53981

DISTR.: LIMITED
WHO/PBL/93.27
ORIGINAL: ENGLISH

F: 53841

MANAGEMENT OF LOW VISION IN CHILDREN

Report of a
WHO Consultation

Bangkok, 23-24 July 1992

Hosted by the International Council for
Education of the Visually Handicapped

WORLD HEALTH ORGANIZATION
PROGRAMME FOR THE PREVENTION OF BLINDNESS

Acknowledgements

This document is based on working papers received from the following authors, who are gratefully acknowledged:

Ms E. K. Chapman
Dr A. Corn
Dr C. Gilbert
Dr L. Hyvärinen
Dr J. Keeffe
Dr K. Konyama
Dr M. N. G. Mani
Ms J. Silver
Professor Sun Bao-Chen
Professor G. R. Watson
Dr S. Veitzman
Ms A. Yeadon

Thanks are also due to Mr A. Best, who, in his capacity of Rapporteur in the meeting, has greatly contributed to the editing of this document.

This document is not issued to the general public,
and all rights are reserved by the World Health Organization (WHO).
The document may not be reviewed, abstracted, quoted, reproduced
or translated, in part or in whole, without the prior written permission of WHO.
No part of this document may be stored in a retrieval system
or transmitted in any form or by any means - electronic, mechanical
or other - without the prior written permission of WHO.
The views expressed in documents by named authors
are solely the responsibility of those authors.

CONTENTS

Page

FOREWORD 1

EXECUTIVE SUMMARY 1

1. MAGNITUDE OF THE PROBLEM OF LOW VISION, AND ITS SPECIFIC CAUSES 5

2. SOCIAL AND ENVIRONMENTAL ASPECTS OF LOW VISION 8

3. EDUCATIONAL IMPLICATIONS 11

4. CURRENT STATUS OF LOW VISION CARE 15

5. IDENTIFICATION OF CASES OF LOW VISION 20

6. ASSESSMENT OF LOW VISION IN CHILDREN 24

7. STRATEGIES FOR THE ENHANCEMENT OF LOW VISION USE IN CHILDREN 28

8. HUMAN RESOURCES FOR LOW VISION CARE 35

ANNEX 1. LIST OF PARTICIPANTS 39

ANNEX 2. SELECTED INSTRUCTIONAL RESOURCES 41

ANNEX 3. LIST OF ESSENTIAL EQUIPMENT FOR LOW VISION CARE 43

ANNEX 4. EXAMPLES OF LOW VISION CARE UNDERTAKEN BY NONGOVERNMENTAL ORGANIZATIONS 44

FOREWORD

In 1981, the World Health Organization (WHO) held its first meeting on the "Use of Residual Vision". That meeting produced recommendations on definitions, practice and services. Since then there have been a number of developments. New resource materials have been produced for training, there is an increase in the manufacture of low vision devices, more countries now have low vision centres, statistics are a little more accurate and there is increasing acceptance of a behavioural/functional rather than a medical basis for the concept of low vision.

In 1991, the WHO Programme Advisory Group on the Prevention of Blindness, at its ninth meeting in Banjul, Republic of the Gambia, recommended that focus should be given on children with low vision to facilitate their development and education. It was felt that improved data on the needs and numbers were needed, as well as a new definition of low vision, based on functional vision.

This report summarizes some outstanding working papers presented, by invitation, at a WHO consultation in July 1992, hosted in Bangkok, Thailand, by the International Council for Education of the Visually Handicapped. The meeting format was based on discussion following a summary outline of each paper. In order to convey the essence of the evidence, arguments and decisions, all this information has been arranged into a number of sections. Each summarizes one major theme of the meeting and highlights suggestions for good practice.

This report brings together much of the current thinking in this field, which is newly emerging, and considerably more is known than has yet been written down. A purpose of this report is to encourage action to strengthen low vision services and practice, by providing the information needed to make decisions. It is now the responsibility of the reader to use this information. The beneficiaries are those children who cannot overcome the challenges of their visual impairment without the additional help that can be provided.

EXECUTIVE SUMMARY

A majority of children with visual impairments have some vision and, even among children in special schools for the blind, up to 20% have vision that could be used in daily activities. However, children are rarely encouraged to develop the use of that vision and its existence is often ignored by medical and educational staff. The challenge for the meeting was to identify ways to enable children to benefit from their remaining vision through the provision of appropriate services, materials and devices.

Papers presented at the meeting formed a focus for group discussion and these papers and discussions are summarized in the following paragraphs.

Implications of low vision

Children with low vision have special needs specific to their use of vision. For example, it may restrict the children's life experience, speed of working, motor development and orientation, and skill in practical subjects. It may affect the child's education as well as social and emotional development. It is now clearly understood that many children can learn at school on the basis of visual as well as tactile information. Children with low vision need not, and should not, be educated as if they were totally blind. However, there is often a need to develop the efficient use of low vision through an instructional programme of visual stimulation and utilization.

Current status of low vision care

A lack of understanding of the nature and implications of low vision seems to be at the centre of difficulties in the identification and assessment of the children. In many developed countries, hospital staff are trained to look for abnormalities at birth and there are systems for the presentation of young children for regular health screening and special registers for high-risk groups (e.g. those with a positive family history, or with a syndrome known to have ocular features).

In developing countries, the systems for presentation and detection are often less well developed. In part, this is because treatment facilities are not available and therefore identification is not considered a priority as it could not lead to any action. Other reasons for non-detection include low levels of health education amongst all those involved in home births, and a shortage of vision screening programmes for those who attend schools (who may be only a proportion of children). Even those with obvious visual problems who attend schools for the blind may not receive a medical examination and, with an educational philosophy of using braille, this results in some children not being treated nor encouraged to use low vision.

Once a child has been identified as having a visual loss, assessment of visual function is required. Not all visual functions are affected to the same degree in people with low vision - for example, near vision is commonly better than distance visual acuity would suggest. Therefore assessment must include near and distance acuities as well as functional vision - the use of vision in common tasks.

Enhancement of the use of vision

Use of vision can often be improved through the use of an instructional programme. Research literature on the effectiveness of some of these programmes is now well established and their use with children is accepted as a central tenet of many educational programmes. Some materials have been adapted and developed to ensure that culturally appropriate activities are available for children in parts of Africa, India and South-East Asia. The availability of this material needs attention as does the training of staff to use it.

Enhancement of low vision also involves the use of supportive devices such as low vision devices. The majority of these devices are lenses which magnify images, but included in this group are non-optical devices such as light absorptive lenses, bold line pens and paper, variable lighting, enlarged print, video tapes and microcomputers.

Supportive devices and technologies will need to be carefully matched to the needs of an individual child and the client will usually need a period of training to acquire the skills necessary to use and care for the device.

The price of these devices to customers varies throughout the world although cost does not seem to be a major barrier to the increase in their use. It is a lack of assessment of children which is holding up progress and therefore needs urgent attention. Production of optical devices has been started in some developing countries and agencies are monitoring product quality and costs to establish if this could become a useful source of devices.

Recommendations

A number of recommendations were made by the meeting.

Definition*

Great importance is attached to the need for a clear statement which explains the nature of low vision. Existing International Classification of Diseases categories for visual impairment are based solely on distance visual acuity. People with low vision will come within categories 1-4 (from near total blindness to an acuity of less than 6/18), will use visually acquired information and will have special needs specific to their use of vision. However, under some circumstances, their needs will coincide with those of totally blind people and then they may use touch and hearing rather than vision. To describe this rather complex set of possibilities, a definition with explanatory notes was created and agreed.

> **A person with low vision is one who has impairment of visual functioning even after treatment and/or standard refractive correction, and has a visual acuity of less than 6/18 to light perception, or a visual field of less than 10° from the point of fixation, but who uses, or is potentially able to use, vision for the planning and/or execution of a task.**

*** Explanatory notes**

(1) This working definition is solely designed for reporting purposes and SHOULD NOT be used for eligibility for services.

(2) The visual criteria included in the definition coincide with the International Classification of Diseases. Note that these refer to acuity in the better eye with correction.

(3) In addition to the criteria included in the working definition, other impairments of visual functioning, such as low contrast sensitivity and loss of dark adaptation, should be included when they are equally disabling.

(4) Individuals with an abnormality of the visual system, who are unable to respond on tests using symbols to measure visual acuity but who respond to visual stimuli, should be included in the classification. Where there is doubt about the presence of an abnormality of the visual system, as may occur with those who have multiple impairments, it is preferable to include the individual in the classification.

Other recommendations

Recommendations for the **identification** of children with low vision included the medical examination of children in schools for the blind and an expansion of school vision screening. The use of procedures to assess functional vision is recommended as part of the assessment of all children with a visual loss. Children with low vision need support to access the school curriculum and this involves attention to the visual environment and to equipment, teaching strategies and a specialist curriculum. The development of low vision centres is advocated. A basic low vision centre comprising an ophthalmologist plus a special education teacher should take care of some 10 cases/day, and one centre per 5 million population is probably needed. Creating awareness and human resource development had the highest priority over all the other recommendations. It included changing attitudes as well as the development of technical skills and applied to all levels of society - policy makers, general public, parents, teachers and health workers, specialist teachers of the blind and ophthalmologists.

1. MAGNITUDE OF THE PROBLEM OF LOW VISION, AND ITS SPECIFIC CAUSES

Low vision in children is defined (International Classification of Diseases [ICD], Ninth Revision) as an individual under 16 years of age with corrected visual acuity in the better eye of less than 6/18 (0.3), but with equal to or better than 3/60 (0.05). Children of this category require special care in their education, and continuing eye care as well in order to prevent further deterioration of their vision.

The above definition of low vision is based solely on visual acuity. However, low vision is a functional state rather than a numeral expression of visual acuity. The Ninth Meeting of the WHO Programme Advisory Group on the Prevention of Blindness, 1991, concluded that there should be a new definition of low vision with special attention regarding:

- usefulness of residual vision; and

- importance of testing near vision.

Children with low vision are in a difficult position from a socioeconomic point of view as they are not blind enough to be entitled to rehabilitation and social services, but not well-sighted enough either to live a life with normal visual functions. This is why national programmes concerned with blindness should include new services for this group.

The prevalence of low vision among children is only partially known, which may lead to the magnitude of the problem being underestimated. This is due to the following reasons:

(i) Registration data, even in developed countries, are often incomplete.

(ii) Population-based surveys of the blind in developing countries usually do not allow for detailed information regarding children with visual impairment, especially the low vision group, because of the need for special examination techniques.

(iii) In general, surveys of the disabled in developing countries often underestimate the prevalence, as socioeconomic and other factors hamper the attendance of disabled people.

(iv) Students in schools for the blind in developing countries do not represent the whole population; often they are from selected wealthy families and only the urban society. In many countries, significant numbers of children attend regular schools.

(v) Certain conditions resulting in visual impairment are associated with high mortality.

(vi) Children with multiple handicaps, including visual disability, are often not registered as blind - at least not until they are much older.

(vii) Children with low vision may be misdiagnosed when other behaviour or disabilities are the focus of professionals' attention.

