



Guidelines for Comprehensive Management of Low Vision in India

A VISION 2020: The Right to Sight - India Publication

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Tel / Fax: 0124-4301-184

Email: info@vision2020india.org
Website: www.vision2020india.org

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Guidelines for Comprehensive Management of Low Vision in India



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October 2013

Developed by

CBM and Sightsavers in collaboration with Lotus College of Optometry, Mumbai, India



Authors

Dr. Sunita Lulla Gur | Dr. Shubhra Sil | Prema Chande | Dr. Uday Gajiwala
Jinal Zaveri | Sumana Samuel | Sudha H. Tumbe | Sachu Ramalingam

Ms. Sujaya Krishnan
Joint Secretary
Telefax : 23062426



भारत सरकार
स्वास्थ्य एवं परिवार कल्याण मंत्रालय
निर्माण भवन, नई दिल्ली - 110108
Government of India
Ministry of Health & Family Welfare
Nirman Bhavan, New Delhi - 110108

FOREWORD

Today as we broaden the scope of our initiative to go beyond cataract, low vision is one area that needs the attention of the eye care fraternity in the country. Currently the information and data on low vision is scarce in our country. There is a need to strengthen low vision assessment, treatment and services for low vision in particular. This will not only improve the quality of life but also reduce morbidity of people with low vision.

It is encouraging to know that Vision 2020 The Right to Sight – India through the manual for comprehensive management of low vision in India is taking steps to bridge the existing gap. I am glad that Sight Savers and CBM who are working in the area of low vision are supporting this significant and timely initiative. All books and manuals in Ophthalmology and Optometry deal with the management of regular eye diseases and treatment of refractive errors in detail. There is however one area-that of low vision in people which is not covered and this manual addresses the gap. This manual elaborately deals with the management of low vision and includes definitions, the causes of low vision and an excellent coverage of the disease processes leading to low vision, its assessment, low vision devices and finally the rehabilitation of these patients.

The low vision manual is aimed at all those who want to set up low vision services in the community. In this manual one will find the scientific foundation and the basic clinical knowledge needed to understand and apply to the practice of low visual assessment and provision of aids. The manual will help increase awareness about low vision services among ophthalmologists and other eye care professionals and the public. The manual will also facilitate people involved in education and rehabilitation work in provision of services to low vision clients.

I sincerely hope that this manual on low vision will be used by organisations across the country to elevate the services for those with low vision in the country at par with the developed ones.

Healthy Village, Healthy Nation



Foreword

It gives me immense pleasure to introduce the manual on Low Vision. The functional definition of low vision is a condition in which person cannot fully be corrected by glasses thus interfering with daily activities such as mobility, reading, use of assets and equipments.

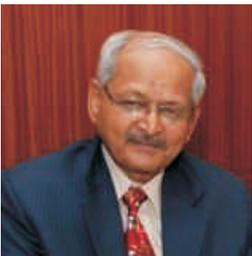
This can occur in any age. Though the number of low vision persons are in huge numbers yet we have not been able to generate awareness nor draw attention regarding the problem. The best possible management for low vision person is to help him/ her in the day - to - day activities with suitable devices. These can be either assistive or adaptive.

Assistive technology has advanced at quick pace and still requires more research and awareness regarding its use by people with disability. Assistive technology is useful for students to access academic curriculum as well engage in extracurricular activities. Desktop technologies for students and workmen are mainly electronic magnifiers and ergonomic designs with built - in controls. Adaptive technologies would aim to change the environmental settings.

There is a need to plan for the significant burden of low vision in population by establishing low vision service cells at secondary levels with emphasis on clearing the perceived barriers for its uptake. Low vision services are multidimensional and multidisciplinary and is not only for ophthalmologists but also rehabilitation specialties. Special educators have to be committed to bring light and happiness in the lives of many with low vision.

We also request policy makers to plan and upgrade the future allocation as well as coverage for low vision services in our country so that people with permanent low vision impairment be able to easily access the services, enjoy mobility and receive information and treatment at an eye health service centre.

We are thankful to CBM and Sightsavers for their efforts in bringing about the manual and sponsoring the workshop.



Dr. Col. (retd.) M. Deshpande VSM
President, VISION 2020: The Right to Sight – India

डॉ. एन के अग्रवाल
DR. N. K. AGARWAL
उप महानिदेशक (नेत्र)
Deputy Director General (O)



सत्यमेव जयते

राष्ट्रीय अंधता नियंत्रण कार्यक्रम
स्वास्थ्य सेवा महानिदेशालय
निर्माण भवन, नई दिल्ली-110108
NATIONAL PROGRAMME FOR CONTROL OF BLINDNESS
DIRECTORATE GENERAL OF HEALTH SERVICES
MINISTRY OF HEALTH & FAMILY WELFARE
NIRMAN BHAWAN, NEW DELHI-110108
TEL. NO.: 011-23061594, FAX : 011-23062702
E-mail : ddgnpcb2010@gmail.com
nkndindia@gmail.com

Message

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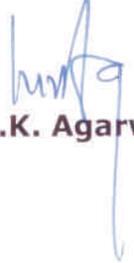
Low vision generally connotes that vision in an eye which can only be partially corrected despite deployment of visual aids/surgical maneuvers of different types available in our armamentarium of low vision aids. This is due to the fact that the underlying pathology in the affected eye is such that it cannot be fully cured, unlike, cataract or refractive error which are treatable by the means available with an ophthalmologist/Optomtrist and where the final visual acuity can be raised to normal/near normal levels. The aim while treating the children/adult persons herein is to enhance their vision to such levels that they can move around comfortably on their own and can also read/write as well as undertake activities whereby they can enjoy some aspects of life without being dependent upon others all the time in any respect.

Most commonly deployed devices to treat low vision can either be spectacle based, attached to bands that rest on forehead, are hand held like the hand held glass magnifiers, magnifying lenses shaped like paper weights that can be put on a paper laid on a table, computer based magnifying devices/books that can give audio inputs as well in addition to the visual function, projector based magnifying appliances that can help a person suffering from low vision decipher the details printed on a sheet/slide.

On a recent visit to L.V. Prasad Eye Institute, Hyderabad, I was really satisfied with their management of patients suffering from low vision and wish that at least, every tertiary care hospital, whether Govt. run or NGO based, has similar type of Low Vision Aids Lab in their hospital.

A manual on low vision that shall provide structural and functional details of the devices that can be deployed to provide visual relief to those in need, was long due for use by all the Ophthalmologists/Optomtrists and all others coming across children/adults suffering from low vision. I am glad that this manual has been developed by Lotus Optometry School, Mumbai and is being supported by Sight Savers and CBM.

I congratulate H.V. Desai Eye Hospital, Pune for organizing the "Low Vision Workshop" to be held on November 15 & 16, 2013 and wish them a grand success in this endeavor.


(Dr. N.K. Agarwal)

Foreword

Globally, a large number of visually impaired people are suffering from Low Vision, with India having maximum number of such persons. Unfortunately, because of ignorance, these people were being labelled as blind or partially blind and imparted Braille training. In fact, their vision could have been enhanced with the help of low vision aids which were not even heard of, till a few years back.

However, with the commencement of Inclusive Education for children with disabilities, under the Sarva Shiksha Abhiyan, dawned the concept of 'Low Vision'. Of course, prior to this, Low Vision initiatives were being taken but mostly by leading disability organisations like NAB, BPA or INGO supported projects. Now, Low Vision initiative has become an integral part of all rehabilitation projects for visually impaired, supported by Sightsavers.

With increasing awareness about Low Vision among policy makers, decision makers, and Civil Society Organisations, there is a growing demand for including it as an integral part of education programs. The need has also arisen for consolidating and imparting the knowledge on Low Vision and establishing standardised procedures and practices that can be adopted by Ophthalmologists and other stakeholders involved in Low Vision management.

For meeting these demands, Sightsavers in India have developed this Manual in consultation with various individuals and organisations who have championed the cause of Low Vision and commenced the process of centre-staging Low Vision as an issue needing attention. Sightsavers in India hopes that this Manual will prove useful for eye health professionals, hospitals, NGOs working on eye health or disability issues, institutions funding eye health programmes and relevant Government bodies.

Sightsavers in India wishes to sincerely thank the Lotus College of Optometry for the hard work put in towards developing this Manual with the support of Dr. Sunita Lulla Gur; Dr. Shubhra Sil; Prema Chande; Dr. Uday Gajiwala; Jinal Zaveri; Sumana Samuel; Sudha H. Tumbe and Sachu Ramalingam.

Sightsavers in India hopes that this manual would serve the purpose of creating awareness among the eye health fraternity on the need to focus on Low Vision and enable quality implementation of Low Vision programs.



R.N.Mohanty
Chief Executive Officer
Sightsavers in India

Foreword

CBM believes that “Together we can do more”. We at CBM are happy that the partnership between CBM, Sightsavers and Vision 2020 has resulted in the development and publication of the manual on Low Vision.

CBM is committed to improving the quality of life of people with disabilities in low income regions of the world. With more than 100 years of experience in the field of disability CBM strives to build the capacity of partner organizations.

India has made considerable progress in the prevention of avoidable Blindness. Low vision has remained a low priority and only 5 – 10% of persons with low vision access low vision services. The lack of access to low vision services results in children with low vision studying in blind schools and being taught braille instead of using their residual vision. Ageing and increasing longevity will also increase the numbers of those with conditions that result in low vision. The number of people living with vision loss will increase over the coming decades. The needs of working-age individuals who lose vision, children growing up with vision loss and the elderly need to be addressed.

This manual has been developed for eye care service providers. We believe that it will help in development of low vision services in the country and strengthen programmes for the needs of persons with Low Vision.

We thank Sightsavers, VISION 2020 the Right to Sight India, the Lotus School of Optometry and all those involved in development of these guidelines on the comprehensive management of Low Vision in India for their collaboration.

With Regards,



Dr. Sara Varughese
Regional Director
ChristoffelBlinden Mission (CBM) India Liaison Office

Foreword

Comprehensive eye care is one of VISION 2020: The Right to Sight – India's focal areas towards achieving the goal of eliminating avoidable blindness from the country.

Under our resource centre, we have been publishing manuals with guidelines and protocols for eye problems. Cataract, Diabetic Retinopathy, Vision Centre, Setting up of a Secondary Eye Care Centre, Planning of Tertiary Eye Care Services are some published manuals.

Low Vision is one field that, till now has received very little attention as the focus has been in tackling the huge number of cataract cases. But now that we have been able to achieve some success in dealing with cataract, we can turn our attention towards other equally pressing eye care problems that has been waiting for attention.

We are glad that along with the release of the manual, we have been able to organise a much needed national workshop for low vision and fortunate that several leading experts in this field will be participating for further deliberation.

This manual has been made possible due to the initiative of Sightsavers and CBM and we take this opportunity to thank both the leading INGOs working extensively in the area of low vision in the country for conceptualising and supporting this manual.

The Lotus College of Optometry, Mumbai have taken the lead role in developing this manual. Some of the low vision experts in the country with extensive experience have authored this manual: Dr. Sunita Lulla Gur, Dr. Shubhra Sil, Prema Chande, Dr. Uday Gajiwala, Dr. Jinal Zaveri, Dr. Sumana Samuel, Dr. Sudha H. Tumbe, Ms. Sachu Ramalingam. We are extremely grateful to Lotus College of Optometry and all the authors for their labour in writing this exhaustive and useful manual.

We are indebted for the technical review and valuable inputs from the CBM international office's technical review team: Ms. Karin van Dijk, CBM global advisor for low vision, low vision specialist and Ms. Deiva Jayaraman, Consultant - Vision Rehabilitation Services, Frontline Eye Hospital and the VISION 2020: The Right to Sight – India technical review members: Dr. Rahul Deshpande, Medical Director, HV Desai Eye Hospital and Dr. Uday Gajiwala, Superintendent, Tejas Eye Hospital.

We appreciate the leadership and encouragement of Ms. Sujaya Krishnan, Joint Secretary, Ministry of Health and Family Welfare, Government of India and Dr. NK Agarwal, Deputy Director General (Ophthalmology), Ministry of Health and Family Welfare, Government of India in our efforts to eradicate avoidable blindness from India.

We sincerely hope that this manual will be used by the eye hospitals across the country for setting up low vision centres thus helping those with low vision to lead a quality life.



Dr. G. V. Rao
CEO, Vision 2020: The Right to Sight - INDIA

| About the Authors

Dr. Sunita Lulla Gur

M.S. Ophthalmology

Dr Sunita Lulla Gur is a consultant ophthalmologist heading the low vision services and associated with Anterior Segment Services at ICARE Eye Hospital NOIDA. She has been working in the field of ophthalmology since last 15 years. Dr Sunita is an alumina of Nagpur University. Formerly she was heading the low vision and contact lens services at Venu Eye Institute, New Delhi. She has been trained as a national focal person for low vision at Hong Kong Society for the Blind, Hong Kong under WHO and Vision 2020. She has presented papers and posters at various international and National conferences on low vision. She has been regularly conducting low vision workshop at national and international level since 2002. She is a resource person for low vision with Sightsavers International, CBM, National Association for the Blind and much other organizations working on disability

Dr. Shubhra Sil

M.S. Ophthalmology

Dr. Shubhra Sil is MBBS from NRS Medical College, Kolkata, DNB (Ophthalmology) from Aravind Eye Hospital, Madurai. She is trained as National Focal Person in Low Vision from Hong Kong Society for the Blind and also in Clinical Low Vision from Light House International, New York. She has completed training in Cornea from LV Prasad Eye Institute, Hyderabad and Moran Eye Institute, Utah, USA. She is at present working as Consultant Ophthalmologist in Vivekananda Mission Ashram Netra Niramay Niketan, a hundred bedded rural eye hospital in West Bengal since 2001. She has conceptualised and managed extensive low vision project for children under the Sarva Siksha Mission in West Bengal. She has made several presentations in national conferences and worked as a resource person in various Low Vision training courses. Another achievement of her is her role in setting up a rural Eye Bank. She is recipient of AIOS Award for Refraction and Contact lens, 2010.

Ms. Prema Chande

M.Optom, DBM, FIACLE

Mrs. Chande heads the Lotus College of Optometry, and is a practicing optometrist at the Roshni Eye Care, Optometry and Contact Lens Clinic, Navi Mumbai. Mrs. Chande has worked as a clinical optometrist, contact lens specialist, low vision consultant, and consultant optometrist at various practices and hospitals in Mumbai. In 2000, Mrs. Chande helped establish Mumbai's first 4-year-degree Optometry program, the Lotus College of Optometry. The College is an active participant in all Vision 2020 activities, and she works with various non-governmental organizations including the Lions Club International Foundation, ORBIS International, and Sightsavers, for eradication of childhood blindness. She is honoured with the "DRIVISA" award in 1998 for her contribution to optometric education. She is a member-at-large (Executive Committee member) for the Asia Pacific Council of Optometry and ASCO (Association of Schools and Colleges of Optometry).

Dr. Uday Gajiwala

M.S. Ophthalmology

Dr. Uday Gajiwala is working as superintendent in Tejas Eye Hospital run by Divyajyoti Trust, Mandvi, District Surat, Gujarat and is also the founder vice president of the trust. He is Trustee of SEWA Rural, Jhagadia, District Bharuch, Gujarat and Drashti Nethralaya, Dahod, Gujarat. He is President – Vision 2020 Gujarat chapter. He has many publications to his name. He is an expert in infection control activities and conducts clinical audits of hospital on a regular basis. Has authored a manual on operation theatre protocol and prepared a video also demonstrating the protocol. Working in the rural tribal area of Surat district, he has devoted his life to the service of the poor people. He was instrumental in developing a comprehensive eye care programme at SEWA Rural, Jhagadia and is now trying to do the same in Divyajyoti trust which includes tertiary eye care activities, training programmes and rehabilitation of incurable blinds and integrated education activities for blind children.

Ms. Jinal Zaveri

M. Optom, FIACLE

Mrs. Zaveri is a consultant optometrist, low vision & contact lens specialist. Mrs Zaveri has worked as a faculty for under-graduates & post graduates at various optometry colleges across Mumbai region. She is a gold medalist from Lotus College of Optometry and has been actively involved in research, contributing articles and pedagogic development in the areas of Optometry. As a specialized service professional, she has

worked with Eye hospitals, Optical Outlets and leading Optometry colleges. Mrs Zaveri has various national and international award winning presentations to her credit.

Ms. Sudha Huzurbazar Tumbe

M.Com.M.Ed.(Spl.Ed.),PGDHRM

She is associated with, Sarva Shiksha Abhiyan Maharashtra as Member of the Panel for Visual impairment; and Low Vision Expert, Lotus College of Optometry, Juhu; as Low Vision Rehab.Spl., V.J.T.I.College of Engineering, Wadala; as visiting faculty Teaching Industrial Organisation and Management. She is also associated with S.N.D.T.University Dept. of Distance Education; As Post Graduate Diploma in ECE, HRM and School Councelling -Course Co-ordinator. She is also involved with Remedial Discalculia Special Educator.

Ms. Sachu Ramalingam

M.R.Sc, (Ph. D)

Ms. Ramalingam is a practicing vision rehabilitation consultant based out of Mumbai. She is currently the Project Manager for Asian Blind Union, Assistant Professor in the Department of Special Education, SNDT University and a visiting faculty and consultant low vision services at Lotus Eye Hospital. Prior to her current role she was a Programme officer with Sightsavers. Her work on the national canvas became more pronounced with her involvement with Dr. Shroff's Charity Eye Hospital. Apart from promoting rehabilitation in a primarily medical intervention based structure, she has also been Secretary of All India Confederation of the Blind and Chairperson of National Forum of Blind Women. Ms. Ramalingam has been the Editor of a well-known journal of visual impairment, named Netranjali and also, the Assistant Editor of Braille Digest an English Braille magazines in India and a blog on resources for low vision. She has won The Helen Keller Award, the Best rehabilitation professional gold medal, the Neelam Kanga Award, the National Role Model Award from the President of India and IBN7 Super Idol award. She has more than 15 publications to her credit including a manual on "Organisational Leadership and Project Management". She has presented papers in various important conferences both in India and abroad in the areas of education, visual Impairment, accessibility products, technology for the visually impaired, comprehensive rehabilitation of Low Vision children and persons etc.

Ms. Sumana Samuel

RN, RM, MA, B.Ed, PGPD, M.Ed (Visual Impairment)

Mrs. Sumana Samuel is the Principal of Sharp Memorial School for the Blind, Rajpur,

Dehra Dun, Uttarakhand. She also heads the Low Vision department at the school. She has helped to establish Low Vision services in Blind schools across a few states in India with the support of CBM. She is a trainer in functional Low Vision and travels and trains teachers in India and abroad. She works as a consultant for children with Low Vision and assists them in their education and rehabilitation. Sumana is a guest faculty for special education at the Study Centre of Indira Gandhi National Open University (IGNOU), Dehra Dun and also helps National Institute for the Visually Handicapped (NIVH). She is a member of the Uttarakhand State Resource Group (SRG) and works closely with the Sarva Shiksha Abhiyan and Rastriya Madhyamik Shiksha Abhiyan. She has assisted Karin Van Dijik in developing a book "Training on effective use of VISION" for use in developing countries (Asia) for children with Low Vision. She and her husband, Mr. P M. Samuel, have been serving the school for the last 28 years and are associated with many organizations. Today Sharp Memorial School for the Blind stands as one of the best Low Vision resource centres in India.

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1

Introduction

1.1. Global and India facts of low vision

- 285 million people are visually impaired worldwide: 39 million are blind and 246 million have low vision, of whom a larger number reside in INDIA.
- About 90% of the world's visually impaired live in developing countries and 80% blindness is avoidable blindness.
- Globally, uncorrected refractive errors are the main cause of visual impairment; cataracts remain the leading cause of blindness in middle- and low-income countries.
- The number of people visually impaired from infectious diseases has greatly reduced in the last 20 years.
- Every five seconds one person and every minute one child goes blind in the world. The total blindness is increasing every day with increasing population.
- We have more than 9 million cataract blinds in India – the highest in the world.

India has a population of over 1 billion and this is growing approximately at the rate of 13%. A study by R.Dandona, estimated that the prevalence of low vision is 1.05% of the entire population. This reveals that India is estimated to have a population over 10 million persons with Low Vision. As per the WHO standards for service delivery, considering that India has a population of 1 billion, based on this the need for low vision services in India would be

Primary Centers = 2000

Secondary Centers = 400

Tertiary Centers = 100

India has done well in last few years in eye care and the total performance as far as cataract surgeries is concerned has also increased substantially. The VISION 2020: The Right to Sight – India programme launched is also providing impetus to the whole National Programme for Control of Blindness.

Having done better with cataract, now India is trying to address other important causes of blindness. Refractive error being next important in the line-up is now taken up more aggressively followed by diabetic retinopathy. At the same time, it is also appreciated that the treatment of uncorrected refractive error is very easy by provision of a pair of spectacles and besides

ophthalmologists that also can be done by optometrists and refractionists.

It will also help to disseminate the information and thus increase awareness among the stake holders and the community and help the managers and administrators for costing and setting up low vision services.

Unfortunately, till date, this has not been looked at carefully, may be because we were busy tackling cataracts, but the awareness about the visually impaired people is lacking even among the general populations and Eye care practitioners. The goal is to equip individuals with incurable visual loss with skills and confidence so that they can function as independently as possible and to improve their quality of life.

Surveys in schools for the blind in India have shown that 50% of children enrolled have low vision and are not blind. Reports indicate that only 3% of all blind and visually impaired children in developing countries have access to basic low vision care. Low vision care of children with visual impairment early in the life could potentially minimise long-term permanent visual disability and reduce the number of blind years. Low vision care is recognized as a priority in "VISION 2020: The Right to Sight" programs.

There is few information available, describing the low vision assessment and treatment for people involved in eye care and for people on how to set up the low vision services and this is making it difficult for everybody to get a head start.

The present low vision manual is aimed at all those persons, institutions and agencies who want to set up low vision services and provide them all the necessary information regarding setting up of low vision services at primary, secondary and tertiary level and includes the equipment required, cost involved and how to raise awareness among all stake holders and also about provision of low vision services.

Learning from different institutions has been used in the process of developing this manual.

1.2. Objectives of the manual

The aim of this manual is to provide guidelines and minimum standards for developing low vision services at primary, secondary and tertiary levels. This manual will help individuals and institutions to incorporate low vision services into their existing programmes. The objectives include

- To understand the current scenario in LV.
- To develop guidelines for clinical, functional, educational and rehabilitation services for Low Vision persons.
- To develop a job description of various personnel involved in providing LV services.
- To develop guidelines for training of personnel for providing low vision services.
- To define the standards of services that is to be provided at primary, secondary and tertiary levels.
- To develop programme management tools for the delivery of quality low vision services at all

levels.

- To develop a framework for Advocacy, Networking, Research and Awareness generation.
- To raise the awareness as "low vision" is considered very low among the stake holders
- To make guidelines for service delivery at primary, secondary and tertiary levels for low vision care
- Provision of low vision services in form of devices (optical devices and non-optical) and visual efficiency training.
- Understanding and procuring of low vision devices and List of suppliers

1.3. Potential users

Following would be the potential users of this manual:

1. Eye health professionals
2. Eye Hospitals
3. NGOs
4. Institutions funding eye health programs
5. Government institutions involved in planning and training of eye health services

A list of potential users & stake holders is given below:

Hospitals / NGOs

Ophthalmologist, Optometrists, Vision Technicians / ophthalmic assistants, Rehabilitation Personnel, Special educators / Inclusive Education teachers, General Practitioners, Paediatricians, Programme Managers, Social Workers / Counsellors, Persons working with multiple disabled persons, General development organizations and; Disabled people organizations

Government Bodies

1. Ministry of Health and Family Welfare,
2. Ministry of Human Resource and Development
3. Ministry of Social Justice and Empowerment

Others

1. Rehabilitation Council of India
2. Medical Council of India
3. Higher Education Institutions such as University Grants Commission (UGC), Universities, Medical Colleges, All India Council for Technical Education (AICTE), National University for Educational Planning and Administration (NUEPA), Centre for Disability Studies, Open Universities
4. VISION 2020 : The Right to Sight – India
5. All India Ophthalmology Society, AIOS
6. State Ophthalmic Societies
7. All India Optometry Council

1.4. Expected outcome

It is expected that the use of this manual -

- Will help the Programme Managers set up the low vision services at different levels
- Will help in planning, implementation and cost containment of low vision services
- Will make the service provision for low vision uniform across the different service providers
- Will help the Ophthalmologists & Para-medics in assessing the low vision clients and guide them regarding the provision of different forms of Services
- Finally help the people involved in education and rehabilitation work in provision of services to low vision clients

2

Low Vision Definitions

Epidemiology of visual impairment helps in identification, management & prevention of eye diseases in different population. Fundamental to the process of providing Low Vision care to visually impaired person is an understanding of the terminology surrounding visual impairment. When it comes to defining low vision, there are many variations within the field. This chapter will be highlighting a range of regularly quoted definition and to review the definition of Low Vision for importance of low vision care.

Low vision indicates that the person is not blind and that the vision is less than normal. These individuals are best helped with low vision devices such as large print, magnifiers, and illumination. In addition, the following aspects should be considered when defining low vision: Low vision may result from many different ophthalmologic and neurological disorders and may cover a wide range. Low vision is a visual impairment that may interfere with a person's ability to carry out daily living and leisure activities, as well as performing work.

Vision loss is not dichotomous, but occurs as a continuum ranging from modest low vision to total blindness. Reconciling the results from many international reports is difficult because of complications with the definition of "low vision." There are confounding factors that skew demographic descriptions of low vision populations due to rather subtle semantic differences in definitions. The consequences in terms of data are fairly predictable.

In 1973 it was highlighted that one of the major problem to collect data was non-standardization of definition. Around 65 different types of definitions were used worldwide to describe the definition of Blindness and poor vision.

