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Editorials

Cataract and "Vision 2020—the right to sight" initiative

In 1999 the World Health Organization and the International Agency for Prevention of Blindness announced a joint programme to eliminate unnecessary blindness. The programme is called "Vision 2020—the right to sight".[1] Key to this initiative is the provision of sufficient, successful, and sustainable cataract services for all communities. The questions that therefore arise include: what is a sufficient; what is a successful; and what is a sustainable cataract service?[2] Two articles in this issue of the *BJO* from Korea[3] and Nepal[4] evaluate cataract services using a variety of performance indicators—cataract surgical coverage, barriers to access, and outcome of surgery.

How many cataracts need to be operated?

The aim of a cataract service is to operate on sufficient cataracts each year (cataract surgical rate; CSR), so that everyone with "operable" cataract (visual loss justifying surgery) can receive surgery if they wish (100% coverage). The cataract surgical coverage is defined as the proportion of patients (or eyes) with "operable" cataract, who have already received surgery. As reported in the paper from Korea, coverage varies according to the level of visual acuity used to indicate surgery, being 78% in people less than 6/60 and 55% for less than 6/18. Coverage surveys from other parts of the world have reported: Malawi <15%,[5] Paraguay 36%,[6] and Karnataka State, India 40%[7] for bilateral <6/60 due to cataract. There is as far as I am aware no report from industrialised countries.

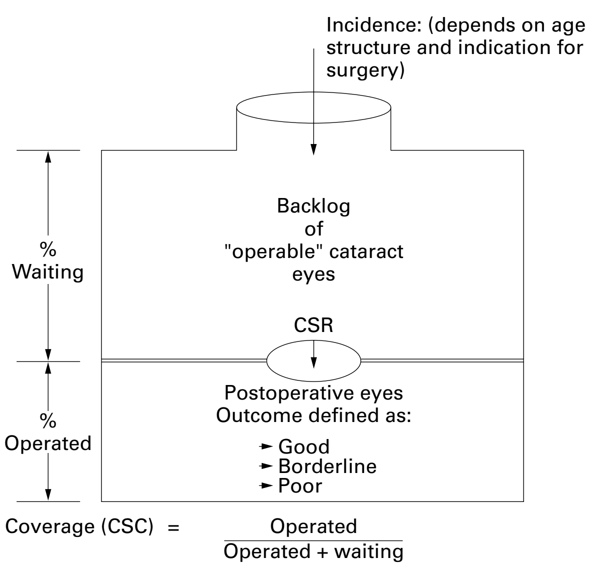

Figure 1 Analysis for cataract services per million population.

The CSR is the number of operations performed in a year for a given population (usually expressed as ops/year/million population) Rates vary from 6300 in Australia[8] to 100 in Nigeria.[9] Figure 1 schematically shows statistics used to evaluate and audit cataract services.

The World Health Report[10] estimates that approximately 20 million people are bilaterally blind (less than 3/60 in the better eye) from age related cataract. However, there are at least 100 million eyes with cataract causing a visual acuity less 6/60 and this number is increasing due to population growth and increasing life expectancy.[2] The incidence of cataract blindness is unknown, but Minassian estimated that for India alone 3.8 million people become blind from cataract each year,[11] and globally at least 25 million eyes become <6/60 due to cataract each year.

To reduce the backlog (or waiting list), the number of cataract operations performed each year must at least equal the incidence of operable cataract, where the definition of "operable" will vary depending on the level of acuity at which cataract surgery is routinely performed. Most ophthalmologists in developing countries agree that cataract extraction with an intraocular lens is indicated in any eye with a visual acuity less than 6/60, and in industrialised countries the indication for surgery is often around 6/12 to 6/24. The lower the indication for surgery the higher the CSR required to achieve a good coverage. Taylor[8] has estimated that the CSR has to increase 2.5 times as one moves the indication for surgery from <6/60 to <6/24, and five times if it goes to <6/12.

At present an estimated 10 million cataract operations are being performed each year in the world. The author's estimates for the cataract surgical rate in various regions of the world are given in Table 1. North America is 5500 and Western Europe averages around 4000. In the middle income communities of Latin America and parts of Asia the rate is between 500 and 2000, and in most of Africa, China, and the poorer countries of Asia the rate is often less than 500.