Numerically, it is recognized by experts working in the field that children represent a small proportion of the total number of people with low vision. In developed countries, where some form of registration is readily available, under 5% of the visually disabled population are infants or of educational age. Recent large community studies in the United Kingdom tend to confirm this (Royal National Institute for the Blind [RNIB] Needs Survey 1991). It is also generally agreed that visual impairment is more likely to attract attention in a child than in an elderly person. It is the elderly who form the vast majority of the visually impaired with 75% being over retirement age. However, if the statistics are viewed in terms of "patient years", a five-year-old may well expect to live for 75 years with the disability, a person of employable age perhaps 30 years, and a 70-year-old perhaps 10, making a considerable difference to those statistics. Seen from this perspective, children account for some 20% of the "population" in terms of "years of visual impairment".

In the United Kingdom, one person in 60 has a significant visual impairment and would fall within the category of registerable as "blind or partially sighted", i.e., distance vision is less than 6/24. If this prevalence holds true for the rest of Europe, which is a reasonable assumption, then in Western Europe, with a population of some 250 million, it can be assumed that there are over 200 000 visually impaired children.

From the above, it can be estimated that globally the total number of children with low vision will be at least one million, at a very conservative level.

The major causes of low vision in children in developed countries are genetically determined, congenital or perinatal. In some communities and groups, genetic counselling and amniocentesis may be restricted for social or religious reasons. But where such facilities are available, the impairments associated with such conditions as spina bifida, Marfan's syndrome, or maternal rubella during the first trimester of pregnancy, will become much rarer. The implications of various recent breakthroughs in basic genetics are yet to be fully explored, but the possibility exists in the foreseeable future for considerable reduction of the group of disorders affecting the pigment epithelial layer of the retina through genetic engineering.

The extent and pattern of low vision in developing countries is not reliably known. The important causes of low vision in children in developing countries are infective and nutritional factors such as measles, xerophthalmia, etc. In addition, congenital cataract and glaucoma also occur. In communities where consanguineous marriages are common, genetically determined diseases may be a contributory cause.

Great strides have been made in the management of congenital cataract, and it is reasonable to assume that the improvements will continue, reducing the handicap caused by this disorder. Optic atrophy, sometimes idiopathic, is more often secondary to a primary disorder such as meningitis or hydrocephalus. Again, it is to be expected that improved management of the primary disorder will result in a reduction in the incidence and severity of any consequent visual impairment.

With the pathogenesis of retinopathy of prematurity now better understood, this disorder is seen less frequently than in the past; but albinism, macular disease, retinitis pigmentosa, buphthalmus, aniridia, retinoblastoma, high myopia and cortical visual impairment all make an important contribution to the statistics.

The presence of disorders causing multiple disability cannot be ignored. Rubella still occurs in significant numbers, often causing also deafness and sometimes heart disease, etc.

Among other preventable causes of low vision is amblyopia; neglected strabismus in a small child does not normally cause a severe handicap but, tragically, children are seen where some disaster affecting the good eye leaves the amblyopic eye as the only source of visually acquired information.

Summary of discussion

The purpose of the current WHO definition of visual impairment is to have a common denominator for reporting. It was agreed that a criterion, or a working definition, was needed for several purposes, e.g. planning, service delivery, resource allocation.

There are currently many different medical definitions of blindness and low vision in different countries, but it was noted that there was little relationship between these definitions and practical functioning, educational placement or medium of instruction.

The general experience was that the majority of children identified have some useful vision, and this applied to 70-80% of those classified as blind. There is clear evidence that a significant number of children are not identified in many countries. The population includes those congenitally impaired and those who acquire visual impairments. There is also an increased mortality rate amongst the children, due to the primary cause of their condition, as well as vulnerability to health hazards.

It was agreed that a definition based solely on visual acuity was not appropriate, and there is a need for one stated in functional terms. It was, in any event, difficult to accurately assess visual acuity in children below the age of four years. A definition should be based on what a person can do, and it should consider performance at a number of tasks, and certainly not be confined to literacy and sustained near vision.

Within the ICD classification of visual impairment is a group of people within categories 1-4 who use visually acquired information and who have special needs specific to their use of vision.

People with low vision may have special needs for programmes, devices, materials and services specific to the use of vision. However, under some circumstances, their needs will coincide with those of totally blind people.

The following working definition of low vision, for the purpose of the present meeting, was agreed upon.

A person with low vision is one who has impairment of visual functioning even after treatment and/or standard refractive correction, and has a visual acuity of less than 6/18 to light perception, or a visual field of less than 10° from the point of fixation, but who uses, or is potentially able to use, vision for the planning and/or execution of a task.

Explanatory notes

(1) This working definition is solely designed for reporting purposes, and SHOULD NOT be used for eligibility for services.

(2) The visual criteria included in the definition coincide with the International Classification of Diseases. Note that these refer to acuity in the better eye with correction.

(3) In addition to the criteria included in the working definition, other impairments of visual functioning, such as low contrast sensitivity and loss of dark adaptation, should be included when they are equally disabling.

(4) Individuals with an abnormality of the visual system, who are unable to respond on tests using symbols to measure visual acuity but who respond to visual stimuli, should be included in the classification. Where there is doubt about the presence of an abnormality of the visual system, as may occur with those who have multiple impairments, it is preferable to include the individual in the classification.

2. SOCIAL AND ENVIRONMENTAL ASPECTS OF LOW VISION

Visual impairment in general affects four main functional areas:

- orientation/mobility
- communication
- activities of daily life (ADL) and
- sustained near vision tasks.

The effect on these four main areas varies depending on the type of impairment and its degree and whether there are additional impairments. The development of skills in these areas is also affected by the social environment and culture in which the child lives. In children there is a particularly important aspect, the development of functions and relations, where visual impairment may play a major role. Since early intervention and special education can balance the negative effects of visual impairment in many cases, it is worth while to consider this in planning the habilitation programmes and educational support.

2.1 Social aspects

2.1.1 The first year of life

Congenital visual impairment often causes inability to develop eye contact which is important in the early bonding between the parents and the child. The parents need support in order to develop auditory and tactile communication and to understand the behaviour of their infant. Otherwise an intensively listening, quiet infant may be taken as unresponsive and inactive.

Inactivity because of reduced visual stimulation is a common problem, particularly amongst blind children. This leads, in some cases, to self-stimulation that becomes a disturbing mannerism which may later be socially more handicapping than the visual impairment itself.

Motor development may be delayed if physical therapy is not started early. Motor delay makes the child function like a younger child and increases the risk of overprotection that is common in the families of visually impaired children.

2.1.2 Pre-school years

Visual communication (i.e., non-verbal) among sighted peers may be difficult to understand since many clues are so subtle that even normally sighted adults do not always notice them. For this reason, interaction between sighted and other, visually impaired, children can sometimes be more successful if there is an adult "interpreter" available in play situations.

Mild visual impairment is often not diagnosed in infancy and the child is thought to be clumsy and inattentive when he does not have normal visual information.

Loss of information related to the world around is a rule until the child learns to use vision efficiently and to use optical devices. There may be restrictions because the child may not know what to look for. Much of the printed material may be out of reach for visual learning. For example, a child may "recognize" pictures but by memorizing where there are different coloured dots on the page and not having proper visible details.

Getting accustomed to play in a large group of children may be problematic to blind and near-blind children who, with restricted visual information, have to depend heavily on auditory cues in an environment where many children are talking and making noises. Much play is highly visual and therefore the blind and near-blind child may be left out.

2.1.3 School age

The social environment of the visually impaired child varies a lot depending on whether the child is in a residential school for visually impaired children or integrated in a local school.

Basically, the problems of those in residential schools are related to growing up in an environment specially designed to meet the needs of their impairment; this same fact is also a positive factor. The separation from the family is often a social problem, especially in adolescence.

In the local school there may be restricted knowledge concerning the disability and limited special teaching materials and techniques, and thus the child cannot learn at optimal level.

Physical education is a common area of social problems because group activities are not modified to allow the blind or near-blind child to participate. The child may receive individual instruction, e.g. mobility exercises, but that effectively decreases contact with his peers.

In countries that have a system of resource centres, children who go to the local school may lose important school days while participating in the activities at the resource centres where they have supportive teaching periods and grade meetings. At the same time these gatherings of visually impaired children of the same age are very important for the experience of not being alone with the impairment.

Denial of the impairment and disability by parents is still quite common, if the impairment is thought to be so mild that it can be hidden. In some cases the family insists on not talking about the subject when everyone but the child himself knows that there must be something wrong with his vision. This may prevent teaching of the special curriculum at the proper age level as well as resulting in adjustment difficulties for the child.

Relationships between siblings may become problematic at any time but often in puberty. There may be too little time for other children or much less money or interest than for the impaired child. In other families the impaired child brings the family members closer together.

2.2 Environmental aspects

The concept of visual space is naturally difficult to develop in cases of severe visual impairment. For example, to some visually impaired people a square room may appear round if the contrast of corners is too low to be seen. Such a simple arrangement as placing lamps in the four corners makes the room look square to the visually impaired.

Normally sighted children use plenty of tactile experiences in learning about space. This type of play is even more important for the visually impaired child, thus special education should be available as early as possible and preferably from the first year of life.

Spatial concepts are needed for orientation. Orientation exercises can be started on special play mats and by arranging the child's play area.

Contrasts are more important to a visually impaired than to a sighted person. The arrangement of the home environment and that of a day care centre requires special knowledge in illumination and low vision.

Safety becomes a problem when the child moves outside the home or the day care yard. It is also a problem in schools where the visual environment may be confusing to a child with low vision and the auditory environment is certainly a problem to both the blind child and the child with low vision combined with even a minor loss of hearing. Changes in the school environment are often more difficult to make than in the day care centres because children move from one classroom to another and thus changes would be needed in a number of rooms which would be costly.

In several countries, there are laws related to accessibility of buildings by persons with motor handicaps. Similar requirements should be developed in terms of visual impairments. However, one difficulty is that blind persons' needs are not the same as those of a person with low vision, and often conflict with the needs of people with other disabilities.

Summary of discussion

Environmental aspects: Much interest has been expressed in this and there is now a wealth of resources to help those who want to consider design of the environment. The barrier to development is the lack of resources to apply the principles. It was suggested that guidelines be prepared for architects.

Social aspects: The differences between attitudes to blindness and low vision were recognized and the significant social implications of low vision acknowledged, particularly in terms of acceptability of the low vision child by other schoolchildren. The likelihood of a

poorly developed self-concept was high, often leading to emotional and behavioural difficulties.

The general public needed training to appreciate the nature of low vision but, unfortunately, there was also still a need to provide training for professionals such as schoolteachers and ophthalmologists who did not always understand the needs, and were not always sympathetic to them.

3. EDUCATIONAL IMPLICATIONS

The recognition that children with severely impaired vision can benefit from specific educational methods and adapted learning materials has gained momentum in developed countries over the last 30 years.

Previous practice had been conservative in terms of the use of vision for learning, with an emphasis on "sight-saving" and the use of braille and tactile materials for learning, even in the case of pupils with defective but useful sight. Studies from 1968 to 1972 in the former Soviet Union, the United Kingdom and the United States of America show figures of 88%, 79% and 77% of pupils being educated in schools for blind children despite the fact that they possessed some vision. However, the experimental work of Barraga (1964) demonstrated that many children, at that time classified as legally blind, could be taught to perceive and order their environment and to learn on the basis of visual as well as tactile information. These developments coexisted with advances in medical and technical fields in the management of low vision, especially in the provision of low vision devices. Together with an increasing understanding of the psychological and educational implications of low vision, these advances have given rise to enhanced opportunities for children, even with measurably low levels of vision, to use this actively in their class and social activities. Programmes have been developed both to assess the child's current levels of visual perception as well as to give attention to clinical data relating to visual acuity and visual field. The multidisciplinary approach involving medical, psychological and educational professionals has led to assessment of the child's special educational needs in terms of access to print and visually presented learning materials as well as to programmes emphasizing visual stimulation, communication and coordination. Such developments have shown that children with low vision need not, and should not, be educated as if they were totally blind.