Thus in 1978 WHO proposed a standard classification that would be used worldwide. This was included in 10th revision of the International Classification of Diseases (ICD-10) but unfortunately this classification is not accepted worldwide although references to it are now common.

2.1 WORLD HEALTH ORGANISATION (WHO) DEFINITIONS VISUAL IMPAIRMENT, BLINDNESS & LOW VISION

Vision impairment:

Refers to conditions encompassing the continuum from partial sight to blindness

WHO Definition of Blindness is defined as Visual acuity less than 3/60 in the better eye after best possible correction and visual field < 10 degree from the point of fixation.

Blindness: It is also defined as no usable vision with the exception of light perception.

WHO Definition of Low Vision is defined as Visual acuity 3/60 to less than 6/18 in the better eye after best possible correction in the better eye and visual field <20 degree from the point of fixation.

The WHO working /Functional Definition of Low Vision (WHO, 1992) is defined as A person with low vision, 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 degrees from the point of fixation, but who uses, or is potentially able to use, vision for the planning and/or execution of a task."

The use of the functional definition ensures that people who have vision less than 3/60 are included for the low vision services to help them to utilize their useful residual vision to its maximum potential.

Functional vision impairment refers to a significant reduction of visual capability resulting from some pathological conditions, that cannot be corrected or treated and results in the following:

- Insufficient visual resolution
- Inadequate field of vision
- Reduced peak contrast sensitivity
- Insufficient visual resolution or peak contrast sensitivity in high or low illumination. This creates a difficulty in performing day to day tasks.

Legal blindness is defined as visual acuity less than 20/200 or 6/60 or less in the better Seeing Eye with best correction (including CLs) or a visual field of 200 in the widest meridian of the better eye. Its significance is majorly for benefits.

INTERNATION CLASSIFICATION OF DISEASE: ICD

The ICD is the international standard diagnostic classification for all general epidemiological, many health management purposes and clinical use. These include the analysis of the general health situation of population groups and monitoring of the incidence and prevalence of diseases and other health problems in relation to other variables such as the characteristics and circumstances of the individuals affected, reimbursement, resource allocation, quality and guidelines.

It is used to classify diseases and other health problems recorded on many types of health and

vital records including death certificates and health records. In addition to enabling the storage and retrieval of diagnostic information for clinical, epidemiological and quality purposes, these records also provide the basis for the compilation of national mortality and morbidity statistics by WHO Member States.

Classification for Visual impairment based on H54 : ICD-10 (International Classification of Diseases –Version 10).

Category of visual impairment	Visual acuity best possible correction	
	Maximum Less than	Minimum equal to or better than
Low Vision		
1	6/18 (20/60) [0.5]	6/60 (20/200)[1.0]
2	6/60 (20/200) [1.0]	3/60 (20/400)[1.3] CF at 3 m
Blindness		
3	3/60 (20/400) [1.3] CF at 3 m	1/60 (20/1200) [1.8] CF at 1 m
4	1/60 (20/1200) [1.8] CF at 1 m	Light perception (PL)
5	No perception of light (NPL)	
9	Undetermined or unspecified	

The standard WHO definition is used in medical reports and publications and is solely based on visual acuity and does not take into account functional vision.

2.2 INDIAN DEFINITIONS OF LOW VISION

The new low vision definition as per, The Right of Persons with Disabilities Bill, 2011 (RPWD Bill) can be used after the Bill is passed in the Parliament and promulgated as an Act and therefore can be used in medical reports, publications, and certification. The new Indian low vision definition gives the much needed quantitative and the qualitative perspective needed to utilize the residual functional vision of the person.

The WHO Functional definition of low vision should be used for service delivery purposes and should not be used for any legal eligibility.

In India, the definition of visual impairment as under the **National Programme Control of Blindness (NPCB)** which is also adopted in the Persons with Disabilities equal opportunities, Protection of Rights & full participation (PWD) Act 1995 is as follows.

Blindness: Total absence of light or Visual acuity not exceeding 6/60 or 20/200 (Snellen) in the better eye with corrective lenses or Visual field of an angle of 20° or worse.

Low Vision: A person with Low Vision means a person with impairment of visual functioning even after treatment or standard refractive correction but who uses or is potentially capable of using vision for the planning or execution of a task with appropriate assistive devices.

- 'Low-vision'** refers to a condition in which a person has any of the following conditions, namely:
- Visual acuity not exceeding 6/18 or 20/60 and less than 6/60 or 20/200 (Snellen) in the better eye with correcting lenses; or
 - Limitation of the field of vision subtending an angle of more than 20 degree and up to 40 degree.

2.3 CATEGORIES OF VISUAL DISABILITY (CLASSIFICATION CURRENTLY IN USE)

Category	Better eye	Worse eye	Percentage Impairment
Category 0	20/30 to 20/60	20/80 to 20/120	20
Category I	20/60 to 20/120	20/200 to Nil	40
Category II	20/130 to 20/300 or	20/400 to Nil	75
Category III	field of vision 10°-20° 20/400 to 20/1200 or	20/8000 to Nil	100
Category IV	field of vision 10° 20/8000 to Nil or	20/8000 to Nil	100
One eyed persons	field of vision 10° 20/20	20/8000 to Nil or field of vision 10°	30

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3

Magnitude, Barriers and Opportunities

In total, the number of people with visual impairment (which includes both low vision- 246million and blindness-39million) is therefore estimated to be 285 million worldwide. . Since the prevalence of visual impairment becomes higher as people age, this combination of an increasing population and an ageing population is expected to cause a significant increase in the total number of visually impaired people.

Data on the magnitude of blindness can be collected from registries, Hospital Based Data and Population based surveys. Population based surveys are important epidemiological tools to ascertain the magnitude of blindness. The WHO recommends that population based surveys should be used to collect data on blindness because of the reliability and accuracy of survey findings.

Situation analysis in 2009 reveals that most low vision secondary and tertiary centres are located in large cities like Mumbai, Chennai, Delhi, Hyderabad or Calcutta and, across the country there are estimated to have 35-40 primary centres. The National Association of Blind has some services for low vision, but the rehabilitation emphasis is more on Braille and hence most low vision patients are rehabilitated with Blind and severely visually impaired. Blind School surveys further reveal that 40-50% of the inmates have low vision.

3.1 MAGNITUDE OF LOW VISION: Prevalence of Low Vision

A recent population-based study has shown the prevalence of low vision to be 1.05% in India.

For People aged 50 and over

About 65 % of all people who are visually impaired are aged 50 and older, while this age group comprises about 20 % of the world's population. With an increasing elderly population in many countries, more people will be at risk of age-related visual impairment.

For Children below age 15

An estimated 19 million children are visually impaired. Of these, 12 million children are visually impaired due to refractive errors, a condition that could be easily diagnosed and corrected. Nearly 1.4 million are irreversibly blind for the rest of their lives.

There is no study available in India on the prevalence of low vision using the functional definition except the Andhra Pradesh Eye Disease Study (APEDS) where prevalence of low vision was 1.05%. Extrapolating the 1.05% prevalence to the estimated 1200 million

population of India, 12 million of people might have functional low vision. This estimate needs further investigation, as the sample size was small.

India has a population of over one billion, and is growing at the rate of 13% per year based on the census 2001.

A study on comparison of socioeconomic status and blindness by R Dandona et.al, revealed that a higher rate of blindness prevailed in the developing countries and in poor socioeconomic background. It also revealed a higher prevalence of no schooling among the visually impaired. Hence addressing Low Vision service delivery needs can not only change the quality of life for over 5 million people but also improve the overall socio-economic status.

3.1 BARRIERS IN PROVIDING LOW VISION SERVICES

Low vision per se has enormous social and economic consequences in terms of productivity losses and dependency. Seeing the rapidly increasing burden of low vision globally, and more specifically, in the developing world, there is a need to have the provision of good quality low vision care as a key element of the Comprehensive Eye Service.

The uptake of low vision services continues to be relatively low even in more developed countries (3%-15%).

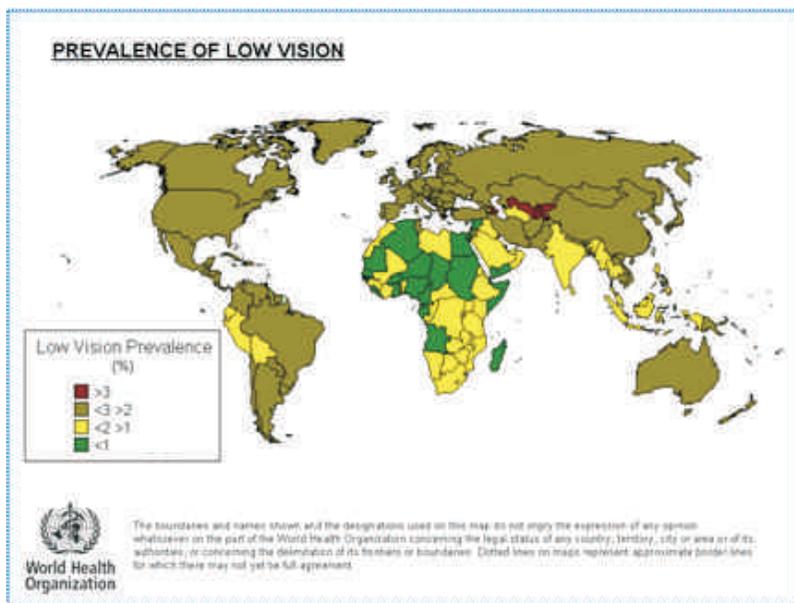
A study by Dr. S.A Khan et al, on Perceived Barriers to the Provision of Low Vision Services among Ophthalmologists in India cited that,

Lack of training/knowledge (82.3%),

Lack of awareness (74.7%) and

Non-availability of low vision devices (72.2%) were perceived as the major constraints / barriers to providing low vision care.

Also the other obstacles seen in providing low vision services are that for practitioners and manufacturers, providing low vision devices do not have any monetary gain. The procedure is



time consuming and often may not yield results as expected by the patient.

From the patient perspective, acceptance of low vision devices is also an issue. Most children do not like to use a telescope in schools due to cosmetic reasons and often parents are unhappy about it too.

The potential barriers that individuals with low vision face when trying to access low vision care, services, and technologies are

- Lack of awareness and knowledge of low vision among ophthalmologists.
- Low vision care is time consuming and not lucrative
- Lack of motivation among eye care providers
- Non-availability of low vision devices
- Lack of awareness and knowledge of low vision services by the general public
- Poor access to low vision services as perceived by the low vision patients themselves.
- Eye care professionals gave patients limited information on coping with low vision and referred them to low vision services at the end of the treatment process.
- The image of low vision patients is that of a people who are blind and who use canes and guide dogs, which was difficult for people with partial sight to relate to.
- Lack of communication between the physician, patient, and family exacerbate this problem.

3.3 OPPORTUNITIES IN PROVIDING LOW VISION SERVICES

The challenges or barriers can become the opportunities to develop and improve the low vision services among the stake holders

- It will help increase awareness about low vision services among ophthalmologists and other eye care professionals and the public.
- Helps develop a well designed education/awareness campaign on awareness of services for people with low vision, targeting eye care practitioners and the public.
- Low Vision can be promoted in cataract campaigns.
- To include low vision services as part of curricula of ophthalmologists, optometrists, mid-level eye care personnel and rehabilitation workers
- A major effort must be made at both the pre and in-service levels of medical education to sensitize the medical community to low vision services and to train them to make the appropriate referrals.
- Helps strengthen existing centers through continued education, infrastructure development etc.
- Helps improve communication and information exchange between ophthalmologists and low vision service providers to increase the rate of referral of visually impaired patients.
- To educate eye care professionals about the availability of low cost, good quality low vision devices in the country.
- To adopt Innovative methods to make simple optical magnifiers.
- Research grants to manufactures/ institutions for developing newer and cheaper devices
- Funds are provided for cataract surgery, free spectacles – but for Low Vision Devices there is basic resistance.

4

Causes for Low Vision

Children and adults get low vision due to any eye disease, hereditary conditions, or trauma. They experience severe visual impairment that either reduces or restricts their ability to use vision to carry out everyday functions, with a negative impact on their quality of life, (e.g., employment, independent living, orientation, experiences, education). Partial vision loss that cannot be corrected causes a vision impairment known as low vision.

There are many different conditions that can cause low vision, and each condition affects sight in a different way. In order to gain a better understanding of the nature of residual vision we need to examine the causes of low vision.

4.1 DISEASE PROCESS

Knowing and understanding the Pathology helps the Low vision team formulate appropriate treatment program. Any low vision patient can be best understood when the cause is divided in any of the three broad categories.

1. **Cloudy media**
2. **Central field defect**
3. **Peripheral field defect.**



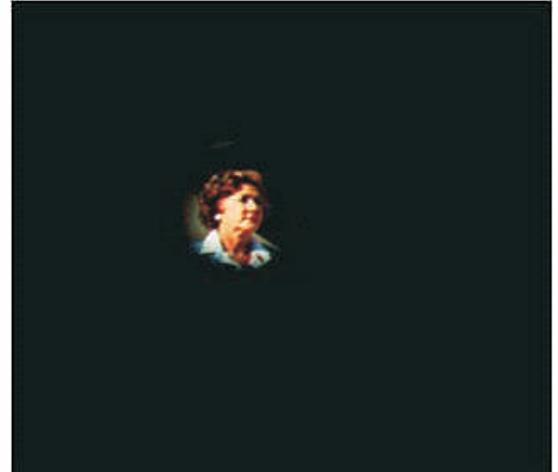
Normal Vision



Cloudy Media



Central Field Loss



Peripheral Field Loss

The disease follows a pattern and accordingly affects the person's ability to perform. It starts as showing anatomical changes to affecting patients vision to giving rise to visual disability to handicap state for the low vision client.

1. VISUAL DISORDER

- It gives rise to anatomical changes in the visual organs
- For example, Glaucoma in its early stages can go unnoticed by the patient, without affecting abilities.

2. VISUAL IMPAIRMENT

- Functional loss from a visual disorder.
- It affects visual acuity, visual field, colour vision, contrast sensitivity

3. VISUAL DISABILITY

- It gives rise to vision-related changes in the skill and abilities
- It is measured in terms of the skills - can or cannot perform.

4. VISUAL HANDICAP

- It has Psychosocial and economic consequences of visual loss.
- Skills of the person gets hampered
- Giving rise to Barriers in the environment both physical and social.

Example of a disease process of macular degeneration

Macular degeneration	DISORDER
Decreased vision	IMPAIRMENT
Can't read and write	DISABILITY
No gainful employment	HANDICAP

4.2 VISUAL DISTURBANCES CAUSED BY OCULAR PATHOLOGIES

1. **Lower central acuity or fluctuating vision:** Persons with such condition may indicate a diminution of vision, haziness, or foggy vision. Visually they first report that they cannot read small prints.
2. **Metamorphopsia:** Persons with metamorphopsia describes distortion of vision. Objects appear to bulge, curve or look funny.
3. **Photophobia:** Person either complains of abnormal sensitivity to light or avoid high levels of illumination recovery, from glare, is slow and adaptation of light is difficult.
4. **Colour Defects:** Person indicates they cannot detect colours or functional observations show that they have trouble identifying colours.
5. **Field defects:** Persons report they have vision in specified sectors of the visual field and parts of the object to be viewed are always missing. Common losses include;
 - General contraction or depression object in the periphery are not seen.
 - Hemianopia
 - Scotoma
6. **Night blindness:** Persons indicate decreased vision at night and difficulty in performing specific task at night. This condition can be confirmed by clinical test or electrodiagnostic testing.
7. **Entoptic Images:** Persons with this condition sees floaters or spots before their eyes, which momentarily interferes with vision. Such symptoms may indicate an acute pathology.
8. **Oscillopsia:** Persons with this condition reports that the world seems to be moving or jumping around. This condition may be sign of neurological disorders. Therefore patient should be referred to a neurologist.

4.3 THE CAUSES OF LOW VISION

The common diseases which give rise to low vision are as follows,

Causes of blindness in adults over age 50 as per National survey 2001

Cataract	62.6%
Refractive errors	19.7%
Glaucoma	5.8%
Posterior segment disorder	4.7%
Corneal opacity	0.9%
Others	6.2%

In children

Refractive error	33.3%
Congenital eye anomalies	25%
Retinal degeneration	16.7%
Vitamin A deficiency	8.3%
Others	16.6%

EYE CONDITIONS CAUSING LOW VISION BASED ON THE STRUCTURE INVOLVED

Cornea

- Corneal opacities
- Degeneration
- Keratoconus
- Macrocornea
- Microcornea

Lens

- Surgeries,
- Aphakia

Uvea

- Aniridia
- Choroidal degeneration
- Coloboma of iris or choroid

Vitreous

- Vitreous haemorrhage
- Persistent Primary Hyperplastic Vitreous (PHPV)

Retina

- Macular Degeneration
- Retinitis Pigmentosa
- Diabetic Retinopathy
- Retinal scars
- Atrophy
- Detachment
- Retinopathy of Prematurity (ROP)
- Rod-cone dystrophies etc.

Optic nerve disorders

- Optic neuropathy,
- Optic atrophy

Others

- Glaucoma
- Albinism
- Coloboma
- Degeneration due to uncorrected/high refractive errors
- Amblyopia
- Neurological disorders & Tumours : viz. retinoblastoma
- Trauma
- Globe abnormalities like microphthalmos

4.4 Summary - Causes of low vision

In Children	In Adults
Corneal scarring	Congenital anomalies
Cataracts	Retinitis Pigmentosa
Lens dislocation	Micropthalmos
Aniridia	Coloboma
RP	High refractive errors
Coloboma	Amblyopia
Glaucoma	INS (infantile nystagmus syndrome)
Albinism	CVI (cerebral visual impairment)
ROP	ROP
Macular degeneration	Albinism
Infantile nystagmus syndrome	Aniridia
High refractive error	Corneal Scarring
Amblyopia	Lens dislocation
CVI	Macular degeneration/scar
Micropthalmos	Optic nerve atrophies
	Hereditary
	Retinopathies
	Optic nerve hypoplasia
	Different syndromes eg Down's

CONCLUSION

Vulnerable groups include both children and adults. Children who are visually impaired due to congenital disorders like Heredomacular degeneration, and those who develop retinopathy of pre maturity, uncorrected refractive errors, and treated congenital cataracts with no therapy given for amblyopia etc. are commonly found having low vision disorders. Children need early intervention as visual impairments effects the overall development of child. We need to detect the disorder early and treat it. In adults with increase in age, age related macular degeneration, is one of the leading cause of low vision. In the southern parts of India, study by Dr Khan et.al reveals Retinitis pigmentosa is a common cause for low vision in adults. Besides these, known diabetics and undetected glaucoma cases are also at a threat to develop visual impairment.

5

Low Vision Assessment

5.1 PURPOSE OF LOW VISION ASSESSMENT

The purpose of low vision assessment is to assess the residual vision present and correlate it with the individual's social, educational, vocational and other needs, and to identify ways and means to enhance the residual visual functions. Low vision assessment is different from a clinical eye exam. While the clinical procedure focuses on diagnoses and management of the eye disease, the priority in low vision assessment is to enable an individual utilize his or her residual vision to its maximum potential. Low vision assessment is a result oriented procedure, at the conclusion of which, the examiner should have a clear perspective of what needs to be done. That is, whether the client would benefit from low vision devices, if there is any training needed in the use of these devices or if the client has to be referred to any other specific department or service provider (E.g. surgical intervention for cataract, squint, corneal opacity etc.)

Many causes of severe visual impairment cannot be medically or surgically cured. For patients with most conditions, however, appropriate optical, non-optical, or electronic prescriptions, and training, instruction, or therapies are designed to enhance sight and improve efficiency offer some level or form of remediation. Psychological counselling to improve the person's ability to cope with vision loss may also improve the functional resolution of vision loss.

Therefore the important aspects of comprehensive low vision regime are:

- To assess and evaluate the functional status of the visual system
- To assess ocular health and related systemic health conditions and the impact of disease or abnormal conditions on visual functioning
- To provide appropriate ophthalmic and optometric low vision intervention to improve the patient's visual functioning, taking into account the patient's special vision demands, needs, and adjustment to vision loss
- To rehabilitate and educate patients regarding their visual impairment and ocular and related systemic health status, including recommendations for treatment, management, and future care giving them a holistic approach towards their well being.
- To provide an appropriate referral for services those are rendered outside the expertise of the low vision clinician.

TOOLS FOR LOW VISION ASSESSMENT

The tools for low vision assessment are long handled occluders, Janelli's and Halberg clips, pointer, trial lens holder, clip-on pin-hole, universal and pediatric trial frames, Jackson's cylinders up to 2 diopters, ruler and torch. The tools also include a full aperture trial lens set and a good range of auxiliary lenses like Stenopic slit, red green filters, prisms, etc.

These may include Snellen's, ETDRS LogMar, Sloan's Letters, Lea's symbols, VA Tester, Lea's preferential looking paddles, Paediatric low vision test, Fienbloom distance test, Bailey-Hall Cereal test. Other tests include brightness acuity test for glare assessment. Panel D15 for quantitative color vision assessment, Lea's low contrast symbol test for contrast sensitivity assessment, Amsler chart manual for central visual field assessment and Ishihara test for color blindness.

Following is the routine for a low vision examination.

STEPS OF LOW VISION ASSESSMENT

3 Steps:

- I. CLINICAL EVALUATION**
- II. FUNCTIONAL EVALUATION**
- III. VISION REHABILITATION**

It involves a complete understanding of the Condition, its symptoms and concluding the management of the low vision patient. Careful observation of the client's behaviour and his physical status can provide an insight to the severity of the problem.

Importance of Diagnosis: The clinical team is primarily responsible for diagnosing the low vision client accurately as the functional implications of the cause of low vision is different in each eye disorder. The areas of intervention are specific to certain eye disorders. Similarly, the age and the status of the eye disorder, whether progressive and non progressive also has a bearing on the interventions planned for the low vision client.

5.2 CLINICAL LOW VISION EVALUATION

A. OBSERVATION

Patients can be observed as they enter the room to see whether they walk unaided or are supported, whether they feel for a handrail or easily recognize open doorways. Wearing dark spectacle lenses or holding the head down may imply sensitivity to light, although this head position could be due to arthritis. Other signs to look for are difficulty in holding things or, tremor. Many elderly low vision patients may attend with a care taker or relative. To summarize observe the following,

1. Mobility
2. Fixation
3. Posture

4. Psychology of patient
 - Ready to accept the services
 - Motivated/depressed

B. INTERVIEW AND HISTORY TAKING

Interviewing is important in order to understand the emotional status and individual needs of the client. The interview also works as a platform for developing a rapport between the examiner and the client. The interview starts with the case history with emphasis on the visual problem. This is followed by the individual's personal history that includes occupation, education, living status and specific functional aspects, like independence, orientation, mobility and activities of daily routine.

The daily routine of the client can identify the needs of the individual and areas where help may be needed. Bringing to focus activities that may be possible can help in narrowing down the objectives of the client. All the data from the interview has to be recorded in an organized manner so it could be used effectively in finding the solutions.

History taking is one of the most important aspects of any low vision evaluation.

It is critical for the development of appropriate and realistic evaluation and management strategies. Following points should be covered.

- General information

- Demographic Information
- Interaction between the patient and the accompanying family member.
- Marital Status/living situation

- Ocular History

- Ocular history correlates the onset of specific visual complaints with disease appearance, progression or treatment.
- Diagnosis and onset of symptoms
- Past, current, or planned surgeries or treatments
- Stability of vision
- Family history of eye disease
- Previous history of eye disease or vision problems
- Current or previous use of spectacles, contact lenses, or low vision aids
- Patient's understanding of vision condition and implications for functioning
- Virtually, every ophthalmic intervention has functional consequences.

- Systemic History

- Many systemic illness have direct ophthalmic effects, one of the most obvious being Diabetes.
- General health review
- current medications
- Hearing impairment or other handicapping conditions
- Self-care needs (e.g., ileostomy, diabetes)

- Orthopaedic handicaps
 - Psychological considerations (e.g., denial, depression, co-dependency, or suicidal tendencies)
 - Activities critical to manage are:-
 - Distinguishing pills and other medications.
 - Self injection of insulin and monitoring blood pressure.
 - Parkinson's patients device adaptation
- **Educational or Vocational status**
- School requirements
 - Seeing blackboard
 - Computers
 - Reading instrument
 - Retired
 - On leave from work due to low vision
 - Homemaker
 - Has the client considered retiring or resigning because of the vision.
 - Social activities hampering
- **Financial Status**
- It's important to understand the commitment to the device
 - Basic needs of the client
 - Affordability of the device
- **Task Related History**
- It is most important as it provides insight into day-to-day problems that the patient faces. Task-related history should also focus towards the occupation of the patient. It helps the practitioner to understand the basic requirement of the patient.
 - Visual tasks can be divided into
 - Distance-street signs, traffic lights, faces and watching television.
 - Intermediate-seeing the computer, food on the plate, reading musical notes and enjoying hobbies.
 - Near-: Reading books, newspapers mails, prices, filling syringes, seeing playing cards and medication labels.
 - Other important daily living activities like travelling, grooming, housework and shopping and other specific job requirement.
- **Lighting situation**
- We also need to check the lighting situation to understand the patients problem whether he is able to tolerate sunlight, having difficulty in seeing in dim light. Whether any difficulty in going from bright to dim light. Whether comfortable with sunglasses or requires more bright light (incandescent or fluorescent).

Patient's needs and one's recommendations can differ from patient-to-patient. It helps you to recognize patient potential as well as limitations and suggests possible interventions.

