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Vision Rehabilitation Preferred Practice Pattern®

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VISION REHABILITATION PREFERRED PRACTICE PATTERN® DEVELOPMENT PROCESS AND PARTICIPANTS

The **Vision Rehabilitation Committee** members wrote the Vision Rehabilitation Preferred Practice Pattern® guidelines (PPP). The Committee members discussed and reviewed successive drafts of the document by e-mail to develop a consensus over the final version of the document.

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The **Preferred Practice Patterns Committee** members reviewed and discussed the document during a meeting in April 2017. The document was edited in response to the discussion and comments.

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The Vision Rehabilitation PPP was then sent for review to additional internal and external groups and individuals in July 2017. All those returning comments were required to provide disclosure of relevant relationships with industry to have their comments considered (indicated with an asterisk below). Members of the Vision Rehabilitation Committee reviewed and discussed these comments and determined revisions to the document.

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FINANCIAL DISCLOSURES

In compliance with the Council of Medical Specialty Societies' Code for Interactions with Companies (available at www.cmss.org/codeforinteractions.aspx), relevant relationships with industry are listed. The Academy has Relationship with Industry Procedures to comply with the Code (available at www.aao.org/about-preferred-practice-patterns). A majority (100%) of the members of the Vision Rehabilitation Committee had no financial relationship to disclose.

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The disclosures of relevant relationships to industry of other reviewers of the document from January to July 2017 are available online at www.aao.org/ppp.

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OBJECTIVES OF PREFERRED PRACTICE PATTERN® GUIDELINES

As a service to its members and the public, the American Academy of Ophthalmology has developed a series of Preferred Practice Pattern® guidelines that **identify characteristics and components of quality eye care.** Appendix 1 describes the core criteria of quality eye care.

The Preferred Practice Pattern® guidelines are based on the best available scientific data as interpreted by panels of knowledgeable health professionals. In some instances, such as when results of carefully conducted clinical trials are available, the data are particularly persuasive and provide clear guidance. In other instances, the panels have to rely on their collective judgment and evaluation of available evidence.

These documents provide guidance for the pattern of practice, not for the care of a particular individual. While they should generally meet the needs of most patients, they cannot possibly best meet the needs of all patients. Adherence to these PPPs will not ensure a successful outcome in every situation. These practice patterns should not be deemed inclusive of all proper methods of care or exclusive of other methods of care reasonably directed at obtaining the best results. It may be necessary to approach different patients' needs in different ways. The physician must make the ultimate judgment about the propriety of the care of a particular patient in light of all of the circumstances presented by that patient. The American Academy of Ophthalmology is available to assist members in resolving ethical dilemmas that arise in the course of ophthalmic practice.

Preferred Practice Pattern® guidelines are not medical standards to be adhered to in all individual situations. The Academy specifically disclaims any and all liability for injury or other damages of any kind, from negligence or otherwise, for any and all claims that may arise out of the use of any recommendations or other information contained herein.

References to certain drugs, instruments, and other products are made for illustrative purposes only and are not intended to constitute an endorsement of such. Such material may include information on applications that are not considered community standard, that reflect indications not included in approved U.S. Food and Drug Administration (FDA) labeling, or that are approved for use only in restricted research settings. The FDA has stated that it is the responsibility of the physician to determine the FDA status of each drug or device he or she wishes to use, and to use them with appropriate patient consent in compliance with applicable law.

Innovation in medicine is essential to ensure the future health of the American public, and the Academy encourages the development of new diagnostic and therapeutic methods that will improve eye care. It is essential to recognize that true medical excellence is achieved only when the patients' needs are the foremost consideration.

All Preferred Practice Pattern® guidelines are reviewed by their parent panel annually or earlier if developments warrant and updated accordingly. To ensure that all PPPs are current, each is valid for 5 years from the approved by date unless superseded by a revision. Preferred Practice Pattern guidelines are funded by the Academy without commercial support. Authors and reviewers of PPPs are volunteers and do not receive any financial compensation for their contributions to the documents. The PPPs are externally reviewed by experts and stakeholders, including consumer representatives, before publication. The PPPs are developed in compliance with the Council of Medical Specialty Societies' Code for Interactions with Companies. The Academy has Relationship with Industry Procedures (available at www.aao.org/about-preferred-practice-patterns) to comply with the Code.

Appendix 2 contains the International Statistical Classification of Diseases and Related Health Problems (ICD) codes for the entities that this PPP covers. The intended users of the Vision Rehabilitation PPP are ophthalmologists.

METHODS AND KEY TO RATINGS

Preferred Practice Pattern® guidelines should be clinically relevant and specific enough to provide useful information to practitioners. Where evidence exists to support a recommendation for care, the recommendation should be given an explicit rating that shows the strength of evidence. To accomplish these aims, methods from the Scottish Intercollegiate Guideline Network[1] (SIGN) and the Grading of Recommendations Assessment, Development and Evaluation[2] (GRADE) group are used. GRADE is a systematic approach to grading the strength of the total body of evidence that is available to support recommendations on a specific clinical management issue. Organizations that have adopted GRADE include SIGN, the World Health Organization, the Agency for Healthcare Research and Policy, and the American College of Physicians.[3]

- All studies used to form a recommendation for care are graded for strength of evidence individually, and that grade is listed with the study citation.
- To rate individual studies, a scale based on SIGN[1] is used. The definitions and levels of evidence to rate individual studies are as follows:

I++	High-quality meta-analyses, systematic reviews of randomized controlled trials (RCTs), or RCTs with a very low risk of bias
I+	Well-conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias
I-	Meta-analyses, systematic reviews of RCTs, or RCTs with a high risk of bias
II++	High-quality systematic reviews of case-control or cohort studies High-quality case-control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal
II+	Well-conducted case-control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal
II-	Case-control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal
III	Nonanalytic studies (e.g., case reports, case series)

- Recommendations for care are formed based on the body of the evidence. The body of evidence quality ratings are defined by GRADE[2] as follows:

Good quality	Further research is very unlikely to change our confidence in the estimate of effect
Moderate quality	Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate
Insufficient quality	Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate Any estimate of effect is very uncertain

- Key recommendations for care are defined by GRADE[2] as follows:

Strong recommendation	Used when the desirable effects of an intervention clearly outweigh the undesirable effects or clearly do not
Discretionary recommendation	Used when the trade-offs are less certain—either because of low-quality evidence or because evidence suggests that desirable and undesirable effects are closely balanced

- The Highlighted Findings and Recommendations for Care section lists points determined by the PPP Panel to be of particular importance to vision and quality of life outcomes.
- All recommendations for care in this PPP were rated using the system described above. Ratings are embedded throughout the PPP main text in italics.
- Literature searches to update the PPP were undertaken in June 2016 in the PubMed and Cochrane databases. Complete details of the literature searches are available in Appendix 7.

HIGHLIGHTED FINDINGS & RECOMMENDATIONS FOR CARE

Ophthalmologists are encouraged to provide rehabilitation resource information to patients who have vision loss. Even early or moderate vision loss may result in disability, which can affect visual performance, cause anxiety, and interfere with everyday activities. The ophthalmologist should refer patients for multidisciplinary comprehensive vision rehabilitation services when available. There is evidence that vision rehabilitation improves reading and visual ability.

All ophthalmologists should advise patients who have central field loss that their peripheral intact retina can be used, with magnification, when central vision is lost.

Ophthalmologists who subspecialize in providing vision rehabilitation should aim to optimize patients' reading, activities of daily living, safety, participation in their community despite vision loss, and psychosocial well-being. Vision rehabilitation should not only include device recommendations but also address the broader impact of vision loss on patients' lives.

Keys to successful vision rehabilitation are the interest and the skills to empathize, communicate with sensitivity, and convey hope to patients with vision loss.

INTRODUCTION

COMPREHENSIVE MULTIDISCIPLINARY MODEL OF VISION REHABILITATION

Vision rehabilitation is part of the continuum of eye care that extends from diagnosis to treatment and rehabilitation. Vision rehabilitation services vary greatly across the United States and around the world. For example, they may consist of a single clinician incorporating low vision devices into his or her clinical practice or they may be larger multidisciplinary teams offering a full range of comprehensive rehabilitation services in a single setting. The primary role of ophthalmologists is to refer patients to vision rehabilitation, a clinical process to help patients to achieve their goals and maintain quality of life despite vision loss. A smaller number of ophthalmologists subspecialize in the practice of vision rehabilitation, and their consultations offer patients, or direct them to, particular interventions that might include devices, training, task modifications, environmental adaptations, or community resources. The rehabilitation team in multidisciplinary comprehensive rehabilitation services may include a wide range of professionals. They may include clinicians (typically an ophthalmologist or optometrist), ophthalmic technicians who assess visual function, staff (e.g., an occupational therapist or vision rehabilitation therapist) who evaluate patient function and train patients to use devices or alternate strategies, assistive technology trainers or orientation and mobility specialists who offer specific skill training (e.g., how to use a white cane), opticians, social workers, psychologists, or vocational counselors. The primary care physician can also provide a key role in supporting patients with vision loss, and communication between the vision rehabilitation physician and the primary care physician is encouraged.

The rehabilitative needs of patients vary considerably: some patients simply require an increase in reading add and others benefit from a wide range of interventions that include training to use adaptive devices. The initial evaluation by a vision rehabilitation clinician typically determines the level of care and disciplines required depending on the complexity of the problems, goals, psychosocial status, and personal attributes, not solely on visual acuity.

A 2012 editorial in the *Archives of Ophthalmology*[4] proposes that ophthalmologists reframe the role of vision rehabilitation in ophthalmic care as follows: “This subtle distinction – that rehabilitation is a part of good care rather than something necessitated by the failure of care – makes a world of difference.”

AMERICAN ACADEMY OF OPHTHALMOLOGY’S MULTIDISCIPLINARY MODEL OF VISION REHABILITATION

The Academy’s three-level Model of Vision Rehabilitation outlines how vision rehabilitation can be incorporated in the continuum of ophthalmic care. (See Appendix 3.)

Level 1 – Continuum of Ophthalmologic Care: Recognizing and Responding to Patients with Vision Loss

Level 1 involves all ophthalmologists, and it the most important part of the vision rehabilitation model. All ophthalmologists who see patients who report difficulty with visual tasks or who are observed to have less than 20/40 best-corrected visual acuity in the better eye, contrast sensitivity loss, scotoma, or peripheral field loss should “recognize” and “respond” by advising the patient that vision rehabilitation is an option. The comprehensive ophthalmologist should recognize the impact of even modest uncorrectable partial vision loss and respond by assuring the patient that reading or other tasks can be improved with vision rehabilitation. Ophthalmologists are encouraged to have these conversations with their patients and refer them to vision rehabilitation. Asking a single question, Do you often feel sad or depressed?, has been shown to be useful in screening for depression in ophthalmology patients. The Academy’s Vision Rehabilitation Patient Handout, which provides information about available services and essential tips for making the most of a patient’s remaining vision, can also be offered to patients. (See Appendix 4.) It is essential that the patient understand that, although no further ocular treatments may be available, rehabilitation can help improve their ability to continue to do tasks they value.