3.1 Low vision in the classroom

It is important to appreciate that educators are concerned with the learning and development of the whole child and that the possession of low vision is only one attribute of this. This implies that the educational programme for a child with low vision should be as close as possible to that of unimpaired children but with such additional adaptations as are required for access to the curriculum and maximum personal development. However, low vision children are not a homogeneous group. In addition to their visual disability they may have other sensory, physical or intellectual disabilities which compound the effects of their sight impairment. Educational work with the child must also be considered in the context of the social and cultural aspirations of the community, and the realistic levels of specialized support attainable.

3.2 The challenge of special needs

At present children with low vision may be educated either in special schools or increasingly in ordinary schools with support provided by a visiting teacher. This presents some challenges as the curriculum in ordinary schools is designed for fully sighted children and is delivered largely through sight-related tasks. Children whose low vision makes such work difficult risk being considered as stupid rather than poorly sighted. Recent research shows that speed of information processing can be a problem for pupils with low vision, affecting their ability to complete reading tasks. Typically, a child able to use enlarged print, or using low vision devices involving magnification, can have problems in speed of reading because phrases or even words are visible in incomplete form. Additionally, it can be difficult to locate a precise area in a map or diagram in order to obtain precise information. Techniques have been developed to improve search and scan and minimize the number of fixations used when reading, but these need specialist teaching and are in themselves time-consuming. The child with low vision may have difficulty in copying a process in practical areas of the curriculum such as craftwork or science. Even the formation of a letter for handwriting may need to be individually demonstrated to the pupil before it is properly mastered. The use of modern technologies such as closed circuit television and microcomputers can be very helpful to some children with low vision since they can be used to present clear illuminated symbols, text and graphics. Such technologies cannot simply be installed. They require the acquisition of skills which need to be taught and, whilst offering the considerable benefits of visual displays that can be adapted to individual needs, still present the problem of the pace of work. They are also expensive devices, currently beyond the budget in many schools. If a chalkboard is used, the low vision child may need to sit as near to it as possible, but even so may be unable to read from it without a visual aid. Both in the classroom and in social situations interpersonal communication may be reduced in subtle ways since the child with low vision may not be able to see the expression on the teacher's face clearly, or even interpret body language and gesture adequately. It is now well established in educational literature that concept formation and the detailed understanding of the nature of objects are often delayed, especially in the first school years for low vision children; if appropriate educational opportunities are not given, these delays continue. The child with low vision is receiving less visual information than the fully sighted child with the consequence that a wide range of school activities can be less easy to understand and slower and more difficult to perform. A major implication here is that the child may be considered to be mentally retarded and lacking in potential unless compensatory skills are developed.

3.3 Positive strategies

Successful work in educational programmes usually results from interdisciplinary support for the child and family from the earliest possible stage following discovery. Clearly medical treatment and optical correction, where feasible, are the primary positive steps in the child's best interest. The child's visual impairment may be discovered after birth, in the pre-school years, or whilst attending school. Late discovery puts the child at risk of misunderstanding and understimulation. Since initial discovery is likely to be made by those involved in primary health care, it is essential that the training of professionals involved include information on the developmental implications of low vision, and it should clarify a path of referral for the child who presents as severely visually impaired so that full assessment can be made of the child's educational as well as clinical needs. Early intervention programmes are sporadic but of considerable significance in offering visually stimulating activities. Bright and colourful materials and activities that involve movement and response to visual stimuli can help infants and pre-school children to use what vision they have actively and with enjoyment, thus increasing motivation to use sight for learning.

Information from assessments of the child's functional vision is helpful to those carrying out early intervention programmes so that activities can be matched to the child's visual potential and developmental stages.

Educational material used can be adapted to facilitate the child's use of vision for learning. Teaching techniques can also help to minimize some of the problems attendant upon low vision and its educational consequences. For example, drawings, print and diagrams presented in clear sharp contrast of black on matt white or pale paper, a comfortable working position with adjustable desk or reading stand, to hold work at the distance and angle needed, can be helpful. A review can be made of the seating arrangements in the classroom, so that children with visual problems are sitting in the most favourable light, not looking out into glare through windows. Children can be placed as near as possible to the teacher and to demonstration areas and be in a position to benefit from visual aspects of teaching. The clear labelling of storage cupboards and equipment helps to encourage the orderly organization and self-reliance that it is particularly important for low vision children to cultivate. There will still be some low vision children who may need to use braille as their means of literacy but who can be encouraged to use very minimal vision for cues in mobility and independence training. Specific training in such techniques, and the use of colour contrast in the environment, can help to offer a more stimulating and active participation in school activities.

There are also numerous models outlining the information which a visiting support teacher or adviser should seek in order to support pupils with low vision in any educational setting. The following is a simple example to use as a guideline for school-age pupils.

Basic information

1. *Child's age and sex*

2. *Visual acuity, field defects (clinical)*

3. *Time of discovery/onset of impairment/prognosis*

4. *Functional vision assessment*

5. *Visual requirements*

   (a) *Spectacles*
   (b) *Low vision devices*
   (c) *Technical equipment (CCTV, etc.)*
   (d) *Adapted learning materials (e.g. enlarged print)*

6. *Environmental*

   (a) *Lighting requirements*
   (b) *Seating position in classroom*
   (c) *Safety hazards*
   (d) *Reading stand or adjustable desk*
   (e) *Storage space for special materials*
   (f) *Layout of school building*

7. *Special curriculum requirements*

   (a) *Training in use of low vision devices, visual perception, typing, auditory training, braille if necessary*
   (b) *Method of teaching and strategies involving specialist approaches*
   (c) *Special and adapted materials required for particular subjects, e.g. maths, science*
   (d) *Nature and amount of specialist support and source of support*
   (e) *Advice to class teacher*
   (f) *Contact with parents*
   (g) *Social competencies*

8. *Personal development*

   (a) *Apparent adjustment to disability*
   (b) *Personal organization and self-help skills*
   (c) *Social competencies*
   (d) *Parental/family attitudes*
   (e) *Teacher expectations*

Interdisciplinary cooperation is essential between medical, psychological and educational services with opportunities for full assessment of the child's educational needs and the means to implement them. Where programmes to meet the needs of low vision children have not yet been developed, a review of the training of professionals is of prime urgency. Management in terms of the provision of low vision devices and appropriate technology offers many but not all the solutions to the needs of low vision children. These children also require an understanding from their teachers and families of the social and developmental aspects of their impairment within the context of a full and appropriate education.

Summary of discussion

A potential barrier to the development of educational low vision services is the attitude of specialist teachers to their work with braille. This is sometimes seen as part of their professional specialty or even mystique and there may be a reluctance to let go of this. Teacher training courses should address this issue and ensure their students are adequately prepared to work with low vision children.

The curriculum for low vision children should include access to the full regular curriculum but the additional specialist subjects must be considered an integral part of the educational programme, and not as an additional, or supplementary aspect.

Training in low vision mobility is of critical importance for many children. Inclusion of the family in educational planning can benefit the child, school and family. It should be encouraged wherever possible.

4. CURRENT STATUS OF LOW VISION CARE

4.1 Developed countries

Despite the disparity in actual numbers reported, there are several areas of strong consensus involving children with low vision in the USA. First, the size of the handicapped population is steadily rising, and children with low vision constitute the overwhelming majority of legally blind and severely visually impaired children. Second, the old "sight-saving" philosophy toward the use of vision is no longer accepted as necessary or desirable. Third, instruction in the use of vision increases the visual efficiency for those visually impaired children who have low vision, and the use of vision and low vision devices can increase independence and quality of life. Fourth, there is a need for an interdisciplinary team of professionals to assess and develop educational plans, and to instruct low vision children in the use of their vision and low vision devices. Fifth, there is a need for special personnel preparation for professionals who will be assessing, examining and instructing children with low vision.

Low vision services range from those using traditional clinical procedures such as visual acuity assessment and the prescription of optical devices, to more recently introduced services including vision stimulation, training with both optical and non-optical devices, environmental assessments and modifications. Service delivery systems are equally diverse and often stem from at least three different sources encompassing social, health and educational fields.

In many developed countries around the world the shift to sight utilization from sight-saving began in the 1960s and 1970s. During the last 20 years through the efforts of many pioneers, with the growing influence of parents' groups and findings from research and demographic studies, it is now known that the vast majority - over 80% - of children and youth with visual disabilities have some degree of usable vision and that visual efficiency can invariably be improved in children with remaining vision.

Optical devices, sometimes referred to as low vision devices, consist of one of more lenses placed between the eye and the object to be viewed. Non-optical devices do not involve lenses. Rather, they are devices which alter environmental cues through the utilization of illumination, contrast and spatial relationships. Electronic devices, such as closed circuit television systems, are also widely used. New research in the areas of computerized image enhancement for the development of new low vision devices promises to change their nature in the 1990s.

Assessment techniques for discovering the level of vision and the visual potential for children with low vision have become increasingly sophisticated. Even in nations where service delivery systems are minimal, there is a growing recognition that vision is the major sensory modality necessary for infant concept development and that "early intervention", in terms of screening and therapeutic attention to such conditions as cataracts and amblyopia, gives children the best chance for improved vision.

4.1.1 Key issues

The key concerns of the field of service to children with low vision today include: (1) literacy and the most appropriate reading media; (2) the use of low vision devices (optical, non-optical and electronic); (3) the need to adapt the environment; (4) services for children with multiple impairments; (5) the funding of low vision services; (6) the need for educated personnel; (7) information and support for parents and families of low vision children.

It is vital that educators providing communication skills instruction have professional training to guarantee use of appropriate teaching techniques for each student with a visual disability. This means that special educators for the visually impaired must themselves be thoroughly knowledgeable and skilled in their understanding and ability to teach the use of braille, listening skills, and print with low vision devices.

Properly prescribed optical devices are essential for maximizing a child's visual functioning. In the spirit of early intervention, the time to make changes in a child's life is as early as possible. Most important is that the child receive a clinical evaluation by an ophthalmologist or optometrist knowledgeable in the prescription of such devices, that a functional vision assessment be conducted by an appropriately trained teacher, and that the child receive the instruction he needs in order to use the device(s). To ensure specific devices are appropriate for particular children, many clinics have introduced a loan system and encourage participants to try out different forms of devices until the most appropriate one(s) is (are) found. Few single optical devices are capable of resolving all the low vision needs of a child, hence the use of more than one device is - or should be - encouraged.

Counselling services that help both child and parent accept the device(s), and see it(them) as a positive means for promoting independence, have proved especially helpful in addressing both the child's and some parents' fears of being viewed as "different".

Although the cost of devices in some countries or particular regions of a given country can be prohibitive, it is important for health and educational authorities to realize that large-print books are more expensive than those of standard-size print and are certainly less accessible and more cumbersome. For this reason alone it is more cost-effective to provide children with optical devices that will enable them to use standard-size print books. In this way the child's access to information both in the school and in future employment situations, where the use of standard print is required, will be more effective and efficient. Although most children with low vision can benefit from the use of optical devices, many children with visual impairment and neurological impairment seem to benefit from the use of enlarged print as well. The reasons for this are unclear and deserve to be researched.

