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How Can Blind Children Be Helped?

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There are an estimated 1.5 million blind childrenworld-wide. Table1 documents where they live and Table 2 gives the major anatomical causes. The years of blindness resulting from these diseases represent a major social and economic burden on communities, as well as individuals.

This issue specifically asks the question 'How can blind children be helped?' It concentrates on what can be done to help the child with significant visual loss, rather than what can be done to prevent blindness in children, which has been discussed in previous issues (see Issues 5, 8, 11, 22).

Dr Rahi discusses how to examine a child who is reported to have visual problems in order to assess the level of visual function, the cause of visual loss and the prognosis for future vision. The examination is often difficult to perform, but it is important that time is taken, if necessary over several examinations, to determine accurately visual function, aetiology and prognosis.

Surveys from around the world have demonstrated that a significant proportion of children in blind schools or special education have conditions which may be improved by surgery, specifically cataract and some cases of corneal scarring. Identification of these children, followed by surgery in the hands of an experienced ophthalmologist and follow-up to manage errors and amblyopia, is an important part of any prevention of blindness programme. Dr Vijay, in her article, gives information on the management of surgically remediable causes of childhood blindness. The role of IOLs in the management of paediatric cataract in developing countries is an important area for evaluation.

Work from West and East Africa and South America is reported in the very practical article by Lynne Ager which shows that approximately half of all children in blind schools can be helped to read normal print (and therefore avoid the need of Braille), if they are carefully refracted and supplied with the appropriate spectacles and magnifiers. This results in better educational opportunities and improved integration. A number of low vision programmes in Africa and Asia for children in blind schools and special education have now been implemented, with encouraging results.

Visually impaired children, some with albinism, in Kenya

Photo: Clare Gilbert

Blind schools are good places to start such programmes as studies show that 5–10% of children can benefit by surgery and 10–15% can have improved vision with spectacles alone.

To conclude, blindness in children is important because of the numbers affected and the years of resulting disability. As

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well as preventive measures to avoid blindness in children, there is much that can be done surgically and optically to improve the vision of a significant proportion of children with visual loss (Table 3). It is proposed that a minimal requirement for the developing world is 1 unit specialising in 'visual loss in children' for every 10 million population. Such a unit requires an experienced ophthalmologist and optometrist who are willing to work as a team with educationalists to provide services and long term follow-up.

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Table 1: Magnitude of Blindness in Children

Region	No. children million	No. blind	Prev. /1,000	Total % blind children
Africa	253	330,000	1.2	24
India	340	270,000	0.8	20
Rest of Asia	264	220,000	0.8	16
China	336	200,000	0.6	12
Middle East	238	190,000	0.8	14
Latin America	167	100,000	0.6	8
Western Economies	168	50,000	0.3	4
Eastern Europe	77	40,000	0.5	2
Total	**1,843**	**1,400,000**	**0.71**	**100%**

Table 2: Causes of Blindness in Children

Site	No. blind	%	Conditions
Retina	400,000	29	Retinal dystrophies and ROP*
Cornea	300,000	21	VAD, measles, ON and TEM*
Globe	200,000	14	Microphthalmos, coloboma
Lens	130,000	9	Cataract and aphakia
Other	130,000	9	Cortical blindness, amblyopia
Optic Nerve	120,000	9	Optic atrophy / hypoplasia
Glaucoma	70,000	5	Bupthalmos or glaucoma
Uvea	50,000	4	Aniridia and uveitis
Total	**1,400,000**	**100%**	

*ROP: Retinopathy of Prematurity
VAD: Vitamin A Deficiency
ON: Ophthalmia Neonatorum
TEM: Traditional Eye Medicines

Table 3: Avoidable Causes of Childhood Blindness by Region

Region	Corneal Scar	Cataract	ROP	Total
Africa	100,000	30,000	<500	130,000
India	90,000	30,000	<500	120,000
Rest of Asia	60,000	30,000	2,000	92,000
Middle East	25,000	10,000	<1,000	35,000
China	15,000	35,000	<1,000	50,000
Latin America	10,000	10,000	25,000	45,000
Eastern Europe	<1,000	10,000	5,000	16,000
Western Economies	<1,000	5,000	6,000	12,000
Total (approximates)	**300,000**	**160,000**	**40,000**	**500,000**

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Children in Blind Schools: What Conditions Should be Treated?

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During our team's routine screening of children in blind schools in Madurai, we find a considerable number of children every year who can benefit by being given spectacles, simple magnifiers or by surgery. This situation can be attributed to the fact that many of these children were not seen by an ophthalmologist before admission to these schools.

Children who have vision better than counting fingers (CF) should be investigated thoroughly and this includes anterior segment examination, refraction and fund-oscopy. With the preliminary diagnosis in hand, the examination of refraction should be given more importance. It may be practically difficult but every effort should be made to achieve the best corrected visual acuity with appropriate glasses. Many times we come across children with high myopia, macular dystrophy, congenital nystagmus, microphthalmos, albinism, coloboma, cone dystrophies, and sometimes even optic atrophies showing significant improvement for both distance and near vision or sometimes with near vision alone. Apart from doing routine refraction, steps should be taken to ascertain the acceptance of simple low visual aids.

Often these children show very good improvement with telescopes. The improved visual acuity (telescopic) could even be 6/6. Near vision also can be improved in the same way with simple magnifiers. It needs a lot of motivation from parents, teachers and the children to use these devices later in childhood. Reluctance is always experienced particularly since most of these children are trained in the use of Braille.

The children who show minimal improvement or no improvement at all, even with low visual aids, are often those with uncorrected aphakia because of dense stimulus deprivation amblyopia.

The most important and significant pathology causing blindness which was untreated has been congenital cataract. In this category of children are those who have had no treatment or had treatment but were not followed up properly or ended up with complications. Under the 'Seeing 2000' programme sponsored by the International Eye Foundation, 245 children admitted into blind schools in the city were examined by us in 1998. The main objective was to identify children who could benefit by surgery. Of the 245 children, 16 were found to be blind due to unoperated cataracts in both eyes. Thirteen were uncorrected aphakics. Among the unoperated children with cataract, nine had surgery. The remaining seven did not have surgery mainly because of less motivation by their parents. The minimum vision gained by those who had surgery was CF and the maximum vision was 6/60 (Table 1). Among these, three had intraocular lens (IOL) implants. Most children had only cataract extraction, either extracapsular cataract extraction (ECCE) or lensectomy, depending on the nature of the cataract (partially absorbed or calcified). Nystagmus was present in almost all cases. The number of children showing improvement post-operatively even at this late stage of childhood is encouraging and justifies the undertaking of surgery after proper investigation. The visual improvement was less when the child had associated micro-cornea, microphthalmos or coloboma.