C. VISUAL ACUITY

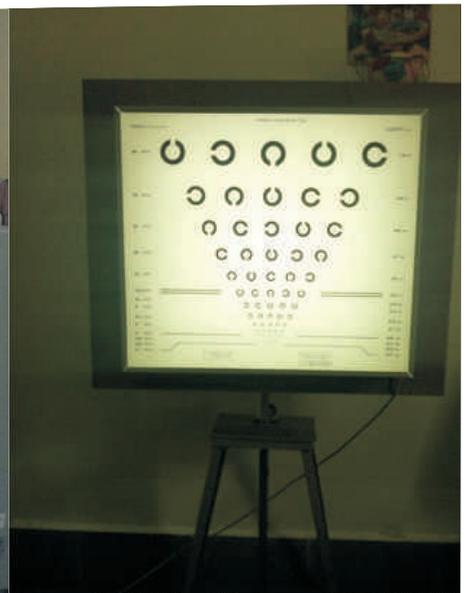
Measurement of visual acuity is one component of the evaluation that allows one to quantify the degree of high-contrast vision loss and, in many cases, clearly identifies the patient's visual impairment as it relates to the chief complaint. Measuring visual acuity also allows the clinician to:

- Helps determine best corrected visual acuity (BCVA)
- Monitor the effect of, stability and progression of the treatment of a disease
- Assess eccentric viewing postures and skills, patient motivation, scanning ability (for patients with restricted fields), and, in many cases, afford the patient an opportunity to experience success
- Teach basic concepts and skills (i.e., to eccentrically view) relevant to the rehabilitation process.
- Furthermore, the results of visual acuity testing are the basis for determining initial magnification requirements and the potential for specific rehabilitation strategies. Estimate the dioptric power of optical aids necessary for reading regular print size
- Verify the person's eligibility for tasks such as driving
- Classify patients as "legally blind" for the purposes of government, insurance and other benefits of exemptions.
- The methods of assessing distance and near visual acuity in visually impaired patients may be modified to address specific concerns

C1- VISUAL ACUITY ASSESSMENT (DISTANCE)

The visual acuity assessment begins with determining the distance acuity of the patient. The procedure involves showing the patient large size numbers on sheets from a particular distance and asking him or her to identify them. Optotypes, single-letter chart gratings and crowded letters of different sizes may be shown to the patient alternatively. The same procedure is repeated for each eye individually also.

1. Traditional methods of testing acuity are not practical for low vision patients.
2. Vision charts designed for low vision are hand held or movable rather than fixed or projected. Each line contains several characters so memorization is less likely
3. ETDRS charts are recommended for more accurate recording.



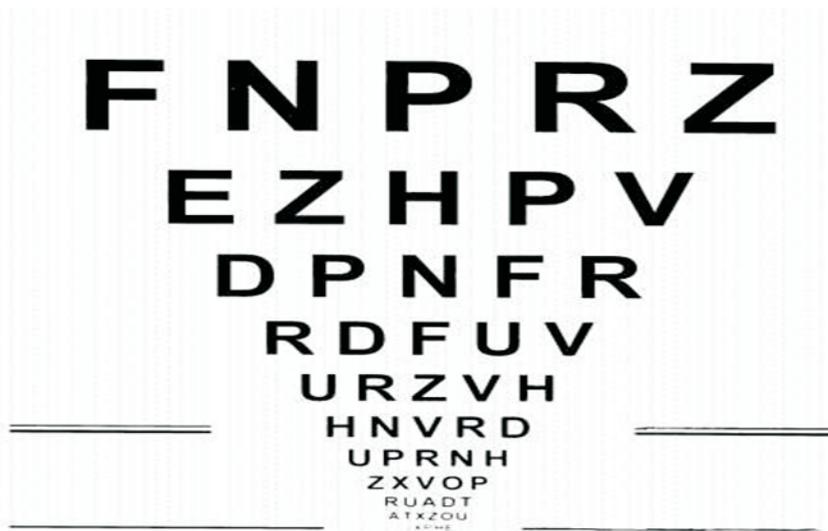
4. Patient feel more confident when they are able to read more letters and the start of low vision is with a positive note.
5. The hand held charts avoids glare, give better contrast and can be moved closer so that letter size is doubled.
6. Changing testing distance requires recalculation of acuity.
7. Record acuity with the actual testing distance in the numerator and optotype size in denominator.
8. All patients should be examined first in daylight condition
9. Special charts with grey background should be used in patients with glare problems
10. Bailey & Lovie chart are the logarithmic scale. Main advantage of chart is that it's near vision equivalent; greatly simplify the process of calculating the estimated magnification required by a patient.
11. Log MAR chart – ETDRS uses Sloan optotype. Essentially it is same design as Bailey Lovie charts but differ in actual letters used.

LogMAR charts

- Principle of a LogMAR chart is that it uses a logarithmic scale. LogMAR means Log of Minimum angle of Resolution
- Ian Bailey and Jan Lovie first to incorporate a log scale which has stepwise changes
- Calculation of required magnification easy
- Five letters per line. There is constant size progression ratio of 5/4 and each line is 1.25X bigger/smaller than previous.

Advantages of a LogMAR chart : Design feature and advantages

1. Equal number of optotypes per line and allows the use of single-letter scoring which reduces test-retest variability
2. Equal logarithmic interval between lines
3. Equal average legibility for each line. It ensures that letter size is the sole determinant of difficulty on a given line
4. Consistent spacing between letters and lines i.e.. Proportional inter-letter and inter-line spacing.
5. Geometric progression of letter sizes and allows testing distance to be variable. Vision recording is done at 4m to 2m to 1m. Correction factor of 0.3 should be added to the Log score when the distance is halved.



PINHOLE ACUITY ASSESSMENT

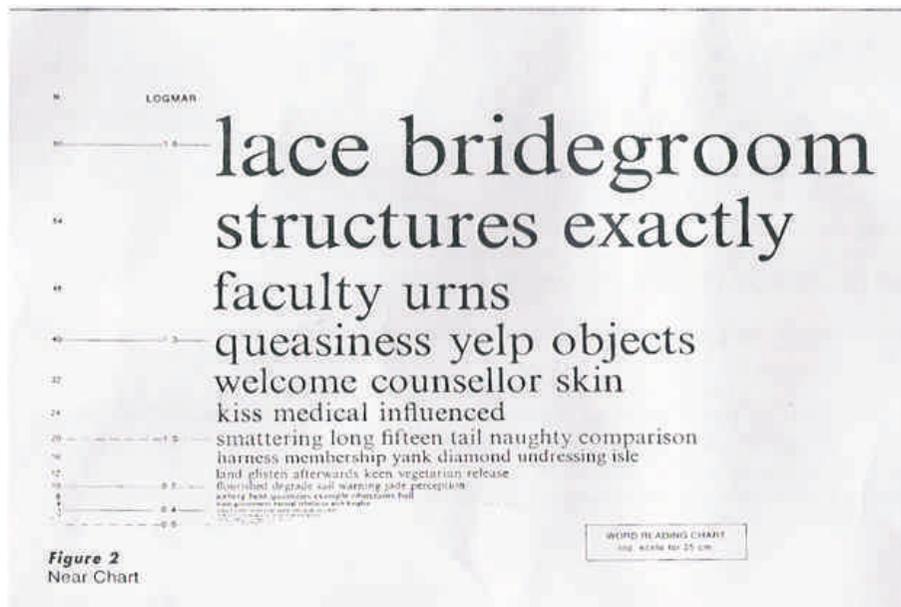
Pinhole acuity test is used to assess the presence or absence of a refractive error improvement in vision through indicates that the person may benefit from refractive correction.

LOW CONTRAST VISUAL ACUITY

1. The vast majority of our visual interaction with the world involves resolving low contrast details. Variation in contrast in everyday tasks is undertaken by all patients.
2. Bailey – Lovie low contrast chart, Pelli Robson charts; symbol charts – Lea's symbol charts, hiding Heidi charts with smiling faces to measure low contrast acuity.
3. When optotype based letter charts are used for assessing contrast sensitivity, patient should be given enough time to recognize the letters (temporal summation)
4. Practical relevance of low vision contrast visual acuity is that it helps the patient for better understanding of the nature of their visual impairment.
5. Patients feel relieved to see a clinical test that equates to their experience.

C2- NEAR ACUITY ASSESSMENT

In this step the patient identifies or reads certain typeset of a smaller size from a nearer distance. The distance is accurately recorded. The typeset size is denoted in M units. Reading acuity is the patient's ability to read a more congested and complex typeset prints from a measured distance.



Near Vision Testing

1. In low vision near vision is recorded as the size of print that can be read fluently and easily.
2. Perform near vision at two distance allow the patient to read at his/her preferred distance. Measure the distance.
3. Secondly measure functional reading ability for each eye at 40 cms.
4. For both near testing situation use reading cards specifically designed for low vision.
5. It is imperative to undertake near vision assessment only after having completed an accurate

refraction and having determined optimal distance vision, low contrast vision, contrast sensitivity measurements.

6. Use M system along with testing distance for recording visual acuity. Discrepancy of more than two M units between the two eyes when tested at same distance, in this case better Seeing Eye alone can be corrected by low vision aids.
7. Record near acuity as fraction – The reading distance in cms is the numerator. The print size in M units is denominator eg. 40/4M.
8. Use single character visual acuity.
9. Evaluate word recognition abilities.
10. Measure continuous text visual acuity. Graded continuous text materials will provide a more accurate measure of reading ability than single optotype measures and are recommended for evaluation of performance with reading devices.
11. Assess effects of illumination.
12. Use appropriate vision charts (Lighthouse near acuity chart, near ETDRS chart, LVRC, Sloan 'M' series charts – These are calibrated in meter equivalents (M units); and these simplify calculation of magnification.
13. Final determination and prescription of a low vision device should be based on performance (i.e., reading actual printed materials such as newspapers and labels, not printed acuity charts).



Lighthouse Near Visual Acuity Test (SECOND EDITION)
MODIFIED ETDRS WITH SLOAN LETTERS
For Testing at 40 cm (16 inches)

Letter Size (M)	Snellen Distance Equivalent	Chart 1
	at 40 cm	at 25 cm
8.0 M	20/400	200 400
6.3 M	20/320	160 320
5.0 M	20/250	120 250
4.0 M	20/200	100 200
3.2 M	20/160	80 160
2.5 M	20/125	60 125
2.0 M	20/100	50 100
1.6 M	20/80	40 80
1.25 M	20/63	30 63
1.0 M	20/50	25 50
.8 M	20/40	20 40
.6 M	20/32	16 32
.5 M	20/25	16 25
.4 M	20/20	16 20
.3 M	20/16	16 20

Instructions: An 800 test distance requires a magnifier 40x at 20 cm. If the patient cannot see the top line, move test distance to 20 cm and a magnifier 80x at 10 cm. Distance 25 cm test distance is required. The magnifier should be placed at the same distance as the test distance. Distance 40 cm, 20 cm. The distance on the right column represents the Snellen distance equivalent for the test distance. Magnifier or add for 16 print size for test distance.

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NEW YORK, NY 10011
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D. REFRACTION

Importance of a good refraction in a low vision examination cannot be over-stated. Improvement in visual acuity may begin with the correction of refractive error. Many times, people with low vision will have improvement with just careful refraction.

The basic techniques of refraction of low vision persons are not too different from the normal refraction procedure. Although specialized techniques like bracketing and over refraction are commonly used. The main difference from routine refraction is reduced sensitivity to small changes in power of trial lenses and slow responses. The refraction is performed both objectively and subjectively. In both procedures it is important to adjust procedures according to the eye condition of each individual client.

After establishing the best-corrected visual acuity (BCVA) and determining the client's

requirement, level of magnification needed is calculated. Different options are tried and the most suitable solution is prescribed.

Magnification needed is calculated using the same formula of actual over desired acuity equals the desired magnification of the telescope. Usually 6/12 is taken as the reference acuity to be achieved.

The importance of cycloplegic refraction at the time needed to do it is to be remembered and practiced.

The battery of tests conducted after the BCVA is obtained is:

- Visual Field Testing and Amsler Grid Testing
- Contrast Sensitivity Function (CSF)
- Colour Vision Testing
- Glare Testing
- Binocular Testing

E. ASSESSMENT OF VISUAL FIELDS

Visual Field testing is an important diagnostic and screening tool for patients with Glaucoma, Retinitis Pigmentosa, and many neurologic disease, to determine the presence of any functional field loss. Confrontation test is the most commonly screening test done to evaluate the peripheral visual field losses in different quadrants. The examiner compares the examinee's visual fields with his or her own visual field size. Bernell's perimetry, Goldmann Test and Tangent screen are often more accurate is indicated when a more accurate evaluation of visual field is required.

The visual field test

- helps to evaluate central scotoma's
- Mid, long and peripheral constrictions
- Importance for orientation mobility and help in searching

Humphery Visual field if possible can be performed, would also be a valuable assessment tool.

Confrontation Test



Tangent Screen Test



F. AMSLER GRID TESTING:

Amsler's is a simple test, which helps in measuring any visual field losses in the central field by using a special grid.

It establishes whether patient has Central or Eccentric fixation. Patient with central scotoma needs eccentric viewing training. It also helps to determine dominant eye.

There are 7 types of Amsler's chart available to assess the central field loss.

The visual field testing is significant as,

- Helps to know, extent of central retina available for magnification
- Visual Fields of 5 Degrees or less may limit the amount of magnification
- Mobility instructions should be considered when visual fields are reduced below 40 Degrees
- It is a parameter of "LEGAL BLINDNESS"



G. CONTRAST SENSITIVITY ASSESSMENT

Sensitivity to contrast is the ability of the eye to perceive the smallest difference in luminance and thus to appreciate the niceties of shading and slightest nuances of brightness which are decisive for the forms and shapes. In order to measure contrast sensitivity, a procedure is used in which the subject compares the luminance of standardized target with its surroundings.



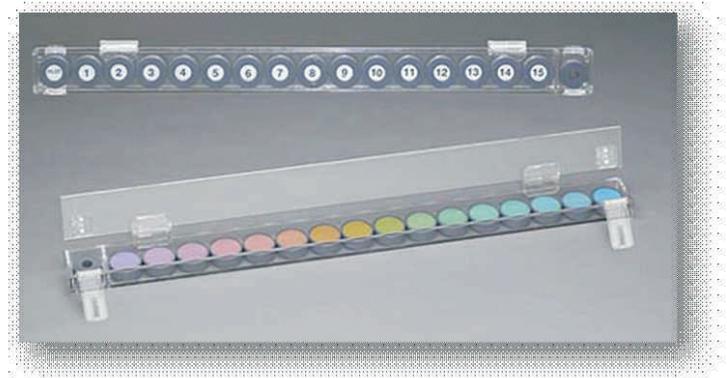
Many tests are available to measure contrast sensitivity functions and the result can be quantified in a contrast sensitivity curve or simply by qualifying the loss as mild, moderate and severe. Lea's contrast test, Pelli Robson chart provides a good way to measure contrast sensitivity. Contrast testing is important to find,

- Need for Magnification
- Ability to use Optical Devices
- Lighting (Functional Adaptive Device)
- Dominant Eye
- Overall Function-contrast enhancing techniques



H. COLOUR VISION TESTING

Colour vision anomalies, which can significantly affect educational, vocational, daily living, and mobility needs, can be diagnostic of specific diseases. Some colour vision tests e.g., Holmgren wool, D15 panel test, Ishihara's test can help assess the functional implications of color vision loss.



I. GLARE SENSITIVITY

- *Glare* is the reduction of visual function caused by the scattering of incoming light.
- Clear ocular media is required for clear image on the retina
- Glare may be caused by the opacification of the ocular media
- Glare testing is an objective means of quantifying the deleterious effects of light scatter on visual performances.

Glare is result of excessive brightness within visual field. It is defined as discomfort/disability glare. Glare is more prevalent in individuals with visual impairment in case of cataract, corneal scarring, and albinism

It can assessed in simplest form by introducing a pen torch/light from an angle into the visual field close to line of fixation the subject undertake a visual task. Instrument designed specifically to assist with the qualifications of disability and discomfort glare is the BAT (brightness acuity tester)

In certain conditions, glare can significantly reduce the visual acuity of the client. Sensitivity to glare should become obvious during the interview and it can actually be assessed by taking visual acuity after exposing the client to the glare source and noting the reduction in vision. If the vision reduces by more than a factor of 1.5, some type of absorptive filter lenses may be indicated. As the BAT test is not available trail of filters lenses is given on trial and error basis and the most effective filter is recommended.

Importance of Glare Testing

To choose proper levels of illumination required for different tasks and preferred non optical devices like tinted lenses/poloroids or peaked caps. (E.g.. Reading.)

- Tinted Lenses/poloroids
- Peaked Cap

J. BINOCULAR TESTING

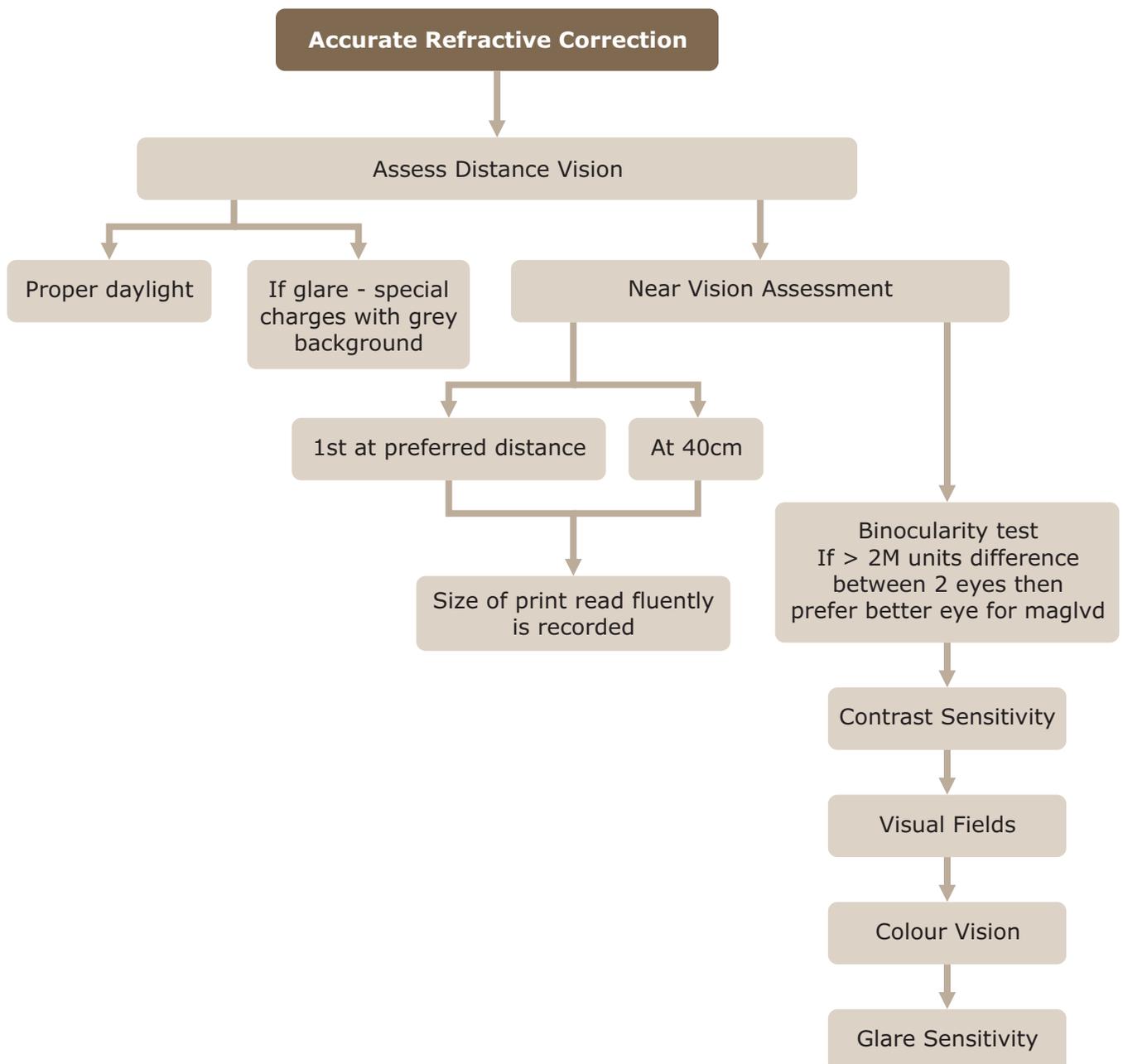
The oculomotor system should be evaluated for the presence of nystagmus, ocular motility dysfunction (e.g., poor saccades or pursuits), strabismus, substandard binocularity, or diplopia, which could influence visual performance or treatment options. Any of the following procedures may be used to assess binocular function and to determine the need or potential for binocular correction

- Gross assessment of ocular alignment (e.g., Hirschberg estimation)
- Sensorimotor testing (e.g., Worth four dot, stereo fly, red lens test)
- Amsler grid testing, monocularly versus binocularly (to determine eye dominance and the need for occlusion)
- Contrast sensitivity, monocularly versus binocularly (to determine eye dominance and the need for occlusion)

Effects of lenses, prisms, or occlusion on visual functioning

In many cases, a visually impaired patient will have a preferred or better Seeing Eye or strabismus, negating the need for a binocular prescription. However, the potential for binocular or biocular use of optical devices, or conversely, the potential for improved functioning by occlusion of the non-preferred eye should be carefully explored. The patient with nystagmus may adopt an unusual head posture to attain the null point, which could affect the placement of the optical centers of bifocals or telescopes. Prism may be helpful in reducing head turn. Cover test and alternate cover test reveal the presence of any latent or manifesting squints and give a crude idea about the status of binocular functions. Before the end of the assessment, client's examination and direct & indirect ophthalmoscopy is routinely carried out to follow the progress of any active pathology for further management of the disease.

Flow Chart of Clinical Low Vision Assessment



5.3 FUNCTIONAL ASSESSMENT

INTRODUCTION

Vision is responsible for 80 to 90% of what a child learns during the first six years of life. A child uses vision in real life situations and these real life situations are the environments which promote his/her growth and development.

Functional Vision refers to an individual's ability to use his/her vision in the everyday tasks of real life, such as reading, doing house work, getting around from place to place.

A functional vision assessment measures how well a child uses his/her vision to perform routine tasks in different places and with different materials throughout the day. This information gathered in the assessment enables the Low Vision teacher and the parent/caretaker to develop an educational programme which will further enhance the development of functional vision.

The assessment of functional vision aims to determine:

- what people see
- how they can see and use their vision
- under what conditions they can see

The information can be used to understand why people can or cannot do particular activities.

The purpose is to provide information about the use of vision to plan training to enhance visual skills.

A functional vision assessment is conducted by rehabilitation professional - a low vision specialist, or a teacher who is specially trained in low vision; information about how the child uses his/her vision is gathered from parents/caregivers and other teachers who know the child well. Specialist will review records and may talk to the eye doctor to learn more about the child's visual condition.

Functional Assessment can be done at various places and with a variety of materials. It is crucial to assess the child in everyday settings at home (indoors and outdoors); school (in the classroom or playground); or in the community, doing his/her usual activities and tasks. The low vision specialist will observe the child in his/her usual surroundings to learn how the child uses vision. It is essential to evaluate the child's effective use of vision.

Factors that affects how well a person sees

- Visual Acuity
- Visual Field
- Control of eye movements
- Light
- Colour
- Contrast
- Duration and severity of low vision

- Use of vision at an early age / visual experience
- Intelligence

Note: Visual acuity alone does not tell how a person is able to use vision!

Areas and skills covered in functional Vision

Visual Skills used for functional Vision follows the sequence of normal visual development. These visual skills are used to carry out every day activities.

The assessment of functional vision has been based on the **Low Vision kit**

The seven areas of skills to be assessed are:

1. Awareness and attention to objects

Finding an object or target and looking at it (fixating) long enough to be aware of it or recognize it.

Importance of assessment: Can a person see objects close to them? Does the person search for objects visually or with their hands? What makes objects easier or possible to be seen?

Factors that affect how easy an object is to find or recognize are:

- size
- distance
- contrast
- familiarity (makes it easier to recognize)

2. Control of eye movements - Tracking

Being able to follow moving objects with the eyes or head movement

Reason for assessment: Can the person follow the movement of objects without "losing" where they have gone?

Different directions of movements should be tested:

- up and down
- side to side
- diagonal and
- near to far

3. Control of eye movements - Scanning

Accurately moving eyes and shifting his/her from one object to another.

Reason for assessment: Some people with low vision have to search around for a long time to find objects, and others may find it difficult to change from looking at near objects to look for something further away.

4. Discrimination of objects

Recognizing objects from an outline or general shape.

Reason for assessment: To learn if a person can discriminate between people and objects recognize familiar objects, recognize different or similar objects. Objects can be discriminated because of their colour, shape, contrast with the back ground, position or size, its distance, the type of object, how familiar it is, and whether the object is moving or still etc. Good scanning and discrimination skill is needed to discriminate an object.

5. Discrimination of details to identify actions and match objects

The discrimination of detail to identify an object is more difficult than seeing the object. Features of the object have to be identified.

Reason for assessment: Most learning occurs from visual awareness and imitation. It is important to know what can be seen and how the environment (such as lighting) affects what can be seen. The factors of distance, size, colour and contrast are very important.

6. Discrimination of details in picture

Pictures can be simple outlines or complex, detailed pictures. The important features (parts) in pictures have to be identified so that the meaning of the picture can be understood.

Reason for assessment: Pictures give useful information on posters, advertisements or in books. Objects in pictures may be difficult to find and recognize.

7. Identification and perception of patterns, numbers and words

Matching letters and numbers by their similarity or their differences; this does not require reading but is a necessary skill for reading.

Reason for assessment: To find out if a person can discriminate between similar and different shapes and letters. The results will help in making decisions on whether a person should use normal size print, large print, low vision devices or needs Braille.

