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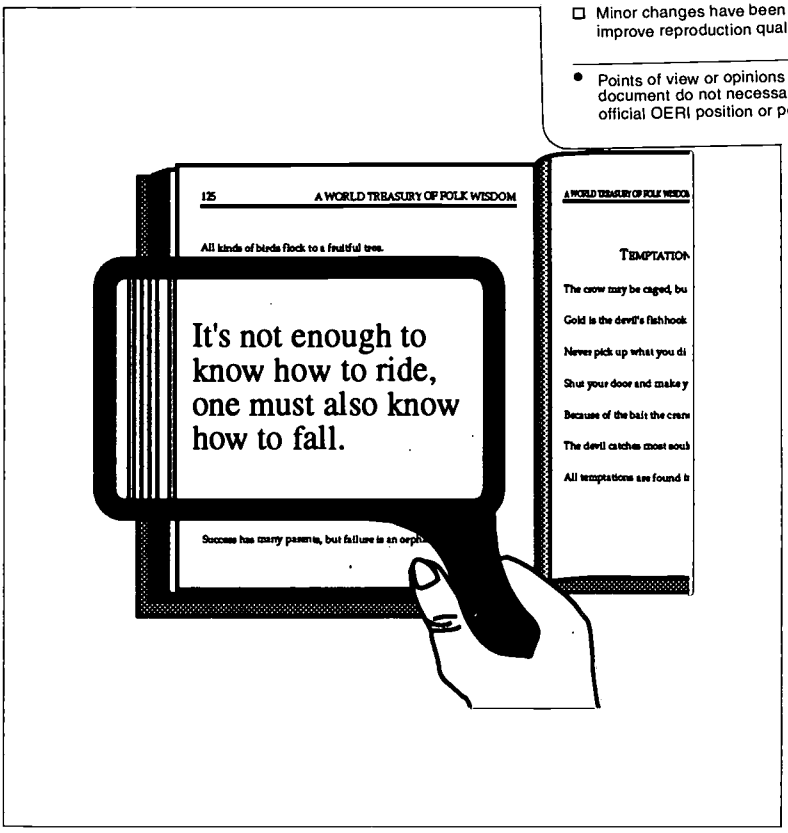
ABSTRACT

This consensus statement on best practices for choosing low-vision devices is a product of a 10-member expert panel which brought together a variety of disciplines as well as consumers for the purpose of synthesizing available scientific information to improve services to people with low vision. After an introductory section, the remaining sections address the following topics: (1) the clinical measurements and functional behaviors which can help define those adults who can benefit from low-vision devices; (2) the best standard clinical and functional assessment practices in vision rehabilitation; (3) assessment and referral services provided by primary care specialists; (4) the optical and functional characteristics of low-vision devices; (5) the best practices for determining which low-vision devices maximize visual function for adults with low vision; and (6) the instruction and guided practice which best ensures successful utilization of devices. Topics of needed research in the areas of technology, environmental issues, social/cultural applied research, service delivery, basic and clinical sciences, and personnel preparation are identified. (DB)



Protocols for Choosing Low Vision Devices

CONSENSUS STATEMENT

National Institute on Disability and Rehabilitation Research
January 25-27, 1993

Volume 1, Number 4

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The National Institute on Disability and Rehabilitation Research (NIDRR) Consensus Validation Conferences are convened to evaluate and synthesize available scientific information and improve the dissemination of findings from rehabilitation research. It is anticipated that practices discussed in this statement will be adopted by practitioners and consumers.

NIDRR Consensus Statements are prepared by a non-federal, 10-member panel, based on (1) resource papers prepared by experts; (2) testimony presented by researchers, clinicians, and consumers during a one-day public hearing; and (3) a day of closed deliberations by the panel during which the consensus statements are prepared. This statement is an independent report of the panel and is not a policy statement of NIDRR or the Federal Government.

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Abstract

Protocols for Choosing Low Vision Devices, the fourth Consensus Conference sponsored by the National Institute on Disability and Rehabilitation Research (NIDRR), brought together a variety of disciplines in the field of low vision to arrive at consensus on the best practices for choosing low vision devices. This statement, a product of the Consensus Conference, is a part of NIDRR's ongoing commitment to synthesize available scientific information that can improve the services offered to people with disabilities.

The Conference's 10-member expert panel, which included consumers, commissioned a series of papers summarizing research in the field and listened to a full day of testimony from providers, consumers, family members, researchers, and others in order to determine the current knowledge in the field.

The panel deliberated on questions that define the population of adults who can benefit from low vision devices to improve independence at home and at work, and to enjoy activities that enhance the quality of life. The panel also determined the best standard clinical and functional assessment practices in low vision rehabilitation and the best practices for determining which low vision devices are most effective in maximizing visual function for adults with low vision.