Surgery for congenital cataract
Photo: Clare Gilbert

Among the 13 children who had already had surgery but were uncorrected, only a few showed visual improvement with aphakic correction (Table 2). Only patient no. 12 showed significant improvement with a telescope. Others were either not co-operative or unable to 'fix' because of nystagmus. Most were densely amblyopic and the visual acuity ranged from CF to 6/60. This strongly supports the fact that bilateral childhood cataract in South India is a significant cause of childhood

Table 1: Children with Cataract Showing Visual Improvement after Surgical Intervention

No.	Age	Surgical Procedure	Pre-op. VA	Post-op. VA
1	14	ECCE	PL	2/60
2	14	ECCE	PL	3/60
3	8	ECCE + IOL	HM	CF
4	15	PCIOL	HM	6/60
5	6	Lensectomy	PL+	1/60
6	6	Lensectomy	PL+	2/60
7	12	ECCE + IOL	PL	1/60
8	9	Lensectomy	PL	1/60
9	9	Lensectomy	1/60	3/60

Table 2: Aphakic Children Showing Improvement with Correction

No.	VA (without correction)	VA (aphakic with correction)	NV	DV (telescope)	NV (hand magnifier)
1	1/60	1/60	-	-	-
2	2/60	2/60	-	-	-
3	2/60	2/60	-	-	-
4	CF	CF	-	-	-
5	CF	CF	-	-	-
6	2/60	2/60	-	-	-
7	1/60	5/60	-	-	-
8	1/60	5/60	N5	-	-
9	1/60	3/60	-	-	-
10	4/60	4/60	N12	-	N10
11	CF	CF	-	-	-
12	1/60	6/60	-	6/12	N12
13	1/60	4/60	-	-	-

Microcorneas and corneal scarring
Photo: Murray McGavin

blindness and accounts for 12% of admissions to blind schools.

One more condition which could be treated surgically is corneal opacity of late onset due to acquired pathology such as keratomalacia. Either keratoplasty or optical iridectomy before dense amblyopia develops is worth trying.

Conclusion

To conclude, we would like to emphasize that all the children who are likely to be admitted into blind schools should be thoroughly examined by an ophthalmologist. The eye specialist should have a background of working with children and a knowledge of amblyopia and the use of low visual aids. With this approach, and if simple low visual aids are introduced early in life, the quality of education and life can be significantly improved.

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Review article

Examination of a Child with Visual Loss

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Ophthalmic examination of a child with visual loss aims to confirm the impairment, establish the diagnosis, identify the treatment required and describe the prognosis for the disorder(s) causing visual loss. The examination by ophthalmic professionals is an important component of the broader assessment of visual function and educational needs of the child, which form the basis of the plan of management of that child and her/his family. The benefits of evaluation by a multi-disciplinary team, comprising ophthalmic and paediatric professionals together with educationalists and psychologists, are recognised.[1] Therefore, where the necessary resources exist, visual assessment teams are being increasingly established.

The ophthalmic examination of a child is essentially the same as that of an adult but with the techniques adapted according to the child's age, personality, ability to co-operate, and level of responsiveness. Any other non-ophthalmic disorders the child may have will also need be taken into account. Thus, the precise content and sequence of the components of the examination will vary from child to child. Most children can be successfully examined without anaesthesia or sedation, which are generally only necessary on clinical grounds.

Taking a History

It should be remembered that the mother of the child is the person who knows the child better than anyone, and if she suspects that her child may not be seeing normally then this should be taken very seriously. It is usually possible to assess the overall level of visual function through a detailed history, taken from the parents, and possibly from other relatives and teachers, as well as from the child, if appropriate. The interview also provides the first opportunity to assess the parents' response and adaptation to their child's visual problems and to establish a relationship between the family and the ophthalmic team.

Information on the age at onset, duration and level of visual loss should be sought. The presence or absence of specific symptoms and signs should be determined: these include eye-poking, photophobia, significant worsening of vision in dim or very bright light, or nystagmus. It is also important to enquire about any family history of ocular or systemic diseases. Questions should be asked about the mother's pregnancy, the birth, including gestation and birth weight, and the neonatal period. It should be established whether the child's general development is normal or whether there are concerns about hearing, speech, motor or learning abilities. Finally, as appropriate, it may be necessary to ask about specific aetiological agents, such as drugs, infections, nutritional deficiencies or trauma.

The Ophthalmic Examination

Observing the child

The clinical examination starts during the history taking, through assessment of the child's visual alertness and behaviour: for example, her reaction to changing the lighting, or if someone unknown approaches her. The child should also be observed for any external ocular

Matching test (Sheridan-Gardner) to measure visual acuity
Photo: David Taylor

Portable slit-lamp examination in Chile

Photo: Clare Gilbert

abnormalities, such as ptosis or nystagmus, as well as for other unusual features, such as abnormal head shape.

Testing visual fixation and following

The ability to fix and follow an object should be tested as well as whether fixation is central, steady and maintained.[2] This is particularly important in young infants and in older children with other disabilities who are unable to co-operate with formal tests of vision. However, it should be remembered that fixation and following require normal ocular motor responses and, even when normal, cannot be interpreted as indicating a particular level of vision.

Examining pupillary responses

Assessment of pupil size and their response to a bright light can be difficult, especially in infants, but should be carried out. Abnormal responses are important diagnostic clues. For example, a relative afferent pupillary defect indicates asymmetrical anterior visual pathway disease and a paradoxical pupillary response may suggest retinal disease.

Assessing eye movements and strabismus

The ocular motor system should be assessed by examining the corneal light reflexes, and by the cover-uncover test to detect strabismus. The range of ocular movements should also be tested, especially when a neurological disorder is suspected. Eye movements can be tested to ascertain whether the child can follow a moving object (smooth pursuit system), and whether they can refixate on an object introduced into the field of vision (saccadic eye movements). Children are naturally interested in faces, and the examiner can use her/his own face as the object of interest.

Examining the anterior segment

Wherever possible the cornea, iris, lens, anterior chamber and anterior vitreous should be examined using a slit-lamp. Young infants can be examined in this way if held up to the slit lamp in the prone 'flying baby' position or, alternatively, by using a hand held slit-lamp. If a slit-lamp is not available, examination is possible using a magnifying loupe and appropriate light source. The organisation, symmetry and clarity of the structures of the anterior segment should be carefully evaluated. The intraocular pressure should be measured when there are specific concerns, using methods appropriate to the child's age and level of cooperation. Pulse-air tonometry, if available, is generally more suitable for infants and young children but in older children, applanation tonometry is usually possible.