5.4 CLINICAL ASSESSMENT IN CHILDREN

INTRODUCTION

Specific expertise and methodology is required to examine children and evaluate their visual response as the visual system is immature at birth and its maturation depends on both structural and functional changes. The various visual functions (as visual acuity, and visual fields) mature at different rates, very fast at the first year of life. Failure of normal vision maturation affected by ocular, central nervous system disorders or both, simultaneously implies in alteration of the image that is transmitted to higher visual centers as in prematurity, infectious or genetic diseases. If the visual situation is irreversible, the management requires more complex and well equipped infrastructure for diagnosis, a well trained team of professionals for treatment and family orientation. This is the main reason why is so common in developing countries for a baby being diagnosed as blind. The diagnosis based upon the ocular disease is not sufficient to determine if a visual response exists to be complemented by the functional vision assessment. Also in developing countries if children don't have severe eye or health conditions may not be referred to tertiary health care or low vision care.

Ideally, paediatric eye care practitioners providing services for children at tertiary ophthalmologic centres need a child centred approach. The integration of preventive childhood blindness initiatives and low vision care at tertiary level as screening and surgical treatment of ROP in pre-term infants inter-related to infant low-vision care services is an strategy to add efforts, with more beneficial results. The provision of low vision services attached to ROP screening and treatment programs in intensive care neonatal units can reduce significantly the impact of visual impairment. Although providing screening and surgical treatment for ROP babies has been

present, it is only recently a service for low vision children was implemented. After the establishment of an accurate diagnosis, visual functional tests (as visual fields, contrast sensitivity and binocularity) will be relevant to understand overall visual function. Many of these methods are useful if they determine whether an infant is totally blind or not (fixation, light reflex, eye and head movements).

Nevertheless, visual acuity remains, in many countries, the most frequently measured visual function in children with ROP, ocular sequel and minimal residual vision (grade IV and V). They can be greatly helped with magnification and environmental changes.

The battery of tests for evaluating a child is as below.

LOW VISION PEDIATRIC EVALUATION

The Goals of paediatric examination is to do a

- Functional visual assessment
- Address visual demands/ tasks
- Education of family, teachers ,others

A. History

- Visual history
- Detailed birth history
- Medical history
- Low vision information

B. Visual acuity testing

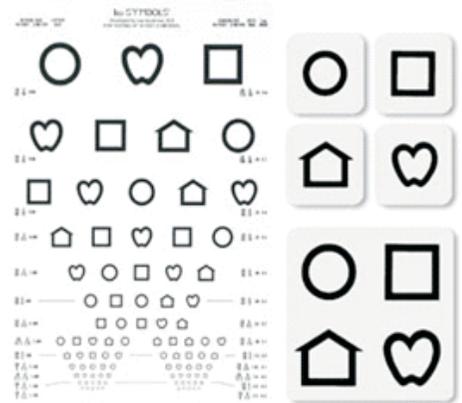
- Recognition acuity testing
- Lea Symbols
- Broken wheel test
- Letter / number charts
- Allen symbols
- Tumbling 'E' chart
- HOTV
- Lotus College Of Optometry symbol chart

C. Resolution acuity charts

- Teller acuity
- Optokinetic nystagmus drum
- Visually evoked potential
- Cardiff acuity charts

D. Refraction

- Retinoscopy
- No auto refraction
- Cycloplegic retinoscopy
- Keratometry



LEA Symbols

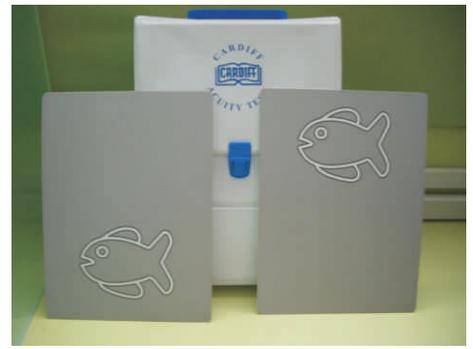


E. Visual field testing

- Confrontation – quantitative analysis
- Amsler's chart – qualitative analysis

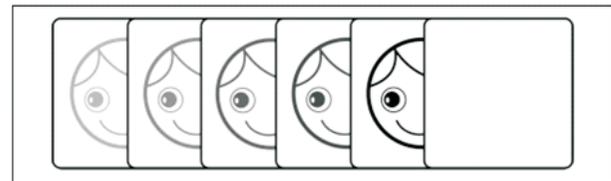
F. Color vision testing

- Farnsworth 100 Hue
- HRR plates
- Ishihara plates
- Color matching games
- Color naming



G. Contrast sensitivity testing

- Hiding Heidi test
- Mr. Happy face
- Lea contrast flip chart
- Pelli Robson test
- Vistech contrast testing



Hiding Heidi Test

H. Stereopsis

- Titmus fly test
- Lang test
- Synaptophore



Titmus Fly Test

I. Eye hand co-ordination

- Puzzles
- Copy forms
- Any other skills which may judge the functional ability of the child

J. Glare testing

- Caps
- Umbrella
- Absorptive lenses
- Tinted spectacles
- Photochromic lenses
- Tinted contact lenses

K. Rehabilitation

- Encouraging support and friendship development.
- Teaching peer support and friendship skills
- Providing a positive role model
- Orientation and mobility training.
- Low vision instruction.
- Career services and training.
- Psychological counselling etc.

LOW VISION CARE FOR CHILDREN

Tertiary Low Vision Care is necessary because when a child has congenital visual loss, depending on its severity visual enhancement alone will not be sufficient. There are also important implications for some aspects of the child's development if the child is multiple-handicapped. The impact of visual impairment at an early age can impair motor, cognitive and sensory acquisitions and consequently there are mainly educational and social barriers that need to be overcome. Children being at risk of intellectual and emotional difficulties may also develop low self-esteem and difficulty in social integration.

In developing countries, it will not be sufficient to provide children's habilitation only at the tertiary centres. It's also important to transfer knowledge to other professionals planning and delivering training programs at Institutions for multiple-handicapped children; other organizations or Schools whenever a need is identified.

Tertiary centres should take responsibility for research, training of trainers for primary and secondary level programs; and supporting, supervising and motivating staff of secondary centres; developing low vision information materials; design and offer family services; administration and database management.

In developing countries there are many children with mild and moderate visual loss that will not be easily detected, diagnosed or treated for low vision condition. They will hardly have access to tertiary centres. Consequently, they will have no access to education. Community based programs for low vision children can be integrated into tertiary level centres, as extra-mural work of the hospital. An organized primary health care program (Maternal and child health) can aggregate the detection of visual problems in babies with developmental delays. The integrated action of paediatricians, nurses, health and community agents and mothers can provide basic and local attention for populations at risk of low vision.

LOW VISION PEDIATRIC REHABILITATION

It is important to listen to and understand the needs of the family as well. One needs to spare valuable time to talk to the parents/family and help them and the child to overcome his/her handicap.

One needs to avoid giving first-hand diagnosis like 'your child is TOTALLY BLIND' but give hope for something better. Encourage parents to send their child to a mainstream school. If possible keep a list of regular schools which allow and help visually impaired children. Interact with teachers if needed. Encourage parents to be bold, send their child out, increase his drive and build his personality to live normally in society. Educate parents/ teachers on simple non optical aids like adequate lighting, large sized prints and books, magnifiers. Inform parents about benefits (According to persons with disability act 1995): free education in certain environments, free books and uniforms, special books and equipment, appropriate modifications of curriculum and evaluation system.

Help answer questions like:

- Was it something I did wrong?
- Social implications
- Genetic worries/ affection of other siblings
- Will he ever live a normal life?

Combat popular myths

- Holding book close to eye is harmful and will further reduce vision
- Watching TV from a close distance will mean progressive vision loss
- LVAs are harmful
- Sustained use of eye will itself damage sight
- All children with low vision will progress to blindness and eventually need to learn Braille.

5.5 LOW VISION WITH ADDITIONAL DISABILITIES

The enormous medical advances in prenatal care have enabled the survival of premature and sick infants. Also there is an increase in the ageing population, thus there will be increase in cases of people suffering from stroke or visual perceptual defects that result from central nervous system damage. This trend of increasing numbers of multiple disabled infants and individuals is not likely to reverse in near future.

Evaluating the visual functioning of severely disabled individuals and partially sighted individuals has long been a source of challenge for many eye care professionals. A reflection of this difficulty is seen in the number of Multiple Disabled children labelled un-testable, uncooperative or blind by eye care professionals; although the caregivers, parents, teachers' report that these children do have some amount of residual vision. This confusion or conflicting reports can lead to distrust among the rehabilitation professionals, special educators and eye care professionals, inconsistent rehabilitation and educational programs and ignorance of potential ability to use the residual vision in an individual. All these outcomes can result in decreased learning potential and quality of life for the individual.

The common syndromes associated with multiple disabilities and visual impairment are Downs, Hallermann-Steriff, Laurence Moon Beidle, Crouzons, etc. Other cases which can lead to significant visual impairment and handicap are intra uterine infections such as rubella, syphilis, cytomegalovirus, etc. Cerebral asphyxia due to birthing problems is also associated with visual impairment and other disability in an infant.

Although these infants survive, they often exhibit lifelong handicapping conditions, such as hearing loss, cerebral palsy, cortical visual impairment and learning disability along with visual impairment. These individuals may not be responsive to standard testing procedures for variety of reasons. Stress related behaviors, orthopedic and neuromuscular disorders, mental retardation, and preverbal levels of development often greatly interfere with the communication and cooperation levels.

The goals of assessment are to determine the functional vision available for communication, education, navigation and other activities, and to advise on methods of enhancement and compensation to circumvent the visual problems and enhance development for each individual child

STEPS IN ASSESSING A CHILD WITH VISUAL IMPAIRMENT AND MULTIPLE DISABILITIES

1 Information gathering

To ensure holistic approach in a child with multiple disabilities it is necessary to get the information from a variety of sources

1. Background data: how the individual is using vision functional to any sensory stimuli, level of expressive and receptive communication. The information can be gathered from primary caregivers like parents, relatives or day care workers.
2. Eye care data: diagnosis, visual acuity (if any taken previously), refraction fields and colour perception.
3. Educator's checklist usually done in an educational setup: visual postures, illumination problems, use of previously prescribed lenses/ devices, type of setting the individual prefers.

2 Patient history and observation

A detailed history can help compensate for what may necessarily be a limited examination in these children. Current educational / vocational status and daily living skills, observations on visual and sensory functioning can give a clue on how the individual is using his vision.

The profoundly visually impaired child may show evidence of "blind sight" subserved by the collicular visual system. Such children commonly have impaired movement of all four limbs and appear to react to slowly moving targets at the side. If they are mobile, they can navigate around obstacles, but paradoxically may show little evidence of other visual functions.

Severe visual impairment warrants particular enquiry concerning eye contact, and the maximum distance from which a silent smile is returned.

3 General medical history

- Type, frequency duration, severity, last onset and level of control of seizure activity.
- Any history of drug intake
- Difficulty in swallowing, eating,
- Diabetes or allergies
- Presence of cardiopulmonary abnormality/shunts

(All this should be kept in mind during testing procedures requiring vestibular stimulation, strenuous physical activity and administration of ocular drugs)

4 Behavioural Observations

- Manifest behaviour: assaultive, aggressive, self-abuse, tactual defensiveness, hyperactivity, fearfulness.
- Optimal position for attentiveness: always do the visual functioning testing in the best position when the child is most attentive or responsive.
- Appropriate reinforcement: positive stimuli like auditory, tactile, olfactory, gustatory, verbal praise, favourite object, etc.
- Reported behaviours: one should explore for squinting, light gazing, eye poking, head tilting or turning, mobility and movement postures, etc.

5 Psychosocial Information

6 Visual Behaviour

These are watched carefully

- Look for eye contact, and note at the distance within which communication can be made.
- An alert child repeatedly changes the direction of gaze to fixate on different targets,
- The child with impaired vision appears to look past the examiner with inaccurate and less frequent eye movements.
- Eye movement disturbances like nystagmus (particularly with additional optic nerve hypoplasia), gaze palsies, oculomotor apraxia
- Impaired tracking may cause children to have no interest in fast moving cartoons but to prefer TV programmes with limited movement

7 Examination procedure

A) Clinical low vision examination

It is done by an ophthalmologist or optometrist trained in low vision. The clinical components are:

- Etiology and prognosis of the visual dysfunction.
- Secondary or accompanying visual conditions such as nystagmus or photophobia.
- Diagnosis and proposed treatment regimen.
- Near/distance and corrected/uncorrected acuity measures for left, right, and both eyes.
- Measures of visual fields for both eyes, if appropriate.
- Recommendations for use of aids, glasses, or special lighting requirements.

The optimal tools required to complete the test depends on individual cognitive and visual skills.

A.1 Visual acuity:

Visual acuity may be estimated in a number of ways, the functional significance of which needs to be distinguished. One single test is not sufficient to determine visual acuity levels. One should combine the results of the observations of the different test and individual behavior to yield more valuable result. Tests must be appropriate for age and ability.

a) Detection acuity (Catford drum or STYCAR balls)

- Estimates the minimum size visible.
- Tested in individuals who do not perform to two dimensional symbols or gratings.
- It provides the parents and teachers information about the size and contrast of solid objects which will help in eye hand coordination and sorting activities.

b) Resolution acuity: preferential looking cards, Cardiff acuity cards, Tellers acuity cards, LEA Gratings cards)

- Is the minimum separation which allows discrimination
- Useful in individuals with cortical visual impairment, delayed visual maturation, developmental disabilities and optic nerve involvement.
- Insensitive in cases of strabismic amblyopia macular abnormalities
- Cardiff cards afford a rapid and reproducible preferential looking test. The vertical presentation is helpful in obviating problems due to hemianopia or horizontal
- Nystagmus and the picture format allows end point detection.

c) Recognition acuity (LEAS symbol, broken wheel visual acuity cards, letters or pictures)

- is the minimum size which facilitates identification.
- used in children where cognitive functions are of a three year old
- can be done by matching, naming, pointing.
- Should be done binocularly first then uniocularly.
- May require more settings to repeat the test.
- Recognition tests can give a lower visual acuity due to crowding

As the visual acuity is a measure at maximum contrast and does not estimate functional vision, the size of educational material must be gauged to allow maximum speeds of access to information.

A.2 Electro-diagnostic testing

- VEP acuity is the minimum target separation which permits VEP signal detection
- VER occipital cortical responses are monitored and averaged by the computer.
- It yields visual acuity estimates and is a measure of macular functioning.
- It cannot monitor cognitive functioning
- Limited information is yield in CVI
- Cooperation of individual is required for validity of test.
-

A.3 Light and Form response

- **Blink response** if it is positive then it usually indicates a positive response of visual discrimination
- **Pupillary response:** pupillary constriction in direct light is more responsive.
- **Light stimulus for fixation response** –flicker bulbs can be used, red is the preferred colour by most of the individual.
- *Care should be taken from auditory response when switching on and off the lights and for tactile stimulus from the heat of the bulb.*

A.4 Refractive Error

- Associated in conditions like albinism, Downs syndrome, ROP, rubella, cerebral palsy, microphthalmos, monochromatism, etc.

- Always perform a cycloplegic refraction in individuals with unsteady fixation, fluctuating reflex, hyperopia and squint.
- Can use refracting glasses at the doctors working distance
- An appropriate distance target suitable for an individual is desirable to maintain fixation and minimize accommodation.
- In case where cycloplegic refraction is not possible then one can perform near retinoscopy.
- Always prescribe glasses whenever significant refractive error is present
- Use frame tolerance program with positive reinforcement for successful wear of spectacles

A.5 Ocular alignment and binocularity

1 Motor alignment

- Hirschberg test is done to check for motor findings
- While determining for phoria/ tropia check for onset, magnitude (in prism diopter if feasible) type, pattern, frequency, laterality.
- Bruckner's test: observation of brightness difference in between the fundus reflex. It is a screening test for squint/ amblyopia detection

2 Sensory alignments

- Determines amblyopia, suppression, diplopia , stereopsis, etc.

Other observations to determine eye dominance are difference in visual acuity, refractive errors, head posture, visual fields,

A.6 Ocular motility

Check for ocular tracking, saccades and pursuits skills.

A.7 Accommodation and convergence

(One can use simple push-up or pull out amplitude)

- Some children with brain damage (cerebral palsy) have reduced or absent accommodation and therefore poor third dimensional tracking.
- It can also lead to difficulties in working or learning with small detailed targets at near working distance.
- Retinoscopy prior to cycloplegia can identify impaired accommodation and reveal manifest hypermetropia not corrected by the accommodative reflex.
- The provision of spectacles can give gratifying results.

A.8 Visual Fields (confrontation test)

- Functional visual field assessment is carried out binocularly, particularly to elicit homonymous defects.
- Best is to do with the practitioner and the assistant.
- For the young child, his attention is attracted while a toy target that is introduced from behind in each of the four quadrants, anticipating a head turn.
- See for any eccentric fixation.
- For the older, co-operative child small discreet movements of an extended forefinger in each of the four quadrants, both singly and on both sides simultaneously, can be made into a game.
- Check for midline problems

Homonymous defects are commonly identified. Inattention (extinction) is common and functionally can be equally handicapping, e.g. when crossing roads or attempting to read as the page progressively disappears for a left hemianopia and jumps into view if it is on the right.

A.9 Contrast sensitivity

(Mr Happy contrast sensitivity test, Hiding Heidi contrast test chart)

- Helps to know individuals functional visual capabilities
- Helps in choosing educational materials.
- Reduced contrast sensitivity necessitates the use of high contrast educational material.

A.10 Colour vision

(Assorted toys of different colours)

- Can be performed by Colour naming, colour identification, colour preference, or colour vision defects detection test
- Colour vision is commonly intact although some children can match but not name colours (colour anomia).
- Helps in identifying appropriate educational material, self help and work related goals required by an individual.

A.11 Photosensitivity

- Usually found in individuals with congenital ocular disorders such as albinism, rod monochromatism, congenital cataracts and aniridia and individuals on anti convulsion medication.
- Sun lens evaluation should be done in individuals with downward head tilt, squinting, increased irritability or degradation of behaviour in brightly illuminated environment.

A.12 Ocular health examination

- It should always be done in individuals preferred position with positive reinforcement.
- More than one session may be required.

Please note that all tests might be not required or all tests might not be possible to perform in one assessment setting

B FUNCTIONAL VISION ASSESSMENT

The following are components which should be addressed in a functional visual assessment.

- Visual Efficiency and Potential (Areas of visual function as described in WHO kit)
- Recognition of Objects
- Distance Requirements
- Size Requirements
- Lighting Requirements
- Colour Perception
- Visual Discrimination Subtle and Obvious
- Contrast Sensitivity
- Exploration of Objects Visual, Tactual, Mouthing, Auditory
- Check for cognitive development

- Any components which were contradictory or omitted from the optometric or ophthalmological report which may be assessed functionally

Management of low vision with multiple disabilities

- Once the assessment is done and information gathered and analysed it is important to develop appropriate individual management plan.
- It is important to note that whenever an individual with multiple disability needs is identified than it is important to refer them to a tertiary care centre as he will be requiring special test for assessment and management. These individuals may also require assessment and rehabilitation for other associated disabilities.

The management plan typically includes medical, functional and educational recommendations.

Medical recommendations

Early referral to a tertiary care centre is required in cases where the specialist intervention can be done. Referral for Cataract, glaucoma, and retina or neurologist opinion for further management when and where required.

Following recommendations can be done whenever needed

- Appropriate refractive correction.
- Surgical intervention whenever required
- Appropriate glare control glasses.
- Prescription and training to use a low vision device.
- Binocular vision therapy.
- Patching therapy in cases of amblyopia
- Prognosis for improvement should be explained to the individual.

Functional recommendations

It is advisable that the practitioner should demonstrate equivalent size object at different distance in the surrounding environment. The individual should be encouraged to relate visually to his/her environment. Appropriate visual stimulation programme should be planned and explained to the individual.

Depending on the need following are the functional vision recommendations

- Always emphasis on size, colour, contrast, distance and illumination of targets
- Always choose toys /games keeping in mind the developmental levels.
- Eye tracking exercise
- Peripheral awareness therapy
- Searching and scanning strategies
- Central or eccentric viewing strategies
- Visual reach activities.
- Office based vision stimulation therapy.
- Support from special educators.
- Orientation and mobility instruction

Educational recommendation

Results of evaluation should be discussed with the teacher/special educator. The teacher of the visually impaired should also note which modality seems to be the most efficient for a particular task. The modality of preference and the most efficient modality may not always coincide.

Following information will be useful in education planning of a child

- Levels of lightening and sensitivity to glare
- Positioning of the individual
- Size of material
- Placement of material in optimal visual field
- Appropriate colours
- Brightness
- Need for clutter reduction
- Spacing of visual information
- Orientation and mobility in the environment

6

Low Vision Devices

Once a complete history is taken and diagnosis is made, a clinical low vision assessment is done. A meticulous refraction is performed, following which trial of devices for distance and near is done. Often a simple spectacle prescription improves vision substantially. Patients are required to be counselled to wear spectacles and use devices along with it. All optical devices prescribed and accepted by the patient need thorough training in its use which can be imparted by low vision professionals, special educators, school teachers, parents and other care givers.

Low Vision devices are of two types

1. Optical
2. Non Optical

OPTICAL DEVICES

Low vision is a condition when vision cannot be improved further with the help of traditional spectacle lenses, medication and/or surgery. Persons with low vision often rely on the use of a number of different instruments, called low vision devices and tailored equipment to make maximum use of their residual vision. Low vision devices are categorized as either optical or non-optical devices and help to improve visual ability for millions of people every day. Optical devices are those which magnify the object with the help of lenses.

How do they help?

Low Vision devices make things appear larger, make things brighter or clearer and even improve Contrast. They work on the following five strategies:

- Enlargement of object
- Contrast enhancement
- Selective fixation
- Optical magnification
- Electronic magnification

Popularly used acronyms in low vision are 3 Bs – Bigger, Brighter and Bolder and 3 Cs, Closer, Coarser and Contrast.

6.1 PRINCIPLES OF MAGNIFICATION AT NEAR POINT

1. **Relative distance magnification:** Moving the object closer to the eye (shortening the distance) causing a proportional enlargement of the retinal image. eg. Sitting in front of the television, holding a book close while reading (most children can easily do this) etc.
2. **Relative size magnification:** Enlarging the physical size of an object, such as large print rather than standard print. eg. Large print books, writing large letters.
3. **Angular magnification:** Using an optical system such as telescopes, magnifiers.
4. **Electronic magnification:** Enlargement of an object is achieved by projecting the object onto the screen such as films, slides. e.g. CCTV

Following are various types of low vision aids.

Magnifying devices:

For Near: Hand Held Magnifiers, Stand Magnifiers, Spectacle Magnifiers, Pocket Magnifiers, Bar Reader, magnifying eyeglasses, magnifying lamps etc

For Distance: telescopic viewing devices (Monocular, Binocular, spectacle mounted or hand held).

6.2 LOW VISION DEVICES FOR DISTANCE

Pre requisites before prescribing devices for distance

1. Correct patients refractive error (with spectacle or contact lens)
2. Verify the telescopic devices
3. Instruction in the use of telescope, which includes-localization, focusing, spotting, tracing, tracking, and scanning.

A. Spectacles

Spectacle correction for high myopia and hypermetropia has the following problems

1. Aberrations and distortions (chromatic, spherical, coma aberrations, barrel and pin cushion distortions)
2. Lens material selection (options- CR- 39, crown glass, high index glass, high index plastic , polycarbonate)
3. Lens design (options – lenticular, aspheric, doublets)

B. Contact Lens

In low vision contact lens is mainly used for

1. High myopia
2. High hypermetropia
3. High astigmatism
4. Keratoconus
5. Scarred Cornea (eg Post PKP)
6. Tinted CL(to reduce glare) for Albinism, Aniridia
7. X-Chrome CL for loss of colour vision (rarely used)

Types of Contact Lenses – RGP, soft, Toric, Piggyback, Tinted.

C. Telescopes

Telescopic lenses increase the retinal image without decreasing the working distance to the object. They are used for magnification at any distance, and can be of the following types:

1. Hand held – monocular, binocular

Telescope is held by hand in front of the dominant eye to focus and visualize the target. Smaller the power of the telescope larger is the field of view. Because they are hand held, they are used for short term distance task.

2. Spectacle mounted – monocular ,binocular

Telescope is mounted on the spectacle frame. Smaller power telescopes are only available.

3. Clip-on spectacles

Telescopes can be clipped on the spectacle frame whenever required to visualize the distance target. Smaller power telescopes are only available.

4. Bioptics (for driving)- not much used in India

5. Toy telescope-usually given to children at very early age to practice at home

For distance tasks they are commonly used for seeing street and bus signs, blackboard, television, and sporting and watching stage events

Features of an ideal telescope - good field of view, light weight, limited or no aberrations, excellent light transmission, compact, low cost, good focus ability, and appropriate magnification.

Higher the power of the telescope smaller is the visual field. So they cannot be used for patients who have large central scotomas.

6.3 PRESCRIBING LOW VISION DEVICES FOR NEAR

For prescribing low vision devices for near the calculation of effective viewing distance (**EVD**) and effective viewing power (**EVP**) are done. Working distance is measured. Reading speed in words per minute (wpm) is calculated, fluency and comprehensiveness are noted. Choices of reading medium (print /Braille/ print + Braille) are decided depending on the reading speed and the nature of the diseases (progressive vs. non progressive).

Pre requisite before prescribing

- The person with low vision to be seated comfortably,
- Encourage eccentric viewing (in some cases)
- Material to be held at focal distance for clear view (while using high add spectacles)
- Scanning and localization skills to be taught,
- Use of reading stand (especially while using hand held and stands magnifiers)
- Use of typoscopes or line marker,





Range of Near Devices

LOW VISION DEVICES FOR NEAR:

A. Spectacle Magnifiers

1. Full field spectacle magnifiers (spherical, aspheric, doublet)
2. Half field spectacle magnifiers
3. Bifocal
4. Prismatic glass (half field)
5. Loupes



Low powered spectacle magnifiers are available for binocular use. Base-In prisms are incorporated for binocular viewing of near object. Bifocals up to +4.50 D can be used for comfortable binocular use. Higher power lenses can be used for monocular viewing. Aspheric lenses can be used to reduce aberrations. Biggest advantage of spectacle magnifier being its portability, being hands free, gives wider field of view and can be used for prolonged near reading. Its disadvantage is that it has fixed and closed reading distance. It even inhibits eccentric viewing.

