protocols and guidelines.
- Good management of resources.
- Leadership and team-building (including forging links with other sectors or other health departments, e.g. endocrinology).

### Health workforce

- Staff at every level of service delivery who are competent in comprehensive eye examination, with appropriate treatment or referral to higher levels, thereby providing a continuum of care.
- Optometrists skilled in optic disc assessment and interpreting visual fields and detection of DR.
- Sufficient numbers of patient counsellors, supported by appropriate educational materials for patients.
- Technicians to protect, maintain and repair equipment (such as visual field analysers and lasers).
- Team work and task shifting to ensure good management, adequate visual field testing and screening using retinal imaging. For example, hospital optometrists can manage stable

glaucoma patients and technicians can screen for DR using retinal imaging.

- Sub-specialty training in medical and surgical retina and glaucoma.

### Technology, equipment, infrastructure and medicines

- Fundus cameras, visual field analysers, lasers, indirect ophthalmoscopes and vitrectomy machines.
- Affordable medication for non-communicable eye diseases with well maintained stocks, including affordable medication for glaucoma.
- Telemedicine systems for remote interpretation of retinal images.

### Health financing

- Low cost medication.
- Insurance packages or other financing schemes for eye care which include treatment for glaucoma, diabetic retinopathy, age-related macular degeneration and retinopathy of prematurity.

### Health management information systems

- Electronic patient records.
- Good record keeping and retrieval systems.
- Monitoring rates of follow-up

### Service delivery

- Dedicated clinics for glaucoma and retina at tertiary level, where all team members are adequately trained.
- Good care pathways.
- Systems in place to encourage follow-up e.g. SMS messages.
- Relevant activities at primary, secondary and tertiary levels.
- Opportunistic screening for glaucoma in all outpatients aged 30 or 40 years and above.

## Conclusion

In order to overcome barriers, it is helpful to be responsive to the community and their needs. For example, hold clinics at times that suit working people (e.g. weekends and evenings) or screen for DR in physicians’ clinics. Everyone providing eye care, at whatever level they work, can gain knowledge and skills to reduce visual loss from non-communicable eye diseases, which are an increasingly important cause of visual loss in all parts of the world.

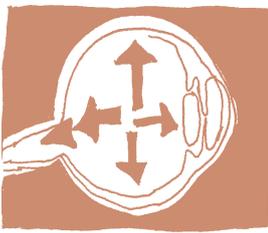
### Further reading

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Cristóvão Matsinho

**A photographer working with a mobile clinic team takes fundus images in a rural hospital. Pictures are graded by ophthalmologists and residents in the referral hospital. If need be, patients are informed and offered further examination and treatment in the referral hospital.**



# 'An ideal service for glaucoma would be...'

**Fatima Kyari**

Ophthalmologist/Senior Lecturer:  
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of Abuja, Nigeria.

This article proposes a 'top-down' approach to developing glaucoma services. To do this, good evidence, gathered through research, is needed about the following:

- The prevalence of different types of glaucoma in the population (as open-angle and angle-closure glaucoma are managed differently).
- The age and socio-economic status of the local population, as well as any biomedical/metabolic or genetic factors that might predispose them to glaucoma. This makes it possible to identify the high-risk groups.
- The local community's knowledge, beliefs and health-seeking behaviour with regards to eye disease.
- The expectations and perceptions of patients and family members.
- The best treatment options (based on randomised controlled clinical trials and outcomes studies), which take into account the local realities and patients' preferences.

All of the above can be used to develop efficient, streamlined services that will encourage patients to come back for long-term care and follow-up, which is essential.

## Suggested steps

The initial focus should be on developing good quality sub-speciality services at the tertiary level, followed by strengthening of secondary eye care (at district level) and then implementation of strategies for the early detection of glaucoma. There should be clear guidelines for referral (in both directions) between tertiary and secondary levels, and from the community to the secondary level once early detection strategies are implemented.

If this approach is ignored, early detection and diagnosis will create false expectations – and eventually disappointment – when patients are told nothing can be done about their diagnosis due to inadequate services at secondary or tertiary level. This will lead to a loss of faith in the eye care service.

The five steps in this approach are described below.

### Step 1. Strengthen tertiary eye care units to provide a good standard of glaucoma services

It must be possible for patients to undergo all the necessary investigations



Mohammed Abdull

### Glaucoma care requires skilled personnel who can work in teams

during a single visit. This will reduce costs to patients and encourage them to come back for follow-up visits. The following are also needed at tertiary level:

- **Equipment.** The hospital should be equipped with the appropriate diagnostic and therapeutic equipment.
- **Skilled personnel.** The glaucoma team should consist of glaucoma sub-specialists, general ophthalmologists, optometrists, ophthalmic nurses, counsellors, equipment technicians and other allied eye care providers. The team should be trained to provide accurate diagnosis and prompt, appropriate management with a choice of medical, laser or surgical treatment. Personnel should be able to monitor disease progression and institute treatment using clear clinical guidelines. Task sharing may be required, such as training nurses or technicians to assess visual fields, to take optic disc images or to counsel patients so that clinicians have time to focus on management decisions.
- **Information management.** There should be robust health management information systems and reliable management of medical records to ensure follow-up and monitoring of disease progression.