Examining the posterior segment

Examination of the fundus can be difficult and dilation of the pupils is essential. It is very important to examine the fundus of all children who have reduced vision, as loss of vision may be due to life threatening conditions, such as retinoblastoma. In young infants examination can be made easier if the child is held and fed by a parent while being examined. For older children it may be necessary to wrap the child in a blanket, and have an assistant hold the child's head steady during the examination, after explaining to the parents that the examination is not painful in any way. Wherever possible, direct and indirect ophthalmoscopes should be used. Indirect ophthalmoscopy, if possible using a 28+ or 30+ dioptre lens, provides a good view of the entire fundus whilst direct ophthalmoscopy allows more detailed examination of structures such as the optic disc and fovea.[2]

Refraction

As part of their initial ophthalmic examination, all children should be assessed by cycloplegic refraction for the presence of a refractive error, as this may be the cause of the visual impairment, as well as providing diagnostic clues.

Examining the family

Ophthalmic examination of the parents, siblings and other family members is important whenever the disorder causing visual loss is suspected to be hereditary, even if there is no previously established family history.

Measuring Visual Functions

Measuring visual functions in children is not straightforward. The visual system is relatively immature at birth and development, particularly rapid in the first year of life, continues into late childhood.[3] Therefore, it can be difficult to predict final visual outcome in infants and very young children, including some of those with apparently very poor vision.[4] Acuity is the most frequently measured visual function but others, such as visual fields and binocularity, may be particularly relevant to the overall functional assessment of the child.

Acuity

Despite the development of methods appropriate to different ages, measuring acuity remains difficult in infants, preschool children and those with other disabilities. In addition, many techniques require special equipment and conditions, making them unsuitable for some settings. Whichever method is used to measure a child's vision, it is important to assess vision corrected for any refractive errors, and to assess the eyes separately as well as together whenever possible.

The acuity of infants may be measured using forced choice preferential looking methods using Teller or Cardiff acuity cards, and by electro-physiological tests of visual evoked potentials. Both techniques are time-consuming, require special equipment and trained personnel, and are costly. Until recently these methods were generally only used in specialised paediatric ophthalmology units.[2] In co-operative children, aged 18– 24 months, it is possible to use picture optotype tests (such as Kays pictures) at very short distances. Standard optotype tests, such as the Snellen E chart, can generally only be used in children aged 3 years or above. It is important that testing is carried out at the appropriate distance, and, if possible, using linear optotype systems to ensure the effect of crowding is not overlooked in children with amblyopia.

The 'flying baby' position for slit-lamp examination

Photo: David Taylor

With some younger children and those unable to read, a matching test, involving matching letters on the distance chart with those on a card held at near, can be used.

Visual fields

Formal visual field testing is generally only possible in older children. However, useful information about significant visual field defects, such as hemianopia, can be obtained by testing visual fields using simple confrontation methods.[2]

Binocular vision

Assessment of the level of binocular vision is primarily important in children with strabismus. However, it can be a useful test in the assessment of a child suspected of having serious loss, as the presence of binocular vision implies good acuity in each eye. There are various clinical stereo-acuity tests, some of which can be used with young children.[3]

The Child with Very Poor Vision

When assessing a child thought to have very poor vision, methods which can detect very basic levels of visual function should be used. Examples include assessing whether a child responds in any way to a bright light; or if they respond to a visual threat, such as waving a hand fast in front of the face. In infants a useful test is the spinning test. In this test the child is held at arms length facing the examiner, who spins the child round several times. If, after stopping spinning, the eyes have prolonged nystagmus, this suggests that the child has very poor vision (or cerebellar disease).

All these tests need to be interpreted cautiously, as a normal response depends on motor function as well as visual function. If these tests of basic visual function are abnormal, electro-diagnostic tests (such as electro-retinograms or visual evoked responses) can be used to confirm whether an abnormality is present or not. If these facilities are not available it is advisable to say to the parents that you need to examine the child again in a few months' time, when the tests can be repeated.

What to Tell the Parents of a Child Thought to be Blind

It is advisable to be cautious about giving a definite visual prognosis to parents of young children who appear to be blind. As it is difficult to predict the final visual outcome in young children,[4] it is important to avoid judging the child's visual function too early in life. Whilst it is essential that parents are not given unrealistic expectations of their child's future vision, it is important to remember that some children with serious ocular disorders and apparently very poor vision, can achieve better than expected overall visual ability.

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Optical Services for Visually Impaired Children

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An estimated 1 in 250 children are visually impaired as a result of eye disease. Some of these children have nearly normal vision, some are totally blind, but the majority fall into a broad range between these two points. Children are said to have 'low vision' or 'partial sight' when they have: (a) a corrected visual acuity in the better eye of <6/18 to 'perception of light' (or a visual field of less than 10 degrees); and (b) the ability to use their residual vision to orientate themselves or to perform tasks.[1] They are identified at eye clinics, school screening programmes, community based rehabilitation (CBR) programmes or special schools for the visually impaired.

The education, employment prospects, independence and quality of life of a child with low vision can all be improved by enhancing vision. Optical devices (spectacles, magnifiers and telescopes) play a key role in achieving this. Studies carried out in East Africa,[2] South America[3] and West Africa[4] indicate that approximately half of children who have low vision show an improvement in distance and/or near visual acuity with the help of spectacles, a magnifier or both. The majority of magnifiers are prescribed for children who have a visual acuity in the better eye of <6/60 to 1/60.[3,4]

The Role of Optical Services in the Management of Children with Low Vision

The management of children with low vision requires co-operation between the child, his/her family and eye care educational and social personnel. There are five stages in the management of children with low vision (Fig. 1). Eye care personnel are primarily involved in the assessment and monitoring stages which include: visual acuity measurement (distance and near); eye examination, diagnosis and prognosis; surgical and/or medical treatment; and the provision of optical services.

Sight is a key source of stimulus during a child's development, and so children with low vision should be motivated to make the maximum use of their residual vision. This can be done using both non-optical and optical methods.