When print is not within a child's visual range (even with the use of optical devices), or when visual recognition is so slow that it is not facilitating the child's progress, other reading media such as audio recordings or braille should be considered.

Although different types of visual impairments manifest themselves with different functional problems, many require attention to the visual environment. For example, a student with cataracts or ocular albinism would have problems, perhaps, related to sensitivity to light and susceptibility to glare, requiring carefully planned seating in the classroom and the avoidance of glare on the chalkboard. Information on how to adapt the environment for adults with low vision has been addressed. How these principles might be used to make activities and environments more accessible to children has yet to be determined.

The majority of visually impaired children in developed countries have additional handicaps. These include combinations of cognitive, orthopaedic and neurological impairments. Attempts to measure the amount of remaining vision is perhaps one of the most difficult issues to address due to the complexities of combined disorders and the lack of stable measurement criteria. A variety of procedures has been developed but there are enormous challenges in getting reliable results from these tests and establishing what they mean for the child's visual potential and vision stimulation.

4.1.2 National low vision service delivery systems

Nationally and internationally, low vision service delivery systems reflect a wide spectrum of options. Low vision services are practised in hospitals, community clinics, colleges of optometry and ophthalmology, centres of and for the blind and visually impaired, health centres, educational facilities, pre-school programmes and in the home. Services are of varying quality and scope, and often dependent upon the initiative of low vision advocates (a parent, a teacher or an ophthalmologist). In some instances they receive the support of local and/or central governments or large national nongovernmental agencies.

Low vision advocates in Australia have been especially aggressive in promoting the establishment of public and private low vision services that emphasize the importance of a multidisciplinary team approach to their provision of low vision services, backed by major government funds through Medicare and other programmes. The Low Vision Clinic at Kooyong, Victoria, has served as the key model for a number of the low vision clinics in that country and the innovative approach to "multidisciplinary rehabilitation" results in referrals to the other community or government services at little or no cost to clients.

In Canada, at the Canadian National Institute for the Blind (CNIB), vision rehabilitation workers became approved authorizers for designated devices within the provincial Assistive Devices Programme (ADP) within the Ministry of Health. This

programme funds 75% of the cost of the low vision device if it is recommended by an approved authorizer - a trained professional, registered with ADP and approved to authorize a given device after an assessment has been completed on the person. Although recognizing the need for further expansion in the provision of low vision services, the CNIB now deals with 90% of all referred people for vision rehabilitation services.

Scandinavia has perhaps the most comprehensive service delivery system in the world for children with low vision. The recognition of the importance of careful vision assessment, instruction in vision function, use of optical, non-optical and electronic low vision devices, together with the wealth of social service funds, has allowed the Scandinavians to provide cutting-edge services to children with low vision.

As an example, county hospitals in Sweden provide low vision services in each region. There are currently 32 low vision centres in Sweden providing clinical low vision services and devices, adjusting activities to the needs of the low vision individual, informing the visually disabled of the best possible conditions for managing with and without sight, and providing research and development in visual impairment. Services are provided by an interdisciplinary team of professionals from the child's own school, county hospital, local counsellors at the county level, and the national resource centre, if the child has received services at that site.

In Spain, any member of ONCE (the National Organization for the Blind in Spain) who has low vision may apply for low vision services. These are free of charge, and optical and/or electronic technical aids and devices prescribed are sold at cost or may be subsidized up to 50% by ONCE. ONCE's low vision services are conducted both at its main centre in Madrid and at seven other low vision rehabilitation units throughout Spain. In addition, since the early 1980s, ONCE has played an active role in preparing and placing children with low vision and special education teachers into ordinary schools.

4.2 Developing countries

Over 90% of the world's visually impaired persons are to be found in developing countries, more than half of whom are in Asia and a majority of these live in rural communities. The absence of reliable statistics on visual disability in developing countries obscures the magnitude of the real problem. For example, estimates of visually impaired persons vary from 4 million to 14 million in India. The addition of low vision children makes it even more complicated. A preliminary survey of low vision children in Tamil Nadu, a southern state of India, reveals that about 4% of school-going children require low vision care. Moreover, approximately one-third of the visually impaired children enrolled in special schools and integrated programmes are low vision children. Those low vision children who are mistakenly enrolled in normal schools, as sighted children, are simply absorbed in the school system. Teachers and parents do not always realize that these children have vision problems, often becoming high-risk children and dropping out of schools. On the other hand, the children enrolled in special schools are labelled as "blind children". These children are often forced to be braille readers while they could do well with print.

According to a national survey in China in 1987, 390 visually impaired were discovered among 406 618 children under 14 years of age, representing a prevalence of 0.96‰, with equal parts for blindness and low vision. This means that there are about 250 000 visually impaired children in this country. According to the survey, the chief causes of blindness and low vision, in order of importance, were hereditary/congenital eye diseases,

ametropia/amblyopia, corneal diseases, optic nerve lesions, cataract, chorioretinopathy, and glaucoma.

The Commission of Education, the Ministry of Civil Administration and the Chinese Federation of Disabled Persons decided in 1988 that education for blind children should utilize special schools on the one hand, and in the meantime also regular schools, so as to educate visually impaired children to the best of their ability. At present, integrated education for the blind and low vision child is being advocated and popularized in China.

The population of "totally blind children" has traditionally been the concern of service organizations. In the past, low vision children were considered privileged when compared to totally blind children. Most developing countries are constantly facing problems of unemployment for the blind, the issue of equal opportunity, reservation for the blind in private and public sectors, etc. Since these problems were considered "more than enough", the concern for low vision children did not get its due priority.

The current status of low vision services in developing countries is encouraging in that many countries have gone from the awareness level to application level. Among many items of the "needs-list" is an assessment kit for identifying low vision children in developing countries. Selected institutions from developing countries are field-testing the first version of a kit. This is the first step in facilitating services for low vision children in developing countries.

As far as teacher preparation is concerned, developing countries are at the planning stage. Most teacher preparation programmes emphasize education of blind children; low vision education as a discipline is just emerging.

With regard to programme implementation in schools, the results are far from satisfactory. It is true that some teachers are well informed about low vision services but the absence of appropriate devices and appliances makes it difficult to apply that knowledge. Most schools, whether integrated or special, do not have closed circuit television. Many schools do not have facilities to prepare materials in large print, nor are these large print materials available in the open market. Schools do not have proper optical devices such as magnifiers, glasses, etc. The unavailability of these makes low vision services difficult to implement.

The path to quality services for low vision children could have the following strategies:

- Arrangement of awareness programmes (awareness programmes have to be arranged for regular schoolteachers to identify low vision children)
- Preparation of an indigenous assessment kit
- Establishment of a coordination team for low vision services
- Implementation of teacher preparation programmes
- Organization of national/regional resource centres
- Establishment of interagency network
- Introduction of service in rural schools

Summary of discussion

There is undoubtedly a higher prevalence of visual impairment in developing countries. Almost always, the urban populations in these countries are advantaged in terms of access to paediatric and ophthalmological care, when compared to rural populations. One factor

common to developed and developing countries is the disappointingly low proportion of eligible people who actually receive services that are available. This might worsen if the current trend, in some countries, of privatizing medical and educational services were to continue.

There was agreement that, to improve care, a priority need was for training of all involved professionals - from medical, educational and allied fields. This was a paramount need in most developing countries. In addition, the content of existing training was considered inadequate, with too little coverage of low vision. This might be due to a lack of interest in low vision amongst many professionals involved with training - but may also be because of the financial burden of developing low vision services.

Solving problems of inadequate access or quality of services will require solutions geared to national or regional conditions.

5. IDENTIFICATION OF CASES OF LOW VISION

5.1 Rationale

Early identification of children with low vision has important implications for the child and the family, for the following reasons:

- By introducing appropriate remedial measures, the developmental delays which may follow visual impairment in early infancy can be prevented or minimized, and the child given the opportunity to learn how to compensate or adapt.

- Children can be taught to use their vision effectively as early as possible.

- Children needing special education services and low vision devices can be identified and appropriate services provided.

5.2 Identification of patients in industrialized countries

5.2.1 Presentation patterns

Children with low vision reach the attention of those providing assessment and services via a variety of routes.

- An ocular abnormality is noticed either by the attending physician during routine postnatal screening shortly after birth, by the parents or family, or by paramedics (health visitors, etc.).

- Abnormal visual behaviour is noticed by the parents or family, teachers or paramedics, usually in the first year of life.

- The child complains of symptoms - this applies to older children and those who develop a visual impairment. Young children can function quite normally without complaining despite very low levels of vision.

5.2.2 Patterns of detection

Ocular abnormalities are detected in high-risk groups, i.e., those with a positive family history, those with syndromes known to have ocular features (e.g. fetal alcohol syndrome, Down's syndrome).

Low vision is detected during pre-school or school screening programmes, usually between the age of 2-5 years.

Vision testing of pre-school children is undertaken as a matter of course in some industrialized countries, as part of general assessment programmes. Whether screening programmes should be introduced specifically for vision testing and orthoptic assessment is a debatable subject, currently under discussion.

The criteria for any screening programme are:

- that the condition should be a significant health problem for the individual or community;
- that an effective treatment is available which, if introduced early, favourably affects the outcome;
- that the screening test should be safe, simple, inexpensive, non-invasive and valid (i.e., show a high degree of specificity and sensitivity);
- that accurate diagnostic and full therapeutic follow-up should be available;
- that the programme should be a cost-effective and continuous process.

Children with obvious structural ocular abnormalities or nystagmus are likely to be identified early, although delay in referral to the appropriate specialist can occur, which may jeopardize the outcome of visual habilitation.

Similarly, children with severe visual loss, but without obvious external structural abnormalities (optic nerve hypoplasia, Leber's amaurosis) are likely to present early because of abnormal visual behaviour.

Children with intellectual or physical disabilities are at greater risk of having low vision than normal children. Little information is available concerning the proportion of multiple-handicap children who have low vision.

Early identification of children with less severe low vision, who do not have structural abnormalities, is largely dependent on:

- the level of awareness of those involved in the care of infants and young children;
- the ability to reliably detect and measure low levels of vision.

Improving identification of children with low vision in industrialized countries

1. *Improve training of those involved with the care of infants and young children, i.e., staff in neonatal units, well-baby clinics, health visitors, etc.*

2. *Introduce simple, quick and reliable tests of vision assessment into routine child care programmes where this is not currently being undertaken.*

3. *Give clear guidelines for referral of children with low vision.*

4. *Introduce screening programmes specifically designed to detect low vision. Whether this is feasible or desirable will vary from country to country, depending on current practices for detection of visual impairments in children, the availability of manpower and financial resources.*

5. *A multidisciplinary approach for assessing children with multiple handicap is required.*

5.3 Identification of patients in developing countries

In developing countries evidence suggests that the majority of children with visual impairments, even those with severe visual problems, are not brought to the attention of medical or educational services for the visually disabled. There is a variety of reasons for this situation.

5.3.1 Reasons for non-presentation

- Low level of parental education.
- Health care services may not be available, affordable or accessible.
- An eye problem in a child may be only one of several health problems in the family and may assume low priority.
- A child with low vision may be able to function adequately within his or her culture and may not be considered to have a handicap.
- Beliefs concerning the cause of low vision may prevent proper care being sought.