Ophthalmologists who provide vision rehabilitation services are listed under Find an Ophthalmologist on the Academy website).

Level 2 – Vision Rehabilitation Service

Level 2 of vision rehabilitation service is provided by clinicians with interest and expertise in vision rehabilitation. This level of the vision rehabilitation model includes some, but not all, elements of comprehensive multidisciplinary vision rehabilitation. It may be offered in the setting of a single clinician who provides low vision evaluation as part of his or her clinical practice.

Level 3 – Comprehensive Multidisciplinary Vision Rehabilitation

Level 3 services are also provided by clinicians with interest and expertise in vision rehabilitation. These services include a full evaluation of visual function; rehabilitation training that is often provided over multiple sessions, often by a Medicare-funded occupational therapist; and referral to a range of community services and psychosocial support, which may include transportation services, audio books, support groups, or problem-solving self-management groups. Level 3 services are typically provided by a multidisciplinary team as indicated that may include a clinician (either an ophthalmologist or optometrist), an occupational therapist or other rehabilitation professionals, psychological support staff (e.g., social workers or psychologists), and specialists (e.g., orientation and mobility trainers). (See Care Process for Ophthalmologists Who Subspecialize in Vision Rehabilitation section.) The World Health Organization (WHO) has also outlined a three-level model of vision rehabilitation and included research, national data collection, and training of personnel as part of tertiary-level services.[5]

It should be emphasized that level of visual acuity alone does not determine who will benefit from multidisciplinary care or what services may help that patient. The various aspects of visual function loss (such as contrast sensitivity loss or visual field loss), extent of the patient's goals and responsibilities, and the availability of other individual resources determine both the need for vision rehabilitation and the most appropriate interventions. Multidisciplinary rehabilitation is not reserved for patients who have advanced vision loss and not all services are required by all patients. Rehabilitation is often important for those with modest loss to address the various aspects of function that are impacted and ensure that patients are on a positive path at the outset. This is particularly true for individuals who face progressive vision loss. Medicare reimburses for a low vision evaluation by an ophthalmologist or optometrist and for occupational therapy.

DISEASE DEFINITION

Low vision is the term for vision impairment that cannot be corrected by standard eyeglasses or by medical or surgical treatment. Low vision may result from many different ocular diseases or from neurological disorders such as cerebral vascular accidents.

The ICD-10 CM definitions of low vision are based on visual acuity and visual field (see Appendix 2), but other aspects of visual function also contribute to visual impairment.[6] For example, contrast sensitivity loss or sensitivity to glare can interfere substantially with day-to-day tasks.[6,7] Even with visual acuity better than 20/70, the ability to perform visual tasks can be affected.[6,8] Visual acuity of 20/50 is required for driving in many states,[9] and a patient's participation in day-to-day tasks can be significantly impacted by losing his or her driving license. In addition, relatively modest levels of vision loss may be a greater disability when they co-exist with other health problems. For example, a patient who has a hearing impairment requires good vision to lip read.

Patients with severe, profound, near-total, or total visual impairment meet the criteria for the status of legal blindness or "statutory visual impairment," a designation that has traditionally been used to determine eligibility for disability benefits in the United States.[10] The Social Security Administration's definition of legal blindness is visual acuity 20/200 or less with the use of a correcting lens or visual field diameter 20 degrees or less in the better seeing eye using both automated visual fields and visual acuity charts that measure lower levels of acuity.[10] Individuals who cannot identify any letters with either eye on the 20/100 line of a visual acuity chart, such as Snellen, Baily-Lovie, or the Early Treatment Diabetic Retinopathy Study (ETDRS) chart, are considered legally blind. Three visual field criteria on the contraction of the visual field are used to determine

legal blindness: a mean deviation of -22 dB determined with automated static threshold 30-degree perimetry testing, a widest diameter of visual field that subtends an angle no greater than 20 degrees, or a visual field efficiency of 20% or less determined by kinetic perimetry.[10]

In some states, only individuals who are legally blind can access state rehabilitation services. The term *legal blindness* can be confusing because most patients with legal blindness have partial vision. They are candidates for vision rehabilitation and should optimize the use of residual vision. Services for individuals with very limited vision are referred to as blind rehabilitation and include sight substitutes such as braille instruction and/or long-white-cane training or guide dog assistance. In this document, the term *blindness* is reserved for total vision loss.

Terms such as *visual function*, *functional vision*, *functional vision loss*, and *functional blindness* can also be confusing. In this document, visual function refers to visual acuity, contrast sensitivity, and visual field. Visual performance refers to how one uses vision and includes observed tasks such as reading. Visual impairment is the decrease in visual function caused by the disease.

PATIENT POPULATION

Adults with vision impairment (for discussion of vision rehabilitation in children, see Appendix 5).

CLINICAL OBJECTIVE FOR ALL OPHTHALMOLOGISTS

Identify patients with low vision and provide information about vision rehabilitation and resources.

CLINICAL OBJECTIVES FOR OPHTHALMOLOGISTS WHO SUBSPECIALIZE IN VISION REHABILITATION

- Identify patients with low vision and quantify their visual loss
- Evaluate the impact of vision loss on reading, activities of daily living, patient safety, continued participation in activities despite vision loss, and psychosocial well-being
- Evaluate the potential to use remaining vision or sight substitutes
- Educate patients about vision loss, the potential benefits of rehabilitation, and rehabilitation options, including devices
- Engage patients in the rehabilitation process
- Optimize patients' ability to read, complete activities of daily living, and safely participate in activities in the home and community
- Address the psychological adjustment to vision loss by recognizing emotions expressed by the patient and acknowledging the relationship of the emotion to the vision loss (empathetic response)
- Provide information to patients about community and national resources and social supports
- Involve family and support persons in the rehabilitation process and provide education

BACKGROUND

PREVALENCE

Worldwide, it is estimated that 217 million people have moderate or severe visual impairment and 36 million have blindness. It is estimated that by 2050 there will be 588 million people living with moderate or severe vision impairment and 115 million with blindness.

Based on prevalence rates and 2010 U.S. census data, it was estimated that 2.9 million individuals in the United States over the age of 40 had low vision (defined as visual acuity less than 20/40 in the better-seeing eye)[11] and 1.28 million had less than or equal to 20/200 visual acuity in the better eye.[12] Since 2000, there has been a 23% increase in the number of individuals in the United States aged 40 and older with vision impairment and blindness.[9]

Vision impairment disproportionately affects the elderly. Adults over the age of 80 account for almost 70% of individuals with severe vision impairment (visual acuity 20/200 or less in the better eye) yet they represent only 7.7% of the population.[13] Currently, approximately 3.5% of individuals over age

65 in the United States are candidates for vision rehabilitation. The aged sector of the U.S. population is rapidly expanding, and this age group will reach 84 million by 2050.[14]

The most common cause of low vision in the United States is age-related macular degeneration (AMD), which accounts for approximately half of the cases of vision impairment.[13] Current estimates are that more than 2 million adults in the United States have late stage AMD[15] and that this will rise to 2.95 million by 2020 as a result of the aging of the population. The future impact of new treatments for AMD is unknown. At present, at least 1 in every 10 individuals over the age of 80 has advanced AMD.[16] With the improvements in the treatment of exudative AMD, patients may have preserved visual acuity yet paracentral vision impairment that can be addressed by rehabilitation. Other causes of permanent low vision in the United States include diabetic retinopathy, glaucoma, optic neuropathy, and retinitis pigmentosa. From 2000 to 2010 the number of individuals 40 and older in the United States who had diabetic retinopathy rose from 4.06 million to 7.69 million, an estimated 89% increase.[17] Glaucoma is more prevalent among the elderly, and the number of individuals with glaucoma worldwide is estimated to increase from 64.3 million to 111.8 million by 2040.[18] It is the most common cause of irreversible visual impairment worldwide. Less common eye diseases, such as uveitis, may contribute substantially to the burden of disease owing to young age at onset and major impact on visual acuity.

Patients with acquired or progressive disorders of the central nervous system, including trauma, stroke, neurodegenerative diseases, and tumors, often have significant limitations that result from visual impairment, but they may be overlooked in the vision rehabilitation referral process.[19,20] The vision rehabilitation specialist can play a vital role in assisting such patients,[21] and referral of these patients is encouraged.

Not all patients who could benefit from vision rehabilitation have access to services.[22] Access barriers to vision rehabilitation services include the lack of referral or awareness of services, lack of appreciation of what services can provide, lack of appreciation of benefits available from services, lack of transportation to services, and lack of financial resources to purchase devices.[23,24] Assistive devices are an important element of vision rehabilitation. The WHO published a Priority Assistive Products List in 2016 to support national assistive technology policies and access to assistive products globally.[25] The list includes nine devices for individuals with vision impairment.

RATIONALE FOR TREATMENT

Vision impairment has a major impact on quality of life.[26-31] Individuals with vision impairment have close to twice the risk of falling and four times or more increased risk of sustaining a hip fracture.[32-34] Fear of falling also contributes to activity restriction.[35-39] When controlling for confounding variables, it has been found that people with impaired vision have increased mortality;[40] are admitted to nursing homes 3 years earlier;[41] make greater use of community services;[42] have increased social isolation;[43] have increased depressive and anxiety disorders;[44-46] and have great difficulty reading, which causes problems in accessing information and errors in self-administering medications.[47,48] Patients with vision impairment are more than twice as likely to require assistance managing their medications.[49] Even early glaucoma negatively affects psychosocial function,[50] and more than 25% of glaucoma patients with relatively minor binocular field loss report difficulty with mobility.[51] Although some patients with low vision successfully minimize the impact of their vision loss without formal rehabilitation, most are unable to read standard print, many are unable to maintain their safety and independence in daily activities, and some require extensive assistance from family members to remain in their own homes or move into extended-care facilities.[42] These limitations lead to decreased participation in routine activities and a lower quality of life.

Eleven recent systematic reviews relevant to vision rehabilitation interventions are listed in Table 1. All Cochrane reviews relevant to vision rehabilitation are included as well as additional reviews that addressed a question specifically relevant to comprehensive vision rehabilitation. Overall, the reviews indicate increasing evidence that supports the effectiveness of vision rehabilitation on such outcomes as reading performance and quality of life, but they note an overall current paucity of methodologically strong research that includes adequate sample sizes, masked assessment of outcomes, randomization, and appropriate controls.