### Step 2. Strengthen secondary centres (at district level) to manage less complex cases

- There should be a robust referral and feedback system between the tertiary centre and the secondary centres.
- Protocols for ocular examination and glaucoma diagnosis and management should be in place.
- Non-complex glaucoma cases should be managed at the secondary centres. Additionally, patients that had surgery or

laser treatment at the tertiary centre can be referred back to the secondary centres for long-term care and follow-up.

### Step 3. Develop glaucoma case-detection strategies at the secondary and primary levels

For example, everyone aged 30 (or 40) years and above who seeks eye care (e.g. with presbyopia or refractive errors) and for driving tests, could be offered a comprehensive eye examination, including optic disc assessment and intraocular pressure measurement, with confirmation of glaucoma diagnosis by visual field testing.

### Step 4. Provide low vision and rehabilitation services

Glaucoma is the commonest cause of functional low vision in Nigeria.<sup>1</sup> Providing low vision services for glaucoma patients could therefore enhance their functional vision and quality of life.

If a high proportion of the glaucoma patients who come forward are already blind, community-based rehabilitation (CBR) should be an integral part of the glaucoma service provided.

### Step 5. Increase awareness of glaucoma among policy makers and the public

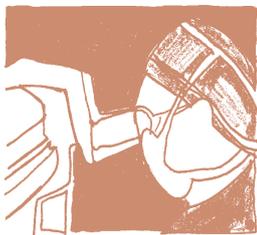
Develop good working relationships with people responsible for health policy, whether at a local or national level. Emphasise that glaucoma is a major cause of irreversible blindness that could potentially be avoided. Encourage policy makers to create supportive policies: for example, to enhance the availability of affordable glaucoma medication and laser treatment at an affordable cost.

A public health awareness campaign for glaucoma should only be instituted when a good glaucoma service is in place. The campaign should be based on local beliefs, attitudes and behaviour, and should make use of suitable communication channels. For example:

- placing posters in public areas
- giving talks and handing out leaflets in hospital waiting rooms
- working with local organisations
- using the media (e.g. radio or television programmes and newspaper articles).

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# Glaucoma care at ATBUTH Eye Clinic, Bauchi



**Abdull M Mahdi**

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The Abubakar Tafawa Balewa university teaching hospital (ATBUTH) in Bauchi, Nigeria, became a university teaching hospital for Bauchi State in 2010. Interest in glaucoma started in 2009, as many patients presented very late and were blind in one or both eyes.

The hospital has a large, mainly rural, catchment population. Most patients self-refer but referrals from district hospitals – which are staffed by ophthalmic nurses – are increasing. Patients with glaucoma now attend from across northern Nigeria.

Glaucoma services at the hospital is supported by the following six components of the local eye health system (refer also to the article on page 51).

## Leadership and governance

The clinic is headed by the author, who also sits on several hospital committees and boards and received specialised training in glaucoma in the UK in 2011. A senior ophthalmic nurse manages the day-to-day running of the clinic, e.g. stock control and ordering.

## Human resources for health

The department benefits from frequent locum consultant ophthalmologists, three optometrists, three resident doctors, two medical officers, eight ophthalmic nurses, two community health extension workers (who measure visual acuities), and five records staff. Residents visit to gain surgical experience. To reduce the load on the ophthalmologists, visual field assessment is undertaken by the optometrists, who are assisted by optometry interns.

Three nurses have been trained at the National Eye Centre in Kaduna to assist in theatre. Two doctors have been sent for ophthalmology residency training with plans to send two more. Weekly departmental meetings are held to discuss cases.

## Technology, equipment, infrastructure and medicines

The eye department has a reception area for records and fee payment, a large waiting area, space for measuring visual acuity, six offices for consultants, and additional consulting rooms for junior doctors, optometrists and nurses. There is also an operating theatre and a minor procedures room. There is a dedicated room for glaucoma diagnostic equipment, a glaucoma research project office, and a

glaucoma counselling room where motivational interviewing (a type of supportive counselling) is provided by two interviewers.

In 2004, the clinic had only one slit lamp, a Schiottz tonometer, a lens trial set and a loupe. For detection of glaucoma there are now 1-, 2- and 4-mirror gonio lenses, tonometers (Goldmann, airpuff and Perkins), lenses for retinal/disc examination, a stereoscopic digital fundus camera for optic disc imaging and a Twinfield visual field analyser. In 2010, the clinic purchased a diode laser for trans-scleral cycloablation.

The eye clinic stocks some glaucoma medication for patients.

## Health financing

The department is funded by the hospital, which runs a revolving fund. This fund works by giving some seed money to the clinic to purchase all the consumables and drugs needed to run the unit. As service is provided, this money is recovered from patients' fees and any profits are used to replenish the revolving fund.

There are three systems for payment: user fees, the National Health Insurance Scheme (NHIS) and retainerships. In retainerships, companies or organisations enter into an agreement with the hospital to treat their staff whenever they need medical attention. These organisations deposit money with the hospital, which is then used to offset any bills incurred by their employees.