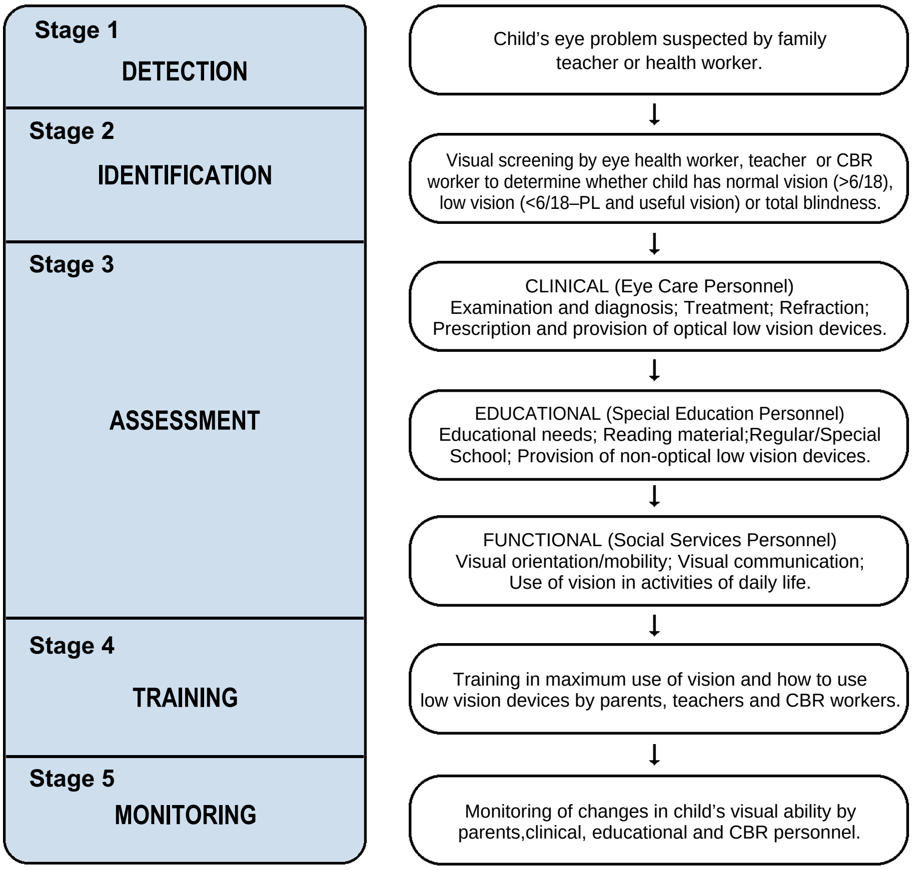
Enhancing Vision Using Non-Optical Methods

- Move CLOSER, e.g., use an angled reading desk
- Use COLOUR to show objects more clearly
- Use CONTRAST, e.g., eat white rice off a coloured plate
- Pay attention to LIGHTING, e.g., sit near a window in class
- Make objects LARGER, e.g., write with larger letters
- Use a LINE-GUIDE such as a ruler when reading and writing.

Accurate refraction and spectacle correction help many children with low vision

Photo: Murray McGavin

Fig. 1: Stages in the Management of Children with Low Vision



Aphakic spectacle corrections after congenital cataract surgery for two Romanian children

Photo: Clare Gilbert

Enhancing Vision Using Optical Devices

Optical devices play a key role in enhancing vision and reducing visual disability in children with low vision. They include: standard prescription spectacles; optical low vision devices for distance vision; and optical low vision devices for near vision.

(a) Standard prescription spectacles: It is important to ensure that children with low vision are refracted and provided with any spectacles they require. Work in West Africa indicates that at least 30% of children with low vision need spectacles.[4] Refraction should always be carried out before a magnification assessment.

(b) Optical low vision devices for distance vision: Distance vision magnification requires a telescopic lens system. Telescopes are expensive and have limited applications. It is often more practical for a child to sit near the front of class to see the backboard than to use a telscope.

(c) Optical low vision devices for near vision: An optical low vision device for near vision uses one or more lenses placed between the eye and an object to alter the retinal image size of the object. This makes the object larger and easier to see. The minimum dioptric power of a device used in this way is +4.00D. These devices are inexpensive and have a wide range of applications. They play a vital role in giving children with low vision access to print and illustrations in standard textbooks.

Prescribing Magnifiers for Near Vision

The **power** of magnifier prescribed for a child is determined by the child's visual requirements, recorded near visual acuity and measured working distance. They are prescribed, starting with low power magnifiers and then progressing to higher powers. The higher the power, the smaller the area of visual field seen through the magnifier. More words in a sentence can be viewed through a +10D magnifier than through a +20D magnifier. The power of the magnifier prescribed should be the maximum power which enables the child to perform the task required, but not above requirements so that maximum visual field is maintained. Moving the eye closer to the lens of a hand-held or stand magnifier also increases the field of view. In West Africa 71% of magnifiers prescribed were low power magnifiers (under +25D).[4] These were prescribed more frequently for those with a visual acuity of 3/60 or better. High power magnifiers (over +25D) were prescribed in 29% of cases and were mainly prescribed for those with a visual acuity of less than 3/60.

To determine the appropriate **type** of magnifier it is important to assess the child's personality, co-ordination, motivation and task aims. The same magnification can be provided using different mounting systems and working distances. Optical devices for near vision include: hand-held magnifiers (illuminated or non-illuminated); stand magnifiers (illuminated or non-illuminated); spectacle mounted magnifiers (e.g., high plus spectacle lenses, hyperocular lenses); and spectacle mounted telescopic units. The most widely available optical low vision devices for near vision are non-illuminated hand-held magnifiers, non-illuminated stand magnifiers, and high plus spectacle lenses. Advantages and disadvantages of these three types of magnifier are indicated in Table 1.

There are many benefits in providing magnifiers to children with low vision. The magnifiers encourage children to use their low vision to the full, thereby increasing visual stimulus and helping the children's development. The magnifiers promote literacy by increasing access to printed material for educational purposes and private reading. It is also more cost effective to provide children with optical devices enabling them to use standard books than to provide large print books which are expensive and heavy to carry.

There are some limitations in providing magnifiers. Using a magnifier may make a child's visual disability more noticeable causing the child to feel different from other children. The human and financial resources available to provide the magnifiers may be limited. The child needs to be taught carefully how to use the magnifier as the restricted field of view can prevent a child from perceiving the overall pattern of words or sentences on a page.

Supply of Magnifiers

Low power magnifiers can be made easily using locally available materials. An

Table 1 : Practical Differences Between Magnifiers

	Hand-Held Magnifiers	Stand Magnifiers	High Plus Spectacle Lenses
Uses	• reading • looking at pictures • writing • identifying money • inspecting small objects	• reading • looking at pictures	• reading • writing • looking at pictures • close range
Advantages	• easy to carry around • available from low to medium power • inexpensive to make • can be used at any position or angle	• has a fixed, stable working distance • easy to use • available in low, medium, or high power	• range of magnification • both hands free • readily available
Disadvantages	• difficult to keep appropriate distance • one hand occupied • difficult to hold steady	• one hand occupied • not useful for writing • bulky to carry around • need flat working surface	• exact reading distance important • heavy to wear

optical workshop in Nairobi, Kenya developed a design using mounts made from plastic drain-pipe tubing. These are now used world-wide as they are inexpensive (approx. $6 each) and robust. Hand-held and stand magnifiers can be made in a range of powers from +8D to +28D. Instructions for making these are available from Christoffel Blindenmission, Nibelungenstrasse 124, D-64625 Bensheim, Germany. Higher power magnifiers can be imported from Combined Optical Industries Limited (COIL), UK or Eschenbach, Germany. These are made from lightweight, plastic aspheric lenses and cost between $6 (low power hand-held magnifier) and $34 (high power stand magnifier). They range in power from +8D to +76D.