TABLE 1 Findings from Systematic Reviews of the Effectiveness of Vision Rehabilitation Interventions

Author(s), Year, Title	Search Results	Main Results	Comments
Baker et al, 2015[52] (Optical reading aids for children and young people with low vision)	No RCTs or quasi-RCTs met inclusion criteria		Future research should include reading speed, accuracy, comprehension, and quality of life outcomes
Binns et al, 2012[53] (How effective is low vision service provision?)	58 studies met the liberal inclusion criteria and only 7 were RCTs	Good evidence that low vision services result in improved reading ability, patients value and use low vision aids, and low vision services improve functional ability	Unable to assess relative benefits of different service models because of different outcome measures, follow-up times, and diverse populations studied
Bittner et al, 2015[54] (Telerehabilitation for people with low vision)	No RCTs or controlled clinical trials were found		Other studies suggest that telerehabilitation could improve access to services
Gaffney et al, 2014[55] (How effective is eccentric vision training?)	3 RCTs, 31 other studies, most are weak "before and after" comparison designs without control group	Lack of high-quality evidence. No evidence that one method of eccentric viewing training is optimal. Moderate evidence that eccentric viewing and steady eye strategy training can improve near visual acuity, reading speed, and performance of activities of daily living.	All but 3 studies had outcome assessed by the trainer, which may exaggerate effects. Many studies fail to adequately describe training or separate training for LVD effect.
Gillespie et al, 2012[56] (Interventions for preventing falls in older people living in the community)	159 trials with 79,193 participants	Group and home-based exercise and home safety interventions reduce rate of falls. Multifactorial assessment and intervention reduces fall rate but not risk. Tai Chi reduces risk of falls.	
Liu et al, 2013[57] (Occupational therapy interventions to improve performance of daily activities at home for older adults with low vision)	9 Level I (RCTs), 5 Level II, 3 Level III	Evidence supports multicomponent interventions and multiple sessions that educate patients about low vision, low vision devices, problem solving, and community resources	Strong evidence that prism spectacles are no more effective than conventional glasses for individuals with AMD
Skelton et al, 2013[58] (Environmental and behavioral interventions for reducing physical activity limitation in community-dwelling visually impaired older people)	No RCTs or quasi-RCTs met inclusion criteria	No studies supported interventions to reduce activity limitation. Although behavioral interventions delivered by OTs reduce falls, authors were unable to conclude if this is due to reduced activity restriction (increased mobility) or reduced activity (lessening exposure to risk)	Future research required, such as current studies of effectiveness of orientation and mobility training, and also effect of OT home-safety modification, coping strategies, and exercise
Thomas et al, 2015[59] (Assistive technology for children and young people with low vision)	No RCTs were identified		Research is needed to find out if children with low vision can use AT successfully at school and home

TABLE 1 Findings from Systematic Reviews of the Effectiveness of Vision Rehabilitation Interventions (continued)

Author(s), Year, Title	Search Results	Main Results	Comments
van der Aa et al, 2016[60] (Psychosocial interventions to improve mental health in adults with vision impairment)	14 RCTs, 4 non-RCTs and 4 “before and after” studies	Limited evidence for the effectiveness of psychosocial interventions on mental health. Not significant after removing an outlier effect on depressive symptoms.	
Virgili and Rubin, 2010[61] (Orientation and mobility training for adults with low vision)	2 small quasi-randomized trials	No difference in these two interventions. Small sample size and poor methodological quality.	Masked RCTs to compare effectiveness of different types of O & M are recommended
Virgili et al, 2013[62] (Reading aids for adults with low vision)	9 small studies with crossover-like design and 1 study with three parallel arms	Insufficient evidence of effect of different devices on reading. Prism eyeglasses were no different from conventional eyeglasses.	Electronic devices allowed faster reading than optical devices

AMD = age-related macular degeneration; AT = assistive technology; LVD = low vision devices; O & M = orientation and mobility; OT = occupational therapist; RCT = randomized controlled trial

CARE PROCESS FOR ALL OPHTHALMOLOGISTS

All ophthalmologists should recommend vision rehabilitation as a continuation of their care and provide information about rehabilitation resources for patients with vision loss. Vision rehabilitation improves the patient's ability to compensate for vision loss.[53] It prepares patients to use their remaining vision more effectively or to use compensatory strategies to facilitate reading, complete activities of daily living, ensure safety, support participation in community, and enhance emotional well-being. Eight American Academy of Ophthalmology PPPs (Comprehensive Adult Medical Eye Evaluation, Age-Related Macular Degeneration, Cataract in the Adult Eye, Bacterial Keratitis, Primary Angle Closure, Primary Open-Angle Glaucoma, Diabetic Retinopathy, and Idiopathic Macular Hole) include recommendations for vision rehabilitation referral when appropriate. Ophthalmologists are urged to provide all patients who have any level of vision loss with the free patient handout created by the Academy's Vision Rehabilitation Committee (See Appendix 4.) A patient education brochure on low vision can be ordered from the Academy.

The continuum of eye care extends from the diagnosis of eye disease to rehabilitation for patients with vision loss that cannot be reversed. The role of the referring ophthalmologist or optometrist is to evaluate and initiate treatment of eye disease before advising the patient about vision rehabilitation; however, it is often optimal for disease treatment and vision rehabilitation to proceed simultaneously. Many conditions that result in low vision are progressive. The referring clinician also should reassess a patient's condition periodically, if indicated, to prevent further vision loss. The ophthalmologist who subspecializes in vision rehabilitation will refer a patient back to the referring clinician for reassessment if visual function changes during the course of rehabilitation.

All ophthalmologists can encourage patients who have central field loss by advising them that their peripheral intact retina can be used, with magnification, when central vision is lost. Patients with central scotomas will use nonfoveal fixation spontaneously and develop a location of eccentric fixation called preferred retinal location (PRL);[83] however, magnification is required for reading and training may be beneficial.

It is important for all ophthalmologists to be aware that the Center for Medicare and Medicaid Services reimburses for vision rehabilitation services provided by occupational therapists**.** Visual impairments are included among the ICD codes that qualify for occupational therapy rehabilitation services on referral from physicians and in accordance with a plan of care. Occupational therapists adhere to the same standards for documentation as required for rehabilitation services that are provided following a cerebral vascular accident, orthopedic procedures, or any other condition requiring occupational therapy. An important aspect of occupational therapy intervention is the modification of the task and the environment to enable patients with significant physical, sensory, and cognitive disabilities to continue to engage in activities. This therapy is in addition to training patients to use devices to accomplish goals. Two-thirds of older adults with low vision have at least one other chronic condition that affects their ability to complete activities of daily living,[63] and occupational therapists are trained to consider and address such comorbidities. Although there are other vision rehabilitation professionals who provide services in private and governmental agencies, they are not reimbursable within the medical system. These include certified low vision therapists, certified vision rehabilitation therapists, and certified orientation and mobility specialists.

Many factors influence the success of rehabilitation. Patients who are searching for a cure for their disease and a restoration of vision to "the way it was" may perceive rehabilitation to be an intense disappointment, and this may present a difficult challenge to the therapist. Cultural factors may influence goals and expectations. Some patients have limited financial resources to obtain aids. Although rehabilitation services are covered by the Center for Medicare and Medicaid Services, devices currently are not. Many patients have other physical impairments that influence the rehabilitation process or increase dependency. Limitations in hearing and mobility, for example, may require specialized adaptations to enable the patient to use optical devices and some compensatory strategies. Patients with low endurance and limited energy may progress more slowly through the rehabilitation process. It is important to realize that although these factors challenge vision rehabilitation professionals, some aspects of vision rehabilitation can still be provided to the patient. Homes of patients who suffer from cognitive limitations can be made safer, and their caregivers can be trained to make accommodations for vision loss for these patients. Therefore, there is no rationale for denying vision rehabilitation to a patient with vision loss.

CARE PROCESS FOR OPHTHALMOLOGISTS WHO SUBSPECIALIZE IN VISION REHABILITATION

The Comprehensive Multidisciplinary Vision Rehabilitation Model incorporates the vision rehabilitation care process in the continuum of ophthalmic care. Level 3 of the care process in this model includes a history, a clinical evaluation of visual functions, an assessment of the patient's performance of activities such as reading, an assessment of risks to the patient associated with vision loss such as falls or medication errors, recommendations for rehabilitation interventions that are pertinent, and patient education. Vision rehabilitation must be individualized to meet each patient's particular goals, limitations, and resources (e.g., age, finances to purchase devices, and responsibilities) and must address reading, activities of daily living, safety, participation in home and community activities despite vision loss, and psychosocial well-being. Some patients require simple interventions, such as increased reading adds and lighting, whereas others will benefit from a range of interventions and services, including occupational therapy.

PATIENT OUTCOME CRITERIA

Patient outcome criteria for vision rehabilitation include the following:

- Maximized access to printed materials
- Improved ability to accomplish activities of daily living and perform tasks of interest
- Improved safety
- Optimized social participation despite vision loss
- Improved psychosocial status and adjustment to vision loss, and enhanced awareness of options for psychological supports
- Overall improvement in quality of life

INITIAL EVALUATION

History

The initial history may include the following elements, and the patient may elect to have a friend or family member present during the evaluation process to confirm or add information:

- The patient's understanding of the diagnosis
- The duration and progression of vision loss
- How the patient's life has changed since the onset of vision loss
- What bothers the patient most about his or her current vision
- Difficulty with near and intermediate vision-dependent tasks such as the following:
  - Using a telephone, cell phone, or computer
  - Reading such things as mail, directions, or medication labels
  - Paying bills and managing finances
  - Shopping and counting money
  - Preparing and eating meals
  - Seeing faces
- Difficulty with distant-vision-related tasks such as the following:
  - Seeing signage in community environments
  - Watching TV, a movie, or a theater performance
  - Seeing interior signs, traffic signals, or road signs when driving or walking
- Current use of magnifying devices and purpose for use
- Driving status and use of transportation alternatives
- Concerns about safety in the home and community, including history of falls, fear of falling, medication mismanagement, bumping into objects, and cuts
- Glare
- Visual hallucinations (Charles Bonnet syndrome [CBS])
- Depressed mood; suicidal ideation, if appropriate
- Fear of dependence

- Participation in activities that are valued or enjoyed
- Home environment; stairs
- Impact of vision loss on hobbies, volunteering, or vocational activities
- Social history:
  - Living situation
  - Family responsibilities
  - Family or other supports
  - Employment
- Medical and surgical history
- Medications
- Goals and priorities with rehabilitation
- Impairments relevant to rehabilitation (e.g., tremor, decreased hearing,[64] cognitive deficit, and restricted mobility)

Evaluation

The referring ophthalmologist should conduct a comprehensive adult medical eye evaluation[65] before referring for the low vision evaluation. Elements of the ocular examination relevant to vision rehabilitation may occasionally be repeated as part of the vision rehabilitation care process. Specific elements included in an evaluation for vision rehabilitation are visual function, assessment of the patient's ability to perform tasks requiring vision, assessment of cognitive and psychological status, assessment of risks to the patient due to his or her visual loss combined with other comorbid features, and assessment of the potential to benefit from rehabilitation.

Evaluation of Visual Function

A review of relevant clinical notes, previous diagnosis, and previous ancillary testing such as retinal photographs or visual fields is helpful when evaluating visual function. Both monocular and binocular visual function assessment can be part of the evaluation. Components of the evaluation include visual acuity and refraction, contrast sensitivity, and visual field.