Although a wide array of information, innovations, and best practices were identified at the conference, there remains a substantial number of research questions that await answers. This consensus statement and its identification of future research issues can move the field forward quickly and effectively to meet the needs of people who use low vision devices.

Introduction

Estimates of the numbers of people with visual impairments in the United States range from 6 to 11.4 million. The most prevalent causes of visual impairment in this country are age-related: macular degeneration, diabetic retinopathy, glaucoma, and cataract. Visual impairment is commonly related to other impairments, causing multiple handicaps for people of all ages. Approximately 60 percent of people with visual impairments who are not institutionalized have one or more additional impairments as well. Vision loss has been ranked third, behind arthritis and heart disease, among the most common chronic conditions causing a need for assistance in activities of daily living for people who are elderly. These estimates include younger adults who have congenital visual impairments (such as Retinopathy of Prematurity or Albinism) and who have acquired visual impairments in youth (such as Retinitis Pigmentosa or Stargardts Disease).

Approximately 90 percent of individuals with visual impairments have useful vision. For these people, low vision devices and rehabilitation offer opportunities to enhance visual capacity. Low vision devices—optical, non-optical, and electronic—and rehabilitation provide means of augmenting or restoring independent function for daily activities. The ability to take advantage of low vision devices may allow individuals with low vision to be independent at home and at work, and enjoy activities that enhance quality of life.

Professionals, and peers working closely with individuals with low vision, and their significant others comprise the interdisciplinary network. Case management and decision-making are accomplished by dialogue among network team members. Professionals in low vision are mandated to provide educational opportunities that insure consumer input, because individuals must set personal goals and make final decisions about the usefulness of their low vision devices.

The professionals and consumers who participated in this consensus conference collaborated to develop consensus on the best practices for providing low vision devices. This consensus includes evaluating needs for intervention and deriving the best decision making processes for determining appropriate device(s) for specific individuals who wish to perform specific tasks.

Following the presentation of expert testimony, the consensus panel deliberated to synthesize this information with that contained in research summaries prepared for their use in order to formulate responses to the following six questions:

1. What clinical measurements and functional behaviors define the population of adults who can benefit from low vision devices (any optical or non-optical device or environmental modification that enhances visual performance)?

2. What are the best standard clinical and functional assessment practices in vision rehabilitation addressing the needs of adults with low vision? What assessment and referral services do primary health care specialists (MD, OD, DO) provide for adults with low vision?

3. What are the optical-functional characteristics of available low vision devices that meet the needs of adults with low vision?

4. What are the best practices for determining which low vision devices will be most effective in maximizing visual function for adults with low vision? (Factors for consideration should include cosmetic acceptability and other psychosocial issues, cost effectiveness, accessibility, user-friendliness, and maintenance/repair/durability issues.)

5. What instruction and guided practice currently best insures successful utilization of devices?

6. What future research is needed?

What clinical measurements and functional behaviors define the population of adults who can benefit from low vision devices?

Low vision, a term which emerged in the 1960's and has since gained wide acceptance and usage, is a general term which describes a serious loss of vision which may be congenitally or adventitiously acquired. This condition may result from eye diseases or accidents, or it may result from health-related conditions commonly associated

with the aging process, and cannot be adequately corrected medically, surgically, or with conventional spectacles or contact lenses. The population of individuals with low vision is far from homogeneous. It includes people with widely differing degrees and types of visual loss. Definitions are left broad and loosely specified for a reason. A study by the World Health Organization found no less than 65 different definitions of the level of visual function at which a person could be declared legally blind. Approximately 90 percent of people with low vision have some degree of measurable residual vision.

While commonly defined clinically in terms of remaining visual acuity or reduced visual field, the widely accepted World Health Organization's definition divides low vision into three categories: moderate, severe, and profound visual impairment, involving best corrected visual acuities from 20/70 to 20/500 and less, or visual fields of 10 degrees diameter or less. The World Health Organization further provides functional descriptions ranging from performing visual tasks at reduced levels to difficulty with gross visual tasks.

As recognition accumulates that clinical data alone gives little practical information regarding functional performance or difficulties experienced or needs of the individual involved, there has been a steady increase in emphasis on defining low vision functionally. Best practice underscores the importance of functional behaviors. For example, an individual with only light projection may be able to utilize this vision to plan or execute a task such as avoiding obstacles when traveling.

Blindness and visual impairment in technically developed countries is largely an age-related problem. Studies indicate that approximately 70 percent of people with low vision are over age 70. Increased longevity, habits of an improved life style, and improved medical control of such diseases as diabetes and hypertension are producing a steady increase in demands for assistance, information and services by adults with low vision.

Many "normal" aging changes are exacerbated for people with low vision. A person with an optically-reduced visual loss resulting from irregularities in refractive surfaces or media usually suffers from a degradation of the visual image. This deficit results from excessive intraocular scatter, which causes lower visual acuity and

reduced contract sensitivity. Such a person has greater difficulty with resolution tasks, and as the angular extent of scatter broadens, resolution and performance suffer.