There is a social welfare department to assist patients who are unable to pay for services. The hospital finances all staff training, including specialist training, and equipment for eye care is purchased by the hospital, mostly from profits from the revolving fund.

## Health information systems

The availability of new clinic space and staff allowed a more organised system of

record keeping to start in 2010: new patients obtain a card to see the ophthalmic nurse or optometrist, and a folder is only opened if consultation with a doctor is required. The system is being made electronic, which is essential for monitoring glaucoma patients.

## Service delivery

Optometry interns screen all patients aged  $\geq 30$  years who attend the clinic for glaucoma using optic disc assessment. All those with suspicious discs are examined in detail. In 2013, glaucoma was diagnosed in more than 500 patients.

Since laser treatment became available (which is explained to patients as computer light treatment), many patients have accepted laser rather than trabeculectomy. Over 300 patients have been treated with laser so far, 160 of whom are being closely followed up. Laser gives good lowering of IOP in the short term and results are being routinely recorded. These data will be published when 1-year follow-up data are available. In 2012, we started a clinical trial to assess the effectiveness of motivational interviewing to increase patients' uptake of laser or trabeculectomy when this is the treatment of choice.<sup>1</sup>

A health education pamphlet on glaucoma, suitable for those who are not literate, has been developed.

## Conclusion

The support of senior management in the central hospital has been very important in the development of the eye clinic. The commitment of senior management to the eye clinic is the result of several factors:

- eye clinic staff involvement in the management of the central hospital
- building good relationships with people in a position to support the clinic and increasing their awareness of glaucoma
- positive feedback from patients about the high quality care they have received
- prudent management of resources, including the revolving fund.

The clinic needs further strengthening as a tertiary glaucoma centre, including the purchasing of better equipment. Once this has been achieved, secondary level centres in the state will be supported by the clinic to improve their care and referral of glaucoma patients. Our long-term goal is to support early detection and referral of glaucoma at primary eye care level, with effective management of glaucoma at secondary and tertiary levels.



**Digital fundus photography for glaucoma screening**

Mohammed Abdull



International Examinations

# Free On-Line Foundation Assessment 1 September 2014

The ICO are offering the Foundation Assessment free to candidates with any Basic Science application. This can be used as a revision exercise for the Basic Sciences and Clinical Sciences Examination as well as a stand-alone assessment.

50 Swiss Francs for direct applications.

It is available 24/7 and candidates can use books or search engine to answer the 84 questions (336 options) in up to 20 minutes each. A compulsory "confidence indicator", which will not have any impact on the final mark, will sit with every question and candidates will receive feedback on their knowledge and confidence levels.

Questions are a statement, a scenario, many with a picture, diagram or video.

When the assessment is completed, candidates will be issued instant results A\*, A, B, C, D or F, a detailed analysis with feed-back and a downloadable certificate.

## Subjects

**A** General Medicine related to Ophthalmology  
Community Medicine and Public Health  
International Medical Ethics and Good Practice  
Epidemiology and Statistics  
Genetics

**B** Ophthalmic pathology and intraocular tumours  
Intraocular inflammation and uveitis  
Retina and vitreous

**C** Trauma, external disease and cornea  
Glaucoma  
Lens and cataract

**D** Anatomy of the Eye, the Orbit and related structures  
Embryology and Development  
Neuro-Anatomy  
Principles of General Physiology  
Vision, Ocular Physiology, Biochemistry, Cell Biology  
Pathology and Micro-biology

**E** Pharmacology  
Optics and Refraction  
Basic design, construction and use of instruments  
Commonly used tests in ophthalmology

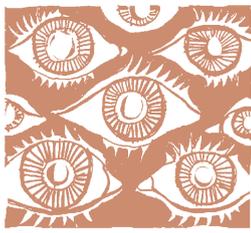
**F** Neuro-ophthalmology  
Paediatric ophthalmology and Strabismus  
Orbit, eyelid and lacrimal disease

Please contact the examinations office:

Email [assess@icoph.org](mailto:assess@icoph.org) or visit the ICO website for further details

[www.icoexams.org](http://www.icoexams.org)

The International Council of Ophthalmology  
Examinations for Ophthalmologists



# The value of clinical audit to improve cataract quality

**Robert Lindfield**

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The *Community Eye Health Journal* is publishing a series of articles about clinical quality. The main focus of these articles will be practical ways to monitor and improve clinical quality using examples from hospitals in a range of low- and middle-income countries. Do share your examples with us and we will publish as many as possible.

One of the easiest ways to start improving quality in a hospital is through clinical audit. Clinical audit is a quality improvement process that seeks to improve patient care and outcomes. It does this through a systematic process of review or evaluation against clearly defined criteria, followed by the implementation of change.

Clinical audit is something that doctors, nurses, optometrists and clinical officers can take part in; and they should be encouraged to do so.

## Audit cycle

There are five steps in an audit cycle (Figure 1). Once the last step is complete, the cycle begins again (called re-auditing).