Visual acuity and refraction

Precise measurements, even in the lower ranges of visual acuity, are necessary to appreciate ocular function fully and to recommend devices and interventions. For patients with visual acuity less than 20/100, the measurement range can be extended by using a portable test chart at a closer testing distance than that typically used in an eye clinic, such as the Early Treatment Diabetic Retinopathy Study (ETDRS) chart at 1 meter (3.3 feet), the Colenbrander Chart (Precision Vision, La Salle, IL), or the Berkeley Rudimentary Vision Test (Precision Vision, La Salle, IL). The latter test is conducted using cards that are held at 25 centimeters (10 inches). Portable tests eliminate the use of the "count fingers" notation. Distance visual acuity measurement is an angular measurement and, thus, 20/200 is equivalent to 1/10M or 2/20M. When using the metric system, it is important to remember that the numerator of the fraction (indicating the test distance) must be expressed in meters and the denominator (indicating the letter size) must be expressed in M units. A one M-unit optotype subtends a visual angle of 5 minutes of arc at 1 meter and is the size of average newsprint.

For near visual acuity measurements, the reading add used (if any), letter size, and reading distance should be specified, because near visual acuity will vary with the power of the reading add used.

Clinical observations during visual acuity testing can be informative. Head turns, deviated gaze, or searching eye and head movements should be noted and may indicate that a patient has scotomas or is using an eccentric viewing location. As patients shift fixation, measured visual acuity may vary. Difficulty identifying very large letters, with better performance in the middle-size range, may indicate a small central island of vision surrounded by an encircling scotoma or a small residual central island in a patient with extensive peripheral field constriction.

Retinoscopy may be performed with a phoropter or with loose lenses, and the prescription may be confirmed by using a trial frame if necessary. Refraction techniques may be modified for the patient with reduced vision, such as by using a +1.00 diopter (D) cross cylinder, because reduced acuity may obviate a patient's ability to determine any difference between ±0.25 D steps. A retrospective study suggests that a small proportion of patients (11%) presenting for vision rehabilitation require new distance eyeglasses.[66] Unless the refraction varies substantially from the current spectacles, a prescription for new distance eyeglasses is often best delayed until completion of occupational therapy training with devices, when the potential benefit and cost of new eyeglasses can be reassessed relative to other devices. This does not refer to increased reading adds or readers that are part of the evaluation of requirement for reading devices.

Contrast sensitivity

Contrast sensitivity should be measured, since it provides insight into the patient's performance and helps in planning rehabilitation interventions.[67] In visual acuity testing, targets are high-contrast dark letters on a white background. The only variable being tested is the size of the letter that can be discerned. The ability of the human visual system to resolve objects, however, depends not only on size but also on the contrast or luminance difference between the object and its surrounding area. In daily visual tasks, many targets do not have high contrast or sharp edges. Recognizing a face or distinguishing between pills of similar color requires sensitivity to low-contrast targets. Patients with poor contrast sensitivity, for example, are at increased risk of missing steps and of falling.[68,69]

Printed and computer contrast sensitivity tests are available. Computer tests allow a much wider range of test conditions.[70] Printed tests include those that test a single spatial frequency or a range of spatial frequencies. The Pelli-Robson Contrast Sensitivity Chart, for example, has letters of one size with decreasing contrast. Patients who can see the 40M-size letter on the ETDRS chart at 1 meter can be tested on the Pelli-Robson Chart. The VISTECH contrast test has sine-wave/bar patterns with five spatial frequencies. A patient with severe contrast perception loss may require devices that supply illumination and contrast enhancement, such as an illuminated magnifiers or video magnifiers. Video magnifiers, or other electronic methods to view text, may be particularly advantageous for some patients because they can produce reverse-contrast text (white letters on a black background) and varied color.

Visual field

Measurement of the central field includes assessment of scotomas (areas that are not seen using a specified testing target surrounded by seeing areas of retina) and fixation characteristics, including the PRL. Assessment of scotomas and fixation are informative for optimal rehabilitation. The size, shape, and position of the scotomas and the position of fixation relative to the scotoma and stability of fixation impact performance on tasks, choice of device, and training to use the PRL.

Central field assessment using traditional automated field tests is of limited use in patients with unstable or nonfoveal fixation secondary to macular disease.[71] Defects detected in traditional field testing are presented relative to the fovea, but this reference cannot be assumed when a patient may have eccentric fixation. A scotoma that appears paracentral may be a central scotoma that is displaced by eccentric fixation. In addition, scotomas can be either overestimated or underestimated by poor fixation. Fundus-related macular microperimetry, or microperimetry, has the ability to accurately detect both fixation and scotomas.[71] During macular microperimetry, real-time eye tracking technology compensates for ocular movements during testing and ensures that point-to-point correspondence exists between the stimulus and the measured retinal location during the test. As a result, clinicians are able to determine fixation location and quantify parameters such as fixation stability and macular sensitivity.[71] These measures are then used to correlate patients' visual function with performance of visual tasks as well as to guide vision rehabilitation therapy. By monitoring the fundus in real time, this technology helps in determining whether a patient is fixing with fovea, a single area of eccentric retina, or

multiple areas. The PRL, or area of eccentric fixation, can change if the task or illumination changes.

Commercially available macular microperimetry devices image the retina with either a camera or a scanning laser ophthalmoscope.[71,72] These devices test monocular central field. Macular microperimetry devices also include an option for biofeedback training to develop a trained retinal locus (TRL), although evidence for biofeedback TRL training is limited.[73] The role of macular microperimetry in vision rehabilitation is expanding; early vision loss due to AMD is being explored using scotopic microperimetry,[74,75] the role of macular microperimetry in glaucoma is also being evaluated,[76-78] and multiple research groups are exploring development of a binocular macular perimeter.[79,80]

Central scotomas can also be detected by other methods. A paper target 8.5 inches by 11 inches and a laser pointer projecting stimuli are not as sensitive as fundus-related macular microperimetry, but they can provide information about binocular central field. The California Central Visual Field test and the Amsler grid are commercially available paper tests for central field assessment. The location of the patient's fixation cannot be accurately determined with these tests. A 1-centimeter target corresponds to 1 degree when a 57-centimeter test distance is used. An Amsler grid will detect only about half of central scotomas due to perceptual completion.[81]

Scotomas can also be located using central confrontation fields with single-letter targets mounted on flash cards[82] or by observing obscured and clear areas when viewing a clock face or human face. The patient's fixation location cannot be certain using either of these methods because the patient may be fixing with fovea, eccentric retina, or changing areas of fixation. As with traditional field tests, a scotoma that appears paracentral may be a central scotoma displaced by eccentric fixation. Clinicians must also be aware that some patients will maintain a sense of straight ahead related to their fovea, whereas others will re-reference their sense of straight ahead to their PRL. Hence, directing a patient to look straight can confound testing results.[83] The Worth 4-Dot Test can be used to confirm which eye, under binocular conditions, is perceiving stimuli presented centrally. In cases where central fixation is intact, traditional visual field tests can be used to characterize paracentral scotomas.

Peripheral visual field testing is important when patients have disease that is anticipated to affect visual field, such as glaucoma, other optic nerve disease, proliferative diabetic retinopathy, other retinal disease such as retinitis pigmentorsa, or neurological disease such as cerebral vascular accidents. Goldmann visual fields are often useful to assess peripheral field in patients with low vision.

Measurement of other visual functions such as glare, color vision, or motion detection may be considered.

Assessment of the Patient's Ability to Perform Visual Tasks

As part of the assessment of the ability to perform visual tasks, the patient may be observed doing the following:

- Reading continuous print
- Writing
- Reading labels, including medication labels
- Using a cell phone
- Using a computer or tablet
- Walking
- Navigating steps

Much information can be gained by assessing the quality of the patient's continuous reading any of the many reading tests that exist, such as the iReST (International Reading Speed Texts) that has single-size text and the MNREAD test (Minnesota Low Vision Reading Test) that has varying text size.[84] Maximum reading speed can indicate a patient's potential reading speed with an adaptive device. The critical print size is the smallest size of text at which reading speed declines significantly and suggests an approximation of required magnification.[85] Reading speeds with both larger and smaller print, and errors

made when reading, can confer information about central and paracentral fields. For example, missing the last letters in words may indicate a scotoma to the right of fixation, or difficulty with large print and more ease with moderate-size print can indicate a small central field surrounded by scotoma (foveal-sparing scotoma) that is frequently observed in patients with macular disease. If the patient reads larger print better than smaller print, magnification is likely to restore effective reading. To read continuous print of a desired text size without fatigue, a patient usually needs to be able to read two or three lines smaller than the desired text size. Series of numbers or letters can be used to illustrate patterns of errors, as in the SKRead test, which is a commercially available test of random letters.

Assessment of Cognitive/Psychological Status

Factors to consider when assessing the patient's cognitive and psychological status include the following:

- Mood and adjustment to vision loss
- Cognitive or memory deficits that may indicate need for formal testing

Assessment of Risks

Based on the above information, the physician assesses the risks for the individual patient, which include the following:

- Medication errors[86]
- Label misidentification/product misuse
- Mismanaging diabetes or other chronic disease
- Nutritional compromise
- Injury from accidents, including falls, cuts, burns, fractures, or head injuries
- Errors in financial management and/or writing/record keeping
- Social isolation, depression, or economic hardship
- Driving safety

Assessment of Potential to Benefit from Rehabilitation

The patient should be assessed with respect to the following factors to help determine the potential for the patient to benefit from rehabilitation:

- Motivation, stamina
- Barriers to attending rehabilitation[23,24]
- Comorbidities, including tremor, weakness, hearing deficit, cognitive deficit, mobility, chronic illnesses, depression, and anxiety

REHABILITATION

Ophthalmologists who subspecialize in vision rehabilitation provide rehabilitation care that considers reading, activities of daily living, patient safety, interventions that support patient participation in his or her community despite vision loss, and psychosocial well-being. Vision rehabilitation goes beyond device recommendations and sales to assess and address the broader impact of vision loss on patients' lives.

Reading

Being able to read is the most common goal that patients bring to rehabilitation, and it should be assessed and addressed.[87,88] There is emerging research on reading rehabilitation, optimal device selection, and effective training interventions,[55,92,93] but further research is required to outline a standard rehabilitation program.[92] Historically, visual acuity levels offered some prediction of the power of reading add that was required. However, this calculation did not consider other factors such as pattern of central field loss, contrast sensitivity loss, or crowding that are now appreciated to have significance, particularly when considering how patients with central field loss read. Determining magnification using a formula will not ensure reading success. Even with magnification the reading speed will not be normal with a nonfoveal retina. Overall, many factors contribute to reading success and must be considered when planning

rehabilitation. These include visual span (the number of letters that can be recognized), perceptual span (the information that can be gained without moving gaze), oculomotor control for effective saccades, fixation, contrast sensitivity, crowding, cognitive processing, and slower visual processing to recognize text seen with the peripheral retina.