In some people, visual acuity may remain unaffected, but contrast sensitivity of all objects within the visual field is diminished. Research has demonstrated that loss of contrast sensitivity and loss of visual field contribute significantly to impaired mobility because of decreased vision. Additionally, visual acuity has been found to be a relatively poor predictor of mobility performance and reading accuracy.

Other functional behaviors associated with severe visual impairment may include difficulties with:

- reading printed materials
- writing, particularly on a straight line
- face recognition
- color discrimination
- detail vision at near and far distances
- depth perception
- light and dark adaptation, and
- light and glare sensitivity

There are important psycho-social issues which should not be overlooked. Some people who have experienced a recent visual loss may still be seeking a "miracle" cure and many have difficulty coming to terms with visual impairment which is not reversible. In cases of rapid onset of visual loss, this problem may be exacerbated. Such people and their families may experience natural feelings associated with loss which require substantial support and counseling from optometrists, ophthalmologists, social workers, rehabilitation and employment professionals, and peers.

A person with low vision may experience problems in performing daily activities such as dressing, grooming, personal hygiene, eating, telling time, caring for clothes and personal effects—virtually every facet of daily life. He or she may need to relearn many routines. Social insecurities and communication difficulties may be experienced, independence may be reduced, and self-esteem may be affected.

Thus, the cognitive and psychological states of people with low vision, their ability to perform daily activities, and their socioeconomic need should be assessed.

What are the Best Standard Clinical and Functional Assessment Practices in Vision Rehabilitation Addressing the Needs of Adults with Low Vision?

In availability and practice, a variety of clinical and functional methods exist for assessing the vision of adults with low vision. Best practice dictates an integrative approach of clinical and functional components to address the holistic nature of each individual. While type of delivery method (sole practitioner or team approach) and setting of delivery (hospital, rehabilitation center, etc.), may vary, an interdisciplinary assessment involving professionals from eyecare and vision rehabilitation is recommended. For the sole practitioner, this interdisciplinary approach need not be site specific. It can be achieved through a coordinated set of interdisciplinary referrals aimed at soliciting assessment information upon which the best decisions can be made regarding appropriate low vision services.

Elements of a comprehensive clinical assessment include:

- **History** - individuals' concerns and interests, goal setting, knowledge of vision condition, occupational information, task-specific vision requirements, visual and medical history, family/friends support, attitude toward visual impairment, previous and current use of optical devices, current visual performance, and response to different illumination;

- **Ocular Health** - external and internal eye examination

- **Refraction** - objective (retinoscopy) and subjective (patient interpretation)

- **Visual Acuities** - single letter and continuous text; near, intermediate and distance; monocular and binocular, with and without current prescriptive lenses, under different conditions of illumination;

- **Visual Fields** - central and peripheral, monocular and binocular, under different conditions of illumination

- **Contrast Sensitivity** - monocular and binocular, varying distances

- **Illumination and Glare** - assessment of the impact by illumination and glare reduction adaptation on visual performance

- **Binocularity** - objective and subjective, degree of

- **Optical and Non-optical Device Evaluation** - near, intermediate and distant magnification; minification; visual field enhancement systems; lighting and glare control and recovery testing; assistive non-optical devices such as large print, reading stands, filters, signature guides;

- **Direction and degree of eccentric viewing for persons with macular loss**

- **Color Evaluation** - using larger target sizes

- **Ancillary assessment** - referrals to such services as electrodiagnostic testing, genetic evaluation, prosthetic device evaluation;

A number of instruments are used to assess visual acuity and visual field. For appropriate testing, a standard visual acuity chart should include:

- the same number of symbols on each size line

- standardized spacing proportional to the size of letters or symbols, and spacing between rows proportional to the size of letters

- logarithmic size progression (constant ratio)

- acuity discrimination tasks should be the same at each distance or with whatever magnification device is used

In addition to single letter acuity, continuous text acuity is important in determining the necessary optical device for reading activities, especially for people with macular losses. Recent research suggests the benefits of assessing reserve acuity versus threshold acuity when evaluating and recommending magnification for reading.

Both central and peripheral field assessments are important parts of evaluation. The tangent screen measures the central 30 degrees of field primarily necessary for a near point task. While grids measuring the central 10 degrees are widely used, recent research has shown them to be less valuable tools than previously thought. The emerging search coil instruments and scanning laser ophthalmoscope technology are particularly useful for precise mapping of field loss and designation of eccentric viewing positions. In addition, the scanning laser ophthalmoscope affords the clinician a more complete assessment of visual acuity anywhere on the retina. Though not widely available, referral for this information augments a comprehensive clinical assessment.