B. Hand magnifiers

These are handy and easy to use. They have to be used at the focal length of the lens. Higher the power heavier is the magnifier, more distortion and lesser is the field of view. Can be used along with bifocals or reading glasses. Excellent for spot viewing, the only disadvantage being one hand always gets blocked while use. These are available as self illuminated and LED forms also.



Hand Held Magnifiers



LED Illuminated Magnifiers



Stand Held Magnifiers

C. Stand magnifiers

These can be used by people who have tremor and cannot hold hand magnifier steadily, and by students who need both hands free for writing. They are very useful when used along with reading stand. These are available as self illuminated and LED forms also.

D. Others: Fresnel prism, bar / ruler magnifiers, dome magnifier, pocket and deluxe pocket magnifiers.

E. Spectacle mounted telescope for near work

These can be used for near tasks such as reading or vocational tasks such as viewing computer screens.

F. Telemicroscope- A reading cap is attached on the objective lens of the telescope to achieve magnification at larger working distance for near.

G. Low vision near system – Electronic magnification

These are very useful in cases of severe visual impairment. They give more amount of magnification with reduced aberrations compared to the traditional magnifying glasses. A video magnifier or closed-circuit television (CCTV) system uses a stand-mounted or handheld video camera to project a magnified image onto a video monitor, a television (TV) screen, or a computer monitor. There is considerable versatility in types of video magnifiers available today. Handheld cameras are portable systems designed to hold above/on top of the material to be viewed. They can magnify almost anything within reach, including labels on packages of food and medicine. Handheld cameras are often on rollers, which make them easier to move across a flat working surface. Some manufacturers of video magnifiers that use handheld cameras offer a writing stand as an accessory.



Acrobat



Merlin CCTV



DEVICES TO MANAGE GLARE AND PHOTOPHOBIA

Methods to decrease glare are

1. Coatings and tints (ultra violet coating, antireflective, edge coating)
2. Polaroid filters – yellow, amber etc.
3. Tinted lenses and photo chromatic lens.

DEVICES TO INCREASE PERIPHERAL AWARENESS

1. Prism and Fresnel prism

Prisms can be dispensed by decentration principle or Ground In prism for higher prism powers. This mode of treatment is used for patients with peripheral, central, hemianopic or sectoral field defects.

Fresnel prism is a 1 mm. plastic (polyvinyl chloride) material stuck to the back surface of the spectacle lens by surface tension. It has minimum weight, thickness, low cost and available in powers from 0.5 prism diopter to 40 prism diopter.

Prism



2. Reverse telescope

The conventional telescope is reversed and objective lens is used as eye piece. It produces minification of the object and larger area is minimized and seen together. This helps in patients who have decent visual acuity but reduced field of view. Concave lens works same as reverse telescope.

3. Convex mirror

4. Mirrors

COMBINATION OF DEVICES

Often persons with low vision are helped by a combination of non-optical, optical, assistive and electronic devices. A methodical calculation of the amount of magnification required and the proper selection of devices is the key step towards good and successful low vision care.

The low vision optical devices should be prescribed by an ophthalmologist or an optometrist specially trained in the dispensing of low vision devices or a rehabilitation professional trained in the same field.

6.4 NON OPTICAL AIDS

Non optical aids are also known as Adaptive Devices. They are prescribed along with the optical aids to perform certain visual tasks for day to day activities.

Non Optical Devices can assist a person with low vision to use his/her vision effectively. Non Optical Devices can really make the difference between e.g. being able to read text in school book or not to read (by sitting near window in classroom / wearing sunglasses when walking outside) A device that does not involve optics used to make visual information and visual functioning more accessible to individuals with low vision such as a writing guide, large print, telephone key pad, high intensity lamp etc. Non-optical devices are items designed to promote independent living.

Non-optical devices are used in combination, with the optical devices, such as lighting, bold pens for writing. Non Optical Devices are prescribed according to the types of tasks at home, work or school (Near, intermediate or distance). A Low Vision specialist or a Vision Rehabilitation Teacher can prescribe Non Optical Devices.

Low cost/locally made Non Optical Devices:

Non-optical devices are easily available locally. Parents, teachers, or clinicians can make simple devices to assist children with reading /writing or drawing: they can cut black cardboard into frames or 'windows' to create reading slits or writing and drawing guides; they can also draw bold black lines on white paper, which makes writing easier.

Non-Optical Aids are classified as follows

1. Relative Size Devices

The size of the object itself is increased. E.g. large print books, large typewriters, keyboards, needle threaders etc.

2. Light and Illumination Controls

There are some patients who can function/read well with extra illumination. For those reading lamps are provided. Lot of magnifiers come with inbuilt lighting system.

There is another kind of patients who have glare problem. For them less illumination is beneficial. They usually perform well if some wavelength of light is cut out from the spectrum. For them tinted lenses, typoscopes are provided which enhance their working ability. Kids with Aniridia or Albinism experience photophobia which can be reduced with the help of tinted / controlled pupil contact lenses.

Lighting Tips

- One 200 watt bulb produces more glare than five 40 watt bulbs!
- Place lamp at eye level and behind the shoulder
- Light should be on opposite side of the writing hand or same side as stronger eye
- Combine general illumination and task lighting
- Maintain even illumination throughout the room

Changes in the Environment: Control or adjust light/glare with hat, eye shade or lamp, sun



glasses

Modifications to illumination

- Reposition the lamp away from shiny surface and use lamp shades.
- Curtains – thin, light coloured
- Mini-blinds
- Floor rugs
- Caps / hats / visors
- Umbrellas
- Off-white coloured walls
- Increase general room illumination
- Sunglasses

3. Posture and Positioning Devices

The Low Vision Device should be comfortable. Maintaining Focal distance, line of sight and body posture, especially for Geriatric patients with arthritis and Parkinson's disease play a very vital role. Illuminated reading stands are available for the same purpose.

Adjustable reading / writing stand: adjusts or provides a comfortable working distance.

4. Writing and Communication Devices

Writing with large felt tip pen enhances contrast as well as increases the size of the written text. Letter writing paper, typoscope helps reducing glare from the paper and maintaining line spacing to help easy reading. Large size Telephones, voice modulators help in easy communication.

Typo scope: Enhances the Image (reduces glare)

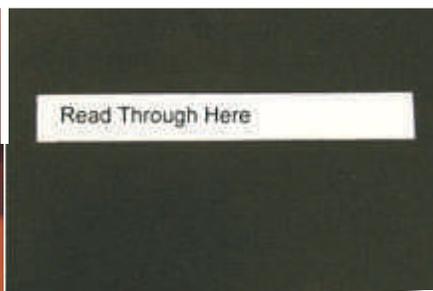
Writing Guide: Enhances Contrast and maintains a straight line.

Colour: Choose colours that differ in saturation (light/dark) Black and white gives highest contrast. Do not use dark colours together. Avoid using white or grey with other light colours. Avoid using pastel colours next to each other.

Contrast: When there is good contrast with the background things are easier to see.



Letter writer



Typoscope



Cheque guide

5. Medical assistive devices

E. g. Magnifiers designed for syringes, Count-a-Dose and Single dose units for insulin, Digital Thermometers and BP apparatus with Voice modulators etc

6. Mobility assistive devices

These are extremely important for low vision patients who want to move around independently. Foldable and non-foldable canes, dog guides, electronic travel aids like GPS and broad beam lights for Retinitis Pigmentosa patients are all useful for this purpose.

7. Sensory substitution devices

Sense of seeing is substituted with Tactile and Auditory Senses. E.g. Digital Clocks with LED displays and talking Clocks, Braille writing, Buttons with Embossed ends for matching correct pair of clothes, Notex for identifying currency etc.



Walking Cane



Currency Identifier



Braille

7

Rehabilitation of Persons with Low Vision

INTRODUCTION

Rehabilitation is the most important aspect especially as patient's perspective. Rehabilitation includes all the measures aimed at reducing the impact of Disability - Enabling to achieve Independence aiming towards Social Integration, Better Quality of life and Self-Actualization.

Rehabilitation helps a person with low vision to overcome the following difficulties-

- Mobility problems,
- Inability to identify people, objects, colours etc.
- Difficulty in reading-writing, or performing vocational tasks.
- Difficulty in recognizing details such as patterns, signs, facial features etc.
- Difficulty in discriminating contrasts, glare problems, poor night vision problems, fluctuating vision or double vision problems.
- Difficulty in performing activities of daily living.
- Loss of confidence due to inability in doing basic tasks,

All these lead to, *Withdrawn Behaviour* many a times. Rehabilitation can be a short term or a long term process depending on the individual needs. Rehabilitation Professional helps a person with Low Vision to deal with the following reactions-

- | | |
|-------------------|---|
| • Shock | Oh my God! |
| • Denial..... | This can't be happening to me. |
| • Anxiety..... | Now what will I do |
| • Anger | I don't deserve this. |
| • Depression..... | I will never again be a worthwhile person. |
| • Acceptance..... | I guess I might as well get used to it |
| • Adjustment..... | I'm going to make the most of it(with the help of Rehab. services). |

An individual may not always progress through all of these stages, particularly those of acceptance and adjustment. There may be a possibility of continual unwarranted hope of recovery, unnecessary or exaggerated displays of dependence, personal devaluation, and social

reclusion, lack of motivation, prolonged depression, continued denial, and exaggerated blind behaviourism. Thus,

As a Rehabilitation professional –

- Emotional Rehabilitation is the starting process.
- Leading to Social, Educational, and Vocational Rehabilitation leading to the Financial Independence of the person with Low Vision.
- Helping the Inclusion of the Excluded is the need of the rehabilitation process.

It can be achieved with the help of – Convention on the Rights of Persons with Disabilities.

7.1 UNCRPD- Convention on the Rights of Persons with Disabilities

The purpose of the present Convention is to promote, protect and ensure the full and equal enjoyment of all human rights and fundamental freedoms by all persons with disabilities, and to promote respect for their inherent dignity.

Persons with disabilities include those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others.

For the purposes of the present Convention:

- "Communication" includes languages, display of text, Braille, tactile communication, large print, accessible multimedia as well as written, audio, plain-language, human-reader and augmentative and alternative modes, means and formats of communication, including accessible information and communication technology;
- "Language" includes spoken and sign languages and other forms of non spoken languages;
- "Discrimination on the basis of disability" means any distinction, exclusion or restriction on the basis of disability which has the purpose or effect of impairing or nullifying the recognition, enjoyment or exercise, on an equal basis with others, of all human rights and fundamental freedoms in the political, economic, social, cultural, civil or any other field. It includes all forms of discrimination, including denial of reasonable accommodation;
- "Reasonable accommodation" means necessary and appropriate modification and adjustments not imposing a disproportionate or undue burden, where needed in a particular case, to ensure to persons with disabilities the enjoyment or exercise on an equal basis with others of all human rights and fundamental freedoms;
- "Universal design" means the design of products, environments, programmes and services to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design. "Universal design" shall not exclude assistive devices for particular groups of persons with disabilities where this is needed.

The Convention does not explicitly define disability

Preamble of Convention states:

'Disability is an evolving concept, and that disability results from the interaction between persons with impairments and attitudinal and environmental barriers that hinders full and effective participation in society on an equal basis with others'

Convention states:

'Persons with disabilities include those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others'.

Disability results from an interaction between a non-inclusive society and individuals: Person using a wheelchair might have difficulties gaining employment not because of the wheelchair, but because there are environmental barriers such as inaccessible buses or staircases which impede access

Person with extreme near-sightedness who does not have access to corrective lenses may not be able to perform daily tasks. This same person with prescription eyeglasses would be able to perform all tasks without problems.

A PARADIGM SHIFT

The Convention marks a 'paradigm shift' in attitudes and approaches to persons with disabilities.

Persons with disabilities are not viewed as "objects" of charity, medical treatment and social protection; rather as "subjects" with rights, who are capable of claiming those rights and making decisions for their lives based on their free and informed consent as well as being active members of society.

The Convention gives universal recognition to the dignity of persons with disabilities.

7.2 Areas of Rehabilitation required for low vision children and adults

Areas Effected Due To Lack of Early Intervention

- Communication
- Bonding
- Level of wakefulness
- Motor development
- Physical Development
- Language and Social Development
- Social and emotional development
- Adaptive development and
- Cognitive development

THE AREAS OF INTERVENTION REQUIRED FOR VISION REHABILITATION

1. Assessment

- Clinical Vision Assessment
- Functional Vision Assessment

2. Vision Enhancement Training

- Depending On The Functional Vision Assessment Depending on the eye condition

3. Developmental Skills Training

- Gross Motor Skills
- Concept Developments

Guidelines for Teachers or when Teaching any Concept to VI Children

- Teach one concept at a time
- The concept should be presented in many ways and in different situations
- Don't be rigid. Use any technique/ method which you feel is giving result
- The child can initially learn concepts which are concrete in nature and later on you can teach abstract concepts
- Try to teach a variety of concepts including
 - Body concept
 - Spatial concept
 - Concept of direction
 - Concept of laterality
 - Concepts related to environment
 - Mathematical concepts

4. Sensory Stimulation and Training

Developmental Steps

- Awareness
- Attention
- Identification
- Discrimination
- Localization

Activities

- Close relatives, friends
- Toys
- Daily useable objects
- Grains and pulses – natural
- Vegetables & fruits – natural
- Shapes & size
- Texture, paper, clothes etc.
- Beads of different shapes and sizes
- Vehicles, Animals (Sound)

5. Developmental Skills Training

- Writing Skills
 - Braille
 - Print writing skills
- Daily Living Skills

6. Low Vision devices training

- Near Vision Skill's Training
 - Optical Aides
 - Non Optical Aids
 - Eccentric Viewing
- Distance Vision Skill's Training
 - Telescopes And Other Distance Vision Aids

7. Educational guidance

- Pre School Skills
- Inputs for Children in Integrated Education
- Career Guidance

8. Vocational guidance

9. Orientation and Mobility

- Cane Techniques
- Sighted Guide Techniques

10. Counselling

- Psychological Counselling
- Attitudinal inputs

11. Home Management

- Cooking
- Home Maintenance
- Cloth Management
- Environmental Modification

7.3 DEVELOPMENTAL REHABILITATION OF CHILDREN WITH LOW VISION

Early Intervention - Visual functioning is basically the use of vision for particular functions. Functional visual skills are very important and are needed to execute everyday activities. The dissimilarity in how people use vision is usually not related to the measures of distance or near visual acuity. A child/person may have very poor vision, not well enough for detailed tasks such as stitching, weaving, carving or reading but may be able to see and keep away from objects so that he can move around safely. Functional vision may be improved with training. Many people can learn to make better use of their low vision and can function efficiently with only small

amount of visual information. Objects and print can be recognized when they are blurry or when only parts of them can be seen.

Thus, it is necessary to develop the early intervention plan so as to prevent the handicapping conditions in child or an adult.

The visual skills used to enhance functional vision are listed as follows

- Fixation (awareness and attention to objects)
- Tracking (control of eye movements)
- Scanning (control of eye movements)
- Discrimination of Objects
- Discrimination of details (to identify actions and matching objects)
- Discrimination of details in pictures
- Identification and perception of patterns, numbers and words

A person with low vision may not be able to progress through all the steps without special training. Some skills may not be achieved (for example tracking moving objects) but the person can still progress on to later steps.

Visual functioning plays a very significant role in promoting independent living in low vision people. If a low vision person, no matter mild, moderate, severe or profound low vision, is given proper early training of visual skills mentioned above for the enhancement of his/her visual functioning he/she will certainly show an improved performance in the everyday activities and move closer to an independent life.

Exercises of visual skills for the enhancement of visual functioning:

- Fixation exercises.
- Tracking exercises.
- Scanning exercises.
- Spotting exercises.
- Eccentric-viewing exercises.

USING RESIDUAL VISION

- People must be acquainted with how to make best use of their residual vision. Guidance, counselling, rehabilitation, training on special tips, tact and techniques to perform different tasks and environmental modification i.e. change in size, distance, colour and contrast of things being used in daily living activities, the use of suitable light and simple setting of furniture and other usable in the house can have a very helpful and encouraging effect on the performance of a low vision person in everyday life. Low vision devices can also be useful
- In order to encourage the use of residual vision, the foremost information needed about each person with low vision is his/her:
 - Visual Acuity (near and distance)
 - Visual Field
 - Colour Vision
 - Day Vision
 - Night Vision

- Contrast Sensitivity
- Illumination preferred
- How the child/person is able to use vision for particular purposes

The Persons involved in Developmental Rehabilitation are Low Vision Child/Person, Parents, Special Educators, and Rehabilitation Professionals.

7.4 EDUCATIONAL REHABILITATION

The aim of training for teachers in local/ mainstream schools is so that, they can detect children with impaired vision and include the students with low vision in all aspects of school life. Teachers can also be taught vision screening if it is not conducted regularly by others. They need to be able to test vision or conduct a functional assessment to determine if a student has normal or impaired vision, and for those with impaired vision to assess if the student has low vision or is blind. Knowledge of referral pathways is also essential.

For effective inclusion in school and community activities an understanding (and assessment) of appropriate learning medium using the five categories of functional vision is essential. Teachers need to be trained in assessment of functional vision to make decisions about the most appropriate medium for each student. The categories are:

Functional vision	Learning medium
Normal vision	As for normally sighted children
Low vision - Mild-Moderate	Regular print with or without low vision devices
Low-vision - Severe	Regular print with low vision devices or large print
Low vision - Profound	Braille; use of vision for mobility, activities of daily living etc.
Blind	Braille and other non-visual media

Assessment of the ability to use print is used in this table but it is an example only of the everyday objects and materials that people with low vision need. Assessment of functional vision should use a variety of objects and materials. Reading speed can also be used to select the medium of education.

Educational Activities

Reading, Writing, Matching, Drawing Working off black board, Moving in classroom and school, Interaction with class fellows, friends and teachers.

The following criteria will decide the modifications needed in classroom environment – (Child Centred Approach)

Familiarity, Distance, Size, Details or simplicity, Light, Contrast, Colour, Mobility, Complication, Position, Time given

The persons involved are low vision child, parents, class teacher, school head and fellow students.

Strategies for Educational Management of Children with Low Vision

Children enrolled in schools have residual vision. This residual vision's visual efficiency needs to be improved through training of children.

There are 3 aspects in training effective use of vision

- 1. Stimulation of vision.** People who have very little vision or have not used vision need to know that they can use their vision. They may also need encouragement to do so
- 2. Visual efficiency.** How vision is used can be improved with training. Measures of vision do not change after training, that is, visual acuity or visual fields will not change because of the training
- 3. Knowing when and how** to use vision leads to knowing how to change the environment (for example, lighting), choosing suitable materials and using low vision devices if appropriate

Daily Tasks Affected

Daily tasks of children with Low Vision are affected in following areas:

- Reading textbooks / fine print even while wearing glasses
- Moving around classroom or school utility places
- Traveling at night
- Identifying money
- Finding the right notebook or text book
- Feeling sad depressed or anxious about vision loss
- Difficulties faced with limited distance vision
- Learning by imitation
- Understanding nonverbal communication
- Integrating senses
 - Visual / auditory
 - Visual / tactual
 - Visual / olfactory
 - Visual / gustatory
- With independent mobility
- Recognizing people, objects or actions

Difficulties faced with limited near vision

Following are the difficulties faced by children with limited near vision

- With personal care and hygiene
- Preparing food and eating
- Making and taking care of clothes
- Near vision vocational tasks
- Reading

Difficulties faced with limited field of vision

Following are the difficulties faced by children with limited field of vision

- With general functioning in poor light
- Finding objects
- With independent mobility

Role of teacher to understand the specific implications of low vision

- Determine the activities normally done by the child with low vision
- Analyse the visual elements of a task to modify the task & environment adapted to the special equipment used
- Observe the visual environment and assess/observe the child under different environmental conditions
- Determine the sense most efficient for a particular task
- Background Colour

Class Room Management

Following aspects needs to be taken in to consideration for classroom management

- Understanding what classroom modification is needed
- Level of lighting
- Size of print
- Seating position
- Improvement with glasses
- low vision devices
- The visual condition and the associated prognosis
- Safety considerations
- Understanding what classroom modification is needed
- Restrictions to his visual field
- Monocular or Binocular vision
- Eye dominance or preference
- Implications for games or physical activities
- Colour vision deficiency
- Medication needed e.g. eye drops for glaucoma
- Additional impairments

Adaptations to be made while using Work Displays

All work displays must be:

- Bold, Clear well contrasted
- Near to eye level as possible
- Avoid standing with your back to the window
- Display with a contrast background
- Give the display in the child's hand

Adaptations for Writing Materials

All writing materials must be modified based on the need of the child on following points:

- Bold Line paper or notebook
- Felt tipped black pens
- Advise use of soft lead pencils by the child
- Have notebooks with black purple or dark blue lines
- Encourage neighbouring child to dictate for the low vision child
- Reading Materials
- Size of print
- Quality and quantity of print

- Contrast of the reading material
- Encourage child to use low vision device
- Enlarge print size
- Use large print books if needed
- Lighting
- Extra time and
- Strain to the eyes

Managing extensive note taking

Teacher can do the following to support child with low vision

- Teacher to read out the notes aloud as and when he/she writes on the blackboard
- Allow tape recording if necessary
- Teacher to give you the notes in advance
- Arrange for one of the child's friends notes to make a carbon copy or photocopy
- Colour Contrast

School Preparedness

Activities must be undertaken at different places for School Preparedness such as

- At home
- In the park / garden
- In kitchen
- At the store
- Knowing the family of visually impaired children and his surroundings
- Family Counselling

Barrier free Environment in schools for Low Vision Children

Accessibility is an integral part of usability as access results in the ability to use a product, program or service. Following areas / points in school will need to be made accessible to Low vision children by making necessary modifications.

- Play Area
- Wash Area Borders
- Class Room Signage
- Environmental Modification
- Bus number near the entrance on the right at 4.5 feet from ground
- Road Crossing and Kerb cuts
- Stairs
- Effective lighting
- Balanced and defused lighting
- 3-4 inch of contrasting border on the tread
- Warning texture difference at the beginning of stairs and at the landing
- Ramps
- Lighting must be balanced and effective around and highlight the presence of a ramps with borders in contrasting colour on the edge and warning texture
- Lighting move around (i.e. lighting should illuminate the way, without glare, confusing reflections or shadows, for people entering, using and leaving a building)

- Identify features (i.e. facilities and features where people have to operate controls, such as information panels, directional signs, call buttons, access panels and interactive terminals, should be clearly lit)

7.5 GENETIC COUNSELLING IN LOW VISION REHABILITATION

Genetic and inherited diseases are major medical problems in the world. As infectious diseases and malnutrition are being reduced, chronic medical disorders have emerged as the main cause of mortality and morbidity. The ocular diseases with genetic components, does have an effect on the patients' ocular and visual health and potentially can affect their offsprings.

Family history contains important information about each family member. It can be used as a diagnostic tool and help guide decisions on genetic counselling. The Genetic Counselling is a cornerstone of the multidisciplinary approach used for patients who suffer from low vision induced by genetic or familial disorders.

Genetic counselling is designated for patients and their families suffering from low vision caused by genetic disorders such as, retinal degeneration like RP, optic atrophy, macular degeneration, aniridia, glaucoma, and others.

It includes:

- A genetic investigation, conducted in order to obtain all relevant familial data
- An explanation regarding the ocular diagnosis, the manifestations of the disease, how it is transferred through generations, and the probability of transference to other family members.
- Genetic testing to ensure the clinical diagnosis and to localize the specific genetic mutation causing the disease.

Therefore as a part of genetic counselling process, the patient obtains detailed information regarding diagnosis, treatment, prognosis and inheritance of the genetic condition or birth defect of concern to the family. Thus, Genetic counselling helps to enhance knowledge of the cause of the specific visual impairment, and it is useful tool in providing information regarding the risk of visual impairment in future offspring. Patients should therefore be referred to the Genetic counsellor.

7.6 ENVIRONMENTAL ADAPTATION AND MODIFICATION

Adaptation with the disability and the surrounding environment is the primary objective of Rehabilitation process. Modifications are necessary as per the individual needs. However, to adapt to the environment there are certain Key factors to be kept in mind and these factors are:

1. **Self-Awareness** (knowledge and feelings about vision):

It refers to person's feelings about his vision i.e. whether he/she considers him/herself as;

- Being blind
- Having some but not normal vision

- Having normal vision

As Rehab Professional

The disabled person should be correctly explained the difference between the normal vision, low vision and blindness. The person and his/her family should be made aware of the actual results of the visual assessment. The Person should be told the fact that whether his/her poor vision is usable or noting everyday activities. He/She should be explained the implications of restricted visual fields, the effects of poor contrast or a problem with colour vision, if necessary.

He/She should be given suggestions to enhance his/her visual functioning for Example

- Working in the best light
- Moving closer to objects to see them better
- Using objects with good contrast
- Allowing plenty of time for looking

2. Self-confidence (use of vision for obtaining information):

It refers to whether the vision is used to find out about the environment and what activities are taking place or the person waits to be told.

As Rehab Professional

The person should be encouraged to use his/her vision to be aware of what is happening and to find people or objects. His/her attention should be attracted and directed to watch activities. The person should be encouraged to look for the object and reach out for it rather than giving the object in his hand. The person should be taught how the use of contrast and knowing the position of objects can help him/her to move safely around the community. The person should be encouraged to make effective use of other senses when combined with vision, for example, listening for what is happening to find where to look. Use touch to feel whole object, then look at parts.

3. Environmental Awareness:

It refers to whether the vision has been used to explore and learn about the common objects used by people in the community by observing behaviours and asking questions.