Patients with central scotomas can spontaneously fixate with an alternative area of the nonfoveal retina or PRL, and may use more than one PRL depending on the task being performed or the illumination.[83] The location of a scotoma relative to fixation will determine the reading span[90] and scotoma patterns that limit the horizontal span for reading and may limit both reading fluency and the ability to use magnification. A common clinical example of this is patients with macular degeneration who have a scotoma pattern that encircles the fovea, leaving a limited horizontal span for reading or using magnification (foveal-sparing scotoma pattern).[91] Although different scotoma patterns have different impacts on reading, the position of the PRL has not been shown to affect reading rate.[92] Scotomas to the right of fixation obscure the end of words, scotomas to the left of fixation often impede finding the beginning of the next line of print, and scotomas positioned above or below the PRL impact reading columns of numbers or navigating a page of text. There is no decisive evidence about optimal PRL location.[92]

Various interventions to train reading have been studied, including training oculomotor function,[93] addressing perceptual span,[94] providing structured reading practice,[95] and training an alternative-fixation location or TRL.[92] Most studies also provided devices, so the benefit of training on outcomes such as reading speed or acuity cannot be assessed separately. Also, some investigators provide training when fixing with the spontaneous PRL, whereas others encourage patients to move their eyes to another location or TRL. A study has compared training with the spontaneous PRL, training with a TRL, supervised reading, and a control group.[96] Eccentric viewing training was not found to have a significant effect on reading speed or acuity, and there was some improvement in reading comprehension when training was provided at the PRL. Overall, moderate evidence supports reading rehabilitation training to improve reading speed and near visual ability.[55] Further study with strong research design, particularly randomization, clear definitions of training methods, appropriate matched controls, adequate sample size, and masked assessment of outcomes, is required to identify optimal interventions.[62,92] A review article reported a positive effect of yoked prisms on visual acuity, but data was pooled from controlled and uncontrolled trials.[97] A large-sample, well-designed study reported that prisms do not improve visual acuity or reading.[98]

Patients with homonymous hemianopsia from brain injury also frequently experience difficulty reading.[99] Loss of vision within 1 to 3 degrees of fovea causes the patient to miss the beginnings (left hemianopia) or endings of words (right hemianopia) and disrupts the reading saccade pattern.[99] The patient subsequently experiences decreased accuracy and reading speed.[100] Practice reading laterally scrolling text has been shown to improve reading for patients with right hemianopia.[101,102]

It is important for patients to be aware of the large array of devices for reading rehabilitation, because more than one device may be appropriate for different reading tasks. If the patient's only difficulty is in reading fine print, which may occur with very mild impairment of visual acuity and contrast sensitivity and without significant scotomas, then supplemental direct lighting and possibly a simple device like a low-power lighted magnifier for spot reading in dim conditions may suffice for that single task. Electronic magnification is very commonly used for reading and other tasks when patients require both magnification and contrast enhancement. Audio and tactile braille alternatives for accessing text are important, and text-to-speech options range from free smartphone applications to head-worn technology. Patients may use magnification for some reading tasks and audio for other texts.

The effectiveness, ergonomics, and appropriateness of the following interventions and devices should be considered, and the patient's response to each should be noted:

- Lighting
- Reading eyeglasses
- Handheld magnifiers with or without illumination
- Stand magnifiers with or without illumination
- Electronic video magnifiers[62,89,103]
- Electronic books/readers[104]

- Computer tablets
- Text-to-speech devices, audio books, audio newspapers
- Large print
- Telescopic devices for near
- Braille for individuals with little or no vision

The clinician can guide a patient's optical and nonoptical preferences, but each patient will make his or her individual selection. Once the patient can use a device in the clinical setting, it is essential to provide training to ensure confidence and successful use in the patient's environment.

When considering recommendations for reading rehabilitation, the clinician and patient should discuss the following issues:

- Remaining visual function (visual acuity, contrast sensitivity and central visual field)
- Development of eccentric fixation
- Potential for reading rehabilitation interventions to improve performance
- Why conventional eyeglasses will not correct low vision that is a result of ocular disease

Activities of Daily Living

Recent systematic reviews indicate value in vision rehabilitation interventions that educate patients about low vision, low vision devices, problem-solving strategies,[105] and community resources.[57] Patients have varied goals for rehabilitation depending on their set of unique circumstances.

Different tasks may require different optical and nonoptical devices. In general, objects at near can be enlarged or magnified for viewing at a closer distance. Objects at distance can be enlarged by moving closer or by viewing them with a telescopic device. Adaptive, nonoptical devices may be used to address some goals.

The effectiveness, ergonomics, and appropriateness of the devices listed in the Reading section and the following list should be considered with respect to improving patient participation in activities of daily living. The patient's response to each item should be noted.

- Nonoptical aids such as audio devices (e.g., watches, labels), large-print bank checks, large-button telephones, signature templates, and needle threaders
- Modification of lighting, pattern, and contrast to increase visibility
- Tactile, audio, or braille labeling
- Computer adaptations using magnification, audio-screen readers, and text to speech using optical character recognition
- Cell phone accessibility options and specific cell phone applications that read print aloud, offer directions, and identify colors, objects, currencies, and so on
- Strategies and devices for completing desired daily activities, including personal care, home management, financial management, meal preparation, and shopping

New technologies are emerging and available for both patients with low vision and patients with very little vision. These include innovative mobile assistive technologies,[106] head-worn devices that can read printed text with optical character recognition,[107] implantable miniature telescopes,[108] and retinal prosthesis for patients with near-total vision loss or blindness.[109]

Visual deficits are common with acquired brain injury, and they frequently mix with motor, language, and cognitive deficits to create a complex disability picture that requires a multidisciplinary approach to rehabilitation, including occupational therapy. Neurological deficits may determine capacity for rehabilitation. (For discussion about occupational therapy, see Appendix 6.) Vision impairment, such as hemianopia, affects both reading and mobility. Because reading and mobility are integral components of many independent activities of daily living, the individual with visual field loss often experiences significant limitations in a broad range of daily activities, including medication management, meal preparation, financial management, homemaking, working, driving, and shopping. There is evidence for two approaches to hemianopia rehabilitation: the first is compensatory scanning training[110-113] and the second is peripheral sector prism eyeglasses.[114] However, only a single pilot, randomized controlled trial has compared peripheral sector prism eyeglasses and visual search training. This

comparative trial found some improvement in visual function questionnaires in the visual scanning training group compared with subjects who wore peripheral sector prism glasses. The study also found adverse events to be common with sector prisms.[115] Cost-effectiveness of these interventions should also be assessed in future research.[116]

Patient Safety

The visual rehabilitation process should address the following patient safety issues:

- Meal preparation, including identifying expiration dates on food, handling knives to avoid cuts, operating stoves to avoid burns and starting fires
- Ability to accurately identify and self-administer medications, including insulin, over-the-counter medications, and prescribed medications
- Ability to manage chronic health conditions including ability to self-monitor glucose using a glucometer, manage an insulin device or pump, and to monitor blood pressure and weight using adaptive devices
- Ability to dial a telephone for help and implement an emergency evacuation plan
- Reducing the risk of falling.[58] Risk of falling is increased in the setting of vision loss (e.g., inferior field loss from glaucoma).[117] Fall risk can be addressed by safely participating in physical exercise, strength training, and modifying the environment (home safety).[56,58,118,119] There is evidence that exploratory saccade training is beneficial for patients with retinitis pigmentosa who have limited visual field.[120] Many new technologies for obstacle detection are being developed.[121]
- Independent ambulation. Orientation and mobility services and white-cane instruction are available through most state services and some privately funded services for the visually impaired. Guide dog training is reserved for patients with very limited or no vision and is available through a number of agencies.

Vision Loss and Barriers to Participation in Activities

Many issues limit full participation in activities, such as difficulty with individual visual tasks, mood disorders, activity restriction due to fear of falling,[35] and limited opportunities for employment.[122,123] Transportation is a significant barrier to continued participation. Driving is also a key element in maintaining independence.[124-126]

Driving requires a composite of visual, cognitive, and motor functions. The ophthalmologist has a role in formally assessing visual function in drivers, in discussing findings, offering advice about driving restrictions, driving retirement, or driving alternatives, and in reporting according to state requirements outlined in the American Medical Association's (AMA) Physician's Guide to Assessing and Counseling Older Drivers.[127] Further evaluation and training with a driver rehabilitation specialist may be appropriate for some patients. A 2014 systematic review of occupational therapy interventions for driving performance, including education, cognitive-perceptual training, physical fitness, simulator training, and behind-the-wheel training, demonstrated low to moderate positive effects of driving rehabilitation interventions for older drivers.[128] Some states allow restricted driving licensing or bioptic telescope driving. The bioptic driver looks through a carrier lens and looks briefly through the telescope mounted superiorly in the spectacle to quickly spot details. Behind-the-wheel driving assessment remains the gold standard for driving competence.[129] Driving retirement can be associated with depression and social isolation, each of which may require intervention.

Psychosocial Well-Being and Patient Education

Patients with any amount of vision loss often experience fear, frustration, loneliness, depression, and anger. Mood disorders should be considered by vision rehabilitation clinicians because even early or moderate vision loss causes disability and can generate great anxiety.[44] Additional comorbidities such as hearing loss may increase the risk of decreased mental health.[130] Experiencing the hallucinations that are part of CBS can cause anxiety, particularly when the cause of the hallucinations is not known to the patient.[135] Early referral to vision rehabilitation may be very important.

There is limited evidence on specific psychosocial interventions such as problem-solving treatments to improve mental health for patients with low vision,[60] and trials are ongoing. A

systematic review and meta-analysis[60] included 16 trials that included assessment of depressive symptoms. One trial reported positive benefit of behavioral activation embedded in low vision rehabilitation interventions provided by occupational therapists during six in-home, 1-hour sessions;[131] but the benefit of the behavioral activation intervention was found only in the group with poorer visual acuity (less than 20/100). The trial had a categorical outcome of PHQ-9 diagnosis of depression and the review by van der Aa[44] considered a continuous variable outcome. Based on continuous PHQ-9 scores, there was no significant difference between intervention and control groups in terms of the standardized mean difference in scores. Considering all studies included in the review, there were less effective results in older subjects. Stepped care, where interventions are added as needed in addition to usual care-vision rehabilitation, has also been shown to lead to significant reduction in incidence of major depressive, dysthymic, and/or anxiety disorder over a 2-year follow-up (absolute difference 17%; 95% confidence interval 13 – 22).[132]

Professional assessment should be recommended for patients who report severe changes in their mood or suicidal ideation. In addition, although there is limited literature on the topic, vision rehabilitation may minimize caregiver burden and depression.[133]

The evaluation and assessment in vision rehabilitation concludes with a comprehensive discussion of patients' questions and concerns.[134] Discussion may address the following issues:

- Independence and engagement in meaningful activities
- Family interactions and concerns
- Patient concerns (e.g., fear of blindness)
- Questions about legal blindness
- Emotional support systems, such as support groups
- Situations that arise when the disability is not apparent to others
- Visual hallucinations related to CBS

Patients with any level of vision impairment may also experience recurrent episodes of CBS when, they see formed images of objects that they realize are not real.[83] Patients may be disturbed by these hallucinations, particularly when they are unsure of why they are experiencing them.[135,136] Patients who have CBS and family/caregivers should be reassured that this phantom vision is common in visually impaired people. Discussion often leads to significant relief and decreased anxiety on the part of patients and their family members. A possible link between CBS and cognitive dysfunction is a topic of current research.[136,137] Charles Bonnet syndrome occurs in up to one-quarter of patients who have visual acuity, contrast sensitivity, or visual field loss. The hallucinations are attributed to a cortical-release phenomena resulting from a lack of afferent visual information. Atypical features that should raise suspicion of a diagnosis other than CBS include lack of insight into the unreal nature of the images despite an explanation of CBS, images that interact with the patient, or other associated neurological signs or symptoms. Patients with atypical features require a medical or neuropsychiatric evaluation for accurate diagnosis because entities such as neurological disease, psychiatric disease, or medication side effects can also cause hallucinations.