Using a stand magnifier for near vision
Photo: Lynne Ager

Case Studies

In West Africa, 291 students with low vision were identified at eye clinics, special schools for the visually impaired, integration programmes and CBR programmes during 1995/6. All received an initial visual assessment including distance and near visual acuity measure–ment, refraction, magnification assessment and a quantitative measure of their level of functional vision. The functional vision tests included orientation, activities of daily life, ability to recognise pictures and reading speed. A follow-up assessment was received by 139 students. At first assessment (128/291) of the students showed an increase in distance or near visual acuity with an optical device. Potential to read normal print (N10 or better), with or without the help of spectacles and/or a magnifier, was shown by 55% (159/291) of students. Those who benefited were provided with optical devices and all the children with low vision received non-optical low vision devices and educational support. At follow-up assessment six months later, 63% (88/139) of students with low vision showed a further improvement in their distance visual acuity, near visual acuity and/or their functional vision. In special schools for the visually impaired in Ghana, 46% of students with low vision showed an improvement in reading and/or writing at their follow-up assessment.

These figures indicate that correctly prescribed optical devices can be of significant benefit to the child with low vision and, therefore, the provision of optical services should be an integral part of any low vision service

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The Role of Integrated Education for Blind Children

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College of Education
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India

Why Integration?

Over the years, studies in child development, sociology, and special education have led enlightened educators to the conclusion that blind children grow, flourish, and achieve greater self and social fulfilment by being nurtured in the least restrictive environment. Through local education, supported by well prepared specialists in education of the blind, these children may enjoy everyday common experiences essential to the development of a keen awareness of the realities of the world around them. With proper technical assistance, consultation given to regular classroom teachers, and a broad educational environment, blind children are able to show their true worth; they are then more readily accepted socially by their sighted counterparts. Statistics reveal that not even 10% of blind children in most of the developing countries are receiving any kind of education, and therefore, integrated education is considered to be the only practical approach. It is the economically viable, psychologically superior, and socially acceptable model to bring all those unreached blind children into the mainstream of education.

Objectives of Integration

The true objectives of integrated education are to:

- Provide the same opportunities and educational experiences for blind children as those provided for sighted children
- Allow blind children – and their families, neighbours, and friends – to interact socially in normal situations
- Change the typical public response to blindness by demonstrating that blind children are children first and blind children next
- Provide a natural basis for adult life experiences so that blind students may take their proper places as contributing members in all sectors of society.

Integrated education is not simply placing a child in a regular classroom. The child needs assistance. Blind children can easily assimilate more than 80% of teaching and experience in the regular classroom if they are provided with **the correct material in the correct form at the correct time.** Therefore, development of the right educational environment will make integration of blind children a reality.

Factors Contributing to the Success of Integration

The major means of attaining successful integration are:

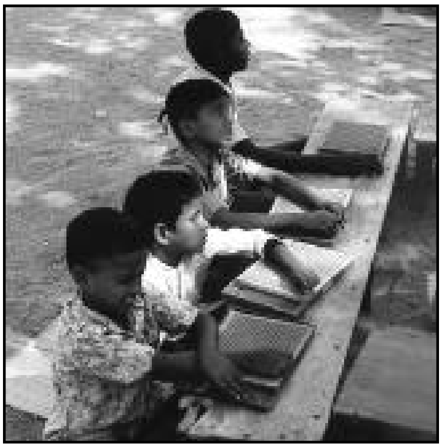
1 Provision of specialised teachers to serve as resource persons, to prepare special materials, as required, and to provide special instruction in those skills peculiar to blindness such as Braille reading and writing, use of reader services, auditory perceptual training and orientation and mobility.

2 Provision of all appropriate educational texts and selected aids and appliances. If textbooks are not available in Braille, substantial quantities of individually transcribed Braille materials may be required.

3 Provision of consultation for regular classroom teachers, school administrators, families, local health authorities and the general public on matters dealing with education of blind children, specialised training techniques and selection of appropriate materials.

4 Full use of local consultants, specialists and volunteers with special skills or those who are willing to be trained to assist in specialised ways, such as through reading services, or materials preparation including Braille transcription.

Children and teachers at work! *Photo: Lynne Ager*



Reading Braille *Photo: Clare Gilbert*

Curriculum in Integrated Schools

A curriculum for blind children is never less than the curriculum for sighted children; on the contrary it is more comprehensive. In addition, for every skill expectation of the sighted child, blind children must do more. Apart from academic subjects, integration becomes effective when the blind child is well trained in compensatory skills such as Braille reading methods, use of slate and stylus, use of audio equipment, development of visual perceptual activities, speed and accuracy in the use of the abacus, skills of daily living and orientation and mobility. In order to enable the blind child to follow the general curriculum without any difficulty, the resource teacher, in consultation with the regular teacher, can make changes in the presentation of materials, if necessary. There are four principles involved in the preparation of materials.

- **Duplication** is the most encouraged method of materials preparation
- **Modifications**, in terms of content, method of display, type of material used, and the response expectation from the child, are sometimes made
- Sometimes, there is no suitable way to modify materials and therefore an experience may have to be **Substituted** so that it closely approximates that presented to sighted counterparts

- Under unavoidable circumstances, a concept or a lesson may have to be **Omitted.**

Selection of an Appropriate Model of Integrated Education

In developing countries, awareness of integrated education is found among organisations working for blind persons and amongst professionals as well. There is a common consensus that integrated education should aim at normalising the life and education of the blind child but opinions vary to a great extent about how to realise the goal of integration. A minimum of ten models of integrated education are currently observed in developing countries.

Resource models with residential facilities are predominately found in many integrated programmes in developing countries but these are as costly as special school settings. The itinerant model, composite areas approach, and other contract specific cost-effective models have to be tried out to reach the currently unreached blind children in rural areas. **There are claims and counter-claims about the superiority of one model over the other. In this professional debate on models, the real impact of integrated education should not be lost.**

In deciding the cost-effective models of integrated education, three factors have to be considered.

- Number of blind children in a locality
- The nature of services required by blind children
- Expertise needed by a special teacher and general classroom teachers

More than 90% of blind children in developing countries are from rural areas, which are scattered. In a rural locality, it is difficult to find the required number of blind children for resource models. In such circumstances, the only cost-effective model would be an itinerant approach where one resource teacher can attend to the needs of more blind children in a cluster with the assistance of general classroom teachers. Research clearly indicates that resource models are academically superior to all other models of integration but duplication of resource models for mass implementation is not feasible. Now **inclusive education** is increasing in special education and general education itself is sensitised to take care of the educational needs of blind children.

Blind children require different kinds as well as different levels of service. Children who are at the primary level will require the direct assistance of a specialist teacher whereas children at higher levels depend more on regular classroom teachers provided they are given the necessary materials for learning in the regular classroom. **Therefore, selection of a model depends upon the nature of services needed by the blind children.**

The success of integration also depends upon the extent of assistance provided by the general classroom teachers. In integration, the general classroom teacher and the specialist teacher are 'two sides of the same coin' and, therefore, the general education system itself should equip the regular classroom teachers in pre-service programmes to cope with the needs of disabled children in general and blind children in particular. Hence, blind children can be served effectively by a good combination of specialists and general classroom teachers.