Perimetry field tests measuring peripheral fields are performed especially for people with severely constricted fields or pathology suggesting irregular scotomas throughout the field. Evidence suggests that it is worthwhile for the clinician to use threshold-size targets to obtain more precise measurements of threshold fields, as well as targets increased in size 10 or more times to assess gross or substantial loss of field. In addition, bowl perimetry enables the manipulation of variables such as target size and luminance, which are critical factors in the everyday functioning of a person with low vision. Perimetry field assessments are critical in the eventual recommendation of visual field enhancement systems for people with severely constricted fields.

The functional assessment determines a person's understanding and use of vision with and without low vision devices. It is understood and guided by the needs and goals of the individual relative to enhanced vision functioning in daily activities and common settings such as home, work and community environments. Assessment results guide instructional strategies and provide information to discriminate what combination of visual and non-visual techniques most appropriately enable the individual to accomplish a desired or required task.

Though functional assessments of vision are often conducted after the clinical assessment, it is a recommended pre-clinical activity, as information gained facilitates the clinical assessment and promotes greater success. Any member of the interdisciplinary team might perform the assessment, depending on the variables of time, location, etc. In addition, for optimal results, it is necessary to conduct the assessment with and without optical and non-optical tools. It is also necessary to consider the need for instruction in the use of devices as part of the ongoing assessment process. Finally, the assessment, if possible, should occur in the person's own home, work, or community setting, using materials specific to the person's desired goals.

Common elements of a comprehensive functional assessment include:

- Initial interview - with emphasis on knowledge of, and previous/current use of vision and low vision devices, goals/needs, everyday activities and interests, expectations, family/significant other involvement, etc.

- Functional visual acuities at varying distances and under varying conditions of illumination. Threshold identification and optimum viewing distances are noted for discriminating and identifying common objects such as food can labels, television, indoor and outdoor signs, facial details, printed materials, etc.

- Functional visual fields including extent of everyday objects and information perceived in upper, lower and side fields, and at near, intermediate and distant view. These are performed in both static and dynamic mode and in both indoor and outdoor settings, under varying lighting and weather conditions.

- Color/Contrast - including ability to discriminate and identify a variety of materials, objects, colors, and shades under varying figure-ground and lighting conditions.

- Ocular motor skills - fixation, localization, scanning, tracing, and tracking of objects, reading materials, etc.

- Lighting - including type, amount, position, and angle of light source used while performing tasks.

- Glare - including effects of glare in various settings, amount of time necessary to adapt from indoor to outdoor lighting and vice versa, and effect of absorptive lenses and non-optical techniques on eliminating glare.

- Combined use of visual and non-visual cues including detection of a variety of objects, landmarks, depth (slopes, steps, curbs), glass doorways, terrain differences, etc.

- Use of vision for performance of specific tasks that comprise the individual's goals.

A comprehensive mix of the above components comprises an environmental assessment which can be tailored to meet the specific needs of each individual. In keeping with this approach, it is necessary to attend to what the individual brings to the process - values, beliefs, attitudes and life experiences. Understanding the importance of relevant cultural issues, using appropriate assessment materials and approaches, and incorporating family members and support systems into both the clinical and functional assessment process augment chances for greater success.

The assessment process culminates in a vision rehabilitation plan which is a summary of the information with the person being evaluated, and with emphasis on an educational as opposed to a prescriptive process. A comprehensive instructional program in the use of vision, both with and without low vision devices, and in combination with other sensory systems, is recommended if successful rehabilitation is the goal.

What Assessment and Referral Services do Primary Care Specialists (MD, OD, DO) provide for adults with Low Vision?

Typically, the primary health care specialist examining an adult with low vision will assess ocular health status and the general integrity of the visual system including refractive error and a basic assessment of magnification needs. People with higher levels of acuity are usually treated for minimum magnification needs. Those with more

severe vision impairments should be referred to clinicians (optometrists or ophthalmologists) specializing in low vision.

There are a host of potential referrals which will be based on the condition of the individual, on the thoroughness of examining practitioners, and on the setting within which they practice.

Just as a person who loses a limb is naturally referred to physical rehabilitation, an individual with low vision should experience the same referral flow to vision rehabilitation. Proper referral bridges the gap between health care and rehabilitation. Of primary importance is the immediacy of the referral, as delay may result in reduced independent functioning and psycho-social problems for the adult with low vision.

Additional referrals will depend upon other sensory, emotional, mental or physical conditions. Examples of possible referrals representing best practice include, but are not limited to:

- general practitioner for systemic conditions;
- genetic counselor for hereditary eye conditions;
- neurologist for unexplained vision fluctuations or field loss;
- rehabilitation counselors, orientation and mobility specialists, and rehabilitation teachers for vision rehabilitation services;
- physical and occupational therapists for physical/motor assessments;
- psychologist, social worker, or gerontologist for counseling and human services;
- speech pathologists and augmentativecCommunication specialists; and
- specialists such as diabetologists, audiologists, etc. depending upon additional problems discussed or detected.