5.3.2 Reasons for non-detection

- Most babies are delivered at home, by traditional birth attendants who have received little or no formal training.

- In many countries, school attendance rates are low, and only a few schools in some countries have vision screening programmes.

- Children with low vision may be admitted to blind schools without being seen by an ophthalmologist and few blind schools have identified an ophthalmologist with responsibilities for the pupils' ongoing eye care. Data from blind schools in West Africa, southern India and Chile show that 16%, 20% and 12% respectively of children attending schools for the blind are not blind but have low vision. A further 3-7% have treatable conditions.

Improving identification of children with low vision in developing countries

1. *Prior to admission to a school for blind children, all children should be examined by an ophthalmologist.*

2. *All children currently in schools for blind children should be examined to identify those who can be helped by appropriate low vision devices and education services.*

3. *Improve eye care training for health personnel involved in the care of the pre-school child.*

4. *Expand school vision screening programmes, using teachers trained for the purpose. This applies particularly to countries at an intermediate level of development of health and education services.*

Summary of discussion

As the majority of children with low vision have congenital impairments, early identification should be possible and is certainly desirable. This is likely to take place in primary health care clinics. There is a need for further simple tests that could be used by staff who will have minimal training. Different tests are needed for use with children who have multiple impairments.

Where screening of the general school population had been carried out, this often did not result in significant benefits. There may be no follow-up services or low vision devices available and many families do not take account of recommendations. However, it is clear that a number of children with low vision are in regular schools and they would benefit from low vision services. Screening, therefore, should be considered. This does not require a

highly trained person experienced with visual impairments. A member of the school health services or a teacher who had received some special training could be given this responsibility.

Targeted screening of high-risk groups might be of benefit although there is little research to show the efficiency of this approach. Amongst high-risk groups are children in schools for the blind and for the deaf and in other special schools.

6. ASSESSMENT OF LOW VISION IN CHILDREN

Once a child has been identified as having a visual impairment, assessment of visual function is required to identify those who can be helped by low vision services. Tests appropriate to the child should be used.

Not all visual functions are affected to the same degree in people with low vision. Children with low vision commonly have relatively better near vision than their distance visual acuity would suggest (e.g. congenital nystagmus). Assessment of near vision is an important component in the evaluation of children with low vision.

The purposeful use of vision is an essential part of the assessment of children with low vision. Functional vision assessment may be the only source of information in preverbal children and infants, and those with additional handicaps.

6.1 Assessment of distance acuity

6.1.1 In early infancy

Innate reflexes can be used to test visual function. Although these tests do not reflect the resolving power of the eye, i.e., visual acuity, they can indicate whether an abnormality is present or not.

(a) Pupillary reactions to a bright light

(b) Head turn towards a light source

(c) Blink response to a bright light

(d) Oculokinetic nystagmus (OKN) may give false positive and false negative results. It should not be relied on as the only test of visual function as it probably tests visibility rather than acuity.

These tests are not sufficiently sensitive or specific to identify children with low vision, as abnormal responses usually indicate severe visual impairment and/or structural abnormalities in the visual pathways.

6.1.2 Infants and preverbal children

Optotype testing of visual acuity requires a level of alertness, attention and communication that may not be possible or sustained in preverbal children. Results vary in reported testing programmes, but below the age of three it is difficult to obtain cooperation using standard acuity cards. In this age group other tests of visual acuity are required.

Repeated testing over time may be necessary in order to give a clear picture of the level of vision.

(a) Catford drum: The original design (a white drum which presents oscillating black dots of varying size) overestimates acuity. A new version which uses Vernier offsets needs further evaluation as this may prove a quick, simple and reliable means of measuring acuity in infants and preverbal children.

(b) Preferential looking: This is based on the interest shown to a patterned card in favour of a non-patterned card. This method of measuring acuity can be used reliably in infants and young children. The test is time-consuming, however, and requires considerable training of personnel in its use.

(c) Visually Evoked Potentials (VEP): Sophisticated tests such as VEP can indicate whether there are responses to visual stimuli and the sizes of the stimuli which give rise to responses. The equipment for these tests is usually located in specialized clinics.

6.1.3 Older children

Older children can be tested with optotypes, including Illiterate E, Landolt C or Snellen chart, or the Sheridan Gardener, Cambridge crowding set or LH symbol test. The latter has the advantage that it uses shapes, which are not culture-specific, rather than letters. It can therefore be used in many different settings and for children who are illiterate.

6.1.4 Multiple-handicap children

Optotype testing of visual acuity is often not possible in multiple-handicap children because of difficulties in comprehension, coordination, communication and cooperation. Other tests of distance visual acuity are required, depending on the nature and severity of the handicap. Repeated testing is often necessary.

Improving assessment

Evaluation and field-testing of some of the newer, simple acuity tests for infants and young children, e.g. Catford drum, LH symbol test, are required to see whether they would be suitable for use in developing countries.

6.2 Assessment of near vision

The range of accommodation of young children allows them to bring objects very close to the eyes and thus increase image size. When testing near visual acuity, reading should not be used, as single words or passages of text are testing reading skills as well as acuity.

Differences in reading skill will have an effect on the result of near vision testing. Proficient readers use less visual information when reading than less efficient readers, as they use linguistic and contextual information to supplement visual information.

To test near visual acuity, tests which require the naming or matching of letters, numbers or symbols should be used. If the Illiterate E or the Landolt rings are used to test distance acuity, it is recommended that they also be used to test near vision.

Different sized symbols and steps between the sizes are used depending on the system of notation adopted for use in near vision test charts. The number of print sizes on near test charts ranges from 6 to 13. Charts with a large size of symbol and small differences between the sizes are necessary when testing near vision for prescribing magnification devices or monitoring the progression of visual loss.

In the functional assessment of near vision, complex charts are not required. A simplified near vision chart with few print sizes is currently being field-tested. It is intended for use with the WHO distance test cards using the Illiterate E and the Landolt rings. The purpose of the test is to differentiate between:

(1) those people who can see normal print;

(2) those people who can read large print unaided;

(3) those people who require magnification devices, or are able to read very large print;

(4) those unable to read print with magnification devices.

6.3 Assessment of functional vision

Many children are not able to be assessed using distance and near acuity measurements because of:

- age
- physical, intellectual or sensory disabilities

An assessment of functional vision can be carried out to obtain qualitative data on the level and use of vision. Ideally with infants and multiple-handicap children, the assessment is undertaken by a team of personnel including the ophthalmologist.

A number of individuals, schools and services assisting children with impaired vision have developed checklists for assessment of visual functioning and comprehensive kits have been developed for use with pre-school, school-age and multiple-handicap children. A new kit is being developed, to be used by personnel with no previous training or experience in

low vision. No special materials are required and information is gained by observing behaviour and reaction to a variety of stimuli under a range of conditions.

The purpose of assessment of functional vision is to determine:

- if vision is present
- the level of vision
- what it can be used for

Amongst the areas that should be included in an assessment of functional vision in infants and children are the following:

(a) Fixation: The ability of the eyes to fixate a target and maintain steady fixation. The size and type of objects can be varied according to the age and interest of the child.

(b) Eye movements:

- tracking: the ability to follow moving objects or people
- shifting gaze from one object to another
- scanning to find objects

(c) Use of vision for:

- educational tasks
- independent mobility (visually directed reach; safe mobility)
- social contact (identifying individuals)
- independent living skills (identifying objects)

During assessment of functional vision, optimum illumination and contrast should be ensured as far as possible. When the level of functional vision has been established under optimum conditions, the child should be reevaluated following changes in illumination and contrast.

The areas of functional assessment outlined above can be implemented in local communities or schools without specialized equipment.

A functional assessment should be carried out as part of the assessment of all children found to have visual loss. Such an assessment can be used in place of a "clinical" assessment where indicated by the needs of the child.

The materials needed for testing have to be simple to use, portable, durable, readily obtainable and adaptable to local situations as many children in the world are remote from medical services. Assessment of vision has to be performed by people who may have to carry out a range of health, education or rehabilitation roles.

7. STRATEGIES FOR THE ENHANCEMENT OF LOW VISION USE IN CHILDREN

Introduction

When in 1970 Dr Natalie Barraga published the Visual Efficiency Scale (VES), it was the first tool with which to measure change in visual functioning of children at near distance. The VES showed that, through a structured programme, children could become more efficient in the use of their functional vision. In many parts of the world, this approach to low vision was considered a radical departure from a long-held belief that impaired vision was to be conserved or it would further deteriorate.

In the medical disciplines, approaches to efficiency in the use of low vision looked at the possibilities of technology. In 1924 the first telescopic lenses were demonstrated before a medical organization and in 1953 the first organized low vision clinic was established at the New York Association for the Blind, to promote near and distance visual functioning using optical devices. Today there is a blending of the educational and the medical approaches and a realization that the optimum instructional programme combines the best of learning to use unaided vision and learning to use optical devices.

Through the years there have been advances in theories related to visual function as well as in the development of assessment procedures and instruments. Optical and non-optical devices and various technologies have contributed to a repertoire of strategies for the enhancement of low vision use. Instructional programmes have evolved to teach and stabilize visual concepts, provide strategies for viewing near and distant objects, teach the use of optical and non-optical devices, create environmental modifications and identify techniques for the enhancement of low vision use for individual children. However, it is important to note that instructional programmes enhance the visual efficiency of the child but will not and cannot alter any disease process or organic impairment.

Only after he has received a comprehensive assessment of his visual functioning can a determination be made as to whether an instructional programme might benefit a child. As no one instructional programme is intended to work with all children with low vision, the assessment must form the basis for the development of an individualized instructional programme to use low vision or the selection of an available curriculum.

7.1 Instructional aspects for the optimal use of low vision

7.1.1 Purposes for which vision is used

Those who develop instructional programmes must keep in mind the purposes for using vision within their societies. Although the tasks for each purpose may differ from culture to culture, the following purposes apply to all cultures:

- To gain information from directed or incidental visual experiences
- To gain an appreciation of visual experiences and of visual beauty
- To develop a desire to obtain visual information beyond unaided "visual reach"
- To use vision for the planning and/or execution of a task
- To utilize vision to develop one's sense of "self" from a visual perspective

7.1.2 Basic premises of instructional programmes

Instructional programmes, whether standardized or designed for an individual child, should follow these basic premises.

- A functional vision assessment forms the basis for the development of an instructional programme in the use of low vision or the determination that a standardized programme is appropriate.
- Information from the medical examination and low vision clinical evaluation must be taken into consideration when an instructional programme is chosen or designed.
- The earlier an instructional programme is established for the child, the more change may be effected in the child's functional use of vision.
- Goals for the use of low vision should not be expected to exceed the visual skills of a fully sighted child with a comparable mental age.
- While some children may appear to develop their visual function without intervention, not all children with low vision will spontaneously learn to utilize their available vision.
- Instructional programmes require that children act on visual stimuli rather than be passive observers of visual stimuli.
- Instruction takes into consideration the child's culture and beliefs about vision.
- Instruction takes into consideration the child's immediate and future visual environments in the domains of domestic life, school or work, community, and recreation and leisure.
- Instruction incorporates functional skills, aesthetic development and/or psychological goals.
- Instruction in the use of low vision is an integral part of other disability-specific instruction, e.g. social skills, and should not be taught in isolation.
- Instruction increases efficiency with available vision but does not cure or change disease processes or the extent of impairment.
- There are psychological and social aspects to participation in and benefits received from instructional programmes in the use of low vision.
- Each person has an optimal level of visual function at which function can be comfortably sustained.
- Instructional approaches should lead to expanding rather than restricting access to visual environments.
- Instruction should be provided to the greatest extent possible in the natural environments of the child.