Role of Special Schools

Special schools should change their role by serving blind children who cannot benefit by integration. Blind children with additional disabilities require special school services and, therefore, special schools will continue to provide services. In fact, they can become resource centres in a locality to promote the cause of integrated education.

Conclusion

In countries like India where the numbers of blind children are staggering, integration emerges as the only alternative to reach the unreached. Services for blind children in the country are more than 100 years old but the coverage of blind children in education is not even 10%. This scenario will change with the speedy implementation of integrated education. ❑

Book Review

OCULAR INFECTION: Investigation and Treatment in Practice
Authors: D Seal, A Bron and J Hay

This really useful book comprehensively covers the field of ocular infections and is an important contribution to the prevention of blindness. Eight chapters cover general topics such as pathogenisis of infection, ocular immunology and pharmacology and epidemiology applicable to ocular infection, together with specific infections of ocular tissues and systems.

Professor Philip Thomas writes on tropical ophthalmomycoses. Chapter eight deals with hospital acquired infections, covering clinics, operating theatres, surgical prophylaxis and eye banking hygiene. Eight appendices contain very practical information on microbiological methods, formulations of antimicrobial agents and treatment regimens.

The authors are all experts of international renown in the field of ophthalmic infection and microbiology. The text is attractive, clearly laid-out and beautifully illustrated with diagrams and coloured plates. Recommended reading and references are also given.

This volume will become indispensable reading for those dealing with eye infections as it presents essential information on patient management in both temperate and tropical areas. It is a 'must' not only for ophthalmologists but also microbiologists, infectious disease physicians, pharmacists, ophthalmic nursing staff and all medical and nursing libraries. At £35.00 it is a bargain. Perhaps a handy, cheaper paperback version would improve availability for developing countries.

E D Wright PhD FRCPath

People and Eyes: Statistics in Ophthalmology

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In ophthalmic research we have a problem. The collection of data for a project usually involves examining and recording observations on eyes. People generally have two eyes and we often examine both. The problem then comes in the analysis.

- Do we include all our data and talk about eyes?
- Do we look at individuals?
- How should we deal with our data?
- Does it really matter?

Yes, it does matter!

There are a variety of ways people analyse their data. The method employed should depend on the question being asked, the data-collected and the nature of the condition being studied.

The Question Being Asked

Is the question relating to events or observations purely at an ocular level? For example, trauma or the effect of corneal opacity on the ability to diagnose cataract.

Does the question also include events or observations which relate to the individual? For example, diet, systemic disease (diabetes, hypertension, malaria) or social factors. These examples are obvious. A less obvious example of something that relates to the individual is the response of an optic disc to a given level of intraocular pressure. This may be affected by the connective tissue make-up and vascular system, both of which relate to individuals.

If the question is purely at an ocular level then there is no problem. Analyse your data using eyes.

If the question includes events or observations which relate to the individual then the method of analysis depends on the nature of the condition being studied.

The Data Collected

If information on only one eye per person has been collected then there is no problem; analyse your data using the eyes (which also represent individuals). If information on both eyes has been collected on everyone in the study, then you need to consider the nature of the condition being studied before analysis.

There is a big potential problem when it comes to data where information on one eye has been collected on some people and information on both eyes in other people. It is generally safer to analyse only the data of one eye per person in this situation.

The Nature of the Condition Being Studied

Some cases are obvious. If your study concerns visual disability then clearly the results from both eyes are needed to show how disabled the individual is and you analyse your data at the level of the individual. The same is true for squint.

The condition you are studying may hardly ever affect both eyes in an individual. An example of this is choroidal melanoma which occurs in only one eye in 99% of cases.Other examples are corneal herpes simplex infection in the immunocompetent, or severe ocular trauma (98% of cases). In these cases it is appropriate to analyse at the level of the individual.

At the other extreme are conditions such as blepharitis which almost always affects both eyes (proportion bilateral 95%). This means that whatever you find in the right eye is almost bound to be exactly the same as in the left eye (perfect correlation). The result of this is firstly that there is no point collecting data on both eyes. Why not save effort and just use one eye per individual? Certainly that is the way you should analyse your data!

The majority of ocular conditions lie between these two extremes.

If you know the intraocular pressure in the right eye of patient A then you can make an educated guess at the intraocular pressure in the left eye of patient A. You may not be correct because the IOP is not perfectly correlated between eyes but you have a reasonable chance of being correct. There is more chance of being correct than if you take the IOP in patient A's right eye and try to predict the IOP in the left eye of patient B!

Routine statistical analyses rely on all data points being independent of each other. This means that you cannot predict a second data point from the knowledge of the first data point. From the above this does not hold for IOP. Patient A's right eye and patient B's left eye are independent. Patient A's right eye and patient A's left eye are not independent.

Clearly a simple answer is to use the data of only one eye per person. This is sound and safe statistically but in many instances leads to a waste of data which may be important. The analysis of data is often aimed at estimates of effect or descriptions of distributions. These are expressed as figures with confidence intervals. The ideal would be to include the whole population and then the estimate will not be an estimate, it will be the real figure. Studies are done, however, on samples of populations. The bigger the sample the more accurate (precise) the estimate of effect and the tighter (smaller) the confidence intervals.

Forty eyes represent a bigger sample size than 20 people! To use only 20 eyes in the analysis is a waste. To use 40 eyes may give a falsely high degree of precision. Special techniques exist to make use of all the data that has been collected in these instances. These techniques, in this example, make the sample size between 20 and 40. The more correlated the results are between right and left eyes, the nearer the sample size gets to 20. The less correlated the results are between right and left eyes, the nearer the sample size gets to 40.

We recommend discussion with a statistician to help in both research planning and analysis of data.

GLOBAL INITIATIVE
The Economic Case

VISION 2020 THE RIGHT TO SIGHT

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In his introductory article in this Journal (Vol. 11, Issue No. 25) on the Global Initiative for the Elimination of Avoidable Blindness, Bj rn Thylefors, Director of the WHO Programme for the Prevention of Blindness and Deafness, drew attention to the huge burden imposed by blindness, particularly in developing countries. Not only are the numbers of blind and visually disabled increasing, their number could actually double by the year 2020 unless urgent action is taken. And the tragedy is that most of this is unnecessary – 80% of blindness is either preventable or curable. Efficient, effective and well-proven interventions are available to reduce dramatically this increasing threat. Equally important, although probably not so well known, is the fact that these interventions include some of the most cost effective available in the whole of the health sector. This needs to be given much greater emphasis if eye care services are to compete successfully for their fair share of health service budget.

The Economic Case

So what exactly is the economic case for investing in blindness prevention measures? Economic analysis in health projects is ultimately concerned with comparing the costs with the related benefits. Ideally this is done within the framework of formal **cost benefit analysis** whereby the costs and benefits associated with the project over time are identified, quantified and discounted.