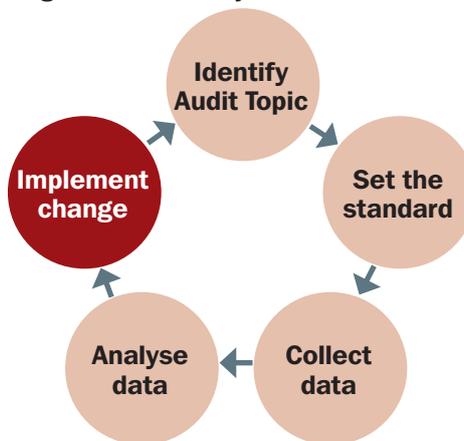
### 1 Identify the audit topic

Is there an issue or problem in the hospital that you think is important? The topic of the audit might be a very simple one, for example whether the wards are clean (e.g., do patients think the wards are clean?) or whether staff have received specific training (e.g. what proportion of staff members have received training in post-exposure prophylaxis for needle stick injuries?). It can also be very complex, for example whether patients have good visual acuity (VA) after surgery (this is complex because VA after surgery depends on several factors).

### 2 Set the standard

Is there a standard for performance related to this topic? For example, do we want all patients to say that the wards are clean? Or 90%? What is realistic? Should 100% of staff have had training in needle stick injuries? Or is 50% adequate? Some topics have international standards. For example, the World Health Organization (WHO) recommends that 90% of cataract operations should have a visual outcome better than 6/18. You need to decide what standard you think is appropriate.

Figure 1. The audit cycle



### 3 Collect data

This might be as simple as asking all staff members to tell you whether they have received training, or speaking to every patient who is discharged during one week to find out how many thought the wards were clean. Collecting data from patient records is a bit more complicated. It helps if you have access to electronic patient records, e.g. to work out the percentage of patients who had VA better than 6/18 during the course of one month.

### 4 Analyse data and draw conclusions

You need to compare what you've found with what you set as your 'standard', and decide what to do next. E.g., what if you thought that every member of staff should have received training and only 80% had? What if you wanted 90% of patients to report that the wards were clean and only 20% said they were? What if only 60% of patients achieved a visual acuity better

than 6/18 after cataract surgery when the WHO recommends that 90% achieve this?

### 5 Implement change

This is the most difficult part of clinical audit but it is the most important. It is an opportunity to try something simple and find out whether it works. Sometimes the solution is obvious – if staff have not received training on needle stick injuries then they need to attend training. If patients feel that the wards are not clean then they need to be cleaned. Sometimes, however, the solution is not obvious – how do you improve the percentage of people achieving VA of 6/18 after cataract surgery?

The most important part of a clinical audit is to make sure that, if your initial changes are not successful, you go back and try something else. You can then check whether that has been successful through re-auditing. This means repeating your audit and finding out whether anything has improved.

As a hospital it is useful to have a standard set of audits that you carry out during the year. It takes time to complete an audit, so staff must be given time off from their usual duties. They will also need to share their findings with other clinical staff so there should be meetings or workshops where the results of the audit can be shared. That said, the cost of an audit is usually very low and the results are, potentially, very valuable.

#### Further reading

<http://www.clinicalaudittools.com>

This is a website with lots of tools to help you with your clinical audit.

<http://www.bmj.com/content/336/7655/1241>

This is a journal article about how to do a clinical audit.

## Case study: Monitoring the quality of cataract surgery at the Presbyterian Eye Clinic Acha-Bafoussam

The Presbyterian Eye Clinic Acha-Bafoussam is one of the leading hospitals in Central Africa for high-volume cataract surgery. However, until 2011, there was no monitoring of the quality of cataract surgery and we did not know how we compared against the WHO standards.

Monitoring of outcomes of cataract surgery was introduced to the hospital with support from the London School of Hygiene and Tropical Medicine. It was a challenge to the entire eye care team as this was the first time they had experienced audit.

Data collected during ongoing audits highlights areas for improvement. The information collected is reviewed periodically and discussed with relevant

members of the team. Appropriate actions are then taken to address areas of concern. Over the last four years there has been a steady improvement in clinical outcomes, patient safety and patient experience.

We have focused on improving VA testing, biometry and the supply of consumables (including intraocular lenses [IOLs] in a variety of dioptric powers), ensuring continuous curvilinear capsulorhexis for most cases, introducing phacoemulsification, and improving counselling, ophthalmic theatre procedures and case selection (so that complicated cases are operated by the more experienced surgeons).

**Faustin Ngounou**, Medical Director



# How to measure blood glucose



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## Background

The level of glucose in the blood can be measured by applying a drop of blood to a chemically treated, disposable 'test-strip', which is then inserted into an electronic blood glucose meter. The reaction between the test strip and the blood is detected by the meter and displayed in units of mg/dL or mmol/L. There are a number of different types of meters available, and all are slightly different. Take care when applying the general principles described in this article to the specific glucose meter you are using.