As Rehab Professional

The person should ask sighted people to explain and describe objects and things taking place. The person should be encouraged to look closely at the objects in the environment. The objects should be described while the person is watching them. For objects that are too far away, too big or dangerous that cannot be looked at closely, should be described in words that the person can understand from what he has seen before and already understands. The person should be shown where the things are kept at home, in the school, in the prayer room and in shops.

4. Independent Task:

It refers to how the person can use vision to carry out some or all the activities that other people perform without special help, and how hearing and touch is used to help.

As Rehab Professional

The disabled person should be encouraged to take part in all family and community activities and it should be made sure that the person will be safe and will be helped by others only when necessary. One should describe what he is doing or going to do. He/she should tell a low vision person when he/she enters or leaves the room as the low vision person may not be aware of any other person nearby or in a room. A low vision person should be trained to perform activities and jobs by demonstrating close to the person. It should be described what to do and how.

5. Lighting

It refers to either natural or artificial light both inside building and outside. The amount and direction of light are essential for best visual functioning. The amount of light cannot always be changed. A person can move to different positions to adjust the amount of light from direct sunlight to shade or from a shady to bright position.

As Rehab Professional

Some low vision people face problem with too much light. Vision can be worse for some people in bright sunlight they are better in shaded areas. If they need to be in the sun, they should shade the eyes with the hands, umbrella or wear a hat.

Some people face problem with less light. If a person has to work inside it is better for him/her to sit near a window or a door to use the light, but he should not face the window

People with certain eye conditions are almost blind at night or in dull light. They may not have sufficient vision to move safely and independently or do their normal activities that they could do during the day time. They may need extra help to move safely at night. A torch or flashlight should be used by them.

As direction of light has an affect on low vision person's performance so it is better to have light coming from behind and to one side rather than facing the light. The person should have light shining on the work being done.

6. Contrast

It refers to the fact that if there is a good contrast against the background, things are easier to see, for example, light coloured accessories on a dark coloured table. Poor contrast leads to poor performance. Examples of poor contrast are animals which are same or having similar colour as their environment, for example, grass hopper.

As Rehab Professional

The disabled person should always use dark objects against light background or vice versa.

7. Colour Vision

It refers to the correct use or knowledge of colour that is important in some situations, for example, selecting and matching colours. Certain colours are used to decorate objects and people.

As Rehab Professional

Colours should be named accurately. If this is not the case, person should still be able to work with coloured objects by picking out different and matching similar colours. The person should

know the colours of the objects in order to find it without any difficulty, for example, knowing the colour of a person's clothing can help in identifying a person.

Classification of everyday activities for adaptation and modification (as per individual needs):

Different people have different activities to perform in everyday life regarding their individual needs; therefore we have classified everyday activities in different categories, which are as follows:

1. Routine activities
2. Educational activities
3. Domestic activities
4. Recreational activities
5. Self and health care activities
6. Outdoor activities

1. Routine Activities:

- Obtain complete familiarity with the environment i.e. to be acquainted with how the setting is, how everything is arranged and where every object is placed.
- Apply protective techniques (upper hand and low arm techniques) and trailing technique while moving inside the building.
- Use white cane with diagonal technique and apply hands and feet discrimination techniques during ascending and descending stairs and while moving outdoor.
- Use telescopes to watch distant things easily.
- Use other senses i.e., hearing, smelling and touching as much as possible besides vision to make out what is happening around.
- Use bright and high contrast crockery
- Always put dark coloured crockery on light coloured mat or light coloured crockery on dark coloured mat; similarly put light coloured food in dark bowls and dishes, for example, boiled rice in a dark dish.
- Dip the fingertip in the glass while pouring water in it when you feel water touching your fingertip stop pouring, as it means that the glass is almost full.
- Feel the temperature of the cup from outside with finger while pouring tea in it and as the level rises towards the mouth of the cup stopping.
- Use the sense of smelling to recognize the dish.
- Use the prescribed telescope to recognize faces and objects.
- Use the sense of hearing to recognize any person by his voice and sense of touch to recognize any object by feeling its parts with hands.
- Use protective techniques and hand discrimination techniques to find and pick any dropped object from the floor.
- Use tactile measuring tape or ruler to measure anything
- Use the telescope/ magnifying glasses to watch time or use enlarged, high contrast or talking wall clocks, time pieces and wrist watches Use the sense of touch to dial phone. The digit 5 is always tactile in a phone set.
- Use enlarged and high contrast telephones

2. Educational Activities:

- Sit near the window or in proper light (don't face the light).
- Use prescribed magnifiers
- Use lamp for proper light, reading stand for comfortable posture and low vision devices for reading .
- Use bold line copies, black felt-tipped pens and other devices for writing.
- Use the prescribed telescope to work off chalkboard.
- Ask the teacher to repeat verbally what she writes on the chalkboard after writing.
- Use enlarged and dark graph papers.
- Use pen or marker to draw angles or pictures.
- Trace over pictures or shapes with a dark pen.
- Get familiar to the classroom, its setting, arrangement and contents.
- Get acquainted with all the passages/ways, areas and portions of the school by taking rounds of the school again and again.
- Ask someone demonstrate to you everything properly and completely about your classroom and school.
- Develop pleasant and friendly terms with class fellows, friends and teachers. Don't feel hesitant to interact with them. Don't feel shy to explain them about your impairment and problems you face due to it. In this way they can understand you and feel happy to cooperate with you and help you whenever you need their help.

3. Domestic Activities:

- Use the sense of touch and feeling in cleaning, sweeping, washing and dusting.
- Get familiar to each and every object and their permanent places.
- Watch all the stains before washing anything by using magnifying glasses and keep in mind the parts where the stains are, and then wash those parts cautiously.
- Always use a lighter to put on the fire.
- Keep yourself at a distance from the stove or oven when putting on the fire or while cooking.
- In order to increase the contrast of food being cooked in it, use white enamelled pans for cooking.
- Use pans with black inside to boil the milk. It will also give good contrast.
- Use whistling kettle to boil water as it makes a whistling sound when water boils.
- Use vegetable cutting board that is white from one side and black from other. Cut light colour vegetables on black side and dark colour vegetables on white side in order to enhance contrast and make the task easy and visible
- Use bright coloured kitchen tools, usable and other devices for domestic activities, so that they are easy to find and easily visible.
- Label all the jars containing masalas and cereals either with names or with signs, in order to recognize them easily.
- Also use the sense of smell to recognize various masalas and cereals.
- Paint the handles of pans in contrast colours to make them safe and easy to see and hold.
- Use needle threading device to put thread in the needle. It involves sense of touch.
- Use big size needles.
- Use bright colour threads for stitching, knitting and weaving.

4. Recreational activities:

- Use enlarged and high contrast ludo, chess, carom board, foot balls and other devices for recreational activities
- Use prescribed monocular telescope to watch TV.
- Use prescribed magnifiers, reading stand and lamp and typoscope to read anything.
- Use talking books to listen to the book you want to read.
- Play video games in which bright colours are applied.

5. Self and Health Care Activities:

- Avoid making too many dresses of same type of cloth.
- Apply different types of laces and buttons on the dresses of exactly same material. The lace applied on one piece of a dress should be applied on other pieces as well so that it will become easy to separate all pieces of a dress from other clothes.
- To separate socks of same pair from other socks it would be better to join them with stitch buttons even while washing so that they remain in pair.
- Avoid buying too much wearable or garments of same cloth, material and style.
- Select some standard shades of lipsticks, nail polishes, blushers and eye shades which can be applied with any colour of the dress.
- Having less but standard variety of dresses, cosmetics, shoes help to easy selection, separation and recognition
- Always buy lipsticks, nail polishes, blushers, eye shades and other cosmetics, of different companies; this will make it easy to recognize their shades as their outlooks differ from each other.
- For more convenience label them with the initials of their colours' name.
- Use the prescribed near vision glasses to cut nails.
- Use a magnifying mirror while doing make up or combing hair.
- Use talking thermometer/insulin measuring device to hear the measurement or use a digital thermometer/ insulin measuring device and read it with prescribed magnifier.

6. Outdoor Activities:

- Take some sighted guide along with you when you go for shopping so that he/she can assist you to recognize objects, to move to different shops or portions of any plaza, to recognize colours and to select things you want to buy.
- Select some particular markets and other land marks permanently. Get familiar to their complete environment and also get familiar to their shopkeepers and staff. By doing so you can go to those places independently.
- Learn the routes by going through them again and again.
- Learn the permanent clues on the route to different places.
- Always keep the prescribed pocket magnifier along with you, where ever you go, it will be helpful to read prices of things while shopping, menu of any hotel or restaurant etc.
- Always keep the prescribed telescope along with you to read bus numbers, street signs, house numbers, shops' names and boards etc.

Even though low vision people cannot be given any medical or surgical treatment to cure them of their impairment; the problems faced by them can be reduced to a great extent by providing them guidance & counselling; rehabilitation services; low vision aids; adaptations & guidelines;

and techniques, so that they can perform their everyday activities better.

Low vision people should know how to make best use of their residual vision. They can be encouraged to do so by enhancing their visual functioning by providing them the proper low vision devices according to their everyday needs (big, bold and bright), environmental modifications (proper light, high contrast and bright colors), developing self awareness in them, developing self confidence in them and suggesting ways, solutions and techniques to overcome their problems in daily life and to perform their different activities.

If a low vision person understands how to make best use of his/her residual vision he/she can perform everyday activities easily and lead an independent life to a great extent. These modifications will help persons with low vision to deal with their disability. They are cost effective, if, implemented correctly. The persons involved in this process are Persons with low vision, their family, rehabilitation professionals, special educators, school, and the community.

7.7 SOCIAL AND VOCATIONAL REHABILITATION

Persons with Low Vision are considered as blind people. The behaviour of community towards them is either of a protective or neglecting nature. This attitude of society is unfavourable and discouraging. A low vision person is not blind. Blindness means total absences of sight - that is no perception of light (NPL). In low vision the client has some residual vision that can be used.

A low vision person should neither be over neglected nor be over protected. This means, the attitude of community (family, relatives, friends, teachers etc.) should be very balanced.

Low vision people are those who can lead an independent life to a great extent, provided they know how to make best use of their residual vision in carrying out various everyday activities.

All these activities mentioned above require interaction with people - family, friends, school, community and surrounding. Thus, Social Rehabilitation is very important.

SOCIAL AREAS COVERED ARE

Persons with Low Vision need inclusion in society. It is a Two-Way process i.e. it can be done by changing community's attitude towards the capabilities of disabled as well as disabled person's views about society.

Lack of Confidence due to vision loss creates withdrawn behaviour and thus they tend to avoid public interaction.

Following are the factors which help them to overcome this inferiority complex-

- Encourage to develop pleasant and friendly relationship with relatives, friends and others.
- Don't hesitate to interact with the people.
- Develop self-confidence.
- Tell people about your impairment without hesitation and the problems faced by you so that

they can understand how to deal with you i.e. they know what to expect of you & when you need their assistance.

- Whenever some people visit you, first of all get properly introduced with them and take into account where everyone is seated.
- Serve the drinks or other refreshments very calmly without getting confused.
- Arrange the eatables on the table yourself so that you know where everything is placed.
- Whenever you visit anyone observe your surroundings carefully or ask someone to demonstrate you all the details.
- When you are served dinner or lunch, first of all try to observe what things are placed on the table and their arrangement or ask anyone to explain you.
- Try to accept and successfully cope with this impairment and try to lead an independent life as much as possible.

VOCATIONAL AREAS COVERED ARE-

- Imparting vocational training as per the aptitude of person.
- Pre-vocational can be started at school level.
- Computer Training is the pre-requisite of vocational training.
- There are skilled and semi-skilled vocational training programmes offered by NAB and other NGOs.
- One percent reservation policy in Government sector provides vocational and economical rehabilitation.
- Also loan facilities are provided for the persons with low vision by Government agencies for business or self-employment.
- Vocational training as per interest and aptitude leads to the economic rehabilitation of persons with low vision which is the ultimate aim of rehabilitation programme.

Thus, it can be concluded that Rehabilitation is the process of restoring the Person with Low Vision to the fullest of his Physical, Emotional, Intellectual, Social and Vocational usefulness for which he or she is capable.

8

Case Studies

8.1 Case 1 - HEREDOMACULAR DEGENERATION

Mst. XYZ, 11 year old male was referred to the Low vision clinic by retinal clinic for further evaluation and management. He was diagnosed with OU: Heredomacular degeneration. The child was accompanied by his parents and he was youngest of 3 siblings. Gross observation revealed normal behaviour and child was able to maintain eye contact. He was 3rd standard student in a regular school. His sitting position was on 3rd bench in the middle row.

Child's chief complaint was diminished vision for distance and near in both eyes since 3 years and he was unable to see black board and television clearly. Birth history was normal and had no unwanted events. His ocular history revealed no prior eye examination, ocular surgery or use of low vision devices. His medical history was not significant.

Low Vision Evaluation:

- Task related history: child had difficulty in writing in straight line, but he could read his books clearly while keeping it at close distance from the face. He could not identify faces, bus numbers and train boards. He complained of difficulty to mobility in bright sunlight and reduced vision with direct car lights at night. He did not complaint in mobility issues otherwise.
- Visual Acuity:
Distance: (LVRC English flip chart) OD= 1.1 Log MAR, OS= 1.2 Log MAR, OU= 0.9 Log MAR.
Near: (LVRC English chart) OD= 1 M, OS= 1.25 M, OU= 0.8 M at 10 cm.
- Refraction:
Net Retinoscopy: OD: +1.25 DS, OS: +1.25DS
Acceptance: OD: +1.00 DS, 1.0 Log MAR, Near VA 0.8M @ 20 cm.
OS: +1.25 DS, 1.1 Log MAR, Near VA 0.8 M @ 20 cm.
- Colour vision: OU= Basic colour discrimination present.
OD & OS = Farnsworth D-15 Panel: Within normal limits
- Visual field and Amsler chart: unable to test as child is not fixating properly.
- Contrast sensitivity function test: (Lea contrast flip cards) OU= 25% at 1 meter.
- Glare test: child was comfortable with dark grey filter and peak cap in sunlight.
- Low vision device trial for distance vision:
OD = 4x monocular telescope on the new refractive error correction, Distance VA improved till

0.1 Log MAR. Overall child's response was good. He was able to localize and fixate the object. He could smoothly scan and track letters on the chart.

Low vision Rehabilitation and Management:

- Refractive error was prescribed with dark grey photochromic tint for the constant use.
- 4X monocular telescope was dispensed after black board training
- Letter writer and typoscope with thick black felt tip pen was advised while writing in the book.
- Peak cap and umbrella was advised for use when out in sun.
- Approach magnification was explained while watching TV or studying.
- Letter to school teacher was given for school sitting modification.
- Referred to genetic counsellor with parents.
- Follow up visit was given after 1 month / sos.



Trial of filters



Trial of telescope

8.2 Case 2 - AGE RELATED MACULAR DEGENERATION

Mr. abc, 70 year old male was referred to the Low vision clinic by retinal clinic for low vision evaluation and management. He was diagnosed with OU: Dry Age Related Macular Degeneration. He was accompanied by his daughter-in-law. By occupation he was farmer. Gross observation revealed he was not able to maintain eye contact and eccentric viewing was present. Patient's chief complaint was gradual painless diminished vision for distance and near in both eyes since 10 years and he was unable to mobilize smoothly at night. His ocular history revealed left eye cataract extraction with IOL implantation 10 years back. He was using glasses for 20 years and present pair was 3 year old. He did not have any reports of prior ocular investigations. No history of low vision device usage. His medical history revealed he was having hypertension, for which he was taking Atenolol 50 mg/day. It was well controlled. There was no other significant medical history.

Low Vision Evaluation:

- Task related history: Patient had difficulty in mobilizing in familiar and non familiar places with independence. He could not identify bus numbers or read train boards and couldn't cross roads alone. He could not see television clearly or identify faces. He therefore had to stop visiting public places. He faced glare issues while working in farm. He could not read newspaper print, books or electricity bills. He faced challenges while reading medicine packs and price tags. He could not sign his documents and cheque. There was no problem in currency identification, food on plate, or matching clothes.

- Visual Acuity:
Distance aided VA (LVRC English flip chart): OD= 1.2 Log MAR, OS= 1.2 Log MAR, OU= 1.2 Log MAR.
Near aided VA: (LVRC English chart) OD= 4 M, OS= 4 M, OU= 5M at 8-10 cm.
- Refraction:
Net Retinoscopy: OD: -3.00 DS, OS: +0.75/-2.00x 90
Acceptance: OD: -3.50 DS, 1.0 Log MAR, Near VA 4M @ 8-10 cm.
OS: +0.50Ds/-2.50Cyl x90, 1.1 Log MAR, Near VA 5M @ 8-10 cm.
- Colour vision: OU= Basic colour discrimination present.
- Visual field: (confrontation) OD=reduced moderately on temporal side. OS= WNL
- Amsler chart: unable to test as patient was not fixating properly.
- Contrast sensitivity function test: (Lea contrast flip cards) OU= 25% at 1 meter.
- Glare test: Patient was comfortable with dark grey filter in sunlight.
- Low vision device trial for Near vision:
+8D with 8Δ half eye spectacle magnifier improved patients near vision binocularly to 1M with reading distance of 10cm with good speed in normal illumination.
+10D pocket magnifiers improved near vision to 1.25 M

Low vision Rehabilitation and Management:

- Refractive error was prescribed with dark grey photochromic tint for distance viewing.
- 8D with 8Δ half eye spectacle magnifier was dispensed for near reading tasks.
- 10D pocket magnifiers dispensed for spot viewing.
- Signature guide with thick black felt tip pen was advised while signing cheques.
- He was asked to use peak cap and umbrella when out in sun. Use of bright torch at night
- Approach magnification was explained while watching TV or reading.
- Advised to take help of sighted people for mobility.
- Follow up visit was given after 1 month / sos.

8.2 Case 3 - RETINITIS PIGMENTOSA

Mr. abc, 48 year old male was referred to the Low vision clinic by retinal clinic for low vision evaluation and management. He was diagnosed to have OU: Retinitis Pigmentosa.

He was accompanied by his friend. By occupation he was sales person. Gross observation revealed he was not able to maintain eye contact.

Patient's chief complaint was gradual painless diminished vision for distance and near in both eyes since 4-5 years and he was unable to move around at night since the last 15years. Younger brother, elder sister and maternal grandfather had similar visual issue. No history of consanguinity was present. There was no record of glass wear or previous eye examination. No history of low vision evaluation or device usage. There was no other significant medical/ systemic history.

Low Vision Evaluation:

- Task related history: Patient had difficulty in non familiar places with independence. He could

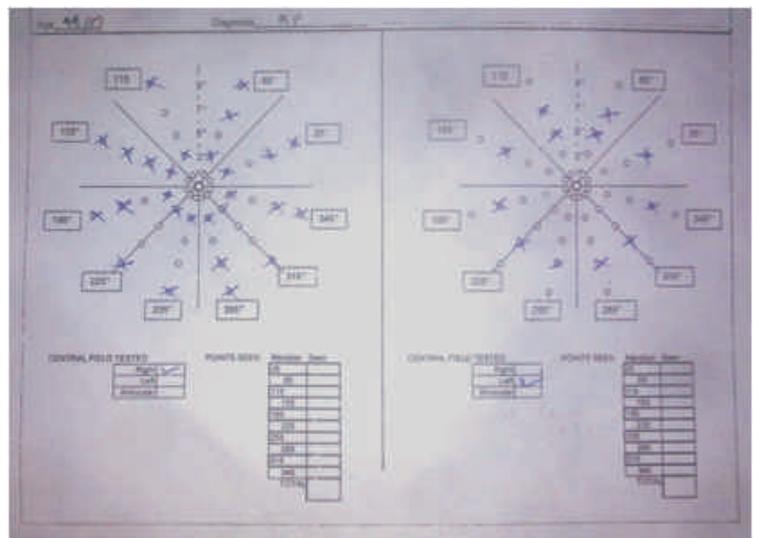
not identify bus numbers or sign boards and couldn't cross roads alone. He could not see television clearly or identify faces. He faced glare issues while working and navigation problem at night. Mobility test was positive.

He was unable to read fine newspaper print. Otherwise there were no significant issues in currency identification, food on plate, or matching clothes.

- Visual Acuity:
Distance aided VA (LVRC Sloan letter chart): OD= 1.0 Log MAR, OS= 0.80 Log MAR, OU= 0.74 Log MAR.
Near aided VA: (LVRC English chart) OD= 1 M, OS=1.25 M, OU=1M at 30 cm.
- Refraction:
Net Retinoscopy: OD: -1.25Ds/-2.50Cyl x90 DS, OS: Plano/-2.00x 90
Acceptance: OD: -1.75Ds/-2.00Cyl x90, 0.3 Log MAR, Near VA 1M @ 25cm.
OS: Plano/-2.00Cyl x90, 0.7 Log MAR, Near VA 1.25M @ 25 cm.
OU: 0.28 Log MAR
- Colour vision: OU= Basic colour discrimination present.
- Visual field(Berkeley central field test): OD=central 5 degree perseverence, OS= central 7 degree perseverence.
- Amsler chart: unable to test as patient was not fixating properly.
- Contrast sensitivity function test: (Peli Robson contrast chart) : OD= 0.75 Log units, OS= 0.75 Log units, OU= 0.90 Log units.
- Glare test: Patient was comfortable with amber tint sunlight.
- Low vision device trial for Near vision:
OU= +3.00 addition improved patients near vision binocularly to 0.63M with reading distance of 30cm with good speed in normal illumination.

Low vision Rehabilitation and Management:

- Patient was explained about the nature and progression of the disease.
- Bifocal Refractive error was prescribed with amber tint for distance viewing.
- Advised to use peak cap and umbrella to use when out in sun. use for bright conical beam torch at night
- Advised to take help of sighted people for mobility at night and to avoid travelling at night alone.
- Family members were advised for the eye exam to rule out RP.
- Genetic counselling was advised
- Referred to rehabilitation clinic.
- Follow up 6 monthly.



Berkely's Central Visual Field Documentation

8.1 Case 4 - DIABETIC RETINOPATHY

Mr. XYZ, 68 year old male was referred from local eye hospital to the low vision evaluation clinic for the management. He was diagnosed with OU: Diabetic Retinopathy with Ischemic clinically significant macular oedema.

He was accompanied by his wife. He was retired person, who is a passionate reader and likes to spend time reading books and newspaper. Gross observation revealed socially amicable behaviour and eye contact.

Patient's chief complaint was gradual painless diminished vision for distance and near in both eyes since 1 year. Last eye exam was done 1 year back. He was wearing glasses since 26 years and current glasses were 1 year old. Patient was having DM I since 13 years and he was under medication. Blood sugar levels were controlled. No history of low vision evaluation or device usage. There was no other significant medical/ systemic history.

Low Vision Evaluation:

- Task related history: Patient had to identify bus numbers or sign boards and couldn't cross roads alone. He could not see television clearly or identify faces in cinema. There was no problem while walking and navigation in familiar places. He had glare issues in bright sun light. Mobility test was positive.
He could not read newspaper print, religious books. He was having problems while reading the medical prescription and price tags. Otherwise there were no significant issues in currency identification, food on plate, or matching clothes.
- Visual Acuity:
Distance aided VA (LVRC Sloan letter chart): OD= 0.8 Log MAR, OS= 0.70 Log MAR, OU= 0.70 Log MAR.
Near aided VA: (LVRC English chart) OD= 2 M, OS=1.60 M, OU=1.60 M at 20 cm.
- Refraction:
Net Retinoscopy: OD: +2.75/-1.25Cyl x90 DS, OS: +3.25/-2.00x 70
Acceptance: OD: +2.25Ds/-1.25Cyl x90 , 0.8 Log MAR, Near VA 2M @ 25cm.
OS: +2.75/-1.75Cyl x70, 0.6 Log MAR, Near VA 1.6M @ 25 cm.
OU: 0.60 Log MAR
- Present glass prescription: OD= +2.25/-0.75x100, OS= +2.00/-1.00x80
- Colour vision: OU= Basic colour discrimination present.
- Visual field(Confrontation): OD & OS = Within normal Limits
- Amsler chart: OD & OS central metamorphopsia noted
- Contrast sensitivity function test: (Peli Robson contrast chart) : OD= 1.35 Log units, OS= 1.35 Log units, OU= 1.50 Log units.
- Glare test: Patient was comfortable with peak cap and grey tint.
- Low vision device trial for Near vision:
 - 8D with 8Δ half eye spectacle magnifier improved patients near vision binocularly to 0.83M with reading distance of 20cm with good speed in normal illumination.

Low vision Rehabilitation and Management:

- Patient was explained about the nature and progression of the disease.
- Refractive error was prescribed with grey photochromatic glasses for distance viewing.

8D with 8Δ half eye spectacle magnifier while reading fine prints, price tags etc.
Peak cap and umbrella was asked to use when out in sun.
Regular retinal check-ups were advised
Blood sugar levels to be monitored regularly
Use of external illumination was advised along with the use black gel pen on white paper while reading and writing
Explained about a complete holistic approach towards life
Follow up 6 month/SOS

8.5 Case 5 – ALBINISM

Baby ABC , 6 year old female child was referred to the Low Vision clinic by paediatric ophthalmologist for low vision evaluation and management. She was diagnosed to have Ocular-cutaneous albinism and Nystagmus.

The child was accompanied by her parents and she was 2nd child of 3 siblings. Gross observation revealed child was unable to maintain eye contact, she had mild right face turn while fixating at any object. She was studying in regular school, 2nd standard student; her sitting position was on 5th bench in the right extreme row.

Parent's chief complaint was child was not paying attention in the study and she was not writing from the black board in the school. Parents informed that child was very fair skinned out of 3 sibling and her eyes were moving constantly. She could not maintain eye contact for long and her gaze were shifting very rapidly. While watching TV she chooses to sit very close. Birth history was normal and had no unwanted events. No history of consanguinity or any other sibling suffering from same problem. Her ocular history revealed no prior eye examination, ocular surgery and use of low vision devices. Her medical history was not significant.