This type of approach was adopted by the World Bank in assessing the economic impact of the African Programme for Onchocerciasis Control.[1] The Programme, which will eliminate onchocerciasis (river blindness) as a public health hazard in Africa, was shown to deliver an economic rate of return of 17%. This is an excellent return by any standards and is all the more impressive in that the study only took account of the reduction in onchocerciasis-related blindness and the associated increase of the productive labour force as the principal economic benefit. No account was taken of oncho-related skin morbidity, which other studies[2] have shown to impose a substantial burden on those infected and on society in general. Inclusion of these impacts would have demonstrated even higher economic benefits.

One of the limitations of using full cost benefit analysis in assessing health sector programmes is the difficulty in quantifying all associated costs and benefits. Some of the benefits of blindness prevention and cure can be reasonably measured, such as savings in medical care costs, rehabilitation and education costs and production gains from return to work. What is more problematic is quantifying and valuing the less easily defined benefits such as improvement in well-being. For this reason, another approach known as **cost utility analysis** is often used to assess the comparative impact of health interventions.

Disability Adjusted Life Years

This approach was promoted in the 1993 World Bank Development Report, *Investing in Health*,[3] and is based on a single measure of health status known as Disability Adjusted Life Years (DALYs). It is a combined indicator of the time lived with a disability and time lost due to premature mortality. It involves assigning weights to different health states and multiplying these by the number of years during which that state persists – it is thus both a qualitative and quantitative measure. When this measure is considered with the availability and costs of interventions, it leads to an assessment of their comparative cost-effectiveness, i.e., cost per DALY saved.

When applied to the leading causes of blindness this yields some extremely encouraging results. The cost utility of more than 50 specific health interventions were examined as part of World Bank research.[4] This showed cataract surgery to be one of the most cost-effective of all public health interventions. The cost per DALY saved ranged from US$15 to just over US$30, placing it in one of the lowest bands. More recent evidence from the Lumbini comprehensive blindness programme in Nepal dramatically confirms this, where the cost per DALY saved was only US$5.[5] This is an exceptional example of the cost-effectiveness of cataract interventions, and clearly local conditions will determine the precise cost of DALYs saved. Although it is a disease of advancing age in the majority of cases, its cost-effectiveness derives from characteristics such as speed of operation, the potential for high volume cataract surgery and the high success rate.

But it is not only the treatments of onchocerciasis and cataracts which are so clearly worthwhile in economic terms. Various studies[6] into the cost-effectiveness of interventions to reduce xerophthalmia, a major cause of childhood blindness, show comparable impacts. Thus, interventions based on measles immunisation, fortification of monosodium glutamate (MSG) with vitamin A and mass dosage with vitamin A capsules achieve costs per Daly saved in the range of US$2–US$29.

There is less available evidence on the cost-effectiveness/utility of traditional interventions for the treatment of trachoma, the leading cause of preventable blindness. However, one very detailed study[7] of the trachoma control programme in Myanmar using handicap-adjusted life years (HALYs) as the composite measure, rather than DALYs, demonstrated savings of US$3 to US$11 per HALY, based on marginal cost utility for non-surgical and surgical interventions respectively.

Conclusion

All this evidence shows that outstanding returns are available from interventions in the key eye disease areas that have been identified as priorities for action in the Global Initiative. Not only are effective

Table 1: Cost Benefit/Cost Utility of Eye Care Interventions

Eye Disease	Cost per DALY saved (US$)
Cataract	5–32
Childhood blindness (xerophthalmia)	
– Measles immunizaton	2–15
– Vitamin A capsules (mass doses)	9
– Fortification	29
Trachoma	3–11 (HALY)
Onchocerciasis	17% (Economic Rate of Return)

interventions available but they demonstrate tremendous cost benefit/cost utility when compared to other well-accepted health interventions.

It is vital that the economic case supporting the Global Initiative is widely disseminated to maximise resource mobilisation and ensure that blindness prevention programmes receive the priority they deserve in international health programmes.

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Benefits and Costs of Preventing, Treating and Controlling Blindness: A Preliminary Review and Annotated Bibliography
by Health Economist (WHO/ICEH)
Margaret Thomas.
Available via e-mail only from International Centre for Eye Health at
e.cartwright@ucl.ac.uk

Readership Survey – Prize Draw Winner

Congratulations to our winner,

Nurse C A Puka, Tanzania.

Our thanks to all who responded to the questionnaire.

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Details are available from the Examinations Office, The Royal College of Ophthalmologists, 17 Cornwall Terrace, London NW1 4QW.

Abstract

The Prevalence of Glaucoma in the Melbourne Visual Impairment Project

Matthew D Wensor
Cathy A McCarty
Yury L Stanislavsky
Patricia M Livingston
Hugh R Taylor

Purpose: The purpose of the study was to determine the prevalence of glaucoma in Melbourne, Australia.

Methods: All subjects were participants in the Melbourne Visual Impairment Project (Melbourne VIP), a population-based prevalence study of eye disease that included residential and nursing home populations. Each participant underwent a standardised eye examination, which included a Humphrey visual field test, tonometry, fundus examination including fundal photographs, and a medical history interview. Glaucoma status was determined by a masked assessment and consensus adjudication of visual fields, optic disc photographs, intraocular pressure and glaucoma history.

Results: A total of 3271 persons (83% response rate) participated in the residential Melbourne VIP. The overall prevalence rate of definite primary open-angle glaucoma in the residential population was 1.7% (95% confidence limits = 1.21, 2.21). Of these, 50% had not been diagnosed previously. Only two persons (0.1%) had primary angle-closure glaucoma and six persons (0.2%) had secondary glaucoma. The prevalence of glaucoma increased steadily with age from 0.1% at ages 40 to 49 years to 9.7% in persons aged 80 to 89 years. There was no relationship with gender. The authors examined 403 (90.2% response rate) nursing home residents. The age standardised rate for this component was 2.36% (95% confidence limits = 0, 4.88).

Conclusions: The rate of glaucoma in Melbourne rises significantly with age. With only half of patients being diagnosed, glaucoma is a major eye health problem and will become increasingly important as the population ages.

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Ophthalmology 1998; **105**: 733-9

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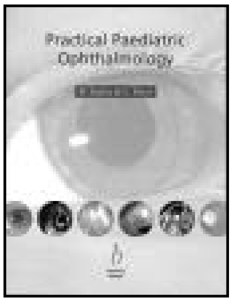
Book Review

Practical Paediatric Ophthalmology

D Taylor and C Hoyt



Published 1997 by Blackwell Science Ltd
Osney Mead, Oxford OX2 0EL, UK
£39.50

David Taylor and Creig Hoyt have produced an excellent, compact book in 232 pages. There are many superb colour photographs and illustrations. The text itself is ordered and practical with liberal use of bullet points together with boxed information lists such as ‘The red eye in infancy’, ‘Differential diagnosis of leucocoria’ and ‘Eye abnormalities and deafness’.

