Community Eye Health JOURNAL

International Centre for Eye Health

VISION 2020 THE RIGHT TO SIGHT

VOLUME 27 | ISSUE 85 | 2014

Cataract services: ensuring access for everyone

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VISION 2020 states that everyone has the right to sight. This means that, regardless of status (wealth, education, gender, impairment or other factors), everyone has the right to maximise their visual potential.

Evidence suggests, however, that many groups in society (for example women, those who are poor, or those who are disabled) are frequently unable to access eye care services. When they do, these disadvantaged groups experience poorer care despite their greater need. Providing services that are equitable – that are available and affordable to all – has been a priority for VISION 2020, and those organisations that support the initiative, since 1999.

There is limited evidence, however, that cataract surgery is reaching these groups. A recent study conducted by the London School of Hygiene and Tropical Medicine[1] asked eye hospitals throughout the world to report the preoperative visual acuity of the next 100 cataract operations they were going to perform. Even in the hospitals in the poorest countries, where the prevalence of cataract blindness (and hence the need for surgery) was high, only 40% of operations were on people who were blind from cataract. Instead, the hospitals were offering surgery to people who were not yet blind, which is hard to justify considering that there were so many people who were blind and who needed an operation more urgently.

Adriane Ohanesian/Sightsavers

A woman rests in the hallway after her cataract operation, conducted at a clinic in South Sudan as part of an outreach programme.

Tackling unequal access to cataract surgery for women has been a priority for VISION 2020 since its inception. Unpublished data from three ophthalmology

Continues overleaf ➤

ABOUT THIS ISSUE

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Cataract remains the number one cause of bilateral blindness in the world. This is despite improvements in surgical technique resulting in better visual outcome and – using a variety of cost containment and income generation activities – attempts to lower the cost of surgery.

There are many good examples of the delivery of high volume, good quality and low cost cataract surgical services throughout the world. Unfortunately, however, there are also many places that have low volume, expensive cataract services, with less than optimal outcomes for patients.

A critical question, then, is how to transform a system with ineffective and inefficient delivery of cataract services into one with effective (good results) and efficient (good use of resources) delivery? This requires providers to ensure that they are delivering efficient eye care services with high quality surgery at a reasonable cost, together with activities in the community to create demand and overcome barriers to access.

This issue of the *Journal* includes case studies from Asia and Africa, together with articles on best practice, to try and assist readers to improve the quantity and quality of existing cataract services, while realising that each situation is different and has its own challenges, but also its own opportunities for good and innovative solutions.

In this issue

centres in Uganda revealed that, of the 2,800 cataract operations performed in 2013 for which information on gender were available, 50.2% were on women. The Uganda Bureau of Statistics estimates that 56% of Ugandans aged over 50 are women. This suggests that women are not accessing cataract surgery to the same degree as men in this setting, and is a finding that is repeated elsewhere.

The results from the most recent Rapid Assessment of Avoidable Blindness (RAAB) surveys suggest a similar finding. Almost uniformly, these surveys reveal that the number of men who have had cataract surgery is higher than the number of women, despite the fact that there are more women in the older age groups. This suggests that men find it easier to use (and pay for) the services that are provided.

There is very little information about poverty and access to cataract surgery. We know that cataract surgery contributes to a reduction in poverty, but it is also thought that people who live in poverty are less likely to access services. Unfortunately, we do not collect much information on these people, and few studies have focused on the best ways to reduce their barriers to seeking care.

'There is very little information about poverty and access to cataract surgery'

So why does it appear that we are failing to address inequity in cataract surgery services?

It is recognised that there is a drive towards financial sustainability within hospitals. This is often achieved by asking wealthy patients to supplement the cost of operations for those who are too poor to pay. For this to work, wealthy patients must be attracted to local hospitals and there are a variety of successful tactics to achieve this. At the same time, anecdotal evidence suggests that hospitals are also cutting costs by closing down outreach programmes that target hard-to-reach groups. This implies that many hospitals are investing in attracting wealthy people at the expense of treating those in greatest need. This is borne out by the LSHTM study.[1]

Creating financial sustainability is good, as is cross-subsidisation for cataract operations for people who are unable to afford them. However, unless hospitals make a conscious effort to target hard-to-reach groups, inequity will widen.

The World Health Organization (WHO) has recognised that people from deprived groups find it difficult to make use of services, predominantly because people


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Volume 27 | Issue 85

Supporting VISION 2020: The Right to Sight

International Centre for Eye Health

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ISSN 0953-6833

are usually expected to pay something towards the cost of their own treatment. It is thought that this 'out-of-pocket spending' on health by people in low-income countries leads 100 million people into extreme poverty every year.

Cost also prevents people who are already in poverty from accessing services.[2] A recent study assessing the impact of cost on the uptake of cataract services in Nigeria[3] indicated that the indirect costs of coming for cataract surgery (including transport, food and the cost of bringing an accompanying person) is nearly double its direct cost.

To address these issues, the WHO has introduced the concept of 'universal health coverage', whereby health systems support equitable access by making services affordable whilst ensuring that they are of high quality. The main focus of universal health coverage is to ensure that out-of-pocket spending is kept as low as possible and that no one enters poverty as a result of health costs, or is excluded from health care because of costs.

The United Nations has adopted a resolution on universal health coverage that urges governments to move towards providing all people with access to affordable, good quality health care services.

As members of the eye health community, it is our responsibility to support this resolution and to promote action towards universal access to eye health. This means advocating with colleagues in other health sectors and with governments, non-governmental organisations and corporations to make sure that no one is excluded from essential eye care because of their age, gender, ability or socio-economic status.

This is the only way to ensure that people with the most need, including those from marginalised groups, have access to affordable, high quality cataract surgery, allowing them to maximise their visual potential and achieve the goal of VISION 2020.

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BARRIERS TO CATARACT SURGERY

Reaching people who do not use eye services

People with eye problems in India, Nepal and the Gambia gave the following as their main reasons for not seeking treatment:

- fear (that surgery will damage or 'spoil' the eyes, or miscellaneous fears)
- inability to leave family or work responsibilities
- put off by the post-operative recommendations
- treatment cost
- feel they can manage – that treatment is not necessary
- too old
- fatalistic – 'God's will'
- no-one to accompany them
- distance and lack of transport

Despite the differences in geographical and cultural settings, there was a remarkable consensus of opinion amongst people about why they did not seek treatment.

Providers tend to attribute poor user demand to a lack of awareness of treatment availability and benefit. Lack of knowledge or understanding may explain a proportion of non-use of eye services but it is not the root cause. It is known that poor service use occurs also amongst communities with a good knowledge of eye problems and treatment options.

Another commonly held view is that people need to be motivated to seek treatment. Individuals are motivated, but their motivations may differ from that of the provider community. When viewed in context, many of the reasons given above start to make sense.

'We need to raise awareness about the low use of cataract services'

1 Fear

The fear that treatment such as cataract surgery will 'spoil' eyes may not be irrational. In response to concerns about the quality of cataract surgical outcomes, the World Health Organization (WHO) strongly recommends the need for better monitoring and evaluation systems. It is well known that 'bad news travels fast'. Treatment failures may – unfortunately – impact more upon community attitudes to eye treatment than all the examples of success.

2 Cost in time and money

Dealing with direct treatment costs has been a major concern of service providers, and is a very important obstacle to overcome. However, these are only part of the cost borne by service users and their families. The concept of 'time is money' is not only the preserve of the city professional. In fact it has a sharper reality for people living in poverty. Seeking treatment involves leaving day-to-day responsibilities. In an existence of 'work today, eat today' early treatment is a luxury that may be unaffordable. Costs are multiplied when other family members are involved, either to fulfil roles as carers or to accompany the person for surgery.


Suzanne Porter/Sightsavers

Many older people accept poor eyesight

3 Attitudes to old age and gender

Unless actively addressed, there is scope for negative attitudes to old age and female gender to become a bigger barrier to treatment. Cataract is an age-related condition. Given demographic forecasts and life expectancy patterns, many of the people requiring surgical treatment will also be women (including widows). In many communities these are the people who are likely to be forgotten.

4 'I don't need treatment – I can manage'

To a greater or lesser extent, people report that they are coping and do not perceive a need for treatment or surgery. This includes people who are blind in both eyes too. This is somewhat surprising but a possible explanation is that they have adjusted to their disability. On the other hand, this response may mask hidden barriers. After weighing up the advantages and disadvantages it is not worth the bother – 'I'll manage'. Currently the explanation is not clear, and requires further exploration.

Conclusion

We need to raise awareness about the low use of cataract services, and adopt strategies that promote equality in eye service delivery, access and use. People who do not use eye services know why they do not seek treatment. It is therefore critical that providers ask and listen to the views of their community.

A précis of an article written by Martine Donaghue in the Community Eye Health Journal, Volume 12 No. 31, 1999.

CASE STUDY: INDIA

Improving cataract services in the Indian context

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In many countries, the number of cataract operations performed is inadequate to deal even with the people who have newly become blind from cataract, let alone those who are already blind or visually impaired. There is, therefore, a backlog of cases needing surgery. This could be due to low surgical capacity (people are on a waiting list) or to a lack of demand for cataract surgery (people haven't come forward for the services they need and there is therefore no waiting list).

India has been very successful in raising its cataract surgical rate (the number of operations per million people, per year), from just over 700 in 1981, to 6,000 in 2012.[1,2] This is much closer to the estimated cataract surgical rate of 8,000–8,700 needed to eliminate blindness due to cataract in India.[3] Much of this is the result of increased efficiency, with surgeons being able to perform twenty operations per day thanks to innovations in surgical technique, good team work with appropriate staffing levels, use of day case surgery, and improvements in operating theatre design.[4]

In order that people can come for surgery in large numbers, however, demand for cataract surgery must be created in the community. This means that:

1. People must be **aware**. They must know that the condition they have is cataract, that surgery gives good results, and where to go for surgery.
2. People must have **access**. There must be services available within reach, family members must be willing to support or allow the person to undergo cataract surgery, and any other barriers to attending for surgery must be successfully addressed (e.g. for people with disabilities or women).
3. People must be able to **afford** cataract surgery, including any associated cost (e.g. for transport).