Low Vision Evaluation:

- Task related history: child had difficulty while copying from board, watching TV. While reading she turns her face on right. She faced difficulty in bright sunlight and has photophobia and glare problems. She did not complaint of mobility issues.
- Visual Acuity:
Distance: (LVRC Sloan letter chart) OD= 1.00 Log MAR, OS= 0.9 Log MAR, OU= 0.8 Log MAR.
Near: (LVRC English chart) OD= 1 M, OS= 1.25 M, OU= 0.8 M at 8-10 cm.
- Refraction:
Net Retinoscopy: OD: -5.50Ds, OS: -5.50Ds
Acceptance: OD: -5.00 DS, 0.6 Log MAR, Near VA 1M @ 10 cm.
OS: -5.25 DS, 0.62 Log MAR, Near VA 1M @ 10 cm.
OU: 0.58 Log MAR , 0.8M with Face turn
- Colour vision: OU= Basic colour discrimination present.
- Visual field and Amsler chart: unable to test as child is having nystagmus.
- Cover test: Orthophoria with nystagmus
- Nystagmus Observation: pendular with null zone in left gaze. Dampens on convergence.
- Contrast sensitivity function test: (Lea contrast flip cards) OU= 10% at 1 meter.

- Glare test: child was comfortable with dark grey filter and peak cap in sunlight.
- Low vision device trial for distance vision:
OS = 4x monocular telescope on the new refractive error correction and right face turn,
Distance VA improved till 0.2 Log MAR. Overall child's response was good. She was able to localize and fixate the object. He could smoothly scan and tract letters on the chart.

Low vision Rehabilitation and Management:

- Nature and progression of the disease was explained to parents.
- Refractive error was prescribed with dark grey photochromic tint for the constant use.
- 4X monocular telescope were dispensed after black board training.
- Peak cap, sunscreen lotion with SPF more than 14 and umbrella was asked to be used when out in sun.
- Advised to wear long sleeves cotton clothes while out in sun.
- Approach magnification was explained while watching TV or studying.
- Letter to school teacher was given for school sitting modification and use of telescope while black board viewing.
- Referred for genetic counselling with parents.
- Follow up visit was given after 1 month / sos.

9

Human Resource Development

Low vision is a relatively new field in ophthalmology. Thus the first objective should be to sensitize the practitioners and create interest among them. In-depth training can bring great commitment to the care givers. Curriculum should be framed in such a way that each category can carry out their responsibility properly. The specific area that needs to be dealt thoroughly by the specific groups has been highlighted. Although overview on low vision will be given during the training programme special emphasis (with practical) should be given on those areas. Periodic refresher course need to be arranged to update people on different developments in the field of low vision. Customized training also needs to be arranged based on the need of the individual / Institution. A short overview on low vision includes definition and causes of low vision, clinical and functional low vision assessment, use of optical and non-optical devices, counselling, calculation of magnification, light stimulation, approach to a patient with multiple-handicapped.

9.1 PROFESSIONALS INVOLVED and THEIR TASKS

Target group:

Ophthalmologist

Tasks

1. Proper work-up of cases and prescription
2. Clear idea about definitions
3. Clinical assessment
4. Researches and Referrals
5. Creating awareness and training of staff

Duration (Minimum 3days –3 weeks)

2 – 3 days for initial orientation and later on extended duration depending on interest and felt need.

Optometrist

Tasks

1. Proper work-up of cases and prescription
2. Refraction
3. Clinical assessment

4. Prescription
5. Training in the use of devices
6. Visual skill training
7. Stock maintenance
8. Record keeping

Duration: 1 Week-1 month

C B R Personnel (community based rehabilitation)

Tasks

1. Identification of cases and referral
2. Testing visual acuity distance and near
3. Functional assessment

Duration: 2- 3 days

Village health worker

Tasks

1. Identification of cases and referral
2. Functional assessment
3. Vision assessment distance and near

Duration: 1 day

Special Educators

Tasks

1. Identification of cases and referral
2. Vision assessment distance and near
3. Functional assessment
4. Training in the use of devices
5. Training in the use of vision
6. Advising\adaptation on Classroom environment
7. Orientation on assistive technology-(Computers for the visually impaired)
8. Braille knowledge
9. Orientation mobility training

Duration: 2- 3 days

Sections 1,2,3,4,5,6 for all special educators from different fields.

Section 7,8,9 for special educators on VI (Vision Impairment) for 2-3 days more.

School Teachers

Tasks

1. Identification of case and referral
2. Training in the use of devices
3. Environmental and classroom modification

Duration: 1-2 days

Rehabilitation Personnel (in the field of eye) and counsellor

Tasks

1. Low vision counselling
2. Causes of low vision
3. Functional assessment
4. Early intervention
5. Training in the use of devices
6. Computer for the visually impaired
7. Certification
8. Orientation, mobility and ADL.
9. Environmental modifications
10. Carrier guidance
11. Correspondence (referral)
12. Record keeping
13. Store\stock management
14. Braille education

Duration: 2- 3 months

Doctors (non-ophthalmologist – family physician and paediatrician)

Tasks

Identification and refer

Duration: 1 day

Health Managers / Programme Managers /

Non-Ophthalmic Persons / Other stake holders/Parents of VI clients

Tasks

Orientation to Low Vision

Duration: 1 day

Parents of VI students must be given training in the use of devices /computers / Braille / orientation and mobility so that their child is not dependant on instructors always.

Following the basic training, the respective human resources must work their respective areas for 6 months, following which there will be an advanced course .

A clear outline of tasks (Job descriptions) of each personnel can enable us to frame the training programme (curriculum) accordingly. Teaching methodology used during these training sessions could be as follows – PowerPoint Presentations, Lecture, Video, Group activities, Practical (using simulator glasses and also on low vision patients, use of other IEC materials like Poster, Flip Books, Stickers, Charts and others).

10

Service Delivery

10.1 OVERVIEW

The goals of low vision service delivery are multi-faceted, as it can result in loss of independence in educational and financial management, mobility and travel, personal care and other activities of daily living and social interactions. The needs of people with low vision will depend on their circumstances, the region they come from, their economic status, their literacy levels, their family responsibilities, their attitude towards ageing and disability, their general health, their motivation, and so on. Whereas loss of reading ability is often considered to be the most devastating consequence of visual impairment in literate persons, it may have little significance and impact on the quality of life of an older person in a rural village.

It is also seen in developing nations that people with low vision are only taught compensatory strategy rather than use of residual vision. Every person with low vision must be considered on an individual basis. It is proposed that service delivery needs to be coordinated with extensive public educator and outreach activities, not only to serve more individuals with low vision, but also make low vision a more common, visible and socially acceptable condition.

There is great variety in models of low vision care throughout the world, sometimes even within a single country. In developing nations, services are often utilized more by males than females. It is recommended that low vision services be integrated into each level of eye care, educational systems, and rehabilitation system. Low vision service delivery can be delivered in primary, secondary and tertiary levels of care, as previously described in a WHO Asia Pacific Regional Low Vision Workshop report (World Health Organization, 2001).

COMMUNITY LOW VISION SERVICES

Community low vision services is community based, and is provided by primary health care workers, primary eye care workers, community-based rehabilitation workers, community leaders, consumer advocates, and in the educational systems by teachers.

Activities:

- Identify people with visual problems

- Awareness creation
- Refer to eye care professionals for ophthalmic check-up and diagnosis
- Facilitate use of the necessary glasses and devices to the LV persons after primary assessment
- Provide counselling and training (such as mobility, vision training, environmental modification) to those with low vision
- Refer LV persons to get support at secondary and tertiary levels
- Help children go to school, and create awareness among teachers
- Give livelihood support to adult LV persons
- Provide regular follow up

Infrastructure:

- Screening Test
- Publicity materials

Training:

Short Term (1 day -1 week)

- Vision screening
- Understanding of low vision
- Skills training-vision/other skills
- Training in use of devices
- Community awareness creation
- Training in to use various referral methods

10.2 PRIMARY LOW VISION SERVICES

Can be delivered through vision centre/primary eye care centres

Human Resources

- Mid-level ophthalmic persons (MLOP)

Liaison with

- Community-based workers
- School teachers
- Special Educators
- Social workers
- Volunteers

Activities

- Ophthalmic check-up, treatment, diagnosis
- Refraction
- Basic low vision assessment, mainly for adults / older people with moderate visual impairment
- Supply the necessary glasses and basic/simple low devices to the LV persons
- Refer LV persons, especially children and those with severe visual impairment and blindness (as many of them have functional low vision) for surgery, specialized clinical services, clinical low vision care at secondary and tertiary eye care services

Infrastructure:

- Assessment/ storage Room (5mx5m) in the existing infrastructure
- Screening Test
- Publicity materials
- Basic low vision devices for assessment and dispensing

Training of MLOP

Short Term (2months)

- Up gradation of refraction skills
- Vision screening
- Understanding of low vision
- Skills training-vision/other skills
- Community awareness creation

Strategies at Primary Level

- Low Vision screening in the community
- Create awareness among teachers at schools
- Identify people with low vision during camps.
- Organize screening camps in association with local NGO.
- Identify children in special schools and refer them for clinical evaluation
- Display of posters in school
- Documentation

10.3 SECONDARY LOW VISION SERVICES

Secondary services can be provided at small private and public facilities including regional hospitals, District hospitals and low vision professional's offices.

Human Resources

- Ophthalmologist
- Refractionist /Optometrist
- Liaison with
- Rehab./health personnel
- Educators
- Volunteers

Main Activities

CBR/ education:

- See primary level; Added here is special emphasis on schools for children with special needs
- Supervise low vision work done at local schools, CBR and other community programmes
- Provide basic training to staff at community level
- Eye care
- Conduct ophthalmic examinations, refraction, low vision, clinical diagnosis & assessment, prescribe and provide devices, vision training, assess LV persons referred by CBR/special schools / other rehab programmes

- Refer LV persons to CBR/ (inclusive) education / other rehabilitation programmes
- Refer complex cases to tertiary clinic.
- Linkage with rehabilitation and education
- Outreach services-screening for refractive errors and low vision
- Mentoring and monitoring of primary low vision

Infrastructure:

- Space
- Secondary level assessment materials
- Low vision devices
- Adaptive equipment

Training:

Short Term for ophthalmologist and optometrist (3days to 8 week)

- Orientation to low vision
- Clinical and functional assessment
- Refraction and prescription of devices
- Assessment of rehab needs
- Skills training-vision/other skills

Strategies at Secondary Level

- Identification, Diagnosis and low vision Management.
- Provide spectacles and low vision devices
- Training in use of visual skill
- Refer complicated cases to tertiary hospital and follow up with them.
- Networking with other programmes dealing with eye care services.
- Network with special schools, old age homes, and educational institute.
- Display of poster awareness material at PHC, schools and Hospitals
- Training and support of primary level health workers.
- Documentation

10.4 TERTIARY LOW VISION SERVICES

Tertiary LVS is characterized by multidisciplinary services, and is typically provided in large hospitals where a variety of eye and health care providers are situated and available for referral and consultation, in a comprehensive vision rehabilitation setting with referral and collaboration to and from a medical facility, or in specialist multi-disciplinary centres.

Human Resources

- Ophthalmologists (2 part time)
- Optometrist/ Refractionist (2 part time)
- Counsellors/coordinator (1 full time)
- Liaison with
 - Teachers
 - Rehabilitation personnel

- Orientation & Mobility instructors
- Therapists

Main Activities

CBR/ Education:

- Provide training to all professionals involved in low vision work
- Coordinate referrals to and networking with all relevant professionals and organizations
- Eye care
- Provide comprehensive LV clinical assessment, including prescription of specialized optical devices, counselling and training
- Assess all referrals from the secondary/primary level
- Refer LV persons to CBR/ (inclusive) education / other rehabilitation programmes
- Provide training on Low vision to all relevant eye care staff at all 3 levels and contribute to training of education and rehabilitation professionals
- Low Vision care for very young children with multiple disability
- Those requiring complex LVDs
- Outreach services
- Follow up
- Research
- Advocacy

Infrastructure

- Space
- Tertiary level assessment materials
- Low vision devices
- Mobility devices
- Adaptive equipment

Training

Short term

- Functional/ Clinical low vision
- Prescription and training in use of LVDs
- Use of complex devices
- Role of Special educator and rehabilitation personnel
- Planning & implementation of low vision programme

Strategies at Tertiary Level

- Diagnosis and low vision management
- Clinical assessment
- Functional assessment
- Prescription of devices
- Training in use of vision and devices
- Follow ups
- Awareness creation
- Assessment of school for the blind, school for children with special needs
- Organising Low Vision camps

- Organizing awareness workshops for ophthalmologist, optometrist, MLOP, rehab personnel, special educators, teacher's parents
- Display of posters / awareness material on low vision at hospital, special schools and mainstream school.
- Organise meetings /workshop with parents of low vision children, patients, Teachers of mainstream school special school
- Human resource Development
- Training of Ophthalmologist, Optometrist
- Training of paramedical staff, special educators and rehabilitation personnel
- Training of trainers
- Providing consultancy to other eye care programs for set up low vision clinic.
- Research
- Networking

10.5 CENTRE OF EXCELLENCE

Strategies at Centre of Excellence

In addition to the above activity of tertiary care the COE should be related

- Advocacy
- Policy making
- Networking
- Research

The table below describes the activities, infrastructure and Human Resources required at different levels of services.

Level	Main Activities	Infrastructure	Human resources
Vision Centre	Awareness creation Identification and vision screening Referral to appropriate level Basic rehabilitation Environmental modification Basic low vision devices Community Participation	Assessment/ storage room(5mx5m) Screening Test Publicity materials Basic low vision devices	MLOP Community-based workers School teachers Special Educators Social workers Volunteers
Primary LVS	Awareness creation Identification and vision screening Referral to appropriate level Basic rehabilitation Environmental modification Simple low vision devices Community participation	Screening Test Publicity materials Basic low vision devices	Community-based workers(trained in low vision) School teachers Social and Multi-skilled workers Volunteers /parents

Secondary LVS	Diagnosis Refraction (plus paediatric refraction) Low Vision assessment Prescription of devices Rehabilitation Counselling Linkage with rehabilitation and education Cross referrals Outreach services- screening for refractive errors and low vision Mentoring and monitoring of primary low vision	Secondary level assessment materials Low vision devices Adaptive equipment	Ophthalmologist Refractionist Mid-level eye care/rehab./health personnel Multi skilled workers Volunteers
Tertiary LVS	Clinical & functional low vision assessment Low Vision care <ul style="list-style-type: none"> • Very young children • Children with multiple disability Those requiring complex LVs	Space Tertiary level assessment materials Low vision devices Mobility devices Adaptive equipment	Ophthalmologists Optometrist/ Refractionist Teachers Rehabilitation personnel Orientation & Mobility instructors Therapists Counsellors

Cost for Low Vision services

The cost for low vision services involves for the assessment equipment/and materials devices. It is also seen that there is a need to keep basic inventory in the clinic, so that the device can be dispensed at the same time of assessments because this will increase the usage of the devices by the client.

The list of assessment material and devices required at primary, secondary and tertiary level is discussed in next chapter.

11

Infrastructure and Devices

11.1 List of Equipment for Tertiary, Secondary and Primary Levels

(I) Tertiary Level Clinic

A. Ophthalmic Equipment for Tertiary Level Clinic

Equipment

Streak Retinoscope (powered by AC)
Ophthalmoscope (powered by AC)
Lensmeter
Trial lens set (full aperture)
Adult trial frame (2)
Paediatric trial frames (3 pairs of different sizes)
Trial lens holder (8 wells)
Halberg clip
Long handle occluder with pinholes
Cross cylinders (0.5, 1)
Pen torch

B. Vision Assessment Equipment for Tertiary Level Clinic

Equipment

Light box for VA test
Distant LogMAR test charts for light box – letter, number, symbol – E Chart (one for each type)
Distant LogMAR test chart on hard cardboard – letter
Near vision tests - LEA symbol paediatric tests for matching and pointing (with and without crowding)
Near vision test – IE, E numbers, continuous reading text, number
Preferential looking – LEA paddles and cards of differential contrasts
Contrast sensitivity test charts
PV-16 Color Vision Test(double set)
"Amsler" grids
Hand disc perimeter
Tangent screen

C. Low Vision Devices for Tertiary Level Clinic

C.1 Optical Low Vision Devices

- Spectacle magnifiers (half eyes) from 6D to 12 D in 2D steps with base in prisms
- 10-40D in 4D steps as half eye total 9 pieces (45)
- 10-40D in 4D steps as full aperture R+L total 18pcs(90)
- Foldable and hand-held magnifiers with and without built-in light source, from 5D to 42D, total 15 pieces (\$21.8)
- Stand magnifiers with and without built-in light source, from 13.5D to 56D, total 9 pieces & \$31.3
- Dome and bar magnifiers, total 4 pieces (\$19.3)
- Hand-held monocular telescopes from 2.5X, 3X, 4X, 6X, 8X and 10X with micro-lens for 8X and 10X telescopes, total 5 pieces (\$56.9)
- Filters of 5 different shades with UV protection and luminous transmission of 40%, 18%, 10%, 2% and 1%, (\$100)

C.2 CCTV Devices

- Black and white hand-held CCTV magnifier, US, Max Port Black & White, (\$475)
- Full colour hand-held CCTV magnifier, US, Max Port Colour, (\$602)
- Table top black & white CCTV with background colour choice and can integrate with computer display, New Zealand, Smart View, (\$2,270)

C.3 Computer Devices

- Computer software with text enlargement and voice output, US, Zoom Text, (\$680)

The total cost of low vision devices will be $C1 + C2 + C3 = \$4,45 + \$3,647 + \$1,880 = C = \$5,972$ The costs of ophthalmic equipment, assessment equipment are A and B i.e. \$1,584 and \$3,750 respectively.

$$A + B + C = \$11,306.$$

(II) Secondary Level Clinic

D. Ophthalmic Equipment for Secondary Level Clinic

Equipment

Streak Retinoscope (powered by AC)
Ophthalmoscope (powered by AC)
Trial lens set (full aperture)
Adult trial frames
Paediatric trial frames (3 pairs of different sizes)
Long handle occluder with pinholes
Pen torch

E. Vision Assessment Equipment for Secondary Level Clinic

Equipment

Distant LogMAR test chart on hard cardboard – letter or IE
Near vision tests - LEA symbol paediatric tests for matching and pointing (with and without crowding)
Near vision test – IE, number
Contrast sensitivity test – LEA screener

F. Low Vision Devices for Secondary Level Clinic

Optical Low Vision Devices

- Spectacle magnifiers (half eyes) from 6D to 12 D in 2D steps, 16D to 20D in 4D steps, total 6 pieces & costs \$54
- Hand-held magnifiers with and without built-in light source from 5D to 17D, total 5 pieces & costs \$8.1
- Stand magnifiers from 13.5D to 40D with no built-in light source, total 6 pieces & costs \$20
- Dome and bar magnifiers, total 2 pieces & costs \$7.4
- Hand-held monocular telescopes from 4X to 8X with micro-lens for 8X telescopes, total 4 pieces & costs \$42.2
- Filters of 4 different shades with UV protection and luminous transmission of 40%, 18%, 10% and 2%, total cost \$100

The total cost of low vision devices is \$231.7

The costs of ophthalmic equipment, assessment equipment are D and E, i.e. \$1,040 and \$400.

$D + E + F = \$1,671$

(III) Primary Level Clinic

G. Equipment for Primary Level Clinic

Equipment

Vision screening with WHO Low vision Kit
Pen torch

H. For Use at Primary Level

- Four hand-held magnifiers from 5D to 14D, (\$6.6)
- Four stand magnifiers from 13.5D to 40D, (\$12.8)
- Two telescopes, 4x and 6x, (\$26.5)

The cost of low vision devices is \$45.9 = H

The cost of equipment is G i.e. \$20.

G + H = \$65.9.

The costs to equip clinics at the three levels are:

Tertiary : approx. US\$ 11,300

Secondary : approx. US\$ 1,700

Primary : approx. US\$ 65

VISION 2020 Standard List - See Annexure I

12

Networking and Linkages

12.1 ADVOCACY

Advocacy plays out at different levels in any initiative, essentially in creating an enabling environment, opening doors to required resources and helping in the implementation or service delivery.

It is a very thin line that divides advocacy from creating awareness and education from action. "Advocates" can be defined as those who are in a position to enable and enrich the process but are not directly involved in the delivery of eye care services either as providers or as recipients of the services (such as patients).

Advocacy issues for Low vision:

- The major issue for advocacy is to raise awareness among all the stakeholders in low vision service provision.
- We need more centres for provision of services as well as for training in low vision.
- We need to advocate for making low cost, high quality LVDs available throughout the country.
- We need to advocate for spreading the awareness about the PWD act, making the facilities approachable by the low vision clients and making rehabilitation services within the reach of PLV.

Advocacy Target Groups

Using advocacy to enhance service delivery, the advocates are broadly categorized as

- Policy implementers such as the government officials at the local, District, State, Province, level etc.
- Community leaders and opinion makers
- Health professionals including the ophthalmic community
- Low vision clients

Related personnel

- School teacher
- Volunteers



- Private sector professionals
- The community, and personnel working closely with the community

Infrastructure

- Use existing health care system
- Use existing community health centres and programs
- Get private practitioners to participate
- Use public media (Newspapers, Television, All India Radio)

12.2 NETWORKING AND LINKAGES:

Partners and networks

Awareness creation programs can benefit enormously by the involvement and inclusion of other organizations already established in the community. These organizations can provide a wide variety of aid, including support in the form of:

- Information dissemination
- Venues for displaying IEC Materials
- Organizational assistance
- Venues for screening camps
- Volunteer staff

Many organizations in various fields are good candidates for a strong network of partners.

These include

General Ophthalmologists: They have pre-existing contacts with low vision clients in the community, who are the primary focus in awareness creation activities of the project. Hence, they are in a position to spread information very effectively during these contacts.

- General medical practitioners
- Indian Medical Association
- LIONS clubs / Rotary clubs
- Local NGOs working in health sectors & other development organizations - Local NGOs will have pre-existing networks of willing volunteers to aid in the distribution of pamphlets and booklets, and pasting of stickers and posters.
- TV and Radio stations - These groups are invaluable for spreading information into rural areas and amongst illiterate population.
- Newspapers - Newspaper articles and advertisements effectively spread information to those who read them.
- Local Government officers - Without the cooperation of local government officers, local government workers are less inclined to actively participate in awareness creation projects and activities. These officers should be involved early on in the project to ensure that they are aware of the project and its importance.
- Optical shop owners / Optical manufacturers
- Eye care service providers
- Special schools / teachers

- Self help groups
- Paramedical personnel - As the initial and sometimes the only, medical contact for large section of rural populations, paramedical personnel are vitally important to the success of awareness creation programs.
- Grass root level workers including ASHA workers, ICDS workers and allied health personnel
- Everyone can help spread the message about low vision. Studies have shown that patients actively share and discuss their ailment experiences with their friends and family members. Every member of the community has the potential opportunity to spread awareness on low vision.

Low vision interest group on Internet: A low vision interest group can be created on the internet where all the people involved in the work can post their problems and others can respond. That way, people can help each other and at the same time, come to know of the problems faced by others and also of the tricky situations that one may come across occasionally.

12.3 RESOURCE MOBILIZATION FOR LOW VISION PROGRAMMES

Resource mobilization is an expression that is commonly used in development terminology. It simply means enhancing or augmenting the means of support. In programme terms, this enhancement of means of support may be financial, human, technical or in kind.

Resource mobilization is a critical element in low vision programme development and is vitally important because:

1. Programmes and projects cost money
2. They are usually in addition to on-going government eye care, educational and rehabilitation activities
3. Even long term horizontal programmes and interventions have vertical components and these need extra resources
4. Pilot programmes are often required to effect a change in policy

Mobilization of financial and other resources can be 'resourced' from:

- National government, private funds or donations
- Governmental agencies
- Inter-governmental agencies
- Non-governmental organizations
- Other forms of funding – multilateral and bilateral aid, INGO support

National resources:

In the planning stage of a low vision programme, it is vital to identify governmental and non-governmental resources. In addition, it is essential to undertake an assessment of current needs and document an inventory of existing activities. This is usually followed up by a carefully prepared plan of action. A firm national commitment can be very helpful in mobilizing external

resources and assistance.

Other strategies to harness the potential of national resources includes the need to increase public awareness of blindness and low vision, generate support from influential 'opinion makers' or celebrities, use of professional societies, print, television and other media (mass media), and recognition and contribution of NGOs and motivating them into increasing their support.

International cooperation:

A variety of options exist for mobilizing support from the international agencies. The WHO Prevention of Blindness and Deafness programme can offer assistance to national programmes. International non-governmental organizations can provide support to various components of a national programme. Multilateral and bilateral aid is very useful in transfer of financial resources and creates a sense of responsibility. Technical Cooperation among Developing Countries (TCDC) is another mechanism for resource mobilization, particularly for training of human resources and organization of low vision programmes.

Role of government:

The role of governments in the context of resource mobilization can be summarized as below:

1. Policy and institutional framework for disabled persons
2. Adoption and facilitation of a national programme
3. Running schools with inclusive education (or schools for VI children where such a policy does not exist), and vocational training centres for the disabled
4. Creating a fund for disabled persons
5. Providing grant and aid to disabled persons
6. Running Training of Trainers programmes
7. Supporting university departments of education and special education

Role of NGO:

Similarly, the role of NGOs can be considered as that involving:

1. Support to training programmes – human resource development
2. Capacity building of existing institutions
3. Filling in gaps in programmes
4. Assistance in strengthening of government run components of the programme
5. Advocacy
6. Technical assistance, supplies and equipment
7. Support to organizational development and strengthening of management structures/for a at national, provincial and district levels

Resource mobilization is often equated with finances. However, a very important and oftentimes vital element of a programme is the human capital. Initially, financial resources are required to roll out a programme (e.g. a low vision programme), but as a critical mass of trained persons is reached, the programme growth becomes less dependent on finances and its expansion and sustainability are to a large extent driven by the human resources developed.