There are no references – to keep the book a handy size. (The much larger referenced text is David Taylor’s *Paediatric Ophthalmology*, 2nd edition, Blackwell Science 1997).

From the viewpoint of ophthalmology in developing countries, readers of the Journal of Community Eye Health will need more in depth information regarding vitamin A deficiency and the eye than given here (perhaps in a future edition?). Strabismus is dealt with in more detail in the ‘twin’ book *Practical Strabismus Management* by Vivian & Morris, Blackwell Science 1997.

Paediatric eye problems such as genetically inherited disorders, infectious diseases, cataract, glaucoma, trachoma, tumours, neurological abnormalities, etc., are comprehensively, but concisely covered.

Designed for general ophthalmologists, paediatricians and those health workers routinely faced with eye problems in childhood, I would have appreciated having this book in my library many years ago, especially when teaching in a developing country.

D D Murray McGavin
MD FRCS (Ed) FRCOphth DCH

COMMUNITY EYE HEALTH

COUNTRY INDEX
ISSUES 1 – 24

Compiled by Sue Stevens

An index of countries and subjects covered in Issues 1-24 is being published to mark the 10th anniversary of the Journal. For reasons of space, the country index is published first. The larger, subject index will appear in the next issue.

KEY TO INDEX

A ABSTRACT / RESEARCH
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S SURGICAL ARTICLE

In 1993, volume numbers were introduced with Issue 11 (first issue of Vol.6).

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	N		4	10
	N	6	11	15
Paraguay	N	10	22	24
Peru	A		1	12
Rwanda	N	8	15	13
	A		2	8
Saudi Arabia	A		1	9
Senegal	S	10	21	10
Sierra Leone	A	10	22	31
	L	7	13	16
	A		10	13
	A		4	7
South Africa	A	9	18	32
	N		2	7
	A		4	6
Sudan	A	7	13	12
	N	6	11	7
Tanzania	L	9	20	62
	A		1	8
	A		5	7
	A		5	9
	A		9	7
	A		10	13
	A	6	11	6
Thailand	A		4	11
Togo	N	10	22	32
Turkey	N	7	13	2
Uganda	N		8	10
	N		10	8
USA	A	7	13	12
	A		5	6
Zimbabwe	N	10	21	3
	L	6	12	32
	A		3	10
	N		3	11
	N		9	9
	N		10	6

Journal of Community Eye Health 10th Anniversary: 1988–1998

The Journal of Community Eye Health is 10 years old! After working in a developing country, my vision was for a Journal which would bring health workers relevant, up-to-date information on ophthalmic clinical practice, research, personal successes and learning experiences, as well as views and comments. Funding was secured by Professor Gordon Johnson, Director, International Centre for Eye Health from Christoffel Blindenmission and Sight Savers International. Today, both organisations continue their generous support to the International Resource Centre.

During the last 10 years there has been encouraging support from a variety of organisations, including HelpAge International, The Coca-Cola Company, The Stanley Thomas Johnson Foundation, The Ulverscroft Foundation, The International Glaucoma Association and the Department for International Development (UK). We thank them, and the many sponsors of individual issues whose support towards publication costs is vital to the Journal's success.

The circulation is 15,000 to 160 countries, and rising. In 1994, in co-operation with colleagues in India, and supported by the Danish Assistance to the National Programme for Control of Blindness (DANPCB), an Indian edition was published with a 4-page supplement. This has been a success, with our circulation rising in India alone from 2,000 to over 7,000! We pay tribute to our colleagues in India and express real gratitude to DANPCB for their support.

We have experienced many encouragements, and, very occasionally, some difficulties! One concern for the Editor is that accumulated articles are waiting for review and possible publication. My apologies to those who have sent articles to us and are awaiting the outcome. Since we began our thematic approach we have had less space for many good papers. But we still want to receive contributions! We list below the themes that will be covered in 1999 and invite you to send us short reports (5–600 words), comments and letters on relevant topics that contribute to improving practice (publication guidelines are available on request).

Sue Stevens *Photo: Murray McGavin*

Journal Survey

In recent months a review of the Journal has been carried out by an independent consultant. Our thanks to the many readers who responded to the questionnaire. The responses tell us that a single issue of the Journal is shared, on average, by 5–8 people. Over 90% of you have a teaching role and for 40%, teaching is a 'major' part of your work. More than 90% endorse our theme approach and 60% have advised us of ways in which the Journal has influenced or changed their practice. Significantly, 60% have no access to other literature to keep them informed of current practice and opinion.

While many who read the Journal are ophthalmologists (30%), we are encouraged that 70% are in allied professions involved in eye care services. Our aim is to reach a broad spectrum of health workers, and the survey's breakdown of colleagues receiving the Journal includes doctors (19%), ophthalmic nurses (12%), general nurses (9%), ophthalmic assistants (8%), medical assistants (7%), optometrists/refractionists (5%), community health care workers (4%) and others, such as administrators and librarians (6%).

We do want individual health workers to have their own copy. To receive your own copy or to add a colleague's name to our mailing list, please send us a note of your name, occupation and address.

Future Plans

Your feedback has helped us to plan for 1999 and beyond, as follows:

- Continue to publish 4 issues of the Journal each year. In 1999 the four topics will be:
  - *Ageing and the Eye*
  - *The Red Eye; Conjunctivitis and Corneal Ulcer*
  - *Community Participation*
  - *Assessment of Vision*

Murray McGavin *Photo: Ruth McGavin*

- Begin a pull-out section on Teaching Eye Health in mid-1999
- Increase the number of colour pages from the present 4 to 8 in 1999 and then to 12 in 2001
- Increase efforts to make the Journal available in regional and translated editions
- Publish a Global Prevention of Blindness Review of selected Journal articles in English in 1999 and in other languages in future years.

The team at the International Resource Centre (see photos) is supported in its work by the Editorial Review Committee (see page 34) which meets quarterly, our team of Consulting Editors and Language & Communication Consultant (also see page 34), and an Editorial Planning Committee which meets annually. Many others have contributed during the evolving years of the Journal. These include Dr John D C Anderson, Ms Keren Fisher, Mr Pak Sang Lee, Mrs Sybil Lee, Dr Hans Limburg, Mr Hugh Lugg, Dr Sajabi Masinde, Professor Erasmus Oji, Dr Roger Sidestam, Ms Sarah Stubbs and Ms Faith Wakeford.

As Editor, during these years, I express my deep appreciation to these colleagues and friends, and to all who have written for us, whether their articles, comments and letters have been published or have yet to be included. Each one has contributed to the effective impact of this publication which, we believe, has a unique role in the prevention of blindness and community eye health.

D D Murray McGavin
Editor

Anita Shah & Ann Naughton *Photo: Sue Stevens*