D Subramanyam

This vehicle helps to deliver educational materials during outreach camps

Finally, patients and their family must be confident in the quality and safety of surgery.

In India, social marketing approaches were used to create awareness of cataract. This included addressing beliefs about causation (e.g. that it is an 'act of god') and improving people's understanding that cataract is a common occurrence in older people and that it can be treated. Better quality services also helped to enhance the credibility of cataract surgery and to improve people's confidence in the services being offered.

By identifying barriers such as cost, distance, or lack of an accompanying person, and by providing appropriate solutions (such as subsidies, transportation, and practical support for accompanying persons), service providers in India were able to prioritis hard-to-reach populations including women, tribal populations and the poor. A 'menu' of service options was provided and individuals were allowed to choose services based on their ability to pay.

The non-governmental organisation (NGO) sector and Indian ophthalmologists have continued to experiment with innovative approaches to increasing demand for cataract services, many of which have been adopted by countries in the rest of the world. Different approaches include outreach camps to detect those needing surgery, use of counsellors to explain the procedure and what to expect, tiered pricing mechanisms, and local production of surgical consumables and equipment.

Sadguru Netra Chikatsalaya (SNC), Sri Sadguru Seva Sangh Trust, Chitrakoot, is located in a remote and economically deprived region in Central India. It is one example of a hospital which has been able successfully to create demand for cataract surgery even amongst the hard-to-reach, and has also made surgery affordable. The feudal nature and socio-economic deprivation of this region are well known.

This article aims to show how the hospital has:

- created a demand in the community for cataract services, even in the summer
- reached the hard-to-reach
- approached the cost and affordability of surgery.

What has changed?

SNC has evolved from a makeshift surgical camp, only operational during the winter months (a time when communities thought surgery to be safer), to a permanent, high-volume, high-quality and affordable facility. A 350-bed eye hospital was built in 2004, following an innovative planning exercise undertaken in 2002.

Although the initial plan was to provide services at no cost to patients, during the planning exercise it became clear that SNC would have to generate income from patients in order to ensure long term sustainability. Table 1 shows how things have changed.

Outreach screening camps now take

Table 1: Outcome of the planning exercise undertaken in 2002

Before the planning exercise	2013
Rapid turnover of skilled human resources – difficult to attract ophthalmologists	60 full time ophthalmologists and dedicated administrative support staff
23,525 cataract operations per year	117,543 cataract operations per year
45% intra-ocular lens (IOL) implants	99% IOL implants
12% cataract surgery during the summer months	35% of cataract surgery during the summer months
65% free surgery; 34% subsidised; 1% of patients paying the full cost	43% free surgery; 42% subsidised; 15% of patients paying the full cost
Predominantly dependent on non-governmental organisations and philanthropists for running costs. The District Blindness Control Society and philanthropists paid for free surgery.	All running costs covered by patient fees. Free surgery supported by grants from the District Blindness Control Society

D Subramanyam

Operated patients leaving the operating theatre

place in ten districts in Uttar Pradesh and six districts in Madhya Pradesh and follow a very regular schedule, so communities know when the camps will take place at any given location. The eye hospital serves a total population of nearly 50 million people. Primary eye care has been strengthened through the establishment of 26 vision centres. New construction is supported by NGOs while free surgery and related logistics are supported by the District Blindness Control Society. All other running costs are borne by the hospital itself. All operations are performed at the base hospital and transportation to the hospital and back is provided at no cost to the patients. Post-operative follow-up is done at the nearest vision centre and at the next outreach camp to take place in that area.

The outcome of these initiatives is reflected in the increase in service delivery (Table 2). This illustrates how cataract services can be made accessible, acceptable and affordable even in a very difficult and hard-to-reach area where there is a lack of providers. This hospital is an example of how appropriate needs-based cataract services and a growth trajectory can be achieved and sustained with good governance and a responsive leadership team.

How did these changes come about?

To overcome the barriers of seasonal imbalance, the hospital management initiated an outreach programme in the summer months. Free eye check-ups, free transportation and free diet and counselling services motivated people to accept the services and this led to a gradual increase in the volume of patients.

The outreach team struggled during the first three years, as the concept of surgery during the summer months was totally new in the region. To raise awareness of the services offered, SNC distributed educational materials, organised regular meetings with influential members of the community and engaged the local community in key events at the hospital.

Counselling of patients was focused on the improvements in cataract surgery techniques, i.e. IOL implantation.

Another challenge was to ensure that women, the poor and people with disabilities also came forward for surgery. A variety of strategies were used.

- Camps were organised in remote rural locations to bridge the gap between the hospital and community.
- Poor and needy people were provided with free transportation, medicines, examinations, dietary advice and surgery.
- Regular orientation and education sessions were organised for the heads of families to encourage them to increase the uptake of services among the women in their family.
- People accompanying those who were bilaterally blind, those with one eye, and those who were disabled were offered free transport, food and accommodation.
- One or two volunteers from each area visited during outreach were encouraged to accompany their community members to the hospital for surgery. This reduced indirect costs to the families. Accommodation and food was also provided to volunteers and escorts who returned the patients home after discharge.

To reduce fear, which affects people's willingness to accept surgery, SNC adopted the following approaches:

- using a model (dummy) lens during counselling to explain to patients about IOL implants etc.
- using the local language or dialect to counsel the patients
- explaining the facilities available in the hospital
- allowing family members to travel with the patient
- sharing the stories of people from the same community who had been successfully operated on. (Hearing about someone's increased productivity following surgery can also encourage families to support a family member to accept surgery.)

Today, SNC is engaged in providing outreach services through ten outreach teams and 26 vision centres within a 250 km radius of the hospital

The increase in outreach camps did not have a negative impact on the number of walk-in patients at SNC. There has been a parallel growth in the number of operations done as a result of outreach camps and those done on walk-in patients.

What can we learn from SNC?

For this model to work elsewhere, there needs to be proper programme management, effective planning and utilisation of resources, and a periodic review of strategies. In the area served by SNC, the barriers related to awareness, access and affordability are very similar to those in other countries where access to services is poor. We have shown that they can be overcome through perseverance and by using a strategic approach.

Table 2: Outomes of the innovative approaches implemented at SNC Chitrakoot, India

Parameters	2002	2013	% change
Out patients registered	97,304	549,220	464%
Surgeries performed	29,315	117,543	301%
Number of outreach camps	42	547	1202%
Operational cost recovery	78%	100%	
IOL Surgery	55%	99%	80%

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EXCHANGE

Addressing cataract in rural Malawi: the Nkhoma Eye Programme

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Malawi has four main eye care centres for its population of 14.8 million. The eye unit based at Nkhoma Eye Hospital opened in 1955, and CBM has been supporting it since 1977. The hospital is the home of the Nkhoma Eye Programme (NEP), which was started as a VISION 2020 district programme in 2000. In cooperation with the Malawi Ministry of Health (MOH) and other, non-governmental, organisations, the programme provides eye care services in central-western and central-eastern Malawi (population 4.5 million). Cataract operations are performed by an ophthalmologist and a clinical officer who trained as a cataract surgeon.

In 1999, the prevalence of blindness (visual acuity [VA]<3/60 in the best eye) in people aged 40 years or older in Nkhoma was estimated at 3.7%, of which 62% was due to cataract.[1] Only one in seven people who were blind from cataract and living within 10 miles of Nkhoma had been operated on. A survey conducted seven years later, in 2006, estimated the prevalence of blindness at 1.3%[2], of which 36% was due to cataract.[3] By then, four out of every five people who were blind from cataract and living within 10 miles of Nkhoma had been operated on.

Here, we discuss the strategies that led to improved management of cataract.

Case finding

Since 2003, NEP has been involved in the screening of over 30,000 people per year for cataract. Only 5% of people self-refer. NEP uses three methods for case finding.

- Three community member, employed by NEP, run daily clinics to screen for cataracts in designated districts and villages (25% of case finding).
- Eight mobile eye clinics, run by NEP, visit villages in the catchment area according to a well-publicised schedule (35% of case finding).
- NEP cooperates closely with the Malawi Council of the Handicapped (MACOHA), whose community-based health care workers assist with case finding (30-40% of case finding).

Quality of surgery

Since 2004, all operations have been performed using a sutureless technique. The quality of surgery is high, and all outcomes are prospectively monitored. Approximately 90% of operations result in a good outcome (VA≥6/18) following correction. Less than 2% have a poor outcome (VA<6/60).

Increased surgical output

The number of cataract operations performed per year has risen from just over 400 in 1999 to over 4,000 in both 2008 and 2009 – a ten-fold increase in ten years (Figure 1).

There also have been significant increases in cataract surgical output since the initiation of VISION 2020 programmes in two districts in East Africa (Kwale in Kenya, and Kilimanjoro in Tanzania).[4] Similarities between Nkhoma and these districts include:

William H Dean

Patients waiting for surgery at Nkhoma

- assistance with transport
- free examinations
- close links between the hospital and community services
- minimal waiting times before surgery.