### Why measure blood glucose?

- It can be used as a screening tool for diabetes mellitus (diabetes).
- It is an important tool in the assessment of the unwell patient, especially in the young or old.
- Potentially life-threatening extremes of blood glucose can be detected to enable the patient, carer or health worker to respond to high (hyperglycaemia) and low (hypoglycaemia) blood glucose by adjusting the diet or using insulin.

### When to measure blood glucose

- Blood glucose should be measured whenever your patient with diabetes is feeling unwell in any way.
- In the diabetic patient, it should be measured before surgery to ensure that the patient is not going to become

## Top tips

### Patient safety and comfort

- Be aware of what 'normal' blood glucose levels are. Find out what is 'normal' for individual patients by asking them and/or checking their notes or file.
- Take universal precautions as blood is being handled.
- Use aseptic techniques as the skin is being punctured. While it would be unusual for infection to occur, patients with diabetes tend to heal less well and may not deal as well with infection.
- Invite the patient to do the procedure if they self-test regularly (provided they are familiar with the particular meter); they may well be better at it than the health worker. Take the opportunity to check the patient's technique.
- Do take notice if the patient gives you ideas about where best to take blood from!

### If you can't get blood from the finger prick

- Ask the patient to hang the hand down below the waist for a minute or two.
- Ask the patient to place the hands in or under warm water and rub them together.
- Grasp the area to be pricked and squeeze gently for 3 seconds.
- Place the finger on a table or other firm surface to avoid moving while pricking.
- If the lancing device has a dial-a-depth facility, increase the setting by 1 level.

unwell during surgery and/or after general anaesthetic. Measure regularly until the patient is eating and drinking normally and blood glucose is stable.

- In newly diagnosed diabetes patients, more frequent measurements are needed, until blood glucose is stable.

**NOTE:** Blood glucose **monitoring** is done to measure the concentration of glucose in the blood (glycaemia) **over time**, and is important in the care of patients with diabetes mellitus. Information about individual patterns of blood glucose changes, gathered through blood glucose monitoring, can be used to plan meals, activities, and at what time of day to take insulin. The better the patient's blood glucose control, the less likely it is that the diabetes will cause damage in the body and lead to complications such as loss of vision (due to diabetic retinopathy) and amputation.

### You will need

- Blood glucose monitor
- Test strips (check that they are in date and have not been exposed to the air)
- Alcohol swab
- Single-use safety lancets or lancing device
- Gloves
- Cotton wool/gauze
- Sharps box
- Control solution for calibration

### Method

Apply these general principles when using the different types of electronic blood glucose meters available.

- Ask the patient to sit down and explain what you are going to do.
- Wash your hands and put on gloves.
- Choose the site for the blood sample: usually the side of a finger, but the arm

Figure 1



Elmien Wolvaardt Ellison

Figure 2



Elmien Wolvaardt Ellison

Figure 3



Elmien Wolvaardt Ellison

or thigh may be used (change the site used if frequent measurements are needed).

- Use an alcohol swab to clean the site and let the alcohol dry.
- Insert the test strip into the monitor, following the instructions (Figure 1).
- Use a single-use lancet or a lancing device to draw blood (Figure 2) and dispose of it in a sharps container.
- Apply the blood to the testing strip (Figure 3) in the correct way: some strips need the blood drop to be over the whole of the test pad and some suck up the blood directly from the site of the bleeding.
- Place the alcohol swab (note: it will sting) or a piece of gauze over the site (Figure 4) and hold it there, or let the patient hold it there until the bleeding stops. Monitor for excess bleeding.
- Read and record the result, reporting and/or responding to abnormal readings.
- Tell the patient what the result is, explain it and discuss options.
- Dispose of all used equipment safely, in line with hospital or health care policies.

## Calibrating the blood glucose monitor

- Calibrate the monitor and each new pack of test strips together.
- Calibrate the monitor each week.
- Place the control solution on a test strip and check that the value shown on the monitor matches the value on the bottle (or the pack of strips it accompanies). Record the calibration readings.
- If one is provided, use the check strip to make sure that the meter is working.

# Understanding and caring for a Schiøtz tonometer



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A Schiøtz tonometer is an instrument for measuring the intraocular pressure (IOP).

Although the Schiøtz tonometer does not make as precise measurements as other types of tonometers, it is inexpensive, simple to use, durable, requires little maintenance, does not have electronics, does not require batteries, and can be stored for years between uses. These qualities make it well suited for screening and remote or mobile clinics.