Comprehensive referrals to a network of diverse professionals further assures the interdisciplinary array of assessment information

necessary to look beyond the eye toward the needs of the whole person.

What are the optical and functional characteristics of low vision devices that meet the needs of adults with low vision?

Most low vision devices are "task specific", that is, their optical characteristics do not allow individuals to use the same device for all visual tasks desired. This paper classifies low vision devices as optical (providing magnification, minification, and perceived field expansion) or non-optical devices. The cognitive abilities of individuals with low vision is assumed to be equal to the task to be performed.

Magnification may be classified as of four types: relative size, relative distance, angular, and electronic. Relative distance magnification is provided by bringing the target to be viewed close to the eye. Spectacle magnifiers focus the image at ranges closer than the eyes can accommodate, and allow very close distances. Lenses must be prescribed by an eye care specialist experienced in low vision, in order to incorporate the refractive error of the individual. Spectacle magnifiers can be prescribed for bifocal, half-eye, full field, and for use with one or both eyes. Typically, devices require a close working distance and have a short depth of focus. Depending on power and focal distance, they can be used for near tasks such as reading, writing, viewing photographs, etc. Individuals need to maintain the focal distance, maintain fixation through the center of the lens (using eccentric viewing if necessary) and to scan the target, usually continuous text, with a well developed scanning pattern. Motor skills are required to hold the target at the correct distance and, in the case of reading, to move the target slowly to the left to see successive words on a line. Using all these skills at the same time can require both instruction and practice, because high magnification usually results in a small field of view, and because postural adjustments must be made to achieve success.

Magnification may also be provided by stand or hand-held magnifiers. These devices are often easier to use, they do not require a close eye to lens distance, and some are available with built-in illumination. Individuals who develop low vision later in life may

have previously used these devices for tasks like map-reading, so they seem more familiar. These devices are used for reading, writing and other near tasks, and require the same visual skills as spectacle magnifiers. The distance from lens to eye may be wherever the individual feels most comfortable. Hand held magnifiers require a steady hand to maintain the focus, and may be fatiguing for long-term use. Stand magnifiers require the ability to accommodate, or the individual must wear an appropriately determined near prescription.

Telescopic devices provide angular magnification by the use of a positive and negative lens in a housing (Galilean) or by the use of two positive lenses with an erecting prism (Keplerian). Optical design of telescopes influences quality and brightness of image and field of view. They are commonly used by individuals with low vision for tasks that require arms length or further viewing, including such tasks as identifying street signs, or sustained viewing such as watching television. These devices are available in a wide variety of powers, types, and prescribing options. Mounting options for spectacle-borne telescopes include a center mount for watching TV or sports, a bioptic mount for alternate viewing through the carrier lens and the telescope, and a "surgical" mount for viewing at intermediate ranges. Recent advances in the design of such devices include variable focus, a short focus feature, smaller telescopes, and telescopes with less obtrusive appearances. The visual skills required for using telescopes include spotting, scanning, tracing, tracking and focusing. Holding a monocular or binocular to the eye while performing visual tasks can be challenging for some individuals, and mounted telescopes may overcome problems with motor coordination. Many individuals have used binoculars prior to the onset of visual impairment for sports, bird-watching, or other tasks, and will be able to transfer those skills to the use of a telescope. If the individual wishes to drive with a telescope, more instruction and practice is usually necessary. The telescope prescribed for driving will usually be a superior bioptic mount.

The closed circuit television system (CCTV), an example of electronic magnification, was introduced in the '60s as an option for providing low vision individuals with a method of performing near tasks such as reading or writing. Although the camera can be used at any distance, this system is often designed for creative use in home, vocational, and educational settings. The advantages of the CCTV include more magnification than any other device, a wider field of

view, and contrast enhancement via reverse polarity. While the CCTV makes some visual skills easier, such as fixation with eccentric viewing, localization and scanning require other motor skills, and the ability to set the magnification, focus the camera, and move the material on the XY table can be challenging. A digital low vision magnifying device has been developed that provides an automatic computer-controlled scrolling mechanism for the individual and alleviates the need for this motor skill. Although overhead and rear screen projection are useful for some tasks, they are not routinely used as low vision devices. Electronic magnification, including the closed circuit television system, offers future promise for low vision devices that are not bound by the optical principle of "more magnification equals smaller field of view." Low vision researchers are studying electronic magnification as a means to provide new low vision devices that are miniaturized, headborne versions of the CCTV. These devices offer a mechanism for taking advantage of new computer technology such as contrast enhancement, image warping, and field remapping.