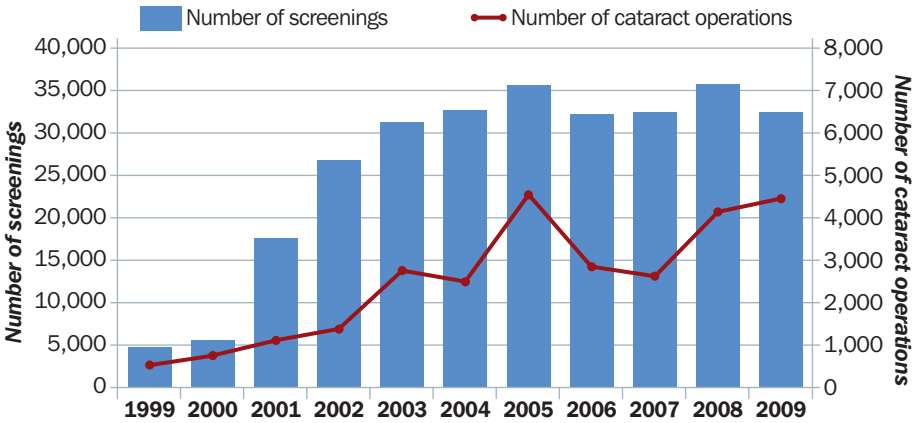
Additional factors at NEP include:

- active case finding
- training of ophthalmic clinical officers to perform cataract surgery
- surgical outreach
- infrastructure development
- Support from national and international partners
- Patient satisfaction with post-operative outcomes and rehabilitation, which has led to a good reputation in the community
- Strong links with traditional authorities, village headmen and chiefs who assist in mobilising their communities, selecting volunteers and promoting our services.

One Nkhoma ophthalmologist and the MACOHA coordinator have permanent positions on the National Committee for the Prevention of Blindness (NCPB). Cooperation with the MOH and other stake-holders ensures that limited resources are maximised. The NEP and MACOHA are fully integrated into the Malawi National VISION 2020 plan.

NEP has improved its eye care services over the last decade. An emphasis on continual improvement and the development of trained ophthalmic staff will help to ensure sustainability in eye care delivery in the future.

Figure 1. Management of cataract with Nkhoma Eye Programme (1999–2009)



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Efficient high-volume cataract services: the Aravind model


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Aravind Eye Care System began as an 11-bed eye clinic in 1976. Over the last 36 years, over 40 million outpatient examinations have been performed and over 5 million patients have undergone eye surgery or laser procedures.

Aravind, with its mission to 'eliminate needless blindness', has been able to achieve this by adhering to the principle of providing large volume, high quality and affordable services in a financially sustainable manner both for the patients and for Aravind. Much importance is given to equity – ensuring that all patients are accorded the same high quality care and service, regardless of their economic status.

A critical component of Aravind's model is the high patient volume, which brings with it the benefits of economies of scale. This article talks about how Aravind built this high patient volume and kept the costs low to provide efficient, good quality and affordable eye care.

Building patient volumes by reaching out into the community

Most hospitals tend to focus only on patients who seek care from them or have systems to attract those who would otherwise go to other hospitals. In a situation where less than 15% of the people who needed eye care were seeking it, Aravind chose to focus on the other 85% – the 'non-customers' – and to build systems and processes to reach them.

Aravind does this by reaching out into the community through active partnerships with social organisations, local philanthropists, volunteers, the school system and industries in the local community.

Outreach screening camps are organised to reach out to the general population, school children and industry workers. These camps are visited by over half a million people each year, of whom over a third receive some significant intervention. Over time, the camps enhance the public's awareness of eye care and improves the health-seeking behaviour in the community, thereby growing the customer base for the hospital.


Aravind Eye Care System

Registration in process at an Aravind eye camp

About 2,500 outreach screening camps are conducted each year and these are highly standardised, resulting in increased efficiency and lower case finding costs. The involvement of local community groups helps to build patient confidence and makes use of local resources, thereby reducing the cost even further.

More recently, a network of 45 vision centres were established, with each centre covering a population of 60,000–70,000. Patients 'walk in' of their own accord and are referred to the 'base hospitals' if they need cataract surgery. Through this combination of community partnered outreach and vision centres, Aravind performs over 100,000 cataract operations each year. As a result of the awareness created through outreach and other means, another 150,000 cataract operations are done on patients who come to the base hospitals of their own accord.

Reducing the cost to the patient

A key factor influencing uptake of services is affordability. This is best addressed by a holistic perspective which takes into account the total costs incurred by the patient, of which the hospital charges are a part. Besides ensuring that the hospital charges are affordable to the patient (which is a significant influence on demand), Aravind also addresses the other costs incurred by the patient in the way the services are designed and provided.

The following strategies to reduce travel and the associated costs and effort (what we call 'patient costs') have been employed:

- Eye care is made locally available through outreach and vision centres, which greatly reduces travel and associated costs.
- All investigations are made during a single visit, eliminating the need for the patient to make multiple visits and thus reducing travel and associated costs.
- Patients are offered a surgery slot immediately if surgery is indicated. There is no waiting list. This enables patients to complete the entire care cycle in a single visit.
- Prescribed medicines or spectacles are made available locally and at a fair price.
- Free transportation is offered to all patients identified during outreach as needing surgery. The patients are accompanied to the hospital and back by Aravind staff or a community volunteer. This costs less than a third of what it would cost if the patients were to come on their own, because they would otherwise have to pay their own transport and that of their accom-panying person. Also, because Aravind transports several patients at a time, they are able to charter a bus for the trip and the cost per person is less than if people travelled as individuals.

Reducing provider costs

The costs associated with providing patient care (the 'provider costs') can be reduced by organising the system more

Continues overleaf ➤

efficiently, eliminating errors, and ensuring quality in all that is done.

First, Aravind recognised that ophthalmologists are scarce and expensive. Over 80% of the tasks that they performed were routine and repetitive (e.g. measuring intraocular pressure and assessing refractive error). Some of them, like prepping the patient for surgery, were time consuming. Aravind shifted these tasks to a new cadre of personnel broadly known as mid-level ophthalmic personnel. By deploying these personnel in the right proportions, it was possible to more than quadruple the productivity of a single ophthalmologist.

Developing standardised protocols, checklists and a quality assurance process also ensured that all required tasks – including patient communication – were performed at the right time and in the correct manner every time. Doing so systematically minimised errors, reduced costs and built patient confidence.

Empowering patients for better compliance

Aravind chose to address patient compliance by developing a cadre of staff called patient counsellors whose main task was to make sure that the patient fully understood the importance of whatever was prescribed – surgery, medication, spectacles or follow-up. Where appropriate, the patients are reminded by phone or SMS. Aravind has over 200 such patient counsellors at a ratio of one counsellor for every two ophthalmologists.

The eye care delivery systems are designed to make compliance easy. For instance, the six-week surgical follow-up examinations for outreach patients are done at the camp site itself, making it very easy for the patient to comply.

Compliance is closely monitored and improvements are made to the counselling process or other systems, as required, on an ongoing basis.

Replicating the model

The Lions Aravind Institute for Community Ophthalmology has worked with over three hundred hospitals across India and with thirty other countries – spanning Asia, Africa and Latin America – to help them replicate the principles behind the Aravind model. In brief, for an eye hospital to be effective under the Aravind principles, it should:

- reach out and serve all those in need
- use scarce resources optimally
- ensure that service outcomes are good
- develop financial viability for the hospital through patient revenues.

Aravind Eye Care System

A counsellor speaks with a patient and his accompanying person

These principles make for a true win-win situation – better value for the patients while strengthening the hospital. For this to work, the principles have to be carefully balanced. For example, financial viability can't be achieved by charging unaffordable prices since that will negate the principle of reaching everyone in need. Also, good outcomes, and hence patient satisfaction, cannot be achieved unless the scarce resources are set up to serve the needs of the patients in a patient-centric system. Our understanding of productivity – and success – has to take into account all of the above.

Aravind, which is located in south India, had to consider the area's dense population, reasonable roads, good public transport and large middle class when it applied the principles behind the Aravind model to the design of its pricing structure and specific processes for generating demand. Similarly, in other countries and settings, the systems, processes and pricing structures must be relevant to the local demographic, social-economic and cultural realities. As these realities vary very widely, this is a challenge that may require some innovative thinking. Aravind therefore offers a systematic mentoring process to those hospitals who want to replicate the Aravind model.

'Aravind recognised that ophthalmologists are scarce and expensive'

The mentoring process starts with a detailed site visit to help the Aravind team understand the local realities such as population density, service area characteristics, local economy, hospital resources (including human resources), current performance levels, governance structure and management systems. This forms the basis for guiding the hospitals to develop the systems needed to generate demand (with a focus on people who wouldn't normally use the services – the 'non-customer') and to support efficient workflow, quality assurance and a transparent fee structure that includes fee waivers for those who cannot pay. Specific organisational capabilities and individual competencies have to be in place to make these systems work well. The hospital's leadership team is offered opportunities to build their organisation's capabilities through training programmes, workshops and problem solving, as well as access to online resources.

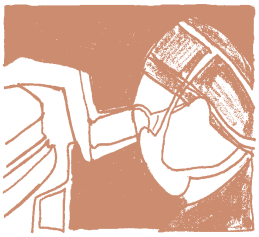
The impact and result of this process, as can be expected, is quite varied. Overall, the hospitals mentored by Aravind have shown a 40–50% increase in their output (number of operations) in the year immediately following the replication process; in many instances the output doubled (a 100% increase) in the year thereafter. The cost recovery (the extent to which the recurring costs, not the capital expenses, were met through service fees) went up from 60% to 90%. Such overall figures can, however, be misleading, as they also include data from hospitals in which the process did not work. The real lessons in understanding the challenges come from these.

In hospitals where the leadership team treated the change process as a time-limited project, and was also deeply engaged, the improvements were quick, significant and sustained. In instances where the leadership team was distanced from the hospital and thus not engaged, the impact or improvements were marginal. Because achieving financial viability also has policy implications, this was not possible in some government-run facilities and some charitable hospitals, whether because of their policies or because of their charter.

The overall lesson from carrying out this replication process in over three hundred eye hospitals in varied settings is that the broad principles are universally applicable. However, the way these are translated into systems and processes must take into account local realities. Even with well-designed, locally relevant systems, the desired impact is achieved only when the systems are implemented well. This is entirely dependent on the quality of leadership and the leadership team's ability to provide the resources needed to support the change process.