The vision rehabilitation clinician often has a role in communicating information to patients that the patient perceives as bad news, such as informing the patient that he or she cannot continue to drive or that vision cannot be improved to normal with eyeglasses or treatment. Conveying bad news effectively is a skill that can be trained.[138] Models of this include attending to body language, asking patients about their understanding of their situation, acknowledging patient emotions and the connection of their emotions to the bad news, and slowing the pace of information delivery or even allowing silence in the encounter.[139-141] Physicians develop individual styles that incorporate honest explanations balanced with optimism and hope. Both the interest and the skills to communicate with sensitivity and convey empathy and hope to patients with vision loss are important keys to successful clinical vision rehabilitation.

Other Resources

Many patients will benefit from referral to or information about community resources, including services for seniors or individuals with disabilities, transportation alternatives, radio or telephone reading services for newspapers and magazines, free dialing services from telephone companies, shopping assistance, services available from state agencies for the

visually impaired, and national services, including the Library of Congress Talking Books Program available to anyone unable to read standard print. Comprehensive services for veterans are available through the Veteran's Administration. National organizations, Internet resources, self-help books, sources for large-print materials, and other resources are listed in the Academy's Vision Rehabilitation Patient Handout. (See Appendix 4).

Internists, family practice physicians, and geriatricians should be informed that vision loss is irreversible and about plans for rehabilitation. The family physician in particular plays an invaluable role in the patient's adjustment to vision loss process.

Family members are often very appreciative of education to avoid misunderstanding the nature of the vision loss and can also be positive team players in a rehabilitation process. They may benefit from training in how to assist a visually impaired person with walking using a sighted guide technique.

The terminology of vision rehabilitation and for services (e.g., those addressing reading difficulties of normally sighted children) are potentially confusing. The terms *vision therapy, visual training, visual therapy*, or *vision training* are used to refer to services, but they are not the same as the interventions used in vision rehabilitation. The American Association for Pediatric Ophthalmology and Strabismus has patient information about vision therapy (www.aapos.org/terms/conditions/108).

PROVIDERS

Ophthalmologists and optometrists can provide low vision evaluation in the United States, both of them can provide the order for Medicare-reimbursed occupational therapy. The referral order indicates the level of impairment as a primary code and the disease-causing impairment as a secondary code. The order also includes a statement of need for rehabilitation; a note of the problems the patient has with performing specific tasks; recommendations for therapeutic activities, techniques, and devices; and an assessment of the patient's potential to benefit from rehabilitation. Occupational therapists or other professionals use therapeutic activities, environmental modifications, and compensatory strategies that may incorporate adaptive and optical devices to enable persons with vision impairment and other comorbid disabilities to complete daily living activities in the home and community.[142] Other professionals who may be involved in the rehabilitation care process include certified low vision therapists, certified orientation and mobility specialists, certified vision rehabilitation therapists, certified assistive technologists, teachers of the visually impaired, social workers, and psychologists. A multidisciplinary team approach is recommended to address the disability and psychological problems caused by vision loss. The ophthalmologist is a team leader and the patient is an active participant in the rehabilitation process. Overall, the rehabilitation team should provide continued opportunities for training and reinforcement, as appropriate, to accomplish sustained success with rehabilitation interventions and devices, and it must offer hope to patients whose lives have been significantly affected by vision loss.

The ophthalmologist has an important role in ensuring that patients under his or her care maintain quality of life despite vision loss. The goal is to incorporate care by the vision rehabilitation specialist into the continuum of ophthalmic care, just as stroke or orthopedic rehabilitation is incorporated into the care process. Such a goal can be supported by ensuring that all ophthalmologists appreciate the benefits of comprehensive vision rehabilitation, display empathy for their patients with vision loss, and facilitate the referral process for vision rehabilitation services.

APPENDIX 1. QUALITY OF OPHTHALMIC CARE CORE CRITERIA

Providing quality care
is the physician's foremost ethical obligation, and is
the basis of public trust in physicians.
AMA Board of Trustees, 1986

Quality ophthalmic care is provided in a manner and with the skill that is consistent with the best interests of the patient. The discussion that follows characterizes the core elements of such care.

The ophthalmologist is first and foremost a physician. As such, the ophthalmologist demonstrates compassion and concern for the individual, and utilizes the science and art of medicine to help alleviate patient fear and suffering. The ophthalmologist strives to develop and maintain clinical skills at the highest feasible level, consistent with the needs of patients, through training and continuing education. The ophthalmologist evaluates those skills and medical knowledge in relation to the needs of the patient and responds accordingly. The ophthalmologist also ensures that needy patients receive necessary care directly or through referral to appropriate persons and facilities that will provide such care, and he or she supports activities that promote health and prevent disease and disability.

The ophthalmologist recognizes that disease places patients in a disadvantaged, dependent state. The ophthalmologist respects the dignity and integrity of his or her patients, and does not exploit their vulnerability.

Quality ophthalmic care has the following optimal attributes, among others.

- The essence of quality care is a meaningful partnership relationship between patient and physician. The ophthalmologist strives to communicate effectively with his or her patients, listening carefully to their needs and concerns. In turn, the ophthalmologist educates his or her patients about the nature and prognosis of their condition and about proper and appropriate therapeutic modalities. This is to ensure their meaningful participation (appropriate to their unique physical, intellectual and emotional state) in decisions affecting their management and care, to improve their motivation and compliance with the agreed plan of treatment, and to help alleviate their fears and concerns.
- The ophthalmologist uses his or her best judgment in choosing and timing appropriate diagnostic and therapeutic modalities as well as the frequency of evaluation and follow-up, with due regard to the urgency and nature of the patient's condition and unique needs and desires.
- The ophthalmologist carries out only those procedures for which he or she is adequately trained, experienced and competent, or, when necessary, is assisted by someone who is, depending on the urgency of the problem and availability and accessibility of alternative providers.
- Patients are assured access to, and continuity of, needed and appropriate ophthalmic care, which can be described as follows.
  - The ophthalmologist treats patients with due regard to timeliness, appropriateness, and his or her own ability to provide such care.
  - The operating ophthalmologist makes adequate provision for appropriate pre- and postoperative patient care.
  - When the ophthalmologist is unavailable for his or her patient, he or she provides appropriate alternative ophthalmic care, with adequate mechanisms for informing patients of the existence of such care and procedures for obtaining it.
  - The ophthalmologist refers patients to other ophthalmologists and eye care providers based on the timeliness and appropriateness of such referral, the patient's needs, the competence and qualifications of the person to whom the referral is made, and access and availability.
  - The ophthalmologist seeks appropriate consultation with due regard to the nature of the ocular or other medical or surgical problem. Consultants are suggested for their skill, competence, and accessibility. They receive as complete and accurate an accounting of the problem as necessary to provide efficient and effective advice or intervention, and in turn respond in an adequate and timely manner.
  - The ophthalmologist maintains complete and accurate medical records.
  - On appropriate request, the ophthalmologist provides a full and accurate rendering of the patient's records in his or her possession.

- The ophthalmologist reviews the results of consultations and laboratory tests in a timely and effective manner and takes appropriate actions.
- The ophthalmologist and those who assist in providing care identify themselves and their profession.
- For patients whose conditions fail to respond to treatment and for whom further treatment is unavailable, the ophthalmologist provides proper professional support, counseling, rehabilitative and social services, and referral as appropriate and accessible.

- Prior to therapeutic or invasive diagnostic procedures, the ophthalmologist becomes appropriately conversant with the patient's condition by collecting pertinent historical information and performing relevant preoperative examinations. Additionally, he or she enables the patient to reach a fully informed decision by providing an accurate and truthful explanation of the diagnosis; the nature, purpose, risks, benefits, and probability of success of the proposed treatment and of alternative treatment; and the risks and benefits of no treatment.
- The ophthalmologist adopts new technology (e.g., drugs, devices, surgical techniques) in judicious fashion, appropriate to the cost and potential benefit relative to existing alternatives and to its demonstrated safety and efficacy.
- The ophthalmologist enhances the quality of care he or she provides by periodically reviewing and assessing his or her personal performance in relation to established standards, and by revising or altering his or her practices and techniques appropriately.
- The ophthalmologist improves ophthalmic care by communicating to colleagues, through appropriate professional channels, knowledge gained through clinical research and practice. This includes alerting colleagues of instances of unusual or unexpected rates of complications and problems related to new drugs, devices or procedures.
- The ophthalmologist provides care in suitably staffed and equipped facilities adequate to deal with potential ocular and systemic complications requiring immediate attention.
- The ophthalmologist also provides ophthalmic care in a manner that is cost-effective without unacceptably compromising accepted standards of quality.