A variety of software and hardware packages have been developed that produce enlarged print on the computer screen. Computer use in conjunction with CCTV can utilize multiple camera sources to provide split screen images for designing a work station that simultaneously accesses computer, print viewing, typing, and distance viewing.

Devices that minify are helpful to individuals who maintain high acuity while experiencing decreased field of view. Minifying devices provide the ability to find targets by expanding the perceived field of view. Once the desired target is spotted, it can be viewed by an individual without the minifying device to obtain full detail. The minifier may be as simple as a low power telescope viewed in reverse, through the objective rather than the ocular lens, or as complicated as a pair of reverse telescopes mounted in a bioptic position. An "amorphic" lens is available that minifies in the horizontal meridian only. Perceived field expansion may also be obtained by the use of prisms attached to a pair of spectacles. The most commonly prescribed are Fresnel press-on prisms. This field expansion system requires individuals to become comfortable with the prism blur and displacement, and overcome problems with image confusion. As an individual practices with the prism, enough scanning ability is usually developed that the prism segment must be reduced in size. If a permanent prism system is to be used, the

Fresnel prism can be used for instruction and loaned for practice. Special mirrors may also be prescribed for field enhancement with hemianopsia.

Non-optical devices may enhance visual function. Included in this category are illumination controls such as lamps, shades, sunglasses, typoscopes and colored filters. Some individuals require more illumination, especially for near tasks such as reading or sewing, but are susceptible to glare. Individuals who are photophobic may find that light filtering lenses, side shields, visors, caps or hats make them more comfortable. Custom filtering lenses can block a higher percentage of the total light spectrum or selectively filter the portion of the light spectrum causing sensitivity to glare. These devices also assist individuals who have long adaptation times when traveling from a bright environment to a dim one or vice versa. Some low vision devices require environments with appropriate illumination controls, reading stand, table, chair with arms, good back and neck support, etc. Environmental modifications that meet the needs of adults with low vision include changes in color, contrast, illumination and size and position of targets to be viewed in the environment. Recent research has shown that appropriate lighting can increase reading rates with optical low vision devices; unless individuals duplicate clinical lighting at home, reading rates drop. Sunlight, incandescent, fluorescent, halogen, and high pressure sodium lamps offer choices. Recent research has suggested that electroluminescent panels may provide lighting that is cool and glare-free. Although experts agree that individualized lighting systems are important to the successful use of low vision devices, there are no clinical guidelines that enable practitioners to evaluate and recommend the most appropriate lighting. Recommendations are usually the result of individual selection after experimentation.

Improved contrast through the use of filters or reversed polarity can also enhance visual performance with and without devices, and has been shown to increase reading speed for individuals with cloudy media.

Large print books, large phone dials, felt tip pen, and bold line paper employ relative size magnification to allow individuals with low vision to read and write more comfortably. Reading stands assist by holding reading material so that the short or fixed focus of low vision devices is easier to manage. Signature guides and stencils assist in writing.

Device portability is an important feature. Most devices are fairly small and may be carried in pocket or purse, but larger devices such as headborne telescopes require their own carrying cases or may be hung around the neck. Many individuals with low vision find that more than one device is required to meet their viewing needs and so must carry all of them in order to enhance vision in a variety of environments. Some electronic low vision devices are portable and are provided with carrying cases, but most electronic low vision devices are meant for stationary use at home, work, or school. There are situations in which the optical/functional characteristics of the most appropriate low vision devices presently available still do not meet the needs of an individual (e.g. a certain reading rate); it is often advisable to evaluate non-visual techniques.

Although full scale studies of the use of low vision devices have not been done, researchers have shown that approximately 45 percent to 80 percent of individuals prescribed low vision devices continue to use them. Information from previous studies is difficult to extrapolate because of differences in definitions of success. The characteristics of low vision devices and the effects of service delivery models that relate to use or non-use have yet to be researched.

What are the best practices for determining which low vision devices will be most effective in maximizing visual function for adults with low vision?

Best practice includes several distinct components which need to be considered individually and in combination when determining the most effective low vision device(s) for any individual. This selection process is conducted through many models of best practice which typically include an interdisciplinary team approach and designated case management with an emphasis on the empowerment of the individual with vision loss. Opinions vary concerning the appropriate sequence in which the components are provided. The components include:

1. functional goal setting concerning distinct visual tasks required or desired;

2. holistic evaluation of the individual involving multiple considerations apart from vision such as lifestyle, other

disabilities, and priority of need among functional goals. The formal and informal support systems of the individual should be understood;

3. discussion with the individual concerning the range of potential feelings about low vision and the use of low vision devices;

4. comprehensive clinical evaluation conducted by an optometrist or ophthalmologist who is knowledgeable in low vision rehabilitation to discover whether and how the patient's residual vision can be enhanced by use of aids and devices;