Futher reading

Visit **www.kcco.net/annquartrep.html** to read the **Karibu Macho** report, detailing the transformation in the Kilimanjaro Christian Medical Centre Hospital Eye Department – with support from Aravind – to provide a more sustainable high quality cataract service in this part of Tanzania.



QUALITY

Improving the quality of cataract surgery

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Quality is a difficult concept to describe and there is no clear definition. People have different views of what quality means and describe it in different ways.

Take the example of a trip by taxi. How would you describe the quality of the trip? Do you base your description on the politeness of the driver or the luxury of the vehicle? Or was it that you arrived at your destination safely? If you asked the driver, how would they describe the quality of the same trip? They might describe quality in terms of a trip without breaking down or being held up in traffic. There are clearly several different ways in which quality can be measured or described, and the ones that interest you will depend on who you are.

Equally, there are many different ways of describing the quality of cataract surgery (some which will be of more interest to patients and others which will be of interest mainly to surgeons). The quality of cataract surgery can be described in terms of:

- clinical effectiveness
- patient safety
- patient experience
- cost-effectiveness
- equity (equal access).

These are also referred to as 'domains' of quality. For the purpose of this article we will focus on the first three.

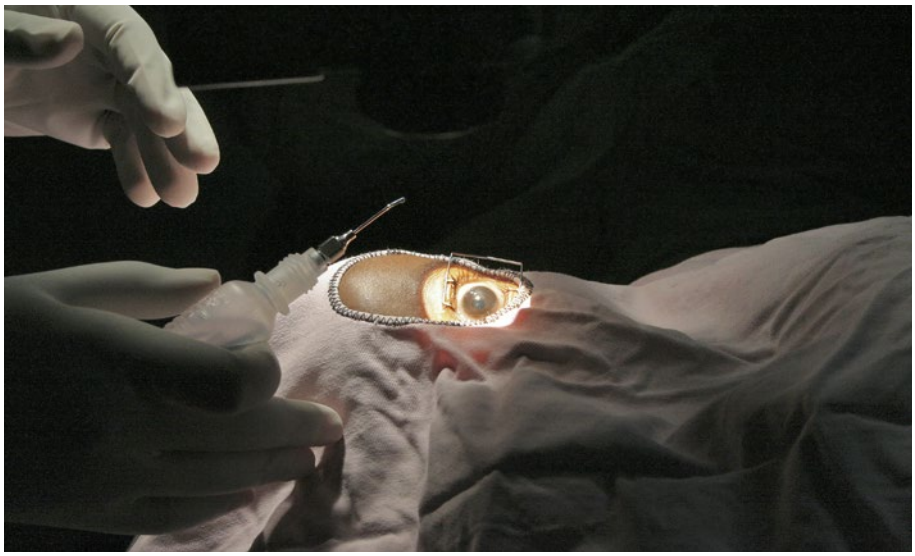
Clinical effectiveness

Clinical effectiveness measures the success of the surgical procedure;i.e., is the patient's vision good?

If you ask most surgeons to describe the quality of an operation, they will talk about the outcome of the operation (the visual acuity). In other words, they define quality as clinical effectiveness. Other indicators of clinical effectiveness include the patient's clinical details before, during and after surgery. Taken together, these aspects of care describe clinical quality.

Visual acuity

Visual acuity (VA) is the most common clinical measure of the quality of cataract surgery. It is how we describe and measure the success of surgery and it is therefore critical that it is measured well. Unfortunately, VA is often measured inaccurately, frequently by junior, or untrained, staff. Whilst the poor measurement of VA does not directly impact on the patient, it means that surgeons and the hospital are unable to assess the clinical effectiveness of their care. A high rate of poor outcomes after cataract surgery is a cause for concern and should lead to investigation of potential reasons. A low rate of poor VA is cause for celebration but it should not be taken for granted.



Lance Bellers/ICEH

Patient safety is an important component of quality

Measurement of VA must be standardised and systematic. All staff members should measure VA in the same way, using the same steps (see article on page 16), and they should record the visual acuity in the same way in the case notes. Therefore, a patient's recorded VA should be the same, regardless of which staff member measured it. The following are minimum standards for VA measurement.

- All patients undergoing cataract surgery should have VA measured pre- and post-operatively. If someone is an in-patient, VA should be measured every day. If someone is a day patient, it should be measured at every follow-up visit.
- VA should be measured using a standard chart with clear letters on a white background (preferably back-lit), from a standard distance.
- Pinhole acuity should be measured for every patient if possible.

Benchmarking

The World Health Organization (WHO) has a set of recommendations[1] for the percentage of operations with good, borderline or poor visual outcome following surgery. Unfortunately, the guidelines do not specify when after surgery this should be measured. More useful than these guidelines is the concept of benchmarking.

Benchmarking allows hospitals to compare their current performance against their past performance and set targets for how much they want to improve or change their performance. It is also possible to use benchmarking to compare their performance with that of other similar hospitals.

Benchmarking involves recording the VA following a set number of operations at specific times (e.g. at discharge, first or second follow-up), and determining the proportion of operations that achieve a certain VA at that point (e.g. a VA of 6/9 at first follow-up). This proportion is then used as a baseline or benchmark to judge whether outcomes have improved at a later point in time. Recording the VA of 200 operations is generally enough to provide a good baseline.

Using benchmarking to improve performance

1. To create a baseline measurement, measure and record VA following 200 consecutive cataract operations at one or more of the following points: at discharge, at first follow-up, and/or at second follow-up.
2. Carry out any planned quality improvement activities.
3. Once the activities have become established and consistent practice, measure and record VA after another 200 consecutive cataract operations **at the same point(s)** as in Step 1 above.
4. Repeat every month or every quarter to monitor progress.

Continues overleaf ➤

Heiko Philippin

Heiko Philippin

Biometry is essential to calculate the power of the intraocular lens and to achieve good visual outcome

It is also possible to set targets for improvement based on the baseline. The hospital might decide that it wants the proportion of patients achieving 6/9 vision at first follow-up to increase by a given percentage over the following six months and put measures in place to achieve this.

Biometry

Biometry, the measurement of the power of the intraocular lens pre-operatively, is as critical as good surgical technique in ensuring good visual outcome.

Where clinically possible, every hospital should routinely use biometry for patients undergoing cataract surgery. If biometry is not available, then the hospital should consider whether cataract surgery should continue, as the risk of sub-optimal VA after the operation is very high.

Complications

The other important marker of clinical quality is the complication rate – the number of complications per 100 operations. There are numerous complications of cataract surgery and it is important that these are recorded in the case notes – both honestly and in detail.

Every surgeon has complications. Recording, understanding and addressing complications is an important part of ensuring the quality of cataract surgery in an individual and in an institution.

All other relevant clinical details must be recorded systematically for every cataract operation performed (see panel opposite). Without this information it is impossible for the hospital or surgeon to understand their case load, identify issues and make changes.

Note: The complication rate can be used in benchmarking in a similar way as VA (see the panel on page 9).

Patient safety

More than 1 in 10 patients in hospital experience a harmful incident unrelated to their condition. These incidents are largely preventable and recognition of the scale of the problem has led to the WHO starting a patient safety programme. The prospect of legal action and costly payouts has led many hospitals, even in low-income countries, to take patient safety seriously.

Patient safety in cataract surgery is critical. Harm can occur at any time during the patient pathway, from tripping over in the outpatient department to endophthalmitis from poorly sterilised equipment. Most incidents are preventable given a culture of patient safety within the hospital and motivated staff.

'The culture of patient safety determines whether patients are harmed'

There are two ways of approaching patient safety: retrospectively, where an adverse incident is investigated to find out the cause, and prospectively, where harm is prevented.

Retrospective incident investigations are critical; however, they must be conducted in a systematic and fair way. There is a concept called 'no blame' in which the hospital recognises that, usually, there is a series of errors or mistakes that led to the patient safety incident. The purpose of the investigation is to find out what errors occurred and the main causes of these errors. 'No blame' does not mean 'no responsibility', however, and it is important that, if someone is culpable, they are disciplined appropriately. Every hospital should have a policy of investigating patient safety incidents with clear guidelines about who is responsible and how they should proceed.

Prevention is better than cure, so ideally a hospital should try and implement as many preventative activities as possible. The WHO has published guidance to help hospitals in low-income countries ensure that their patients are safe.[2]

Most patient safety incidents occur in the operating theatre, thus ensuring the patient does not come to harm in this setting is important. Whilst every hospital recognises the importance of sterilising instruments or wearing gloves, how many think that checking the patient's name, the strength of the intra-ocular lens to be inserted or which eye it is going to be put in, is important?

Most surgeons have experienced operating on the wrong patient, inserting the wrong IOL or operating on the wrong eye. To help prevent such incidents, the UK's National Health Service (NHS) has adapted the WHO surgical safety checklist for cataract surgery. A copy is available online[3] and its use for all cataract operations is highly recommended.

It is widely recognised that the culture of patient safety within a hospital determines how likely patients are to be harmed. Culture describes the attitude of management and staff to patients and their care.

A hospital with a good culture of patient safety has a range of characteristics:

- patient-centred care, where patients are treated with respect
- a good environment with all the necessary equipment
- a strong clinical team that works well together
- the necessary support from management.

There are tools available to assess the culture of patient safety within a hospital and to identify areas that require further strengthening.

Patient experience

In the example earlier you were asked to describe the quality of a taxi ride. Asking

How to measure quality

To know the quality of its cataract surgical service, each hospital must measure quality. There are a variety of tools available to collect and analyse clinical and patient safety data. Collecting patient experience data is a bit more complicated, but simple measures such as a suggestion box or patient discussion groups (where patients come together after surgery with a counsellor and discuss their experience) can be put in place to allow patients to provide feedback that the hospital can act on.