- Instructional programmes should be based on both theoretical and experimental research.

- Instructional programmes should be ceased when no change in visual function can be documented or when instruction may become a detriment to emotional or social development.

- A child's self-esteem should not be tied to an ability or lack of ability to perform visual skills or progress within an instructional programme.

7.1.3 Levels of instruction

Instructional programmes may be designed to carry out the components of three levels of visual function: vision stimulation, visual efficiency, and vision utilization. These levels provide a structure for approaches already utilized in various countries and provide a direction from Level I to Level III in which the child moves from one in which the visual environment is being directed by external individuals to one in which the child develops control over his own visual environment.

The levels include instructional components which may be appropriate for children of different ages and different levels of cognitive development. Children with lower levels of cognitive development may benefit from instruction in their use of low vision and should not be excluded from receiving assessments and instruction. Also, children with normal levels of cognitive development and with very low levels of vision should receive instruction with age-appropriate materials.

- Level I: Vision stimulation - To create an awareness of visual stimuli so it may then become a part of the visual process (react, act, respond) by understanding the meaning of light, the direction of a light source, the form of a light source or object; coordinating motor, sensory, and other actions and reactions with light; and being aware of motor, sensory, and other actions with the object form.

- Level II: Visual efficiency - To help the child interpret visual stimuli by making sense of visual images (outlines, details, colours, contours, configurations, patterns) of objects; making time-efficient decisions about visual information; coordinating visual information with other senses and motor actions; coordinating communication and language with visual images; utilizing verbal mediation and other responses, as needed to confirm visual hypotheses; and anticipating, identifying and generalizing specific visual images.

- Level III: Utilization of vision - To help a child become an active participant in the enhancement of his or her low vision use by learning to perceive and interpret environmental cues; altering body positions to rearrange environmental cues; modifying the environment; using prescribed optical devices; knowing when to combine senses; knowing when not to use vision; knowing what helps or hinders visual function; and understanding the causes of "visual discomfort" related to having low vision.

A child may be functioning in such a manner as to benefit from instruction in more than one level at a time. Also, while some children will be able to progress from one level to the next, others will reach their optimum level of visual functioning without reaching

Levels II or III. The child's level of overall efficiency in the use of low vision will relate to many personal factors and the extent and type of visual impairment.

Children may also benefit from receiving instruction in the different components of each level at different ages. For example, a child may learn to use optical devices in one environment (Level III) while in kindergarten, and later increase efficiency with the devices when learning more complex visual skills for independent travel.

7.1.4 Choosing a formal, informal or individualized programme for unaided visual efficiency

Curricula have been developed in several countries utilizing basic principles which have been verified through research. Formal programmes provide a sequenced approach to teaching visual skills which lead to enhanced visual function and were developed with a research population. These programmes may address one or more of the components for each level of instruction. For example, one curriculum may teach a child to gain efficiency in his ability to use unaided distance vision, another emphasizes creating an awareness in a child that he can react to a visual stimulus, and a third may provide instruction in the use of optical devices. Informal programmes have been shown to be effective with children but, to date, have not been verified through research. Individualized programmes may encompass portions of formal and informal programmes as well as approaches and techniques which are designed for a particular child. Some programmes use computer technology while others encourage the use of a natural environment.

7.2 Supporting devices and technology

Devices which are used by children with low vision may be placed in three categories - optical devices, non-optical devices, and technology. In addition to those devices specifically designed for people with low vision, there are numerous devices and technologies which have been created for the normally sighted individual and which are accessible and highly appropriate as devices to enhance the use of low vision. As the use of these products leads to greater normalization of the child with low vision, they should be employed whenever they provide sufficient environmental cues for comfortable visual function to occur.

7.2.1 Purposes for which supporting devices and technologies are used

Supporting devices and technologies have been developed to assist persons with low vision to perform tasks using vision. The purposes for which they are used include the following:

- Devices and technologies provide access to the normal visual environment.
- Devices and technologies increase efficiency and comfort for the person with low vision who uses vision for specific visual tasks.
- Devices and technologies provide means for independent actions on the part of the child with low vision.
- Devices and technologies are cost-effective in reducing the need to provide specialized materials (e.g. large type) or human interventions (e.g. readers).

7.2.2 Basic premises about the use of devices and technologies

Professionals and parents have a responsibility to be knowledgeable about and judicious with the use of supporting devices and technologies. The following premises are offered as considerations in the selection and distribution of such devices.

- Devices and technologies should be used to expand rather than restrict options for task performance.
- Devices and technologies should be chosen which most closely lead to a normalization of visual function.
- Professionals have an obligation to understand the psychological and social aspects of using devices and technologies designed for those with low vision.
- Devices and technologies should undergo the most rigorous of research procedures to assure safety and benefits of the products.
- Whenever options may be available in a category of device or technology, the child and parent should be provided with information about the options.
- The earlier a device or technology is presented to a child, the more readily the child will incorporate the use of the device in a repertoire of strategies for the use of low vision.
- The level of sophistication of a device does not directly relate to its practical applications.
- Devices and technologies to allow a child to perform a task visually should be considered before providing devices which require the child to use nonvisual means to perform a task. However, the ultimate choice of whether to perform a task using vision remains with the child and family.
- To the greatest extent possible, professionals who have the greatest amount of expertise in low vision care should provide evaluations and prescriptions for optical devices.
- Optical devices and technologies enhance the use of low vision but do not alter disease processes or the extent of the organic visual impairment.
- Instruction in the use of optical devices should be provided as needed.
- Instructional programmes in the use of optical devices or technologies should cease when visual function is not enhanced or when there are psychological concerns on the part of professionals or parents.

7.2.3 Optical devices for near vision

Optical devices use one or more lenses placed between an eye and an object to alter the retinal image of the object. Optical devices may be as simple as using a glass marble to see detail in an object, to a sophisticated bioptic telescopic system to allow some individuals with low vision to drive motor vehicles. In between, there is a myriad of devices which

enhance the use of low vision in children. Optical devices may be used with or without standard prescriptions for glasses or contact lenses.

Optical devices for near vision tasks include hand-held and stand magnifiers and high plus lenses placed in spectacles (lenticular, bifocal, or full lens microscopes). It is often possible to provide the same amount of magnification in more than one mounting system; choices for employing one or more systems will be based on personality, visual, physical and task factors, and should not be the sole decision of the individual prescribing or distributing the devices. Optical restrictions, as well as differences in head, eye, lens, and object movements which are inherent in certain devices, may facilitate the use of one device over another for a specific task.

Minus lenses may be used for increasing the amount of information brought into the available visual field. However, such lenses also reduce the size of individual objects within the field. Prisms have been used to alter the position of information within the visual field and may be used in combination with other lenses.

Instruction in the use of near vision lenses includes but is not limited to:

- holding and positioning the lens(es)
- coordinating the movements of the eye, head, lens and object to be viewed
- manipulating the device with other instruments
- choosing the appropriate device for a specific task
- combining the optical device with non-optical devices
- care of the device

7.2.4 Optical devices for distance vision

Optical devices for distance vision include hand-held monoculars and binoculars, bioptic telescopic systems, contact lens and spectacle telescopic systems, reversed telescopes, and Fresnel prisms.

Monoculars, binoculars, and bioptic telescopic systems are devices that provide for altered retinal images of objects seen at distances, usually beyond arm's reach. A reading cap (plus lens) may be placed on a telescopic system to bring objects into focus at intermediate distances; this is known as a telemicroscope. A select group of monoculars are designed with a "close" focus, allowing for clarity of the visual image at a normal reading distance; however, with this type of system the depth of field is extremely small and very precise movements are needed.

Instruction in the use of these devices includes but is not limited to:

- holding and manipulating the device
- spotting objects which are stationary or moving in simple or complex visual environments
- focusing at different distances
- scanning, panning, and tracking objects
- eye, head, and lens movements
- care of the device

7.2.5 Other magnifying devices and technologies

Other devices have been developed which do not utilize lenses for magnification or their lenses are placed in positions other than between the eye and the object. These include closed circuit television systems, mirror magnification systems, and computer technology.

Closed circuit televisions electronically enlarge print or an object placed below a stationary or hand-held camera. Enlargements of the image are controlled by turning a magnifying control. Contrast can also be altered and black print on a white background can be changed to white print on a dark background. Colour may also be enhanced on some models of closed circuit televisions, and foreground and background colours of printed material may be manipulated. Closed circuit televisions are available in stationary or portable models.

Mirror magnifiers contain a mirror placed higher on a page than is the available print or space in which one wishes to read or write. With these devices, the child looks into the mirror which has an enlarged image of the print he wishes to read. The mirror magnifiers also allow for writing in the space between the mirror and the child.

Computers may provide enlarged print on the screen through either standardized or particular software designed for those with low vision. Some software programmes designed for the general public include means for altering fonts on the screen in the 12 to 24 point range, and also allow the user to create the size of the image which is desired. Specialized programmes designed for those with low vision may be used in other computer environments in which the image may be enlarged and moved in front of the eye of the observer. Software is available to provide speech for the computer. Information which is presented on the screen becomes audible to the user. In addition, printers for computer systems are capable of printing in various type fonts, independent of the size of the image on the computer screen.

7.2.6 Light absorptive and tinted lenses

For children who have photophobia, tinted lenses may be prescribed for near and distance vision, for indoor activities as well as outdoor wear. These lenses reduce the amount of light entering the eye, leading to greater comfort for the child and increased visual function. Lenses with less than 1% of light transmission have been designed for children with very severe light sensitivities.

Tinted lenses may be provided in selected colours. These colours may enhance the apparent contrast of objects in the environment.

7.2.7 Non-optical devices and approaches

Non-optical devices are used to increase visual function through means other than the use of lenses. They include but are not limited to the following:

- visors and shields for glasses
- bold line pens and paper
- enlarged pictures, diagrams or print
- coloured tape placed on tools, dials, steps, etc.
- typoscopes and markers used to eliminate patterns and complexity of visual input

- intense or variable lighting
- braille and braille technologies (translation programmes, printers, etc.)
- reading machines (optical scanners with speech)

Although research in recent years has shown the benefits of using optical devices with regular-sized print over the use of enlarged print it is understood that: (1) optical devices and the instruction needed in their use are unavailable in many parts of the world; and (2) braille is a viable reading medium for students who cannot attain a comfortable and functional reading speed with regular type and optical devices. For these reasons, braille and large type should be considered as options.

Summary of discussion

From the evidence available, the early introduction of devices to children often results in the integration of their use into a child's daily life and access to experiences that are important for learning and development. The very young child will also benefit from training in the use of vision - although there is evidence that it is possible to improve the use of vision throughout school years.

Cost of low vision devices varies widely in different parts of the world and they are clearly part of a commercial market. Unfortunately, cheap glasses bought off the street are unlikely to be of help. The cost of importing devices is often high due to duty and import tariffs. Efforts should be made to have very high dioptre lenses exempt from duties as they are clearly for use only by handicapped persons. Some low-cost magnifiers are now made within developing countries and an extension of this production would be a good way to help the majority have access to essential devices.