There are various reasons for low cataract surgical rates, some due to low patient demand (characterised by low CSR with no waiting lists) and some due to inadequate service delivery (characterised by long waiting lists). Minassian[12] has reported a backlog of 2.4 million people in England and Wales with <6/12 vision bilaterally due to

*Table 1 Cataract surgery statistics estimates for 1999**

WHO/IAPB region	Population (millions)	Number of cataract operations	CSR (ops/mill/year)
Africa	650	0.20	300
Americas	800	2.15	2700
North	300	1.65	5500
Central and South	500	0.5	1000
Eastern Mediterranean	500	0.5	1000
Europe	900	2.1	2300
Western	400	1.6	4000
East and central	500	0.5	1000
South East Asia	1500	3.6	2400
India	1000	3.1	3100
Rest	500	0.5	1000
Western Pacific	1650	1.65	1000
Australia and Japan	150	0.8	5300
China	1250	0.6	500
Rest	250	0.25	1000
Total	**6000**	**10.2**	**1700**

*Author's estimates.

cataract. Further analysis would suggest that the current CSR (estimated at 3800) needs to increase by 50% to keep pace with the incident cases of <6/12 bilateral cataract.

What are the results?

In order to measure the results of cataract surgery it is necessary to define outcome. Patient satisfaction and quality of life measurements have been used; however, they are time consuming and not suitable for ongoing monitoring of results by the cataract surgeon. The WHO Prevention of Blindness Programme defines outcome in terms of visual acuity, which can be assessed with full spectacle correction ("best vision"), or with available correction ("functioning vision"). Good outcome is defined as 6/6–6/18, borderline outcome as <6/18–6/60, and poor outcome as <6/60.[13] These broad categories can be further subdivided—for example, 6/6 excellent, 6/9 very good, etc. This definition is simple and easy to use. The purpose is to encourage surgeons to monitor their own results—self audit over time, not comparison between surgeons or institutions. The period from surgery when acuity is measured will obviously affect the results, and this should therefore be standardised for an individual situation so that trends over time can be reviewed.

Studies from developing countries into outcome can be divided into clinical trials/selected series, routine hospital based data, and long term population based studies. The results from clinical trials and individual series are usually very good with poor outcome being found in less than 5% of cases.[14 15] However, routine hospital based reports and long term population based studies have shown that the results are not as good as expected. Poor outcome (<6/60) is often found in more than 10% of eyes with IOLs and many more if an IOL has not been used.[8 16] The findings for "poor outcome" in the two papers in this issue are summarised in Table 2.

In order to improve results we need to know the causes for "poor outcome." These can be classified as:

- those due to pre-existing eye disease
- those due to surgical or early postoperative complications

Table 2 Summary of poor outcome of cataract surgery from two studies in this issue

Place	Follow up	IOL or no-IOL	No of eyes	% Eyes less than 6/60: With available correction	% Eyes less than 6/60: With best correction
Nepal	63% at 32 months	With IOL	84	34%	11%
Korea	100% <1–10 years	With IOL	25	14%	3%
Nepal	63% at 32 months	No IOL	82	73%	28%
Korea	100% <1–10 years	No IOL	11	71%	65%

- those due to uncorrected refractive error
- those due to long term surgical sequelae.

The two papers in this issue demonstrate the advantage of surgery with an IOL, and the need for care in correcting refractive error after surgery. The Nepal study identifies poor surgical technique in "eye camp" patients.

Naturally poor acuity experienced by patients following surgery will affect the demand for cataract surgery by the community. There seems little doubt that the poor results due to lost aphakic spectacles, and surgery by inexperienced personnel under inadequate conditions are still having a negative impact on people's perceptions of cataract surgery. Hopefully, competently performed IOL surgery in good facilities will begin to demonstrate that cataract surgery can be a very effective procedure with a high success rate in developing countries.

How can cataract services be made sustainable?

To eliminate unnecessary blindness from cataract we need ongoing services which year by year will deal with the new cases. Therefore Vision 2020 is about "sustainable services" rather than one-off campaigns targeting "backlog." Sustainability implies the ongoing availability of adequate resources—people and funding.

Throughout the world eye care and, particularly, the cost of managing cataract is becoming a major part of health costs. Someone has to pay—governments, health insurance companies, the patient, or a donor. The cost of a cataract procedure is made up of various components including the cost of consumables, salaries, overheads, and a proportion of the depreciation cost of the infrastructure, instruments, and equipment. There are also significant indirect costs incurred by the patient for transport, time lost from work, food, etc.