Collecting data on quality

The following are the resources required to collect data on quality:

1. tools (computer and software) to enter data on quality
2. someone to collect and enter the data
3. someone to analyse and interpret the results
4. a forum (meeting) to discuss the results with all staff (everyone has a role in quality)
5. strong leadership to make decisions (sometimes difficult) and push through changes.

Creating change

Changing human behaviour is always difficult. Staff have done the same thing for many years and getting them to change is often challenging. To improve quality, however, change is necessary. Better never stops!

Approaches to change

Communication

Open and honest discussion with staff members about the issues and how to address them effectively is an important first step to improving quality. For example, what prevents staff from measuring visual acuity (VA) accurately? Is it the equipment they have, or that they are expected to check the VA of 45 patients in 30 minutes, or that they don't ever see anyone checking what they've written in the notes? Staff members often have ideas about how things could be improved that are practical and contextual.

Trial and error

Rarely is major change either possible or effective. Change usually occurs in stepwise increments. Making small changes, and checking whether they work, or not, is an important part of quality improvement. For example, you might change the way that patients have their VA assessed so that it is more manageable for the staff members concerned. You would then continue to discuss the effectiveness of this change with staff.

Embedding change

Often, when new ideas are first brought forward, some people embrace them, but there is a tendency for people to revert to their old ways of working. It is critical that any quality improvement activities are actively monitored and supported, not just in the short term.

users to describe their experiences is commonly used by service providers outside of healthcare to assess the quality of their service. Hospitals have started measuring patient experience so they can measure the quality received by their clients, the patients.

In the past, studies have measured patient satisfaction with care they receive. Unfortunately, most patients in low-income countries report very high levels of satisfaction even when they have not received good care. This appears to be the result of patients not wishing to speak badly about the hospital or clinical staff, but leads to an artificially high satisfaction level. A second issue with patient satisfaction is that the presence or absence of satisfaction is of limited use to a hospital. Being satisfied or dissatisfied tells the hospital nothing about their service or how to improve it.

These issues with patient satisfaction have led to the use of patient experience as a measure of quality. Patient experience describes the patient's views about their experience of different aspects of care; for example, was the hospital clean? What did the staff tell you to do after your operation? These can be checked internally and, if enough patients report specific issues, they can be acted on.

Conclusion

We are keen to conduct as much cataract surgery as possible; however, evidence suggests that visual outcome is frequently sub-optimal in many low-income settings. Improving visual outcome is complicated and requires a holistic approach to patient care involving a focus on clinical effectiveness, patient safety and patient experience.

As a minimum, every hospital should be collecting clinical effectiveness data on every cataract operation. It should also have in place patient safety protocols like the WHO surgical safety checklist as well as procedures describing what to do if a patient is harmed. Finally, collecting information about patient experience is important to make sure that patients receive the care they need.

Making changes in the cataract surgery service is difficult and requires good communication and perseverance. Change does not happen overnight and needs to be supported and encouraged. This requires strong leadership.

Clinical Quality Group

The International Centre for Eye Health is launching a Clinical Quality Group that aims to provide a forum for clinical staff who want to improve the quality of their service. There will be a regular newsletter and a chance to link with other clinicians who are focusing on quality.

To take part, email Robert Lindfield (**robert.lindfield@Lshtm.ac.uk**).

References

1 World Health Organization. Informal consultation on analysis of blindness prevention outcomes. Geneva: WHO; 1998.
2 **www.who.int/topics/patient_safety/en/**
3 **www.nrls.npsa.nhs.uk/resources/?EntryId45=74132**

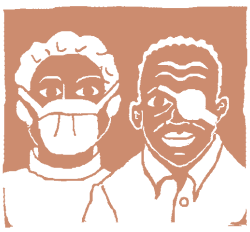
Further reading

SP Kelly and N Astbury. Patient safety in cataract surgery. Eye, 2002; 20(3): 275–282.

Heiko Philippin

Heiko Philippin

Preparing for surgery also includes the small details. If the microscope is not set up correctly (A). it will compromise the surgeon's view during the procedure. B shows the correct setup.



Training a cataract surgeon

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M Daud Khan
Chairman: Board Of Directors, CHEF International, Islamabad, Pakistan.

Training in cataract surgery is one of the key factors needed to ensure high quality cataract surgery with good visual outcomes and patient satisfaction. The training has to impart the right skills to the right person by the right trainer and in the right environment.

Identification of tasks

Cataract surgery is now, in effect, refractive surgery, which involves more than just removing the opaque lens. It includes thorough pre-operative assessment, skilled surgical techniques and proper post-operative follow-up with a focus on the best possible recovery and visual outcome.

The tasks a cataract surgeon is expected to master include:

1. **Case selection *(Selection)***. The cataract surgeon should have thorough knowledge of the patients before surgery. Diseases such as corneal scars, age-related macular degeneration, diabetic retinopathy, advanced glaucoma and other comorbidities must be identified, because cataract surgery in their presence will not give the desired results.[1] This has to be recorded and explained to the patient.
2. **Sterility and the surgical field *(Sterility)***. Procedures such as effective 'scrubbing', 'gowning' and 'gloving' should be strictly observed. Cleaning the peri-orbital skin with povidone iodine prior to surgery will reduce the bacterial load and can prevent post-operative endophthalmitis.[2]
3. **Anaesthesia and intraocular pressure *(Soft eye)***. A soft, well-anaesthetised eye is vital to the success of cataract surgery. Peribulbar injections and intermittent digital pressure are well suited for trainee surgeons and technicians. Note that sub-Tenon's also provides effective anaesthesia and has a lower incidence of sight-threatening complications compared with sharp needle techniques.[3]
4. **Availability and efficient use of suitable, sterilised instruments and optical aids/operating microscopes *(Suitable equipment)***. The candidate should have access to properly sterilised, good quality surgical instruments and have the use of a good quality and affordable microscope.

Heiko Philippin

Trainers should be highly skilled and have an aptitude for teaching

5. **Intra-operative surgical complications *(Safe surgery)***. The cataract surgeon should have good control over:
   - wound construction
   - capsulotomy
   - hydrodissection
   - nucleus delivery
   - cortex irrigation and aspiration
   - lens implantation
   - wound reconstruction.

   A safe cataract surgeon should know how to respect corneal endothelium, uveal tissues and the posterior capsule, and should avoid any damage to such tissues. In the case of posterior capsular rupture, he/she should know how to manage vitreous loss.
6. **Uncorrected refractive errors *(Spectacles)***. Significant astigmatism and uncorrected refractive errors from lost or broken glasses are an important cause of low vision and blindness following cataract surgery. It can be overcome in the following ways.
   - Biometry and the implantation of a customized intraocular lens (IOL) that will ensure significant improvement in visual outcome.
   - Small incision sutureless cataract surgery (SICS) or the appropriate removal of sutures to reduce significant astigmatism, followed by spectacle correction of the residual refractive error 6–8 weeks after surgery.[4]
7. **Post-operative complications *(Sequelae)***. There may be early or late complications. Persistent inflammation in the early post-operative period and posterior capsule opacification in the late period can adversely affect visual results. To avoid or minimise these, a cataract surgeon should take particular care in post-operative follow-up, with early detection and treatment of complications. Routine follow-up on the first post-operative day, after one week and after six weeks is recommended.[3]

Training: length and content

Based on the above skills, a curriculum needs to be designed that gives the cataract surgeon the right knowledge, the right skills and the appropriate attitude. There will be considerable individual variations but, as a minimum standard, a person who is already qualified should receive 4–6 weeks of training in extra-capsular cataract extraction (ECCE) with IOL and a minimum of fifty supervised operations is recommended.

Training should include didactic teaching, videos, wet lab and 'hands-on' training (assisted and then solo).

Training should be an ongoing process and not a one-time activity. Eye surgeons should get an opportunity to refresh their skills and learn new techniques.

Refresher training opportunities should be available according to the needs of the surgeons and should be offered as part of continuous professional development (CPD). CPD ensures not only that the eye surgeons continue to maintain their original set of skills, but also that they learn new skills with a view of continually updating themselves with the ever growing developments in cataract surgery.

Auditing

Auditing or monitoring in the initial phase should allow eye surgeons to compare 'themselves with themselves' over time. This can be done by measuring visual outcomes and patient satisfaction and should be an integral part of the training.

Certification

Certification of training is the responsibility of the trainer who should be highly

skilled and have an aptitude for teaching and training. The trainer is responsible for certifying trainees as safe cataract surgeons or recommending further training under supervision. Each trainee should have a log book which the trainer fills in and signs off at regular intervals and after the acquisition of the required skills.

The training centre

Hospitals used as training centres for cataract surgery should have:

- adequate physical space
- adequate equipment and good quality instruments and consumables, as requested and required
- a 'wet' laboratory for the trainees to familiarise themselves with the instruments and microscope
- audio-visual systems for the recording of operations to enable learning, monitoring and for further reference.

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Tips for training in surgical skills

The cornerstones of achieving good outcomes from cataract surgery are supervised training and practice. Skill and experience are necessary to achieve good outcomes. For these to be the norm the following are required:

- knowledge of the procedure
- supervised training
- practical surgical exposure and practice
- experience
- follow-up and audit of outcomes.

Tips for the trainee

- Watch and observe surgery and write down the steps in a notebook.
- Master the microscope and instruments.
- Scrub with the nursing team to appreciate and anticipate the steps involved.
- Break the procedure up into small sections.
- Practise, practise, practise!
- Practise in a wet lab, on plastic eyes or animal eyes and practise capsulorrhexis on a tomato or grape.
- Attend a microsurgical skills course.