Resource mobilization is one of the key components of a project cycle from planning, to monitoring to evaluation. Opportunities to resource a low vision programme can be sought from various donor agencies (and oftentimes significant funding can also be found in-country) through networking and presentation of a well-conceived plan on low vision as an integrated part of a larger national plan e.g. a national plan for prevention of blindness/comprehensive eye care. Designing of a budget that is segmented into different 'fundable' components also helps to, attract donors that may wish to support a component or a set of components in a program.

13

Programme Management Strategies

Low vision can affect normal development and education of children and all areas of daily living, work and leisure for adults. The broad areas that low vision impacts on participation is in

- Education, work and leisure
- Social and consumer interactions
- Mobility
- Emotional reaction to vision loss
- Household and personal care.

It is important to note that the degree of vision impairment does not predict exactly the extent to which vision limits activities or restricts participation.

13.1 MULTIDISCIPLINARY APPROACH TO LOW VISION CARE

Not all people with low vision will need low vision services nor will they need the same type and intensity of service. Results of research using a questionnaire to establish peoples' needs for low vision care indicate that some people with low vision do not require low vision services and that those who need them will have differing needs for the type and amount on intervention. Results of our research with the Impact of Vision Impairment Profile (IVI) indicate that almost half of the people with visual acuity in the categories $<6/12 - 6/18$ and $<6/18 - 6/60$ report little or no problems with activities due to their vision and so would not need referral for low vision care. Almost 10% of people with visual acuity $<6/60$ also report little or no difficulty. The level of difficulty reported by people with low vision is not the same for all types of activities. These results confirm that visual acuity alone should not be used to determine if a person needs low vision services.

At this stage we can estimate targets for the provision of care to provide coverage for all people who need low vision care. An estimate would probably be that, at any one point in time, approximately 70% to 80% of people with low vision might benefit from low vision services.

ESSENTIAL ELEMENTS OF A LOW VISION PROGRAMME

In a country with a developed low vision service, a team of professionals carries out low vision assessment. A social worker does the initial interview and history, functional assessment by a low vision therapist, optometric assessment by an optometrist and follow-up visits to the client by the social worker. The low vision clinics in these countries are usually very well equipped and the aids are provided to patients on long term loans, free of cost or are covered by medical insurance.

Unfortunately, this is not the case in most developing countries that have either poorly developed low vision services or no services at all. Most of the clients come from a lower socio-economic group and cannot afford expensive devices. Two major impediments encountered in developing a low vision service are paucity of trained people and non-availability of low vision devices.

Under these circumstances, it is necessary to develop a low vision service that can fit into the existing health and social welfare infrastructure of the country.

OBJECTIVES

- To formulate strategies and an action plan to develop appropriate, affordable and sustainable low vision services for individuals with low vision
- To improve the availability of appropriate, affordable low vision devices
- To train a suitable cadre of practitioners
- To improve awareness of the need for and benefits of low vision services amongst the public as well as eye care professionals

STRATEGIES

Low vision devices

As affordable low vision devices are not available at large especially in developing countries therefore, there is a need to train technicians in the production of low cost, robust low vision devices from locally available materials. Optical workshops will need to be developed for this purpose. For initial purposes, facilities already available in the market can be utilized e.g. lathe operators to make the stands for the magnifiers and optical technicians for grinding and fitting of lenses. There is also a need to identify potential producers of more sophisticated optical aids either from local markets or other countries capable of producing devices at low cost.

Human resource development

There is a need to identify and train a cadre of eye care workers to provide low vision services. Possibilities include ophthalmologists, the optometrists, mid-level professionals and existing special education teachers. Whoever is trained in low vision work will need to have a particular interest in this specialty.

In the short term, ophthalmic paramedics could be trained to provide very simple devices in remote rural communities. Training of low vision professionals may need to be provided by visiting experts until the expertise and experience is necessary within these countries to take on this development role.

Advocacy

Once low vision services are in place, there will be a need to create awareness in the public and improve awareness on the needs of individuals with low vision amongst ophthalmologists and teachers of visually impaired children. Generally, there already exists a cadre of community health workers in the developing countries who could assist to identify persons with visual handicap and refer them to appropriate centres. This would entail inclusion of low vision in their primary eye care training. For a sustainable development of low vision services, there is a need to create awareness amongst officials of health and special education/social welfare departments.

Development of models of low vision services delivery

The national program for prevention of blindness needs to identify tertiary resource centres that would be involved with human resource development and provision of specialty services, low vision being one of them. There is a need to develop expert centres of low vision as per need of the country, ideally within established eye departments. The functions of the Expert Centres would be to:

- Produce low cost, simple low vision devices
- Obtain or produce more sophisticated low cost, low vision devices
- Train technicians in the manufacture of these devices
- Train practitioners in assessing, prescribing, dispensing and maintaining simple low vision devices, as well as more complex devices
- Manage the complete range of cases, including those with more complex needs
- Improve awareness through health education and continuing medical education
- Evaluate models of services delivery to determine its appropriateness to that country
- Audit service provision
- The Expert Centres should train personnel and supply low vision devices to satellite clinics run in smaller eye units

13.2 AWARENESS OF LOW VISION

A successful programme to combat low vision will largely depend upon raising the level of awareness of the disease within the community. It appears that awareness of refractive error and low vision is very low across the country not only among the community BUT also among the people involved in eye care starting from the Ophthalmologists to the paramedics, making it difficult for the individual patient to engage in preventive actions, diagnosis, or treatment. With optical and non-optical devices, we can help the people use the remaining eye sight optimally and continue to function routinely otherwise. Providing relevant information is an essential step in conducting a successful low vision programme.

A recommended method of assessment is through a study of Knowledge, Attitude & Practice (KAP) within the community. Knowledge refers to the understanding of low vision in the community. Attitude refers to the subjective feelings about it; practice refers to actions taken within the community for the same.

A sample of KAP format is given as annexure for reference.

Low vision awareness strategies

People vary so widely in their socio-economic conditions, traditions, attitudes, beliefs and level of knowledge that uniform communication approach is not viable. A mixture of different approaches need to be used depending upon the local circumstances.

Strategies for the recipients of the services:

Approach	Method	Media
Mass	Press meeting Public meeting Public announcement	Radio/television Poster/banner Newspaper Exhibition Chart
Group	Seminar Lecture/presentation Patient Interaction Group discussion	Powerpoint Booklet Pamphlet Posters
Individual	Patient education Counselling	Flip chart Leaflet

Mass approach

We know that the knowledge about low vision among the community is low and so is a good indication for a high level of effort in the Mass approach to health information for behavioural change.

Press meeting, Guest Lectures, Public meetings and exhibition form part of health information for behavioural change. Messages are disseminated through various means; "Cable TV Telecast, Slides in cinema theatres, message written on walls, display of posters in different locations, mike announcements and bit notice distribution."

The main purpose of press meetings is to disseminate information on the management of low vision through frequent write-ups and articles contributed by press members and faculty of eye hospitals; these are published in local newspapers and magazines.

Television and radio announcements, though expensive, may be useful to reach the illiterate in the rural areas.

Pamphlets and Booklets are distributed in the community to spread more specific knowledge about low vision to low vision clients. The information is read by and repeated by those who pick it up.

Trade exhibitions, local fairs and festivals provide an opportunity to reach a large audience through a booth distributing IEC materials while providing a forum for interaction between knowledgeable project staff and the public.

Group approach

The group approach, characterised by efforts to reach a smaller target audience for a more sustained period of time, is designed to help change the opinions and messages are probably the only source of information for the visually impaired group that we are targeting.

Poster display in hospitals / public places have the same advantage of being widely seen, as well as the additional benefit of more specifically targeting the intended audience. They are displayed in eye hospitals or optical shops, where they are likely to be seen by those who most need to see them.

Group discussions are highly effective tools because they facilitate a free flow of ideas in an informal setting and allow for one-to-one interaction with a knowledgeable person who can answer questions pertaining to the disease. They are conducted during orientation training, teachers' meetings, religious gatherings, support group meetings etc.

Guest lectures offer opportunity to spread knowledge to small groups (selected for a variety of reasons, including being a patient or being in a position to effect a positive change in the community). These lectures are given by doctors and project staff. Guest lectures are arranged at professional gatherings, medical conferences, opticians associations, rotary meetings, NGO conferences and similar settings.

Targeted Intervention: Health education training sessions and presentations given to a group of known low vision clients, the 'patient interaction sessions' conducted involves a short presentation on low vision & its management, followed by a question - answer session between the audience and the presenter.

Individual approach – Counselling

The activities undertaken are designed to change the attitudes & practices of those with mistaken perceptions concerning low vision & LVDs. Though this approach has the greatest possibility of success, it is resource intensive and conducted only after mass and group campaigns. The approach adopted in patient counselling provides specific, detailed information to increase knowledge, change attitudes or alter incorrect practices. It's the perfect opportunity to transfer health information for behavioural change because of the one-to-one interaction between a counsellor & the patient.

Awareness generation among service providers

Basic awareness about low vision activities is lacking among the service providers also. Concerted efforts need to be made to raise the level of awareness among all the key service providers. This includes Ophthalmologists, paramedical workers and Optometrists.

A simple message can be put in all the clinics where eye examination is being done to remind that we are supposed to refer all the patients in whose case the vision does not improve to 6/18 to low vision clinic. If this much is done, it will help the cause in a big way.

Motivating Ophthalmologists and paramedics to refer low vision patients to camps should be arranged through seminars, workshops and orientation training. Orientation training on low vision, its magnitude, signs, symptoms and management is conducted for ophthalmologists, paramedical personnel and optical shop owners.

13.3 IDENTIFICATION OF LOW VISION CLIENTS

This deals with the potential list of peoples who can detect eye diseases and refer cases to the eye hospital for proper diagnosis and treatment. Those cases which cannot be helped by surgery or other means will be referred to the low vision specialist. At the primary level, ICDS workers, CBR workers, PHC, Vision centres, School teachers, special educators, teachers in special schools, school screening, key informants can help to identify cases. At the secondary level patients can be got from general eye OPD, specialty eye OPD (glaucoma, retina, paediatric, neuro) neonatal screening by paediatricians and primary care doctors, paediatric OPD, comprehensive outreach camp. At the tertiary level organizations doing ROP screening, diabetic retinopathy project, glaucoma detection project, from other super specialties especially neuro, institutions dealing with multi handicapped can provide low vision clients. Childhood survey and blind school survey can also identify low vision clients.

Methodology used for children

1. Neonatal screening by Paediatrician and primary care doctors

Preterm/ premature/ low birth weight babies need detailed anterior segment evaluation, indirect ophthalmoscopy (to rule out Retinopathy of Prematurity -ROP), looking for fixation, ant squint and meticulous refraction because they have tendency towards myopic shift. Early intervention programme can be started if they are detected early.

2. Paediatric OPD

3. ICDS Workers:-

As this group takes care of pre-school children and lactating mothers, they can refer cases to the eye clinics from where low vision patient can be detected and taken care of.

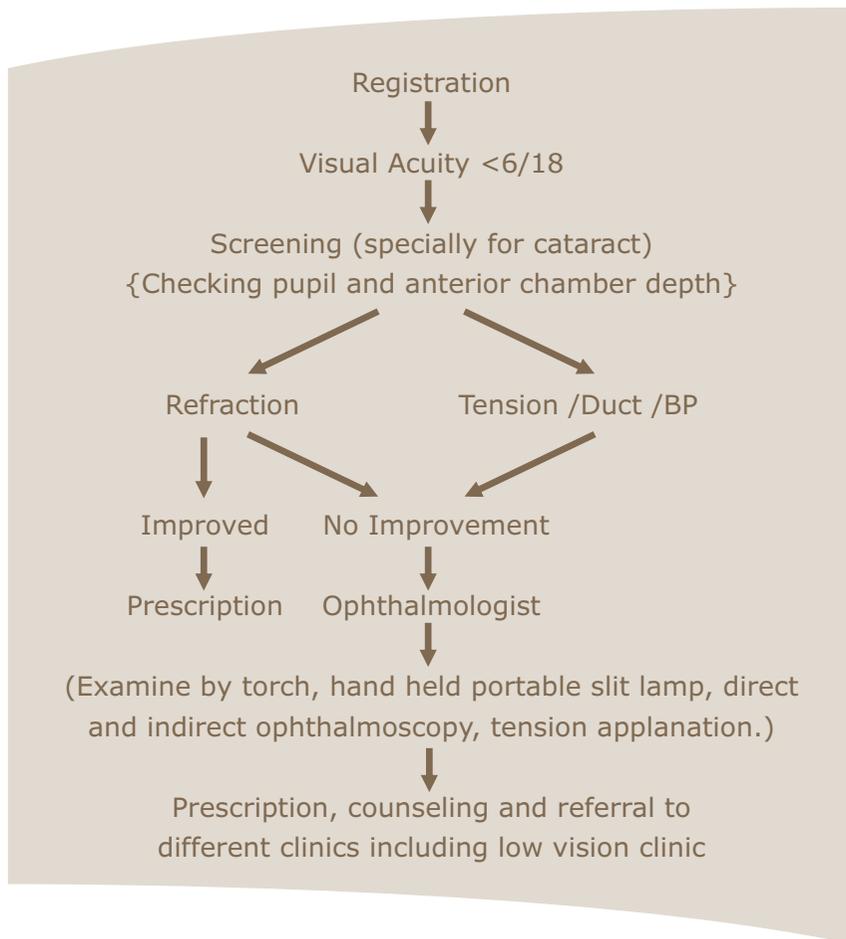
4. School Screening by Teachers

5. Pediatric Ophthalmology unit and general eye OPD

Pediatric ophthalmology OPD should be well equipped with different vision assessment charts to record vision of very young children, treat amblyopia , give vision stimulation etc.

6. Comprehensive outreach camp

In comprehensive camp all patients are thoroughly checked.



Those cases selected for cataract surgery undergo random blood sugar test at the camp site. Medicine is also dispensed. To go for a separate low vision camp is a difficult and costly issue. Low vision cases can be detected if we modify our way of patient screening in the general camp.

7. Non- formal school:

Schools where street children, orphans and children from other sources study

8. Special school:

Here children with other disabilities like mental, hearing, speech, study. These children need good vision assessment because many a time multiple disability (including ocular problem may be present)

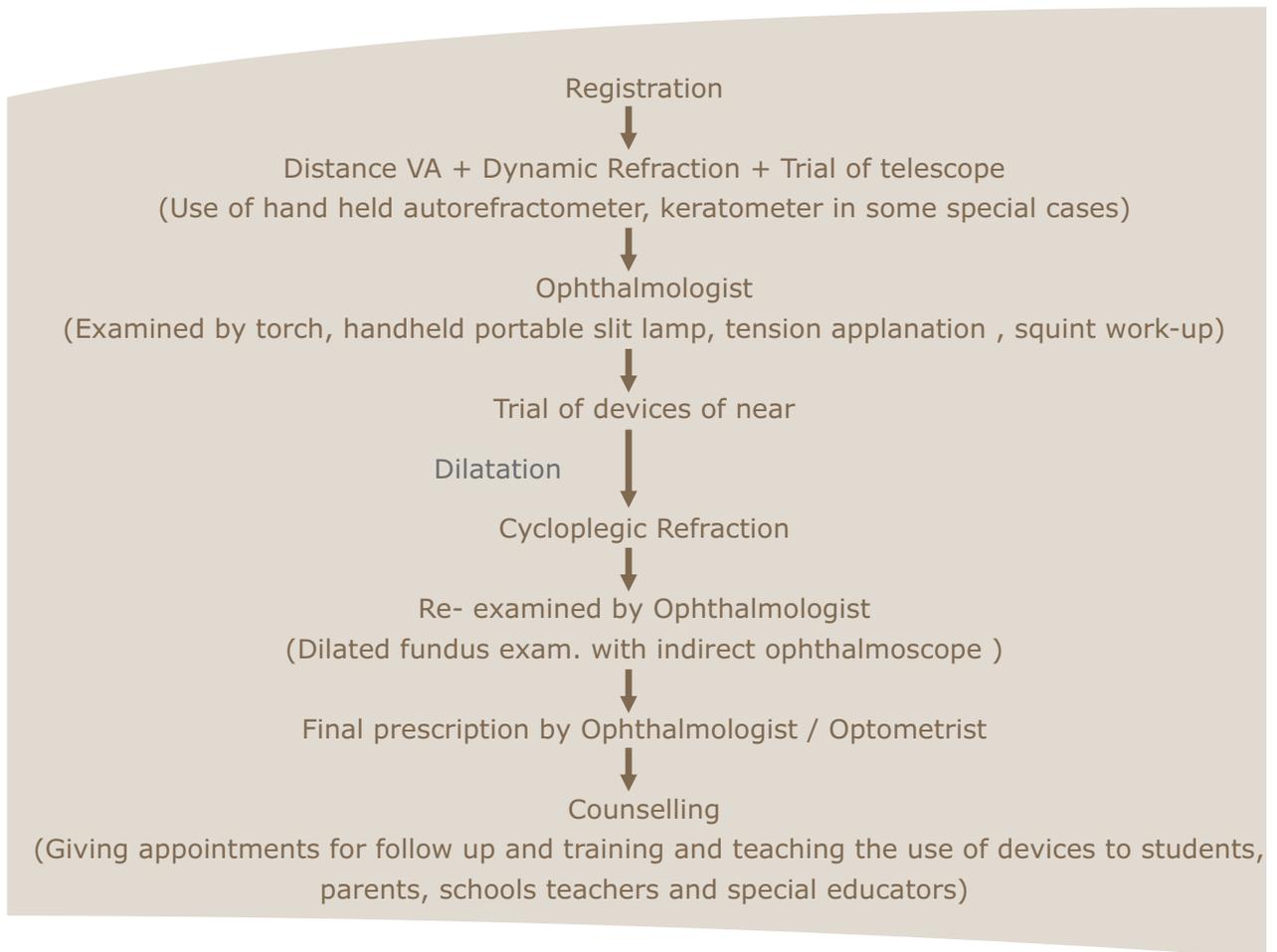
9. Key Informants:

Health workers, social; welfare group, teachers, religious leaders, even sweet sellers and others can help in identification of children with eye problem.

10. Survey of school for the blind

11. Sarva Siksha Abhiyan (SSA) -Universal education drive

Initial screening of children by school teachers and special educators. 25 - 30 patients examined in a day in a time span of 6 – 7 hours.



Human Resource required per Camp

- Ophthalmologist
- Optometrist
- Registration and counselling
- Driver

Vision Assessment Equipments

1. Log MAR chart for distance
2. Different near vision chart
3. Optical devices (telescopes, magnifier of different ranges)
4. Non- optical devices
5. Filters

Methodology used for adults

1. Eye OPD
2. Comprehensive outreach camps
3. Blindness register
4. Old age homes
5. Referral from other specialities of medicine
6. Vision centres
7. Referral from other health\social workers

Thus low vision clients can be identified from different sources. We only need to use our economic and human resources properly to reach them and render our valuable services to those who really need it.

Annexure I: Framework for the review of the LV project

Project Area	Human Resource Development	Infrastructure	Service Delivery	Records	Awareness
Project Design	General	Overall infrastructure in hospital	Procurement	No. of LV patients age and gender seen	Strategy
Demographic details	Total staff in the hospital	Infrastructure for LV services	Availability		IEC developed
Type of population covered	Orientation of the hospital staff	Equipment for LV services	Cost	No. of glasses prescribed and obtained	Seminars and presentations
Urban, Rural or Semi Urban or both	Staff in outreach	LVD s for assessment	Spectacles, LVD and Rehabilitation		Other activities
Services available in the hospital and outside (school, SSA, CBR other hospital)	Other stakeholders			No. of LVD prescribed and obtained	
	No. of LV trained personnel			No. patients coming for follow up	
	Training on LV and institution			No. patients sent for rehab for children / education	
	Basic Advanced Refresher				
	Skill Assessment				
	Client Assessment (Functional and Clinical)				
	Training of the client				
	Counseling				

Annexure II: VISION 2020: Standard List for Low Vision Services

Standard List

Standard List for Low Vision Services: VISION 2020 Low Vision Group		
Ophthalmic Equipment	Tertiary Level Low Vision Clinic	Secondary Level Low Vision Clinic
Streak retinoscope	✓	✓
Direct ophthalmoscope	✓	✓
Lensmeter (Focimeter)	✓	
Trial lens set (full aperture)	✓	✓
Universal trial frames	✓ (2 sets)	✓
Paediatric trial frames (2 pairs of different sizes)	✓	✓
Trial lens holder	✓	
Halberg clip	✓	
Long handle occluder with pinholes	✓	✓
Cross cylinders (± 0.5 , ± 1)	✓	
Pen torch and measuring tape	✓	✓
Vision Assessment Equipment		
Light box for visual acuity test	✓	
Distant LogMAR test charts – letter, number, tumbling Es, Landolt Cs (one of each type)	✓	✓
Near vision tests (same as distant but calibrated for 40 cm)	✓	✓
Reading acuity test (continuous text in English and local language)		
Symbol paediatric tests for matching and pointing (with and without crowding)	✓	✓
Preferential looking system	✓	
Contrast sensitivity test charts	✓	✓
PV-16 Colour Vision Test (double set)	✓	
'Amsler' grids	✓	
Hand disc perimeter	✓	
Tangent screen	✓	
Optical Low Vision Devices		
Spectacle magnifiers (half eyes)	6D to 12D in 2D steps with base in prisms; 10 to 40D in 4D steps as half eye; total 9 pieces 10 to 40D in 4D steps as full aperture R+L; total 18 pieces	6D to 12 D in 2D steps 16D to 20D in 4D steps; total 6 pieces
Foldable and hand-held magnifiers with and without built-in light source	5D to 42D, total 15 pieces	5D to 17D; total 5 pieces
Stand magnifiers	with and without built-in light source, from 13.5D to 56D; total 9 pieces	with no built-in light source, from 13.5D to 40D; total 6 pieces
Dome and bar magnifiers	total 4 pieces	total 2 pieces
Hand-held monocular telescopes	2.5X, 3X, 4X, 6X, 8X and 10X with micro-lens for 8X and 10X telescopes; total 5 pieces	4X to 8X with micro-lens for 8X telescopes; total 4 pieces
Filters	of 5 different shades with UV protection and luminous transmission of 40%, 18%, 10%, 2% and 1%	of 4 different shades with UV protection and luminous transmission of 40%, 18%, 10% and 2%
CCTV Devices		
Colour television (20 inches)	✓	
Black and white hand-held CCTV magnifier	✓	
Full colour hand-held CCTV magnifier	✓	
Computer Devices		
Computer with laser printer and scanner	✓	
Computer software with text enlargement and voice output	✓	

Standard List for Primary Level Low Vision Care

Ophthalmic Equipment	Pen torch
Vision Assessment Equipment	WHO Low Vision Kit
Low Vision Devices	4 hand held magnifiers from 5D to 14D; total 4 pieces 4 stand magnifiers from 13.5D to 40D 2 telescopes, 4x and 6x

The approximate costs to equip clinics at the three levels are:

Tertiary:	US\$ 14,000
Secondary:	US\$ 4000
Primary:	US\$ 100

Annexure III: List of manufacturers / suppliers of Low Vision Devices

- Baliwalla and Homi Pvt Ltd, Mumbai
- Enhanced vision, Mumbai
- Karishma enterprises, Mumbai
- Lensei Enterprises, Pune
- Low Vision Resource Center, Hong Kong
- LV Prasad Eye institute, Hyderabad
- Madhu Instruments, New Delhi
- Om Tao Scientific Apparatus, Hyderabad
- Shah and Shah, Kolkatta
- Sonam Low vision center, Kolkatta
- Tejco enterprise, Mumbai
- Unique Educational devices, Pune
- Vision Enhancement Center, Ahmedabad
- Instruments can be made available from Local ophthalmic instrumentation companies

| Annexure IV: Workup Sheet

Name of Eye Hospital

Sr. No.

OPD No. / Date

Name of Patient:

Age/Sex:

Occupation:

Accompanied By:

Contact Number:

Ocular Diagnosis:

Ocular History:

Systemic History:

Family History:

Distance Vision Task Problem:

Near Vision Task Problem:

Mobility Problem:

...Pg 1

Glare Problem:

Vision:

OD:

OS:

Refraction:

OD:

OS:

Contract:

OD:

OS:

AMSLER:

OD:

OS:

Visual Field:

Colour Vision

Trial for distance:

...Pg 2

Trial for near:

Rehabilitation:

Final Prescription:

...Pg 3

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- enable@un.org



A VISION 2020: The Right to Sight - India Publication

VISION 2020: The Right to Sight - India is the global initiative for the elimination of avoidable blindness, a joint programme of the World Health Organization and the International Agency for the Prevention of Blindness with an international membership of NGOs, professional associations, eye care institutions and corporations. VISION 2020: The Right to Sight - India is a key driver of this initiative in India.

Vision

An India free of avoidable blindness, where every citizen enjoys the gift of sight and the visually challenged have enhanced quality of life as a right.

Mission

To work with eye care organizations in India for the elimination of avoidable blindness by provision of equitable and affordable services as well as rehabilitation of visually challenged persons through development of appropriate policies, quality standards, advocacy, training, and promotion of best practices with a special emphasis on the poor and marginalized sections of society and underserved areas.



VISION 2020: The Right to Sight - India

Room No.205A, (2nd Floor)
Enkay Tower B & B1, Vanijya Nikunj, Udyog Vihar, Phase V
Gurgaon, Haryana 122016, India
Tele / Fax: +91-0124-4301-184
Email: info@vision2020india.org
Website: www.vision2020india.org

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