In an effort to achieve sustainability the cost of cataract surgery should be kept as low as possible without jeopardising the outcome of surgery. Ophthalmologists, managers, and the ophthalmic industries are all important in determining what a cataract costs society and the individual. At the moment "Western" cataract surgery is too expensive for most of the world, and probably also for Western countries. Worldwide, 10 million cataract operations are done each year, but there is a need to do at least 30 million per year for the indefinite future. Economy of scale should bring lower costs. A first step is to minimise the cost of consumables through bulk purchase of "value for money" sutures, IOLs, and medicines. The second step is to increase productivity so that the relative cost of salaries and overheads per cataract procedure is reduced. Through efficient use of only essential consumables and good productivity the cost in developing countries can on average be kept to less than £50 per operation. However, this cost is still too high for many patients and therefore some form of subsidy may be required. Various cost recovery systems have been developed to generate income from paying patients (India), sale of spectacles (Africa), and other less essential eye services (Latin America). The aim is to make programmes self reliant for the running costs of a cataract surgical service, and use external (donor) support for training, new equipment, and other development costs.

A critical question to be addressed by Vision 2020 in Africa is the issue of "sustainable human resources." At present there are insufficient eye surgeons and support staff, a paucity of good training programmes, and inadequate remuneration and motivation for nationals who want to work in their own countries of Africa. Innovative thinking stressing "north-south-north" and "south-south" partnerships rather than "one way north-south" projects is required by donor organisations and Western eye care professionals into how African eye care staff and training programmes can be supported. For example, India in many ways is far better placed to assist Africa in terms of appropriately trained personnel and training programmes than is Europe or North America.

Conclusion

Unless an affordable, easily usable prevention becomes available the only method to reduce cataract blindness is surgery. For Vision 2020 to become a reality it will be necessary:

- to perform worldwide more than 30 million cataract operations every year (varying from 2000 to 6000 cataract operations per million population)
- to improve the results of surgery (<6/60 rate of <5%), through ongoing monitoring and remedial action to deal with avoidable causes
- to encourage professional groups and ophthalmic industry to make cataract surgery affordable for all sectors of society.

The challenge of "Vision 2020—the right to sight" is daunting, but doesn't vision sometimes require making ideas a reality? Vision 2020 will be achieved if people involved in eye care catch the "vision" for themselves and decide to make it a reality for the people they serve.

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A year is a short time in glaucoma

"A week is a long time in politics."[1] Those who waited for a "final result" in the recent American presidential elections will have been only too familiar with this saying, given the frequent, sometimes hourly, changes in the fortunes of the protagonists. However, in contrast with this, the time frame to a "final result" in most patients with glaucoma is much longer. It may take us our whole working careers to learn the lifetime natural history of one of our adult patients with glaucoma or other chronic conditions such as uveitis. In the case of the paediatric glaucoma clinic at Moorfields Eye Hospital that has been running for five decades, it is a sobering thought that it will take the careers of three consultants to see one patient through their lifetime! Yet the very thing patients with glaucoma want is for us to gaze into a crystal ball and predict their fate in the distant future, and help guide them towards the treatment regimen that has the best risk-benefit ratio for them as individuals.

In this issue of the *BJO* (p 689) Broadway *et al* publish the results of Molteno tube drainage surgery from one centre with a mean follow up of 43 months, ranging from 6 months to 10 years of follow up. This group of patients had a mixture of diagnoses that increased their risk of surgical failure and almost 50% of them had already failed one or more trabeculectomy which confers a much reduced future success rate.[2] In addition, the patients had a very high preoperative intraocular pressure of 46.3 mm Hg which would be expected to lead to significant visual loss in a large number of these patients over the course of this study.

With tube implantation approximately 80% of patients had intraocular pressure less than 21 mm Hg a year after surgery, and approximately 50% of patients no longer required eye drops. However, the importance of length of follow up is clear as these figures fall to approximately 70% and 35% at 2 years and 65% and 25% at 4 years. This is particularly important as the mean age of the patients was only 46 years, with a life expectancy of at least two decades. Over the course of the study 21% of patients had a fall in Snellen visual acuity. However, in common with most of these types of studies, data on nerve and field progression are very difficult to obtain.

These results are not dissimilar to other studies on Molteno tubes,[3–7] although it is difficult to compare studies because of the variation in patient groups. Could the long term success rates for patients now be improved by changing tube techniques such as increasing tube plate area[3 5 8] or using adjunctive antimetabolites[9] without increasing complication rates? Would other modalities of surgical treatment such as diode cyclophotocoagulation or high dose mitomycin trabeculectomy give better long term results?

What these results do teach us is that a long term perspective is essential when dealing with patients with chronic disease. Any new treatments or surgical techniques that promise short term gains must prove themselves in the long term. How are we to gain this knowledge which is essential if we are to guide our patients safely through into the long term?

First and foremost, we need to constantly learn from our personal experience, continually auditing the results of the various treatments and surgery we carry out, not just in the short but in the long term. It is this process that bestows on us that elusive but most sought after attribute known as experience. However, this has also to be combined with the information available from large, long term prospective studies[10 11] of various treatments which can also provide long term information or optic disc and field loss progression which individuals cannot easily gather and analyse on their own. Although these studies are very time consuming in staffing and resources they will provide the long term data available from no other source.