Tips for the trainer

- Dedicate a set time on each list for the trainee, e.g. 40 minutes at the start of the list, after which time take over the case, whatever point has been reached. This time can be flexible depending upon the confidence of the trainer, competence of the trainee and the type of case.
- If the trainee needs practice in one particular step, supervise the trainee for that step in each case.
- 'Reverse' training is a method of learning the procedure from the end backwards e.g. suture tying first (in the case of ECCE).
- A positive attitude and approach is essential to encourage rather than humiliate the trainee.
- Discuss what went well and what didn't. Identify areas that need more practice.
- Frequent and regular exposure to surgery and to facilities for practice outside the theatres are essential.

Excellent outcomes can only be achieved through structured training, practising and personal audit of outcomes. Only then will patients truly benefit and the eye unit command respect in the community.

By Larry Benjamin, adapted by Nick Astbury. First published in the Community Eye Health Journal, Vol 15 No. 42, 2002.

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Measuring the impact of cataract services in the community

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In many low-income countries, a substantial number of people remain needlessly visually impaired or blind from cataract as a result of not accessing surgical services.[1] In this article, we will discuss how Rapid Assessment of Avoidable Blindness (RAAB) surveys can play a role in improving cataract services, and the impact that sight-restoring cataract surgery can have on people's lives.

How can RAAB be used to improve cataract services?

RAAB is a method for rapidly assessing visual acuity.[2] People aged 50 years and above are randomly selected from a population. They undergo visual acuity screening and those who are found to have problems with their vision are examined by an eye care professional to determine the most likely cause. To date, more than one hundred RAAB surveys have been conducted to date across the world.

Information from RAAB surveys can be used to improve cataract services in a number of different ways.

RAAB provides estimates of the prevalence of blindness and visual impairment and its main causes. This information can be used to estimate the need for cataract surgery in the community. From this, we can estimate the number of cataract operations that need to be performed per million population per year (known as the cataract surgical rate) in order to help everyone who needs a cataract operation within a set time frame. Information is also collected on the number of people who have undergone cataract surgery; this can be used to estimate cataract surgical coverage (i.e. the proportion of patients/eyes with operable cataract who have already received surgery), which is a measure of progress.

Where no hospital data are available, RAAB survey findings about the visual acuity of people who have undergone cataract surgery can be used to give an overview of the quality of cataract services in an area or district. The causes of poor visual acuity can also be used to identify areas for improvement. For instance, if poor outcome after cataract surgery is common and is attributable to refractive error, then better optometry services may be needed. The RAAB data on quality will not be as good as hospital data in reflecting current outcomes, because RAAB will include people operated on many years ago and from a variety of different surgical services.

Elmien Wolvaardt Ellison

Visual acuity testing during a RAAB survey conducted in South Africa

During RAAB, people who have cataract but have not undergone surgery are asked why they have not attended. This information shows us the main barriers to overcome when providing services in an area. For instance, if cost is cited as the main barrier then the service could consider providing subsidies, whereas if lack of awareness is the main barrier then a publicity campaign may be needed.

Finally, RAAB can also be used to monitor the impact of a cataract surgery service if it is repeated after a period of time (e.g. 5–10 years) and the prevalence and causes of visual impairment at the two time points compared.

Why is improving access to cataract services important?

It was widely believed that visual impairment from cataract could lead to poverty in the household and have a negative impact on the person, but evidence for these assumptions was lacking. We undertook the Cataract Impact Study to explore how sight-restoring cataract surgery impacts on quality of life, daily activities and poverty in Kenya, Bangladesh and the Philippines.

Using the RAAB method outlined above, as well as community-based case finding, we identified approximately six hundred people with visually impairing cataract (VA<6/24 in the better eye) across the three study countries. For each participant with cataract, we selected an age- and gender-matched peer without visual impairment (the controls). Participants and controls were interviewed about their quality of life, their daily activities and household poverty.

People with cataract were offered free or subsidised cataract surgery and one year later they were traced and interviewed again. Patients from the Philippines and Bangladesh were also followed up after six years to assess the long-term impact of surgery.

This study found that, at baseline (before surgery), when compared the controls, the people with cataract[3]:

- had poorer quality of life (both vision-related and generic)
- were less likely to engage in productive activities and were more likely to have assistance with daily activities
- were poorer in terms of household assets, self-rated wealth and monthly expenditure.

One year after cataract surgery, compared to baseline, people who had undergone cataract surgery:

- had improved vision-related and generic health-related quality of life
- were more likely to engage in productive activities and were less likely to report assistance with activities
- had significantly increased household per capita expenditure (i.e. less poverty).

Follow-up six years after surgery in the Philippines and Bangladesh found that benefits were also sustained in the long term.

Among older adults in low-income countries, this study found evidence that cataract surgery can lead to improved quality of life, greater participation and less poverty. These findings highlight the importance of providing affordable and accessible cataract surgery for all those who need it.

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1 Pascolini D, Mariotti SP. Global estimates of visual impairment: 2010. Br J Ophthalmol. 2012 May;96(5):614–618.
2 Kuper H, Polack S, Limburg H. Rapid assessment of avoidable blindness. Community Eye Health. 2006 Dec;19(60):68–69.
3 Cataract Impact Study. www.iceh.org.uk/display/WEB/Cataract+impact+study

How to measure distance visual acuity

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Visual acuity (VA) is a measure of the ability of the eye to distinguish shapes and the details of objects at a given distance. It is important to assess VA in a consistent way in order to detect any changes in vision. One eye is tested at a time.

Indications

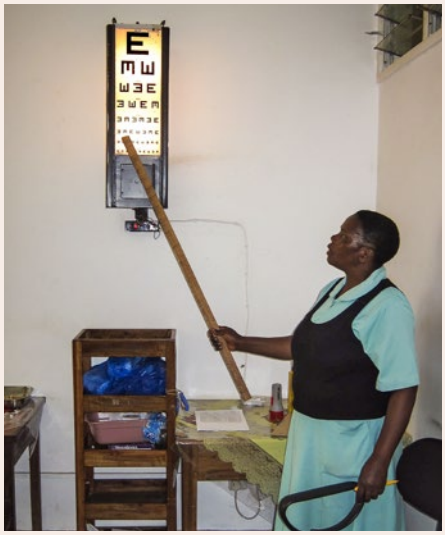
- To provide a baseline recording of VA
- To aid examination and diagnosis of eye disease or refractive error
- To assess any changes in vision
- To measure the outcomes of cataract or other surgery.

Equipment

- Multi-letter Snellen or E chart
- Plain occluder, card or tissue
- Pinhole occluder
- Torch or flashlight
- Patient's documentation.

Procedure

- Ensure good natural light or illumination on the chart. It is important to ensure that the person has the best possible chance of seeing and reading the test chart as treatment decisions are made based on the results of VA testing.
- If the test is done outdoors, the chart should be in bright light and the patient in the shade, with enough light to illuminate the patient's face during the test.
- Explain the procedure to the patient. Tell patients that it is not a test that they have to pass, but a test to help us know how their eyes are working. Tell them not to guess if they cannot see.
- Ensure that any equipment that the patient touches is clean and is cleaned between patients. Infections can be passed between patients if equipment – or the testers' hands – are not clean.
- Position the patient, sitting or standing, at a distance of 6 metres from the chart. The patient can hold one end of a cord or rope of 6 metres long to ensure that the distance is maintained
- Test the eyes one at a time, at first without any spectacles (if worn).
  Note: Some people prefer to always test the right eye first. Others prefer to test the 'worse' eye first (ask the patient out of which eye they see best). This ensures that the minimum is read with the 'worse' eye, and more will be read with the 'good' eye. This means that no letters are remembered, which could make the second visual acuity appear better than it is.
- Ask the patient to cover one eye with a plain occluder, card or tissue. They should not press on the eye; this is not good for an eye that has undergone surgery. It can also make any subsequent intraocular pressure reading inaccurate and it will distort vision when the occluded eye is tested.
- Ask the patient to read from the top of the chart and from left to right. If the patient cannot read the letters due to language difficulties, use an E chart. The patient is asked to point in the direction the 'legs' of the E are facing.
  Note: there is a one in four chance that the patient can guess the direction; therefore it is recommended that the patient should correctly indicate the orientation of most letters of the same size, e.g. four out of five or five out of six.
- The smallest line read is expressed as a fraction, e.g. 6/18. The upper number refers to the distance the chart is from the patient (6 metres) and the lower number (usually written next to the line on the chart) is the distance in metres at which a 'normal' eye is able to read that line of the chart.
- Incomplete lines can be added to the last complete line. e.g. 6/12+3, indicating that the patient read the '12' line at 6 metres and gained three of the letters on the '9' line.
- Record the VA for each eye in the patient's notes, stating whether it is with or without correction (spectacles). For example: **Right VA= 6/18 with correction, Left VA= 6/24 with correction**.
- If the patient cannot read the largest (top) letter at 6 metres, move him/her closer, 1 metre at a time, until the top letter can be seen – the VA will then be recorded as 5/60 or 4/60, etc.
- If the top letter cannot be read at 1 metre (1/60), hold up your fingers at varying distances of less than 1 metre and check whether the patient can count them. This is recorded as counting fingers (CF): **VA = CF**
- If the patient cannot count fingers, wave your hand and check if he/she can see this. This is recorded as hand movements (HM): **VA = HM**
- If the patient cannot see hand movements, shine a torch toward the eye and ask if they can see the light. If they can, record 'perception of light' (**VA = PL**). If they cannot, record 'no perception of light' (**VA = NPL**).
- After testing without any correction, test the patient while wearing any current distance spectacles and record the VA in each eye separately, with correction.
- If 6/6 (normal vision) is not achieved, test one eye at a time at 6 metres using a pinhole occluder (plus any current spectacles). The use of the pinhole reduces the need to focus light entering the eye.
- If the vision improves, it indicates the visual impairment is due to irregularities in the cornea, a problem in the lens, or refractive error, which is correctable with spectacles or a new prescription.
- Repeat the whole procedure for the second eye
- Summarise the VA of both eyes in the patient's notes, for example:
  Right VA= 6/18 without specs, 6/6 with pinhole and Left VA= NPL.