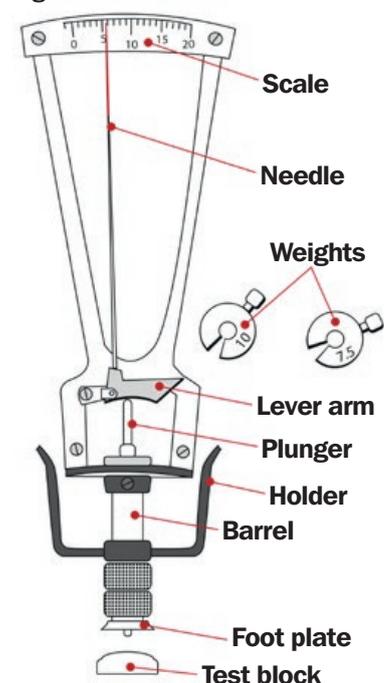
The Schiøtz tonometer consists of a hollow barrel with a concave footplate and a holder (Figure 1). A free-floating, rod-like plunger with a 5.5 gram weight attached fits inside the barrel. When held vertically on top of the eye, the plunger will move downwards by gravity and indent the cornea. This very small up-and-down movement is magnified by a lever arm to move a needle that gives a reading on a horizontal scale numbered arbitrarily 0–20. A firmer eye, due to higher IOP, will result in a lower indentation and a lower reading on the scale.

Since the Schiøtz tonometer does not measure pressure directly, a conversion table, supplied with the instrument, is used to translate scale readings into estimates of IOP in mmHg. To account for the range of pressure, other weights (typically 7.5 g and 10 g) are supplied that can be added to the plunger.

**Table 1. Schiøtz scale conversion table**

Scale reading	Ocular pressure, mmHg		
	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

**Figure 1**



## Calibration check procedure

A calibration check should be done at the start of every day. Place the footplate of the instrument on the rounded test block (the dummy cornea) provided with the tonometer's storage case. With the footplate resting on the test block, a correctly calibrated instrument will have a scale reading of zero.

If not, you can calibrate it to zero.

- If the needle is to the **left** of zero, rotate the footplate in a **clockwise** direction and check again.
- If the needle is to the **right** of the zero position, rotate the footplate in an **anti-clockwise** direction.

## Cleaning

Cleaning of the barrel and the plunger should be done once a day to prevent the plunger from sticking to the barrel.

- 1 Remove the plunger and use gauze with alcohol to clean the plunger and tip.
- 2 Clean the inside of the barrel with an alcohol-soaked cotton swab and then with a dry cotton swab.
- 3 Clean the footplate with gauze and alcohol.
- 4 Allow it to dry and then place, disassembled, in its case.

In between patients, the Schiøtz tonometer should be disinfected by soaking it in sodium hypochlorite.

**Figure 4**



Elmien Wolvaardt Ellison

# Training trichiasis surgeons: ensuring quality



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The World Health Organization (WHO) has set 2020 as the target for the global elimination of blinding trachoma as a public health problem. To achieve this goal, more than 7 million trachomatous trichiasis (TT) operations are needed.<sup>1</sup> Poor post-operative outcomes are a significant barrier, as they reduce the number of patients who are willing to come for treatment. High-quality, high-volume surgery is needed to reach the WHO target,<sup>2</sup> and this begins with high-quality training.

The WHO endorses two procedures for the correction of trichiasis and the WHO manual *Trichiasis Surgery for Trachoma*<sup>3</sup> (commonly referred to as the 'yellow manual') provides specific training guidelines for these procedures. This article is intended to provide general guidance for national programmes on training to encourage high-quality surgery.

Attention to the following core aspects will help to ensure high-quality outcomes.

## Trainer selection

Individuals selected to serve as TT surgery trainers should not only be highly-skilled, active TT surgeons themselves, but also should be good at training and supervising others. A good trainer should have:

- Patience
- Good communication skills
- An ability and willingness to provide constructive feedback.

Wherever possible, cascade training (in which individuals learn how to perform TT surgery and then teach their peers the procedure), should be avoided, as it is likely to jeopardise the quality of training.

## Trainee selection

All potential trainees should have a core set of prior experience, as described on page 49 of the yellow manual.<sup>3</sup> They should also have a demonstrated ability to acquire new skills, a positive attitude and the potential to maintain high productivity and quality outcomes. Potential trainees should be carefully screened to ensure that they have good manual dexterity, excellent corrected near

vision and depth perception, and are able to perform careful suturing.

## Programme duration

Training programmes typically range from 1–4 weeks. Rather than duration, the number of TT operations performed under supervision is more important.

## Classroom instruction

Classroom instruction should be based on the yellow manual and also should include teaching about the appearance of a good immediate post-operative outcome and how to correct any problems noted at that time.<sup>4</sup> Trainees should learn that a poor immediate post-operative appearance can indicate potential unfavourable outcomes later on. Trainees should be aware of the most common unfavourable outcomes: under-correction (post-operative trichiasis), over-correction, pyogenic granuloma formation and eyelid contour abnormalities<sup>5</sup>, and they should be able to describe how to avoid and/or manage these outcomes.

## Skills practice prior to live surgery

All trainees should have the opportunity to practice critical steps of the procedure before performing surgery on live patients. Traditionally, practice opportunities were limited to oranges and gloves. Surgical mannequins, such as the HEAD START training system, available on the IAPB Standard List for TT surgery, now offer the opportunity to bridge the gap between classroom and live-surgery training. Trainees should not be allowed to conduct live surgery until they can adequately demonstrate the ability to:

- Hold and manipulate surgical instruments properly
- Make a straight incision of the appropriate depth and length
- Consistently take suture bites of the proper depth
- Place sutures parallel to each other
- Tie suture knots with proper tension
- Comprehend and implement instructions
- Critically self-reflect.