5. evaluation of functional abilities, in the individual's everyday environments, whenever possible, incorporating tasks related to established functional goals. Since devices are always used within an environmental context, any needs for environmental modifications should be considered. Assessments should be made by qualified professionals who have had extensive training in the functional use of vision. Additional team members may include professionals from other disciplines whose expertise is relevant to an individual's overall functioning;

6. discussion concerning strengths and limitations of potential low vision devices and, when appropriate, between visual and non-visual approaches to functional tasks. This discussion should include the stability of the ocular disease entity and the need for refractive correction. Concerning potential low vision devices, the discussion should address: the adjustability, availability, cost and cost-effectiveness, maintainability, safety, transferability, and portability. In addition, the individual should be encouraged to consider when to use non-visual approaches to functional tasks;

7. meeting with a peer counselor and/or support group to reinforce personal aspects of successful use of devices;

8. thorough instruction in the effective use of prescribed/ selected low vision devices. Members of the individual's support system may require orientation and instruction concerning the functional capabilities and expectations for use of devices;

9. a trial and instructional period with loaner devices during which potential low vision devices are evaluated in "real world" application;

10. when appropriate, referral to consultation with an electronic aids specialist for selection and training in the use of the most appropriate computer access system or related technology;

11. modifications to the environment that are required for successful use of the devices. These include adjustments to lighting, positioning of materials to avoid postural strain, glare reduction, contrast enhancement, and the addition of tactile and auditory modifications.

12. final selection of low vision devices based on the synthesis of experiences during training and trial periods;

13. thorough determination of financial resources and funding alternatives for the purchase of selected low vision devices and associated services; and

14. on-going follow up service to monitor the continued effectiveness of the device to enhance visual functioning and to determine if there are any changes in other factors that may affect visual functioning. Follow up services include the opportunity to repeat any of the other components as needed.

Selection of a low vision device is a dynamic, multi-factored, complex matter. Best practice is based on updated knowledge of demonstrated, effective clinical and instructional techniques, coupled with an intuitive and sensitive approach which develops understanding, acknowledges and supports feelings, inspires and harnesses motivation, and reinforces success. Many of these components are interpersonal rather than clinical.

What instruction and guided practice currently best insures successful utilization of devices?

For the purpose of this document, successful utilization of devices refers to use of a device, for the tasks for which it was prescribed or provided, effectively and efficiently within the bounds of the device's limitations. Ultimately, success is based on the opinion of the individual using the device, with input from professionals about the device's capabilities and the performance-limiting factors of the level and type of available vision. Because no studies have documented long range utilization of devices, there is little research documenting the instruction and guided practice techniques that insure success.

Instruction and guided practice are planned after clinical and functional assessments are completed and are driven by the goals of the individual . The low vision instructor compiles all information from the clinical and functional low vision assessment, and other relevant records and information that help in planning and implementing the instruction.

Best practice in this area suggests that the instructor or therapist be knowledgeable and skilled, not only in rehabilitation instruction, but also in the nature of vision, visual impairment, functional use of vision, basic optical principles, and the optical and functional characteristics of low vision devices. The instructor or therapist must also be knowledgeable and skilled in teaching the use of basic non-visual adaptive equipment and techniques. The instructor or therapist must make knowledgeable referrals to other rehabilitation professionals such as occupational or physical therapists, reading specialists, orientation and mobility specialists, and rehabilitation teachers.

The instructor gives the individual a prediction of the scope and duration of instruction required to meet goals. The range of possible devices is presented tactually and visually, and the instructor describes the devices, their uses, advantages and limitations. Limitations such as a small field of view, speed smear, initial experiences of nausea, and acuity decrease with prism, can be daunting. Individuals may need reassurance that instruction and practice can overcome initial difficulty and that use of devices can become automatic. "Trade-offs" between device limitation and the individuals' ability to complete personal goals must be discussed.

Professionals have recommended a sequence of instructional procedures that cover several areas:

- use of visual skills without low vision devices,
- use of visual skills with low vision devices, and
- use of vision and low vision devices for individualized functional tasks.

Instruction in the use of visual skills without devices covers:

- fixation,
- spotting,
- localization,
- scanning,
- tracing, and
- tracking

Individuals with macular degeneration may require additional instruction in the development and maintenance of fixation using eccentric viewing.

Instruction in the use of visual skills with low vision devices includes integrating unaided abilities with the unique demands of a device, such as maintaining focal distance or focusing the device and adjusting eye and head movements to compensate for a restricted field of view. If the individual is using eccentric viewing, the instructor assures that the device selected allows the opportunity to maximize field and acuity in the eccentric position.

These skills are initially demonstrated in the clinical setting using targets that are selected by the instructor to ensure success. The instructor alters the environment to provide illumination and glare control, non-optical support devices such as reading stand or typoscope, to further ensure success. Frustration is minimized when an instructor can task-analyze in order to teach visual skills at the level of understanding and ability of the individual. Successively increasing the difficulty of the task until the individual achieves the task will maximize success. The pace of instruction is determined by the learning ability and style of the individual. If progress is slow, or reaches a plateau, the instructor or the individual may decide that using vision for the task is not feasible. Alternatives must be presented and experienced by the individual.