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APPENDIX 2. INTERNATIONAL STATISTICAL CLASSIFICATION OF DISEASES AND RELATED HEALTH PROBLEMS (ICD) CODES

Changes to the ICD-10 are courtesy of Jenny Edgar, AAO Coding Specialist

	ICD-10 CM *Code any associated underlying cause of the blindness first.*
Total, near-total, and profound visual impairment in better eye	**H54.0X-** Blindness both eyes Visual impairment, categories 3, 4, 5 in both eyes
Better eye: total impairment Lesser eye: total impairment	**H54.0X-** Blindness both eyes Visual impairment, categories 3, 4, 5 in both eyes
Blindness right eye, category 3	H54.0X33 Blindness right eye, category 3; blindness left eye, category 3 H54.0X34 Blindness right eye, category 3; blindness left eye, category 4 H54.0X35 Blindness right eye, category 3; blindness left eye, category 5
Blindness right eye, category 4	**H54.0X43** Blindness right eye, category 4; blindness left eye, category 3 **H54.0X44** Blindness right eye, category 4; blindness left eye, category 4 **H54.0X45** Blindness right eye, category 4; blindness left eye, category 5
Blindness right eye, category 5	**H54.0X53** Blindness right eye, category 5; blindness left eye, category 3 **H54.0X54** Blindness right eye, category 5; blindness left eye, category 4 **H54.0X55** Blindness right eye, category 5; blindness left eye, category 5
Blindness right eye, category 3; low vision left eye	H54.1131 Blindness right eye, category 3; low vision left eye, category 1 H54.1132 Blindness right eye, category 3; low vision left eye, category 2
Blindness right eye, category 4; low vision left eye	H54.1141 Blindness right eye, category 4; low vision left eye, category 1 H54.1142 Blindness right eye, category 4; low vision left eye, category 2

	ICD-10 CM (continued) *Code any associated underlying cause of the blindness first.*
Blindness right eye category 5; low vision left eye	**H54.1151** Blindness right eye, category 5; low vision left eye, category 1 **H54.1152** Blindness right eye, category 5; low vision left eye, category 2
Low vision right eye, category 1; blindness left eye	**H54.1213** Low vision right eye, category 1; blindness left eye, category 3 **H54.1214** Low vision right eye, category 1; blindness left eye, category 4 **H54.1215** Low vision right eye, category 1; blindness left eye, category 5
Low vision right eye, category 2; blindness left eye	**H54.1223** Low vision right eye, category 2; blindness left eye, category 3 **H54.1224** Low vision right eye, category 2; blindness left eye, category 4 **H54.1225** Low vision right eye, category 2; blindness left eye, category 5
Low vision both eyes, different category levels	H54.2X1- Low vision right eye, category 1 H54.2X2- Low vision right eye, category 2
Low vision right eye, category 1	**H54.2X11** Low vision right eye, category 1; low vision left eye, category 1 **H54.2X12** Low vision right eye, category 1; low vision left eye, category 2
Low vision right eye, category 2	**H54.2X21** Low vision right eye, category 2; low vision left eye, category 1 **H54.2X22** Low vision right eye, category 2; low vision left eye, category 2
Blindness right eye; normal vision left eye	H54.413A Blindness right eye, category 3; normal vision left eye H54.414A Blindness right eye, category 4; normal vision left eye H54.415A Blindness right eye, category 5; normal vision left eye
Blindness left eye; normal vision right eye	H54.42A3 Blindness left eye, category 3; normal vision right eye H54.42A4 Blindness left eye, category 4; normal vision right eye H54.42A5 Blindness left eye, category 5; normal vision right eye
Low vision right eye, category 1–2	**H54.511A** Low vision right eye, category 1; normal vision left eye **H54.512A** Low vision right eye, category 2; normal vision left eye
Low vision left eye, category 1–2	**H54.52A1** Low vision left eye, category 1; normal vision right eye **H54.52A2** Low vision left eye, category 2; normal vision right eye

	ICD-10 CM **(continued)** *Code any associated underlying cause of the blindness first.*
Homonymous bilateral field defects (blind spots in the right or left halves of the visual fields of both eyes: hemianopsia, quadrantanopia, altitudinal)	Homonymous hemianop(s)ia Quadrant anop(s)ia **H53.461** Homonymous bilateral field defects right eye **H53.462** Homonymous bilateral field defects left eye **H53.469** Homonymous bilateral field defects unspecified side
Heteronymous bilateral field defects (blind spots in opposite halves of the visual fields of both eyes: binasal, bitemporal)	**H53.47** Heteronymous bilateral field defects Heteronymous hemianop(s)ia
Scotoma involving the central area (within 10 degrees of fixation)	Central scotoma **H53.411** Scotoma involving central area right eye **H53.412** Scotoma involving central area left eye **H53.413** Scotoma involving central area bilateral **H53.419** Scotoma involving central area unspecified eye
Generalized contraction or constriction	**H53.481** Generalized contraction of visual field right eye **H53.482** Generalized contraction of visual field left eye **H53.483** Generalized contraction of visual field bilateral **H53.489** Generalized contraction of visual field unspecified eye

CM = Clinical Modification used in the United States; ICD = International Classification of Diseases

The following definitions apply to the ICD-10 categories:

- Moderate visual impairment: best-corrected visual acuity is less than 20/60 (including 20/70) to 20/160
- Severe visual impairment: best-corrected visual acuity is less than 20/160 (including 20/200) to 20/400, or the visual field diameter is 20 degrees or less (largest field diameter for Goldmann isopter III4e, 3/100 white test object, or equivalent)
- Profound visual impairment: best-corrected visual acuity is less than 20/400 (including 20/500) to 20/1000, or the visual field diameter is 10 degrees or less (largest field diameter for Goldmann isopter III4e, 3/100 white test object, or equivalent)
- Near-total vision loss: best-corrected visual acuity is less than 20/1000
- Total blindness is no light perception

NOTE: The table below gives a classification of severity of visual impairment recommended by a WHO Study Group on the Prevention of Blindness, Geneva, 6–10 November l972.

Category of Visual Impairment	Visual Acuity with Best Possible Correction	
	Maximum less than:	Minimum equal to or better than:
1	6/18 3/10 (0.30) 20/70	6/60 1/10 (0.10) 20/200
2	6/60 1/10 (0.10) 20/200	3/60 1/20 (0.50) 20/400
3	3/60 1/20 (0.05) 20/400	1/60 (central fixation at 1 meter) 1/50 (0.02) 5/300 (20/1200)
4	1/60 (central fixation at 1 meter) 1/50 (0.02) 5/300	Light perception
5	No light perception	
9	Undetermined/unspecified	

The term *low vision* in category H54 comprises categories 1 and 2 of the table; the term *blindness* comprises categories 3, 4, and 5; and the term *unqualified visual loss* comprises category 9.

If the extent of the visual field is taken into account, patients with a field no greater than 10 degrees but greater than 5 around central fixation should be placed in category 3; patients with a field no greater than 5 around central fixation should be placed in category 4, even if the central acuity is not impaired.

APPENDIX 3. THE ACADEMY'S MULTIDISCIPLINARY MODEL OF VISION REHABILITATION AS PART OF THE CONTINUUM OF OPHTHALMIC CARE

The American Academy of Ophthalmology model of vision rehabilitation outlines how vision rehabilitation can be incorporated in the continuum of ophthalmic care.

MATERIALS FOR PATIENTS

The Academy's Vision Rehabilitation Patient Handout is for the ophthalmologist to give to patients. It offers essential tips for making the most of a patient's remaining vision and provides information about how patients can access vision rehabilitation options in their community.

MATERIALS FOR OPHTHALMOLOGISTS

The Academy's Comprehensive Multidisciplinary Vision Rehabilitation Model outlines how vision rehabilitation can be incorporated in the continuum of ophthalmic care in a three-level model:

- **Level 1** of vision rehabilitation calls on all ophthalmologists to recognize that vision loss associated with the following visual functions affects their patients' ability to function:
  - Best-corrected acuity in the better-seeing eye less than 20/40
  - Scotomas
  - Visual field loss
  - Loss of contrast sensitivity

  Level 1 of this model also calls on all ophthalmologists to respond by advising patients about the option of vision rehabilitation and offering patients a copy of the Academy's Vision Rehabilitation Patient Handout and encouraging them to read it and act on it. Patients who report difficulty doing vision-related tasks aside from simply fine print will benefit from vision rehabilitation. Patients can refer to the handout to learn about services or ophthalmologists can refer patients to local services in their community. Many academic ophthalmic departments in the United States have comprehensive multidisciplinary vision rehabilitation services where patients can be referred directly.

- **Level 2 (partial) and Level 3 (comprehensive vision rehabilitation)** of the model include the multidisciplinary vision rehabilitation services that are important to follow when vision loss impacts more than reading fine print. Comprehensive vision rehabilitation may be a limited clinical encounter when patient goals are limited or it may be a more extensive intervention involving many professionals. Visual acuity alone does not determine the need for service; rather, the impact of vision loss on the patient determines the intervention that is needed. Patients with vision loss benefit not only from using strategies and devices but also from the opportunity to discuss the impact of their vision on their life, receive patient education that supports them, and receive training that can allow them to continue to participate in activities despite ocular disease.

Contact the Academy at lowvision@aao.org with any questions about vision rehabilitation.

APPENDIX 4. THE ACADEMY'S INITIATIVE IN VISION REHABILITATION – PATIENT HANDOUT

American Academy of Ophthalmology Vision Rehabilitation Patient Handout
To locate services in your area, contact the
American Foundation for the Blind: www.afb.org or 1-800-232-5463

MAKING THE MOST OF REMAINING VISION

If you are having difficulty with things such as reading, using your cell phone, or reading on your computer, the Academy's Vision Rehabilitation Patient Handout can help with tips about lighting, contrast, and magnification. There are many new technologies that are of great assistance to people with low vision. Cell phone cameras can magnify, you can send texts by voice, and smartphone applications can help you identify objects and colors. Losing vision does not mean giving up your activities, but it may mean learning new ways to do them.

Patterns of Vision and Vision Loss

- ***Central vision*** is the detailed vision we have when looking directly at an object. Macular degeneration (MD) affects central vision.
- ***Peripheral vision*** is the less detailed vision we have for everything we are not looking directly at. Glaucoma and retinitis pigmentosa typically affect peripheral vision first. Strokes can affect one side of peripheral vision. Diabetic retinopathy can affect central or peripheral vision.
- ***Contrast sensitivity*** is the ability to see shades of gray or items that are similar in color. Reduced contrast sensitivity can make it difficult to see steps or read newsprint.

The Experience of Vision Loss

It is important to acknowledge the frustration or anger you may feel upon learning that your vision loss is irreversible. You can live well with low vision but you cannot live well with depression. Counseling and a good support group can help you recognize that your value to yourself and others does not depend on your vision and that you are worth the effort it takes to learn to make the most of the vision you have.

The Phantom Vision of Charles Bonnet Syndrome

Approximately 20% to 30% of people with vision loss see repeated lifelike images that they know are not real. This is called Charles Bonnet syndrome (CBS) and it is not a loss of mental capacity; it is just a part of vision loss for some.

Making the Most of Remaining Vision

Using Your "Next-Best Spot": Scotomas and Preferred Retinal Locus (PRL)

When the center of your vision is obscured by a blind spot (scotoma), you can use the "next-best spot" (the preferred retinal locus, or PRL). Adapting to using noncentral vision can be challenging. Vision rehabilitation can assist you to use your remaining vision optimally.

Make Things Brighter

- ***Improve lighting.*** Use a gooseneck lamp and carry a pocket flashlight.
- ***Reduce glare.*** Indoors cover shiny counters. Try yellow, amber, yellow, or plum tinted eyeglasses or clip-ons. Visors are useful.
- ***Increase contrast.*** Use a rollerball or felt pen, not a ballpoint. Draw a dark line where you need to sign. Use a white cup for coffee and a dark cup for milk.

Make Things Bigger

- ***Move closer.*** Sit close to the TV and up front at performances.
- ***Enlarge.*** Get large-print checks, playing cards, bingo cards, crosswords, calendars, and books, and large phones, TV remotes, and keyboards.
- ***Magnify.*** Get an e-reader or electronic tablet for books. Use a lighted handheld magnifier for price tags and menus, and a stand magnifier or video magnifier for reading printed text. The camera on your cell phone can magnify.