A week may be a long time in politics, but a year is a short time in glaucoma. We require information from long term studies to provide us with the information to predict the fate of our patients. This will ultimately allow us to accurately determine the best management for every one of our patients in the future.

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Should antiproliferatives be used in filtering surgery of normal tension glaucoma?

The overall goal for all glaucoma treatment is to preserve useful vision. Thus, the two most important tasks for the ophthalmologists are to determine the rate of progression in each case and, if necessary, to slow it down sufficiently to reach the overall goal. It may not be possible to arrest progression completely since elderly patients with moderate visual field loss probably have lost most or all of their "reserves" owing to a combination of glaucomatous damage and natural loss of ganglion cells. In such eyes even the continuous natural loss of ganglion cells may manifest itself as a slow progression of the visual field defect, but hardly at a sight threatening rate.

How should this goal be achieved? Although it is generally accepted that open angle glaucoma is a multifactorial disease the intraocular pressure (IOP) is still the only known treatable risk factor. Several studies have shown that the IOP is a graded risk factor where the risk of diagnosing a damaged optic nerve increases with the level of the IOP, even within the normal range of IOP.[1 2] Considering that more than 90% of the population have an IOP below 22 mm Hg it is no surprise that many eyes with a glaucomatous damaged optic nerve have a normal IOP—normal tension glaucoma (NTG). These patients pose a clinical challenge to all ophthalmologists.

The first question is of course if they should be treated or not. We assume, based on clinical experience, that there is a relation between the pressure level and the rate of progression. This is supported by data from the Normal Tension Glaucoma Study,[3] where a large number of patients did not progress during 5–8 years' follow up even if they received no treatment. Thus, one can expect that in many, but not all, cases of NTG the overall goal is reached even if no treatment is instituted.

When treatment is initiated filtering surgery is often considered as an effective means of reducing the IOP. As the IOP is already within the normal range one cannot expect a substantial reduction of the IOP with drug treatment in most patients. Most drugs exert their effect not on the IOP but on the outflow pressure—that is, the IOP less the episcleral venous pressure. With an episcleral venous pressure of about 8 mm Hg[4] even a 30% reduction of aqueous flow would only reduce IOP about 3 mm Hg in an eye with an IOP of 18 mm Hg. This is barely above the measurement error of 2 mm Hg.[5] In a retrospective analysis of 291 medical records of patients with an IOP of 21 or less at diagnosis, 173 (60%) had an effect with a non-selective β blocker that was less than 3 mm Hg[6]—that is, within the measurement error. At the end of a 2 year follow up the *average* IOP reduction in these patients was 13%, from 18.6 to 16.2 mm Hg.[6] It is obvious that for a large number of these patients treatment could not have made much difference to the progression rate. But there is no doubt that treatment for NTG is mandatory if the progression rate threatens to produce a visual handicap.

Data have been presented supporting the fact that pressure reduction does slow down the rate of progression even in NTG.[3 7] A substantial pressure reduction is difficult to achieve without filtering surgery. Still, even in the best hands filtering surgery is not without risk. Neither is filtering surgery a definite procedure. In many patients the filter fails within a few years. Antiproliferatives have increased the odds of retaining the pressure reduction after filtering surgery, and in this issue of the *BJO* (p 696) Membrey and co-workers report their experience with filtering surgery with or without antiproliferatives in NTG in a retrospective analysis. In an attempt to improve the chances of retaining a good pressure reduction a guarded fistulising procedure was performed. The choice of using antiproliferatives followed the evolved policy in the clinic. In 1992 peroperative 5-FU was introduced and in 1995 peroperative mitomycin C (MMC). The retrospective analysis showed a 50% reduction of the relative risk of progression in patients with an IOP reduction of at least 30% compared with patients with no change in IOP. The analysis also showed that even though the MMC group had the best IOP reduction, the 5-FU group fared better because of late complications, including late hypotony, in the MMC group. The experience that the benefits of MMC in NTG can be outweighed by postoperative sight threatening complications has been reported previously.[7 8] Interestingly, when corrected for the reduction in IOP the group receiving no antiproliferatives tended to have the best outcome, but when compared with the 5-FU group the better pressure control in this group outweighed that advantage. The results indicate that we have yet to find the ideal drug to enhance the chances of a permanent effect of fistulising surgery. With the choices available today the authors conclude that a guarded procedure including peroperative 5-FU is the procedure of choice when filtering surgery is indicated for NTG.

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