Heiko Philippin

Visual acuity should be measured from a standard distance, using a standard chart with a white background

Children

- It is usually possible, with patience, to measure VA in children from about the age of 5, although this does vary. Children need praise and reassurance that it does not matter if they are wrong.
- Ask the parent to cover the eye not being tested, so that the child cannot see around the occluder.
- Try to show only one line of the chart to the child at a time.

VA testing measures one aspect of visual function, but it is important that it is done well and accurately. An incorrect VA can lead to inappropriate decisions and management.

Understanding and caring for an operating microscope

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An operating or surgical microscope is an optical instrument that provides the surgeon with a stereoscopic, high quality magnified and illuminated image of the small structures in the surgical area.

The optical components of a basic stereo microscope consist of the binocular head, a magnification changer, the objective lens and an illuminator which beams light through the objective lens and onto the operating field (Figures 1 and 2). The binocular head consists of two telescopes with adjustable eyepieces for users with refractive error. The magnification can be changed by turning a knob (which selects different magnification lenses) or by using a motorised zoom controlled by a foot pedal.

The working distance (Figure 1) is the distance from the microscope objective lens to the point of focus of the optical system. This value is fixed and is dependent on the chosen focal length of the objective lens. The choice of working distance depends on the type of surgery. For modern ophthalmic surgery that involves delicate work in the posterior chamber, objective focal lengths of 150 mm, 175 mm and 200 mm are commonly used.

The optical system often includes a beam splitter and a second set of teaching binoculars (Figure 2) so that two people can view the operation simultaneously.

The optical system is attached to the suspension arm of the floor stand (Figure 3). The suspension arm makes it possible to position the optics exactly and to fix them in place. The floor stand has wheels and can be moved around the floor and fixed into place using the brakes.

A foot pedal connected to the floor stand allows the surgeon to control the focus, the zoom, the position of the optics over the eye (the x,y position on the horizontal plane) and to turn the illumination on and off.

The illumination system is usually housed in the floor stand in order to keep the bulb heat away from the operating field. In this case, the light is transmitted to the operating field by means of a fibre optic cable. The light in ophthalmic microscopes is usually coaxial, meaning that it follows the same path as the image in order to avoid shadows.

It is essential that all eye units develop protocols for performing microscope checks. Microscope optics should be inspected and cleaned on a weekly basis, or earlier if dirty. The entire microscope should be checked by a biomedical equipment technician at least once every six months.

Figure 1

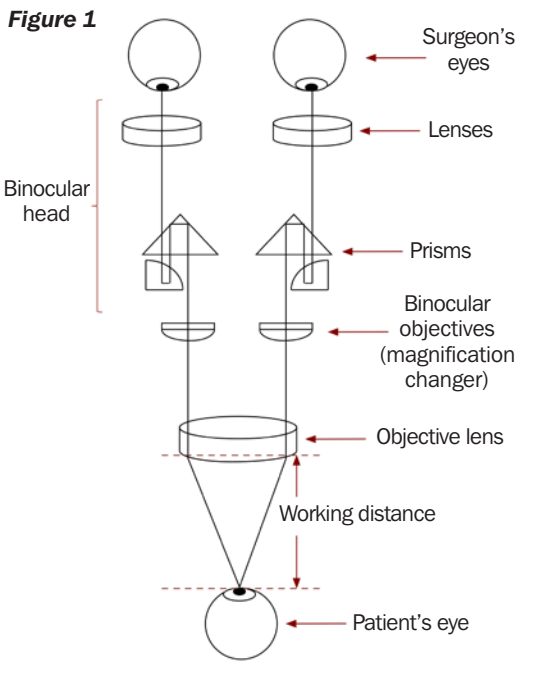


Figure 2

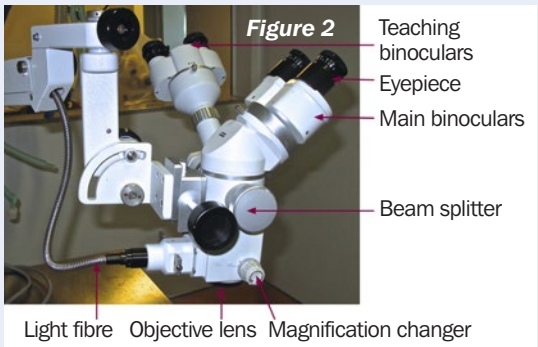
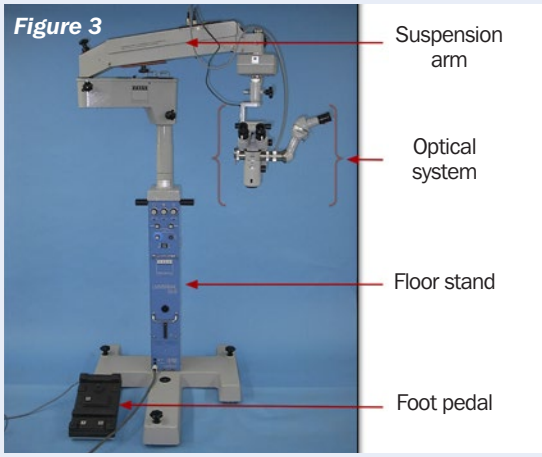


Figure 3



Caring for the operating microscope

- Keep the microscope in a dry, cool and well-ventilated place to prevent fungus growth on the optics (lenses).
- Every week, clean the optics according to the optical cleaning instructions described in a previous issue.[1]
- If fungus growth is detected, clean according to the instructions described in a previous issue.[2]
- To protect it from dust when not in use, drape a cover over the microscope. Vinyl coverings are preferred because they do not shed lint (like cloth coverings do). However, their use should be avoided in humid environments since they can trap moisture, which increases the risk of fungal growth.
- Wipe down the external surfaces with a damp cloth soaked in hot, soapy water.
- Cover the foot pedal with a clear plastic bag to prevent surgical and cleaning fluids from entering and damaging the electronics.
- Lift the foot pedal off the floor when washing the floor.
- Use a voltage stabiliser with the microscope. This will prevent sudden increases in voltage from destroying the bulbs and will ensure that the illumination provided remains constant.
- Before using, test the controls of the foot pedal (the x,y movement, zoom, focus, light on and off).
- Before using, check that the suspension arm can be fixed into position to ensure that it does not fall on the patient.
- Avoid kinking or bending the fibre optic cables.
- When replacing the bulbs, avoid touching them with your fingers. The oil left as fingerprints on the bulb can shorten its life.
- Do not move the microscope while the bulb is still hot because strong vibrations may damage the filament.
- Every six months, clean and oil the wheels and the brakes. Remove any surplus oil when done.

References

1 Cordero I. How to care for and clean optical surfaces. Comm Eye Health J 2010;72(23):57
2 Cordero I. Fungus: how to prevent growth and remove it from optical instruments. Comm Eye Health J;83(26):57

The Global Trachoma Mapping Project

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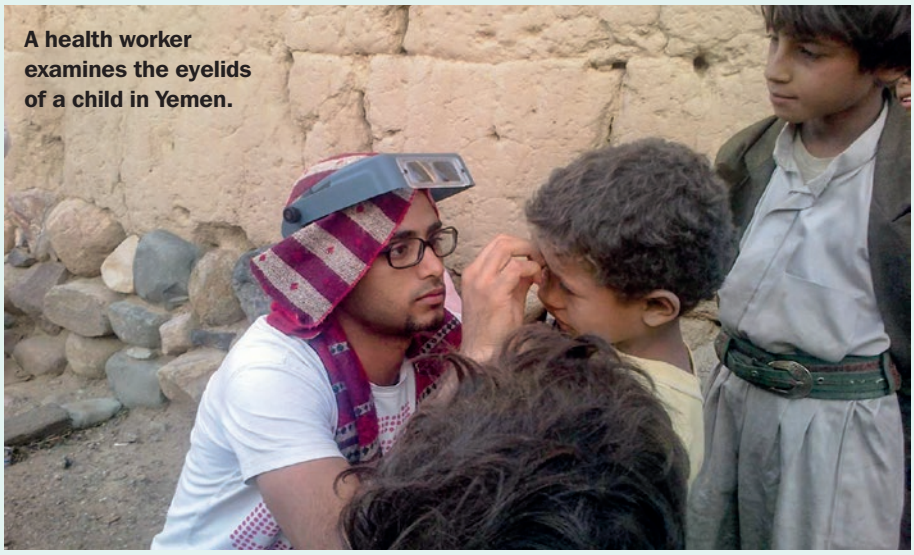


A health worker examines the eyelids of a child in Yemen.

Courtesy of Global Trachoma Mapping Project

In the largest disease-mapping project ever conducted, health workers trained by the Global Trachoma Mapping Project have already examined the eyelids of more than 1 million people in nearly 1,000 districts since December 2012. The data collected are being used to create the first truly complete global map of trachoma and trichiasis, due in March 2015.

Data on the prevalence of trachoma and trichiasis at country and district level are vital in order to plan public health interventions and to mobilise resources. The public health interventions are based on the SAFE strategy for trachoma elimination, a strategy endorsed by the World Health Organization (WHO). SAFE is short for Surgery, Antibiotics, Facial cleanliness and Environmental improvement. It involves offering individuals with trichiasis – the blinding consequence of trachoma – a surgical procedure to stop their lashes being in contact with the eyeball. In populations with active trachoma, SAFE also involves offering antibiotics, education (about facial cleanliness and other good hygiene practices) and environmental improvement to reduce the carriage and transmission of the bacterium that causes trachoma.