In addition to the use of low vision devices, children can be helped through training in the use of unaided vision and the development of visual strategies. Both should be components of low vision care. Large print may be an alternative to use of a low vision device but the medium has strong disadvantages as there are few production facilities, it is expensive to produce and has less flexibility in magnification.

Training programmes are available both for the development of visual efficiency and in the use of low vision devices. The principles behind these programmes are likely to apply in most countries but the training materials need to be examined to ensure they are culturally appropriate for the country of use.

8. HUMAN RESOURCES FOR LOW VISION CARE

Introduction

In meeting the need to create services directed toward the care of children with low vision, the primary challenge to face - and which is often a cause of delays - is the lack of qualified personnel who can consistently and tenaciously develop a work model which is integrated into existing health and educational systems.

As far as eye disorders in children are concerned, what distinguishes the poorer countries from the developed ones is that they fall short of basic public health actions, thus causing the number of people with severe visual conditions to increase.

Despite the crucial problems related to blindness and low vision, it is unfortunately not known, in exact figures, how many children are born with, or develop, severe eye diseases during their first year of life. It must be remembered that in developing countries most of the population is young, birth rates are high and life expectancy is often less than 60 years. Thus, there is no doubt that new services should be concerned with infant care, from birth to school age.

Much of the work requires the formation of multidisciplinary teams. However, in the poorer countries, there is a general scarcity of appropriately trained staff. Thus, it is hardly possible that the same range of professionals are available as work at the centres in developed countries.

Additionally, in both medical and educational fields, there are very few centres specializing in the treatment of the visually disabled.

8.1 The creation of low vision centres in developing countries

Even in developing countries some organizations have dedicated themselves for more than a century to the rehabilitation of children, especially those of school age. Nevertheless, attending school is a difficult task for children with impairments, when they have to strive against the small number of vacancies available, social segregation, and inadequacy of the support provided by education authorities. Furthermore, children above seven years of age may face even greater obstacles and require expensive special schooling. These factors indicate to a great extent the problems facing those in charge of the education and the habilitation of children with visual impairment.

As a fundamental principle, the provision for services directed toward the assistance of visually impaired children and their families should primarily integrate two areas: health and education. This is necessary to ensure adequate attention is given to all aspects of the disability. For example, ophthalmologists often run the risk of making false "functional" judgements if their diagnosis is based purely on an ordinary clinical examination. They may be able to find a serious eye disease, but do not assess the patient's "functional visual performance".

Therefore, in a team provided with two professionals, i.e., an ophthalmologist specialized in low vision and an educator familiar with children with visual disability, it would be possible to gain a better diagnosis by quantifying the available vision, correcting refractive errors, determining how the child uses his or her vision, and instructing the members of the family on how to support and understand their child.

8.2. Personnel in the medical field

The outstanding progress made regarding low vision care as a clinical specialty over the past 10 years has led to growing recognition of the field by ophthalmologists. This has resulted in improvements in their approaches in dealing with visually disabled patients.

Teaching hospitals and clinics are usually significant reference points in major cities. Where a centre for the care of infants with low vision is created, there are three possibilities of promoting professional awareness in that area:

(1) Awareness of the medical school internship students: Here, emphasis should be placed on the fundamentals of low vision, the effects of visual impairment on

normal child development, understanding the main causes of visual disability in infants, strategies for recognizing visual impairments and the reasons why patients should be referred to specialist management as soon as possible.

(2) Training during postgraduate training in ophthalmology: Especially in developing countries, such studies should include low vision and all the subjects related to it. After two to three months of postgraduate training, the ophthalmologist should be capable of examining an infant with low vision through his/her own means and thus prescribe medical treatment and optical devices where indicated.

Upon completion of the medical residency, a number of ophthalmologists return to their home cities, which, because they are usually distant from the large centres, have frequently only one eye specialist. Then the ophthalmologist should be capable of performing population surveys, conducting tests and using assessment methods to prescribe special optical devices and provide the rehabilitation services with informed professional support.

(3) Integration of other medical specialties: Infant care units in major hospitals have a major role in exchanging diagnostic information with physicians from other specialties, such as paediatrics and psychiatry. Such an exchange is useful in developing awareness in these professionals of the assessment practices and the training of infants with low vision. Most of all, however, these specialists should be alerted to the danger of late detection and management of such children.

Low vision centres incorporated into major hospitals will be significant diagnostic and assessment resources, in addition to their role in training specialized personnel. Nevertheless, it is important to decentralize care functions so that they do not remain concentrated in a few centres. This may be achieved through smaller centres that are directly bonded to their "parent" centres, and designed for early intervention in day nurseries or pre-school settings located in the surroundings of large cities. Such small centres may be supported by the community, and integrated into other child care activities.

8.3 Personnel in the educational field

The educator should be responsible for a qualitative evaluation of vision in order to identify major implications, establish a suitable training programme, discuss with the ophthalmologist the difficulties experienced by a given child, and appraise the possibility of using optical devices or other devices to improve the use of vision. A major role played by the educator should be advising the child's parents, placing an emphasis on their direct participation in their child's training. Satisfactory advice coupled with good family relations often allows the infant to function well in a regular day care setting.

Summary of discussion

There is some confusion caused by the terms used to describe the personnel involved in the field of low vision. This is partly because the same term (e.g. teacher, low vision therapist) is used to describe different job concepts and partly because no clear job descriptions exist for some workers in this new field.

The roles of workers need also to be examined in relation to multidisciplinary working. This type of working has proved essential in this field but it may require the reeducation of professionals and positive action to ensure collaborative practices are established.

The paramount need for training is emphasized. Training needs to be available at four service levels.

Awareness should be created amongst general health workers, families and the general public.

Training in the identification of children is needed by primary health care workers, teachers and community-based rehabilitation (CBR) staff.

The assessment of needs is a critical service level and involves refraction, acuity measurement, prescription of devices and preliminary functional vision assessment. Staff who should receive training to do this are likely to be paramedics, perhaps an eye care nurse who has this specialist responsibility as part of a broader job description.

Staff of low vision centres need specialist training in assessment and training. Staff need to be familiar with a range of low vision devices and know how to teach clients in their use. They should have access to materials and training programmes which may develop the use of low vision and have the skills to use these materials for assessment and training.

Some of these services, including training, might be offered by schools for the blind, working as regional centres. The development of materials for staff training is an urgent need and currently no organization has taken responsibility for this. The use of innovative approaches such as distance education and the development of complete training packages for use by trainers might be effective next steps in meeting this challenge.

A basic low vision centre comprising an ophthalmologist and a special education teacher should be able to provide the ophthalmological diagnosis and functional assessment of the child, and to prescribe low vision devices. Such a small-scale centre may take care of some 10 cases/day, and one centre per 5 million population is probably needed. In general, optical devices may be usefully prescribed to children as from the age of three years, provided there is proper follow-up, which should last for at least three months. There should be continuous close interaction between the medical and educational staff to provide comprehensive support to the child, including the use of new or revised devices and training programmes.

ANNEX 1

LIST OF PARTICIPANTS

Mr A. Best, Lecturer in Special Education, University of Birmingham, School of Education, Edgbaston, Birmingham B15 2TT, United Kingdom *(Rapporteur)*

Dr A. L. Corn, Professor and Coordinator, Programs for the Visually Handicapped, Department of Education, College of Education, The University of Texas at Austin, Education Building 306, Austin, Texas 78712-1290, USA *(Chairperson)*

Dr C. Gilbert, International Centre for Eye Health, Department of Preventive Ophthalmology, Institute of Ophthalmology, University of London, Bath Street, London EC1V 9EL, United Kingdom

Dr L. Hyvärinen, VISTEST, Harmaaparrankuja 3, Espoo, Finland

Mrs J. Keeffe, Department of Ophthalmology, The University of Melbourne, The Royal Victorian Eye and Ear Hospital, 32 Gisborne Street, East Melbourne, Victoria 3002, Australia

Dr M. N. G. Mani, ICEVH Regional Chairman, Asia, c/o Sri Ramakrishna Mission, Vidyalaya College of Education, Coimbatore 641 010, India

Miss J. Silver, Principal Optometrist, Moorfields Eye Hospital, City Road, London EC1V 2PD, United Kingdom

Dr A. J. Smith, Executive Director, Institute for the Visually Impaired, Pennsylvania College of Optometry, 1200 West Godfrey Avenue, Philadelphia, Pennsylvania 19141-3399, USA

Dr S. Veitzman, Assistant Ophthalmologist, Coordinator - Dr Eva Lindstedt Low Vision Children Centre, Irmandade da Santa Casa de Misericordia de Sao Paulo, Hospital Central, Rua Jacira 25, Sao Paulo, S.P. Brazil 04517

Representatives from Nongovernmental Organizations

Canadian National Institute for the Blind (The), 1929 Bayview Avenue, Toronto, Ontario, Canada M4G 3E8: Mrs B. Ginou, Director of Rehabilitation, Ontario Division

Christoffel Blindenmission, e.V., Nibelungenstrasse 124, D-6140 Bensheim 4, Germany: Mr S. Bridger, E & R Coordinator

Annex 1

Helen Keller International, Inc., 90 Washington Street, 15th Floor, New York, New York 10011, USA: Mr J. Palmer, Executive Director

International Council for Education of the Visually Handicapped, 37 Jesselton Crescent, 10450 Penang, Malaysia: Mr W. G. Brohier; Miss M. Campos

Organizacion Nacional de Ciegos de Espana, Calle José Ortega y Gasset 18, 28006 Madrid, Spain: Mrs M. R. Villalba

Perkins School for the Blind, Watertown, Massachusetts 02172, USA: Ms V. Brennan, Low Vision Coordinator; Mr D. Lolly

Sight Savers, P.O. Box 191, Haywards Heath, West Sussex RH16 4YF, United Kingdom: Mr K. Carey, Director, Overseas Services Department

World Blind Union, c/o Royal National Institute for the Blind, 224 Great Portland Street, London W1N 6AA, United Kingdom: Mr E. Elissalde, President, Fundacion Braille del Uruguay, Durazno 1772, Montevideo, Uruguay; Mrs J. A. Varsavsky

Representatives from WHO Collaborating Centres for the Prevention of Blindness

Dr K. Konyama, Department of Ophthalmology, Juntendo University School of Medicine, 3-1-3 Hongo Bunkyo-ku, Tokyo, 113 Japan

Professor Sun Bao-Chen, Beijing Institute of Ophthalmology, 17 Hou Gou Lane, Chong Nei Street, Beijing 100005, People's Republic of China

Secretariat

Mr W. G. Brohier, President, International Council for Education of the Visually Handicapped, 37 Jesselton Crescent, 10450 Penang, Malaysia *(Host Organization)*

Dr R. Pararajasegaram, Programme for the Prevention of Blindness, World Health Organization, 1211 Geneva 27, Switzerland

Dr B. Thylefors, Programme Manager, Programme for the Prevention of Blindness, World Health Organization, 1211 Geneva 27, Switzerland *(Secretary)*

ANNEX 2

SELECTED INSTRUCTIONAL RESOURCES

Level I: Vision stimulation

Aitken, S. & Buultjens, M. (1992) Vision for Doing. Edinburgh: Moray House Press

A guide to the assessment of vision in children with multiple impairments. The procedure is very comprehensive and summary information recorded clearly in diagrammatic form. The book contains a wealth of suggestions for activities to help a child move through stages of visual development.