## Live surgery practice

Trainees should begin by watching the trainer perform at least two live TT operations. No more than two trainees should observe surgery at one time. Next, the trainee can begin performing individual aspects of the procedure under close supervision. The trainer should be prepared to step in when necessary, as the patient's safety and the surgical



Emily W Gower

Use of a surgical mannequin (HEAD START) to train new trichiasis surgeons

quality are of utmost importance. As the trainee becomes experienced, supervision can be gradually reduced, but the trainer should always evaluate the final outcome before the eyelid is patched.

## Certification

All those who complete the training process should undergo certification before being allowed to perform surgery independently. The yellow manual provides a certification checklist to guide independent, critical evaluation of trainees' skills, which is normally done during five independent operations performed under direct supervision of the trainer/examiner at the end of the training programme. During the process, the examiner should make an honest appraisal of the trainee's skills. No one should be certified unless they can successfully demonstrate all of the skills necessary to consistently provide high-quality surgery. In some settings, it may be appropriate if trainees who fail are given additional supervision and more practice followed by a repeat certification evaluation. However, if the trainee does not possess the appropriate skills to become a TT surgeon, she or he should be encouraged to find another career path.

After training, regular supportive supervision and monitoring are critical to any successful TT surgery programme. These aspects will be covered in a future article.

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- 3 Merbs SL, Resnikoff S, et al. *Trichiasis Surgery for Trachoma*. 2nd ed. Geneva: *World Health Organization*; 2013.
- 4 Merbs SL, Harding JC, et al. Relationship between immediate post-operative appearance and 6-week operative outcome in trichiasis surgery. *PLoS Negl Trop Dis* 2012; 6: e17118.
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# Test your knowledge and understanding

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

Question 1. Which of the following are known avoidable risk factors for exudative age-related macular degeneration?		Select one
a.	Smoking	<input type="checkbox"/>
b.	Previous cataract surgery	<input type="checkbox"/>
c.	Genetic factors	<input type="checkbox"/>
d.	Malnutrition	<input type="checkbox"/>
Question 2. Anti VEGF injections are INEFFECTIVE in which of the following conditions?		Select one
a.	Exudative age-related macular degeneration	<input type="checkbox"/>
b.	Diabetic macular oedema	<input type="checkbox"/>
c.	Atrophic age-related macular degeneration	<input type="checkbox"/>
d.	Central retinal vein occlusion	<input type="checkbox"/>
Question 3. Which of the following is an important early feature of exudative age-related macular degeneration?		Select one
a.	Distorted vision	<input type="checkbox"/>
b.	Painful eye	<input type="checkbox"/>
c.	Loss of peripheral vision	<input type="checkbox"/>
d.	Photophobia	<input type="checkbox"/>
Question 4. Non-communicable eye diseases (NCEs) are becoming a public health problem. Which of the following statements is FALSE?		Select one
a.	NCEs have increased in importance for three reasons: because the prevalence of infectious eye diseases has decreased, because of changes in lifestyle, and because people are living longer.	<input type="checkbox"/>
b.	NCEs are lifelong and require long term, complex management.	<input type="checkbox"/>
c.	There is a shortage of skilled eye care workers able to provide comprehensive eye care, which is essential for managing NCEs.	<input type="checkbox"/>
d.	The World Health Organization (WHO) advises that efforts to address NCEs should be focused within the health sector.	<input type="checkbox"/>

## ANSWERS

1. a. Many studies have confirmed that smoking is the most important modifiable risk factor. b. Cataract surgery does not increase the risk of AMD. c. Genetic factors are very important in AMD; however, they are not avoidable, as we cannot change our parents! d. Vitamin supplements at very high doses may reduce the risk of AMD, but there is no evidence that malnutrition increases the risk. 2. c. Atrophic AMD is currently not treatable. As there are no new blood vessels or leaking blood vessels, anti-VEGF drugs have no effect. a, b & d can all be treated effectively with anti-VEGF drugs. There is good evidence that treatment with anti-VEGF is better than observation or laser. 3. a. Distortion is the most important early symptom of macular disease. If straight lines look bent or wavy, there is likely to be a macular problem. b and d. AMD affects only the retina and choroid, so it is entirely painless and does not cause any symptoms of discomfort. c. AMD affects only the central retina, so patients experience a loss of central vision but have normal peripheral vision. 4. d. The WHO has emphasised the importance of multi-sectoral engagement, for example with education and agriculture, to effectively address the causes of NCEs, such as diet and lifestyle (including smoking).

## Reflective learning

Visit [www.cehjournal.org](http://www.cehjournal.org) to complete the online 'Time to reflect' section.

## Picture quiz



Shannath L. Merbs

A 50 year-old woman in Africa presented with a history of eye pain and discharge for 3 months after upper eyelid surgery for trichiasis/entropion.