The use of vision and low vision devices must take place in the environment in which the task would usually be performed, or in a clinical or teaching setting that has been altered to resemble that environment. The instructor insures proficiency in goal-related tasks, or recommends additional instruction, and can assist with additional non-optical devices, including strategies for environmental modifications. If it is not possible to instruct in the actual environment, best practice dictates that the individual be loaned a device for practice in the actual environment. The instructor may provide on-site environmental analysis and suggest modifications. Modifications may include changes in illumination and glare control, color, contrast, size and distance of targets to be viewed, and changes that allow greater physical comfort of the individual for using vision. Modifications may be non-visual, such as tactile markings or audible outputs for clocks or appliance controls. Research has shown that duplicating clinically recommended lighting in the home environment increases reading speed with magnification. Studies have indicated that individuals who receive environmental modifications and on-site instruction with their low vision devices significantly improve their skills over those who receive clinical instruction only.

Best practice in instruction and guided practice with low vision devices includes:

1. the development of an individualized vision rehabilitation plan based on clinical and functional assessment for the goals identified by the individual;

2. guided instruction in the use of unaided visual skills, aided visual skills, and the use of the device for real world tasks;

3. instruction and practice which takes place in real environment and incorporates teaching the use of vision and devices for the actual task to be performed; and

4. follow-up by telephone, mail, or home visit that identifies possible vision changes, use and effectiveness of low vision devices, and need for further services.

What future research is needed?

Future basic and applied research should reflect the trend toward interdisciplinary and collaborative investigations, and include people with low vision as equal partners. Desired directions might include research under the following six headings:

Technology

- Design and development of new technology including optical and electronic systems as well as computer technology that are easier to use, and are less noticeable.

- Development of universal/accessible design criteria for existing and emerging technology in low vision.

- Development of technology to give people with visual impairments immediate access to electronic source materials for printed documents.

Environmental Issues

- Ergonomic design of living environments, including home, workplace, and related settings for individuals with low vision.

- Environmental design factors and standards relating to signage, industrial design, print legibility, contrast, proper illumination, glare control, and visual factors that facilitate independent travel.

- Public safety studies on needs of people with low vision (e.g., audible traffic signals, detectable tactile and visual warnings for curb cuts and hazardous vehicular ways).

- Develop technology which gives immediate access for individuals with low vision to electronic source material for printed documents.

Social/Cultural Applied Research

- Studies of social and cultural contexts in which low vision is experienced as a disability.
- Social and cultural and gender differences as they apply to service delivery, particularly the choice and use of low vision devices and environmental modifications.
- Development of strategies to identify needs and to cope with increasing demands for services by people who are aging and/or multiply disabled.
- Definition of elements of public policy that promote or limit the delivery of low vision services.
- International and cross-cultural research into alternative service delivery models.
- Identification of demographic factors in the selection and use of low vision devices.

Service Delivery

- Identify the most effective models of service delivery.
- Identify needed and effective comprehensive services for unserved and underserved populations, including ethnic minorities and individuals living in rural/remote areas.
- Gather data that will enable the formulation of national policy on equitable funding for providing low vision services and devices.
- Study the impact of the interaction between individuals with low vision and primary care physicians; how it affects functional assessment, management, and outcome of the low vision service.
- Prepare longitudinal studies of the effectiveness of low vision devices.
- Study existing curricular and instructional training materials to develop model curricular in low vision rehabilitation.

Basic and Clinical Sciences

- Evaluation of existing low-vision diagnostic procedures and the development of new methods that meet validation and reliability criteria.
- Basic research on the components of visual processing and their integration into effective visual function.
- Determination of visual criteria and training procedures for safe automobile driving by people with low vision.
- Validation of instructional procedures for the use of low vision devices.
- Development and validation of functional visual assessment instruments.
- Development and validation of measures of low vision rehabilitation outcomes.

Personal Preparation

- Studies of existing curricular and instructional materials to develop model curricular for preservice and inservice educational programs in low vision rehabilitation.
- Studies of effective strategies for team building and interdisciplinary communication and collaboration in vision rehabilitation.

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Definitions of Low Vision Population and Low Vision Services, Accessibility of Services, and Assessment and Referral Processes

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When Is It Better to Use Available Functional Vision and When Is It Better Not To?

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Models of Low Vision Delivery Service

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Electronic Devices and Software Available for People with Low Vision

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The Functional Aspects of Evaluation and Instruction

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Psychosocial and Demographic Variables Useful in Successful Device Utilizers

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Reimbursement Resources for Low Vision

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