Frere, S. (1986) Light Box Activity Guide. Louisville: American Printing House for the Blind

The light box in conjunction with its accompanying set of materials is designed to stimulate awareness of light, colour, and objects. Level I is concerned with early stimulation. Levels II and III involve more complex visual skills.

Smith, A.J. & Cote, K.S. (1982) Look at Me: A Resource Manual for the Development of Residual Vision in Multiply Impaired Children. Philadelphia: Pennsylvania College of Optometry Press

This book provides assessment and instructional activities to discovering and stimulating functional vision in children who are visually impaired and who have other impairments.

Level II: Visual efficiency

Barraga, N. (1980) Diagnostic Assessment Procedure. Louisville: American Printing House for the Blind

A programme to teach a person with low vision in a sequential, systematic way how to discriminate and recognize visible objects and symbols in their environment. It utilizes a developmental approach from easy to discriminate to more complex visual skills including contrast, size, colour, distance and complexity of detail.

Blanksby, D.C. (1992) VAP-CAP Handbook. Melbourne: Royal Victorian Institute for the Blind

Fichtner, D. (1988) Visual Efficiency Training Programme (4 volumes). Bensheim, Germany: Christoffel-Blindenmission

The programme includes series of activities which help to develop skills such as systematic looking, hand-eye coordination, an understanding of visual images. Based on photographs and drawings from African daily life, the materials are suitable for children throughout the primary range. A teachers' guidebook contains many suggestions for activities and the use of the materials.

Annex 2

Moore, S. (1984) Bright Sights: Learning to See (Perceptual Level). Louisville: American Printing House for the Blind

This is the second level of a programme designed to help develop attention, visual perception and discrimination in children with low vision. It utilizes tangible materials and can be used under fluorescent or black light environments. The sensory portion of the programme is intended to elicit initial visual interest, attention and localization.

Smith, A. (1991) Beyond Arm's Reach

This is a curricular programme designed to enhance distance visual efficiency for children with low vision. It provides step by step lessons in addition to resources, activities, and references.

Tobin, M., Tooze, F., Chapman, E., & Moss, S. (1977) Look and Think. London: Schools Council/Royal National Institute for the Blind

A programme for the assessment and development of functional vision. The assessment examines functioning in 18 areas. Suggestions for training activities and materials are attached to each of these areas.

Level III: Vision utilization

Backman, O. & Inde, K. (1982) Low Vision Training. Sweden: Liber Hemods

Suggestions for practical activities to develop the utilization of vision in young people and adults. Encourages the use of techniques such as eccentric fixation, enhanced field span, and controlled head/eye movements.

Jose, R. & Freedman, P. (1991) The Art and Practice of Low Vision

This book contains exercises for teaching eccentric fixation to those who experience a central scotoma.

Sonksen, P. & Stiff, B. (1991) Show me what my friends can see. London: Institute of Child Health

Describes the development of vision and its use by young children who have a visual impairment. Although not a prescriptive "programme", it does include many suggestions for activities to encourage the use of vision.

Wiener, W. & Vopata, A. (1980) Suggested curriculum for distance vision training with optical aids

This is a curriculum in the use of hand-held monocular telescopic devices.

ANNEX 3

LIST OF ESSENTIAL EQUIPMENT FOR LOW VISION CARE

1. Diagnostic test kit for visual function

2. Optical devices:

   - magnifiers (hand-held and with stand)
   - telescopes
   - spectacles (magnifiers)
   - prisms (Fresnel) for spectacles

3. Non-optical devices:

   - felt pen
   - reading stand
   - light sources (optional)
   - near-work stand
   - absorptive sun filters
   - different sized print
   - samples of items for near-vision discrimination

ANNEX 4

EXAMPLES OF LOW VISION CARE UNDERTAKEN BY NONGOVERNMENTAL ORGANIZATIONS

CHRISTOFFEL BLINDENMISSION

For over 15 years Christoffel Blindenmission (CBM) has been aware that low vision children cannot be categorized in planning of services as though they were totally blind. Parallel to the encouragement of integrated education of blind and visually disabled, CBM has tried to ensure that all children admitted to education programmes for the blind receive adequate specialist ophthalmic/optical examination.

This has resulted in an increasing awareness within CBM of the needs of low vision children, so that throughout the 1980s efforts were made to develop materials and aids for low vision children as well as to encourage and train special educators to understand how best to help these children.

In recent years, CBM has published the four-volume series on "Vision Efficiency Training Programme" (VETP) by Dorothea Fichtner and developed a list of low vision devices for developing countries, most of which can be produced in CBM-supported optical workshops. The development of the reading desk, which at the same time is a carrying case, is finding widespread use within CBM projects, particularly in Africa.

CBM has 124 projects worldwide for the education of the blind (16 in Latin America and the Caribbean, 60 in Africa, 48 in Asia), all of which are now being strongly encouraged to develop comprehensive low vision services in line with the recommendations of the CBM seminar on low vision held in Botswana in November 1991.

CBM sees the development in coming years of:

- a cadre of low vision therapists who will coordinate the different disciplines necessary to provide appropriate services;
- the widespread use of appropriate low vision devices;
- the implementation of the VETP within special education services, particularly in Africa.

Annex 4

THE CANADIAN NATIONAL INSTITUTE FOR THE BLIND

Part of the uniqueness of The Canadian National Institute for the Blind (CNIB) lies in the fact that, through one medical referral, a visually impaired person is able to access a full rehabilitation programme. The low vision worker is a member of the multidisciplinary rehabilitation team which works together with the client to plan his rehabilitation programme. Low vision services consist of a functional vision assessment, recommendation of devices to enhance vision, and follow-up and training in their use. This service is offered in some locations in a formal clinical setting. For those clients unable to travel to the clinic or who live in remote rural settings, service can be delivered by a visit to their home. For the low vision child attending school, assessments are performed in the classroom followed by consultation with the child's teacher to discuss necessary programme adaptations.

CNIB low vision services are part of a network of service delivery which involves eye care clinicians, rehabilitation services and educational professionals.

HELEN KELLER INTERNATIONAL, INC.

Helen Keller International (HKI) supports blindness prevention programmes as well as community-based activities with blind adults and children. Currently, the agency supports a pilot project in the management of children with low vision in the Philippines and plans to integrate this component, where feasible, into existing programmes in other countries. Programme activities might include promoting awareness of the importance of identification, assessment and support for children with low vision and their families and ways to address this need. Country personnel have been asked to review their activities, to highlight any informal activities related to low vision in children and to suggest methods to profile and advance these activities. Some countries have a natural entry point for expansion into the management of children with low vision, i.e., programmes designed to screen for and treat vitamin A deficiency. For those countries with no obvious entry point a country-specific plan to assess programme potential and direction will be requested. HKI headquarters will continue to foster interest in programme development and to mobilize sources for programme funding.

PERKINS SCHOOL FOR THE BLIND

The Low Vision Service of Perkins School for the Blind has an on-campus programme for its students and clients and, through its Outreach Program, offers services to any individual with low vision in the region. The Service was established in 1984 to address the low vision needs of Perkins' students and clients with multiple disabilities and visual impairment. The on-campus programme is educationally based and provides direct access to clinical, educational and follow-up services for all students and clients.

Annex 4

From 1988 to 1991, Perkins provided outreach low vision services to deaf-blind children in a six-state region through a federal grant. Since 1991, the Service has expanded its outreach role by offering services to any individual with low vision on a fee-for-service basis. Clinical and functional vision evaluations, environmental assessments, prescription and training in the use of optical and non-optical devices, vision utilization programming, information and referral, and consultation to families, programmes and schools are some of the services available. Visits to the individual's home, job, school or programme are made for evaluation, training and consultation.

The Low Vision Service has a staff of three full-time and two part-time low vision specialists with training in vision rehabilitation as well as education/rehabilitation of the visually impaired. The clinic is staffed by a part-time optometrist from the New England College of Optometry (NEWENCO) and serves as an internship site for NEWENCO students.

Additional activities of the Low Vision Service staff include training international visitors and conducting workshops for teachers in developing countries through the Hilton/Perkins National and International Program, providing in-service training locally and regionally for teachers, parents and programmes, lecturing at local colleges and universities, and writing articles and handbooks.

Anticipated future directions for the Perkins Low Vision Service include: (1) expansion and development of the Outreach Program; (2) continued collaboration with the Hilton/Perkins National and International Programs for the training of service providers and preparation of materials; (3) low vision research; (4) expansion of internship possibilities for teachers and eye care professionals; and (5) publication of articles and materials for service providers and families.

ORGANIZACION NACIONAL DE CIEGOS DE ESPANA

In 1985 the Organizacion Nacional de Ciegos de Espana (ONCE) started to implement programmes for visual rehabilitation as part of procedures aimed to make the most of the residual sight of a person with low vision.

In 1985 the Visual Rehabilitation Unit of Madrid (CERVO) was created. It was the first of the eight centres that the organization has at present. There are centres all around Spain: two in Madrid, Alicante, Barcelona, Sevilla, Pontevedra, Las Palmas de Gran Canaria and Bilbao.

All these centres depend, with regard to technical aspects, upon CERVO, which coordinates, counsels and makes a periodic follow-up of their work.

A team of various professionals is in charge of implementing the programmes, which are prepared in a specific way in order to meet the particular needs of the client, his/her residual sight as well as personal capability.

Annex 4

Below is the composition of the group of professionals who take part in the provision of low vision care, together with their tasks:

- A social worker: He/she makes a first interview and states the social and economic position of the client. He/she informs the person about the range of his/her treatment.

- An ophthalmologist: He/she makes the first analysis through several objective tests aimed to determine what kind of residual sight the client has.

- An optician: He/she prescribes the first necessary optical devices. Finally the optician fits up these devices.

- A visual rehabilitation technician: He/she teaches the client how to use the prescribed devices. By consulting the optician, both decide which final optical devices are needed according to the results obtained with the first devices. They also prescribe other kinds of non-optical devices (such as electronic appliances) required by the client.

The number of ONCE's members with residual sight represents more than 50% of the total members, and this group of people with residual sight is growing larger; presently there are more than 20 000 members with low vision.

There are more than 7000 people who have fulfilled a visual rehabilitation programme in ONCE's centres. At the end of 1991, the highest percentage of clients treated corresponded to children of school age or adult students (42%). People who perform some kind of work represent 28% of the total. Only three of every 10 clients following ONCE's programmes are adults who are not working or people over 60 years of age.

SIGHT SAVERS (UNITED KINGDOM)

Because of its interest in the education of incurably blind children and the rehabilitation of incurably blind adults, as well as in the delivery of eye care services, Sight Savers has been deeply conscious of the needs of people with low/residual vision because it is this group which constitutes the majority of those receiving education and rehabilitation services.

All Sight Savers' programmes for incurably blind people have included services for children and adults with low vision, whether this be the provision of large print books and visual devices for children or rehabilitation training focusing on the use of residual vision for adults.

The advent of the eye care paramedical worker has opened up the possibility for better referral from the health system to the education and welfare system and Sight Savers is currently studying the most appropriate cadre for undertaking low vision diagnosis and prognosis, and the teaching of the maximization of the use of residual vision.

Annex 4

Sight Savers' policy rests firmly on the understanding that the use of low vision for the acquisition of literacy skills is only one part of the utilization of low vision; children and adults need to be taught how to make the best of the vision they have, to acquire data on the environment, to interpret them and then use them for mobility, daily living, literacy and enjoyment.

= = =