1. What is the diagnosis? (Select one.)

- a. Pterygium of the conjunctiva
- b. Squamous cell carcinoma of the conjunctiva
- c. Granuloma of the conjunctiva
- d. Kaposi sarcoma of the conjunctiva
- e. Eyelid abscess

2. Which of the following are known risk factors for the answer to question 1? (Select all that apply.)

- a. Exposure to ultraviolet light
- b. HIV infection
- c. Retained suture fragment
- d. Male gender
- e. Malnutrition

3. Which of the following is the first line recommended treatment for the answer to question 1? (Select one.)

- a. Prednisolone drops
- b. Chloramphenicol ointment
- c. Cryotherapy
- d. Excision with a scalpel blade
- e. Radiotherapy

## ANSWERS

1. Diagnosis: c. Granuloma of the conjunctiva following trichiasis surgery. This may occur 6 weeks to 6 months after the operation. 2. Risk factors: c. The commonest cause is retention of a fragment of non-absorbable suture left behind at the time of surgery removal. 3. Treatment: d. Recommended treatment is local excision with a scalpel or scissors under topical anaesthesia.

## Save the date



The **IAPB 10th General Assembly** will take place in **Durban**, South Africa, on **18-20 September 2016**.  
<http://www.iapb.org/10th-general-assembly>

## Courses

**London School of Hygiene and Tropical Medicine, London, UK**  
 MSc Public Health for Eye Care, starting September 2015. Applications re-open from 1 December 2014 and scholarships are available – please contact [Romulo.Fabunan@Lshtm.ac.uk](mailto:Romulo.Fabunan@Lshtm.ac.uk)  
 To apply, visit: [www.lshtm.ac.uk/study/masters/mscphec.html](http://www.lshtm.ac.uk/study/masters/mscphec.html)

**Kilimanjaro Centre for Community Ophthalmology International**  
 Visit [www.kcco.net](http://www.kcco.net) or contact Genes Mng'anga at [genes@kcco.net](mailto:genes@kcco.net) and/or [genestz@yahoo.com](mailto:genestz@yahoo.com)

**German Jordanian University, Amman, Jordan**  
 Professional diploma and MSc in Vision Rehabilitation. For more information, visit <http://tinyurl.com/rehabcourse>  
 Email: [vtc@gju.edu.jo](mailto:vtc@gju.edu.jo)

**Community Eye Health Institute, University of Cape Town, South Africa.**  
 Short courses and MSc. Contact Zanele Magwa, Community Eye Health Institute, University of Cape Town, Private Bag 3, Rondebosch 7700, South Africa.  
 Tel: +27 21 404 7735. Email: [ntombizanele.magwa@uct.ac.za](mailto:ntombizanele.magwa@uct.ac.za)

**Lions Medical Training Centre, Nairobi, Kenya**  
 Small Incision Cataract Surgery (SICS). Write to: The Training Coordinator, Lions Medical Training Centre, Lions SightFirst

Eye Hospital, PO Box 66576-00800, Nairobi, Kenya. Tel: +254 20 418 32 39

## Online courses

**EyecareCE**  
 Free and low cost online courses for the entire eye care team: nurses, ophthalmic assistants, orthoptists, ophthalmic photographers and clinical officers. Over 280 courses in 20 content areas. Provided by the Joint Commission on Allied Health Personnel in Ophthalmology (JCAHPO). Visit: [www.eyecarece.org](http://www.eyecarece.org)

**Aurosiksha**  
 Free short online courses for eye care professionals to help them maintain skills and continue their professional development from Lions Aravind Institute of Community Ophthalmology (LAICO), India. Visit [www.aurosiksha.org](http://www.aurosiksha.org)

**ORBIS Cybersight**  
 Free courses on strabismus, cataract, paediatric ophthalmology, neuroophthalmology and the cornea are currently available. Registration is free. Visit [www.cybersight.org](http://www.cybersight.org)

**Paediatric cataract DVD**  
 This paediatric cataract surgery DVD, by Albrecht Hennig, is for ophthalmologists undertaking cataract surgery on children on a regular basis. To receive a free copy, send your address details and a brief description of the service you provide to: Anita Shah, International Centre for Eye Health, London School of Hygiene and Tropical Medicine, London WC1E 7HT, UK.  
[admin@cehjournal.org](mailto:admin@cehjournal.org)

**ICO fellowships**  
 One-year and 3-month fellowships are available to ophthalmologists working in

low- and middle-income countries. Visit [www.icoph.org/refocusing\\_education/fellowships.html](http://www.icoph.org/refocusing_education/fellowships.html)

## Commonwealth fellowships

One-year Commonwealth Eye Health Consortium fellowships in ophthalmology available for candidates from low- and middle-income Commonwealth countries. <http://cehc.lshtm.ac.uk/clinical-fellows/>

## Human resources

Useful factsheets on human resources for eye health in 21 African countries, available as a free PDF download from [www.human-resources-health.com/content/supplementary/1478-4491-12-44-s3.pdf](http://www.human-resources-health.com/content/supplementary/1478-4491-12-44-s3.pdf)

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# JOURNAL

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Lance Beillers/CEH

The next issue of the *Community Eye Health Journal* is called **Encouraging good eye health behaviours in the community**