In order to plan surgical services adequately, it is useful to know the prevalence of trichiasis: that is, where there are people with trichiasis and approximately how many are affected. To plan antibiotic distribution, facial cleanliness, education and improvements in water and sanitation for trachoma control purposes, it is essential to know the prevalence of active trachoma. This information must be collected at health district level, because health districts (populations of 100,000–250,000) are the units in which SAFE is usually put into practice.

Why is mapping needed?

Trachoma is thought to be endemic in 2,400 districts worldwide. By July 2012, district-level surveys had established prevalence estimates in less than half of these (1,115 districts). The rest, (1,285 districts) were merely suspected to be endemic, without sufficient information to either start interventions in those places or to confidently add them to the list of districts for which full-scale SAFE implementation did not seem necessary.

In July 2012, therefore, Sightsavers, the International Trachoma Initiative (ITI) and the London School of Hygiene & Tropical Medicine, acting on behalf of the International Coalition for Trachoma Control, secured the £10.6 million Global Trachoma Mapping Project (GTMP) grant from the United Kingdom's Department for International Development. Following an intensive planning and piloting phase, mapping commenced in the Oromia Region of Ethiopia on 17 December 2012, soon followed by projects in other regions of Ethiopia and in other countries.

How is the mapping conducted?

Each suspected endemic area is subdivided into 'evaluation units' comprising populations of 100,000–250,000 (these are generally equivalent to health districts). For the purposes of the mapping project, however, larger populations can be mapped as a single evaluation unit if trachoma is suspected to be highly and widely endemic.

In each project location, ministry of health staff are trained and certified by GTMP training teams. A population-based prevalence survey of more than 20 clusters (based on WHO guidelines) is then undertaken by those teams for each evaluation unit. Data are collected on water and sanitation at the household level, and on age, gender and the presence or absence of signs of trachoma at an individual level.

All data are collected electronically, using Android smartphones running the LINKS app, which has been developed and is maintained by the Task Force for Global Health, Atlanta, GA, USA. Data are geo-referenced using global positioning system coordinates; they are then transmitted to a high security server for cleaning and approval by the relevant ministry of health (using a site-specific password-protected web interface). Analysis of approved data is automatic, using pre-agreed algorithms, and prevalence categories are then displayed (with ministry of health agreement) on the web-based Global Atlas of Trachoma.[1] Use of all of these elements of cutting-edge technology means that results can be ready for use for the population's benefit within days of fieldwork being completed. An additional advantage is that the results are considerably less prone to errors in data handling than the paper-based systems used in previous surveys.

The benefits of the GTMP approach have been recognised by ITI's Trachoma Expert Committee and by other agencies. For example, two non-governmental organisations (FHI360 and RTI International), both funded by the United States Agency for International Development, are working with the GTMP to conduct trachoma surveys in countries whose trachoma programmes they support.

Progress thus far

By the beginning of March 2014, the GTMP was working with 18 implementing organisations in more than 30 countries, and some of the 21 million 'bits' of GTMP data had already been put to use to approve the deployment of Pfizer-donated azithromycin for mass antibiotic distribution. The project will continue until March 2015, paving the way for the launch of SAFE interventions – wherever required – to reach the 2020 target of eliminating trachoma as a public health problem.

Reference

1 **www.trachomaatlas.org**

Test your knowledge and understanding

This page is designed to test your understanding of the concepts covered in this issue and to give you an opportunity to reflect on what you have learnt. The multiple true/false questions were produced in collaboration with the International Council of Ophthalmology (ICO). Please visit **www.cehjournal.org** to complete these questions online.

1. Think about the barriers to cataract services		True	False
a	Cataract surgical coverage is usually higher in men than in women.	☐	☐
b	Most patients who are blind from cataract are willing to come for surgery no matter how much it costs.	☐	☐
c	Traditional beliefs, e.g. about going blind when the hair turns white, are no longer important.	☐	☐
d	A person who has had successful cataract surgery can be helpful in persuading others to come for surgery.	☐	☐
2. Think about the costs and quality of cataract services		**True**	**False**
a	If a hospital does a small number of operations and has a waiting list it means there is a need to increase patient demand for services.	☐	☐
b	All patients should have presenting visual acuity better than 6/18 one month after cataract surgery.	☐	☐
c	Offering tiered fees for cataract services is one way in which paying patients can subsidise the costs for poor patients.	☐	☐
d	Accurate biometry is important in providing good quality cataract surgery.	☐	☐

ANSWERS

1.a. True. Women tend to face more barriers to accessing cataract services than men. **b. False.** The cost of surgery is an important barrier for poor people. **c. False.** Traditional beliefs remain an important reason why people do not come for surgery. **d. True.** For many people, meeting someone who has undergone surgery and who has had a good outcome will boost their confidence and motivate them to come for surgery.

2. a. False. If there is a waiting list this needs to be dealt with before creating further demand. **b. False.** This is not possible because some patients will have ocular co-morbidities such as glaucoma or retinal disease and some will suffer from complications during surgery. However, the aim should be that as many patients as possible achieve this vision post-operatively, and every effort should be made to make this happen. The causes of poor visual outcome will only be known if information about post-operative visual acuity is collected routinely. **c. True.** This model involves charging extra for non-clinical services like a private room and to use the profit to subsidise the cost for poor patients. **d. True.** Accurate biometry means there is no – or less – refractive error after surgery and so the visual acuity results are usually better.

Time to reflect

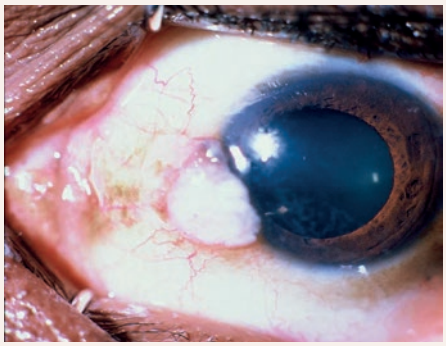
1 How relevant to your day-to-day work was the material covered in this issue of the *Community Eye Health Journal*? **Extremely relevant, relevant, neither relevant nor irrelevant, irrelevant, extremely irrelevant** (circle as appropriate)

2 How much of what you read in this issue was new to you? Please give a percentage:

3 As a result of reading this issue, will you be changing your practice/teaching/leadership/policies/management? **Yes / No** (circle as appropriate)

4 If 'Yes', give examples of planned changes in the space provided, or in your own continued professional development (CPD) diary.

Picture quiz



Allen Foster

This 40-year-old patient in Africa presented with a history of a non-painful swelling on the conjunctiva first noticed three months ago. There was no history of injury. The other eye was normal.

1. What is the diagnosis?

- ☐ **a.** Ptyergium
- ☐ **b.** Bitot's spots
- ☐ **c.** Episcleritis
- ☐ **d.** Squamous cell carcinoma
- ☐ **e.** Pinguecula

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

- ☐ **a.** Iritis
- ☐ **b.** HIV infection
- ☐ **c.** Ultraviolet radiation
- ☐ **d.** Bowen's disease
- ☐ **e.** Pinguecula

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

- ☐ **a.** Chemotherapy
- ☐ **b.** Laser treatment
- ☐ **c.** Irradiation
- ☐ **d.** Topical steroids
- ☐ **e.** Wide surgical excision + cryotherapy

ANSWERS

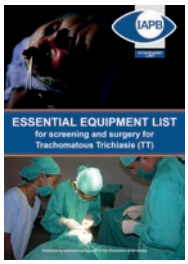
1. Diagnosis: d. Squamous cell carcinoma.
2. Risk factors: b, c and d are all true. HIV positive status, exposure to ultraviolet light radiation, and the pre- (early) cancerous condition, Bowen's disease, may all predispose to squamous cell carcinoma of the conjunctiva.
3. Recommended treatment: Wide (2 mm edges) surgical excision leaving the sclera bare. If possible, cryotherapy should be applied to the bare sclera and conjunctival margins.

Visit **www.cehjournal.org** to complete the questions on this page online.

Major boost for eye health

The Commonwealth Eye Health Consortium, an international group of eye health organisations coordinated by the International Centre for Eye Health, has received a £7.1 million grant from The Queen Elizabeth Diamond Jubilee Trust. The consortium will focus on training (clinical, public health and research), and the development of the smartphone-based Portable Eye Examination Kit (Peek), electronic patient record software (OpenEyes), open educational resources, and an international diabetic retinopathy team training network programme. Eye health workers based in Commonwealth countries can apply for Masters programmes, scholarships, clinical fellowships and research fellowships supported by the consortium. http://cehc.lshtm.ac.uk

THE QUEEN ELIZABETH DIAMOND JUBILEE TRUST



The IAPB Standard List has published the **Essential Equipment List for screening and surgery for Trachomatous Trichiasis (TT)**. It is free to download as a PDF or a Word document. Visit http://iapb.standardlist.org/iapb-essential-lists.html

Global Register of Eye Banks
As advised by the WHO, in order to support eye banking development and services, a global register of eye banks is being developed by the *Global Alliance of Eye Bank Associations*. Contact Heather Machin via info@gaeba.org or heather.machin@unimelb.edu.au to be included in the register and kept abreast of developments. www.gaeba.org

Courses

To tell us about your course, please write to: The Editor: Community Eye Health Journal, London School of Hygiene and Tropical Medicine, Keppel Street, London WC1E 7HT, UK.
Email: editor@cehjournal.org

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MSc Public Health for Eye Care, starting September 2014. To apply, visit www.lshtm.ac.uk/study/ masters/mscphec.html

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Lions Medical Training Centre, Nairobi, Kenya
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We want to hear from you

Two of the issues planned for 2014 include 'Chronic diseases at the back of the eye' and 'Changing eye health behaviour for the better'. If you have any questions about these topics or any experiences to share – whether good or bad – please contact editor@cehjournal.org

Next issue

Perry Athanason

The next issue of the *Community Eye Health Journal* is called **The Eye Team**