Organize

Designate a spot for everything. Minimize clutter.

Label

Mark dials with tactile fabric paint or raised dots. Label medications with markers or rubber bands. Safety-pin the labels of similar-colored clothing.

Substitute: Let's Hear It for Ears!

Get books and magazines in audio format. Get a talking watch, calculator, glucometer, or audio labels. Audio screen readers allow you to listen to your computer or your cell phone and free cell phone applications can read text aloud. (See Resources.)

Participate

Don't isolate yourself. Keep your social group, volunteer job, golf, or bowling. You might need large print, a magnifier, a ride, or someone to spot your ball, so ask for the help you need. Staying home to avoid asking for help is not independence. Friends are honored to be asked.

Driving and Alternative Transportation

Pick your times and routes carefully or use GPS. If driving is difficult, cars appear unexpectedly, drivers honk at you, or you are having fender-benders, consider transportation alternatives. Sell your car and with the money you are saving by not paying car insurance take a taxi or car-sharing services, buy gas for a friend who drives, or hire a part-time driver. Try a 3-wheel bike or electric scooter. Walk when you can.

For Family and Friends

To keep up their spirits, your loved ones need to be empowered to do as much as possible independently. Recognize the challenge of vision loss and offer help, but don't take over their tasks. Instead, help them make the adaptations necessary to accomplish them on their own.

RESOURCES

Audio books, magazines, news, and textbooks:

- American Printing House for the Blind: 1-800-223-1839, www.aph.org
- Audio Bibles for the Blind, http://audiobiblesfortheblind.org
- Choice Magazines (bimonthly articles, unabridged): 1-888-724-6423, www.choicemagazinelistening.org
- National Federation of the Blind, NFB-NEWSLINE news by phone, 866-504-7300, www.nfb.org
- Talking Books Program of the National Library Service: 1-800-424-8567, www.loc.gov/nls
- Public libraries in Canada (celalibrary.ca) and the United States

Large-print books and newspapers:

- Read large print on your e-reader, tablet, or computer
- New York Times Large Print Weekly: 1-800-NYTIMES (1-800-698-4637), http://homedelivery.nytimes.com
- Available in public libraries or purchase large-print books online

Large-print materials – check, calendars, address books, crosswords, playing cards, bingo cards, phone, keyboards:

- American Printing House for the Blind, Inc.: 1-800-223-1839, www.aph.org
- Deluxe Check Printers, Inc.: 1-800-342-1500, large print bank checks
- Independent Living Aids: 1-800-537-2118, www.independentliving.com
- Learning Sight & Sound (LS&S): 1-800-468-4789, www.lssgroup.com
- Lighthouse Guild: 1-800-829-0500, http://shop.lighthouse.org
- MaxiAids: 1-800-522-6294, www.maxiaids.com
- Shoplowvision: 1-800-826-4200, www.shoplowvision.com

Technology – computers:

Both Windows and Apple computers have many features built into the operating systems to assist patients with low vision to use their computer.

- Apple Accessibility: 1-877-204-3930, www.apple.com/accessibility, www.applevis.com
- Apple accessibility courses: http://lowvisionfocus.org/
- Computers for the Blind (CFTB): www.computersfortheblind.net
- Magnification computer software: Ai Squared, www.aisquared.com
- Microsoft Accessibility support: 1-800-936-5900, www.microsoft.com/enable/aging/magnify.aspx, www.microsoft.com/enable/default.aspx
- Search Internet for “voice to text software”

Technology – cell phones

Both Android and iPhones have many accessibility features including magnification, voice dialing, and audio texting

- Cell phones list: www.accessiblephones.com
- Your cell phone or iPad camera can be used to photograph and enlarge images, such as menus in restaurants or prices
- Text-to-speech applications (e.g., Seeing AI (free) application, KNFB Reader (fee) www.knfbreader.com

Technology information

- AFB AccessWorld® Magazine: www.afb.org/aw

Technology – video magnifiers

Electronic magnification (video magnifier) is available in portable or desk formats

- Video magnifiers: List of products and descriptions, www.afb.org/prodBrowseCategory.asp

Technology – audio

- Cell phone applications (above), optical character recognition (OCR) text-to-speech desk or head-worn devices

National organizations for support, information, and research updates:

- AMD Alliance International: 1-877-263-7171, www.amdalliance.org
- American Diabetes Association, www.diabetes.org
- American Foundation for the Blind: 1-800-AFB-LINE (1-800-232-5463), www.afb.org
- American Macular Degeneration Foundation, www.macular.org
- Centers for Disease Control and Prevention (CDC): Fall prevention brochure, www.cdc.gov/HomeandRecreationalSafety/pubs/English/brochure_Eng_desktop-a.pdf
- Clinical trials, http://clinicaltrials.gov
- Glaucoma Research Foundation: 1-800-826-6693, www.glaucoma.org
- Hadley School for the Blind online courses: 1-800-323-4238, www.hadley.edu
- Low Vision Focus (LVF): 30-minute recordings on a variety of topics, www.lowvisionfocus.org
- Macular Degeneration Foundation 1-888-633-3937, www.eyesight.org/
- Macular Degeneration Partnership: 1-888-430-9898, www.amd.org
- MD Support: Support group list and video (Learning to Live with Low Vision), 1-816-761-7080 (toll call), www.mdsupport.org
- National Eye Health Education Program (English and Spanish): www.nei.nih.gov/nehep
- Vision Aware: www.visionaware.org

Self-Help Books:

- Duffy M. *Making Life More Livable: Simple Adaptations for Living at Home After Vision Loss*. New York: American Foundation for the Blind, 2002.
- Mogk, L. and Mogk M. *Macular Degeneration: The Complete Guide to Saving and Maximizing Your Sight.* New York: Ballantine Books, 2003.
- Roberts, D. *The First Year – Age Related Macular Degeneration.* New York: Marlowe & Co. 2006.

Pediatric and Youth Resources:

- AFB FamilyConnect: www.familyconnect.org
- National Association for Parents of Children with Visual Impairments (NAPVI): 1-212-769-7819, www.napvi.org

To Locate Vision Rehabilitation Services in Your Area

- Everyone: American Foundation for the Blind, "Find Services Near You" link: www.afb.org/directory.aspx, 1-800-232-5463,

  Ask if services include the following: a vision rehabilitation consultation by an MD or OD; device recommendations; devices for loan; rehabilitation training for reading, writing, shopping, cooking, lighting, glare control; home assessment; mobility training; support groups.

  Ask about cost: Free, billed to insurance, other? Medicare covers most services; not devices.
- Eligible Veterans: Contact U.S. Department of Veterans Affairs, 1-877-222-8387, www.va.gov/blindrehab

To view this handout in larger print, visit the Academy's Initiative in Vision Rehabilitation page, www.aao.org/low-vision-and-vision-rehab.

APPENDIX 5. VISION REHABILITATION FOR CHILDREN

INTRODUCTION

Vision rehabilitation for children with low vision and their families is an essential component of ophthalmic care. It represents a collaborative effort of a multidisciplinary team that may include ophthalmologists, pediatric ophthalmologists, vision rehabilitation clinicians, occupational therapists, orientation and mobility instructors, teachers, and others working with the child and family. The developmental needs of children, their vulnerability to poor outcome without supports and advocates, their often-comorbid disabilities, and the future lifetime potential of such children necessitates an emphasis on providing excellent rehabilitation at both the earliest point of intervention and on an ongoing basis to ensure a healthy childhood and a future young adult who can fully participate in society.

EARLY IDENTIFICATION AND REFERRAL

Causes of visual impairment in children include congenital structural abnormalities that are sometimes associated with other systemic disorders (e.g., optic nerve hypoplasia, chorioretinal colobomas involving the maculae), genetic disorders (e.g., Leber congenital amaurosis, achromatopsia, cone or cone-rod dystrophies, congenital stationary night blindness, albinism, aniridia), acquired abnormalities (e.g., uncontrolled glaucoma, severe residua of retinopathy of prematurity, ocular and/or cerebral trauma, and uveitis) and neurologic visual impairment also called cortical or cerebral visual impairment (CVI). In children with congenital or early onset vision loss (usually less than 3 years of age) involving the anterior visual pathway, parents and caregivers may note nystagmus. In CVI, damage involves primarily the posterior visual pathway, and nystagmus may be absent. With both types of vision loss, other symptoms of vision loss might include light sensitivity, difficulty seeing under conditions of decreased illumination, or failure to master color identification. The child may have problems navigating steps or curbs, or he or she may trip over objects on the floor. Parents might notice that their child has difficulty identifying familiar people across a room, particularly in a crowd of people. Some children may seem to have reduced visual function in a visually crowded environment such as a shopping mall. Parents of children with severe visual impairment (e.g., Leber congenital amaurosis) will often volunteer that their child pushes on his or her eyes with fingers (i.e., oculodigital sign), which is a risk factor for keratoconus. Some diseases, such as Stargardt disease, may involve very subtle fundus changes initially resulting in a delayed diagnosis. Significant time may elapse, and the child may undergo neurological and even psychiatric evaluation before the true diagnosis is made.

OPHTHALMIC CARE

When measuring visual acuity in the child with visual impairment, it is important to not only assess monocular distance acuity but also to measure binocular distance visual acuity and binocular near acuity at both 40 centimeters and at the child's preferred reading distance. In children with nystagmus, binocular acuity is especially important, because it allows the child to use a compensatory head posture to dampen the nystagmus. Also, monocular occlusion can increase the amplitude of nystagmus, further reducing measured visual acuity. For best monocular measurement, a high-plus sphere can be used as an occluder. The preferred method of visual acuity testing for all children involves linear or crowded optotypes. (See Pediatric Eye Evaluations PPP.[143]) The acuity card procedure can be used to estimate resolution visual acuity, and comparing with normative values can be helpful, but the results of the acuity card test may not predict optotype or recognition visual acuity. Cycloplegic retinoscopy is necessary to reveal significant refractive errors that may improve visual acuity. If eyeglasses are prescribed, vision should be checked with and without the correction to determine whether there has been a measurable improvement.

The cause of visual impairment should be explained in an unhurried manner. A written explanation and referral to support organizations may be offered to parents. Additional testing may be necessary for diagnosis and prognosis (e.g., neuroimaging of the pituitary in optic nerve hypoplasia, genetic

testing for inherited disorders, renal ultrasound for aniridia). Understandably, parents can be upset and often grieve for the loss of vision in their child. They may require increased support during office visits. Parents frequently ask about prognosis and usefulness of procedures that lack evidence of efficacy. The ophthalmologist can provide guidance in these areas. Parents should be reassured that it does not hurt the eyes when children sit close to the television or hold visual targets close to the eyes as they use their innate ability to accommodate to see smaller print at a closer focal distance.

REHABILITATION

It is the ophthalmologist's role to provide prompt referral for low vision rehabilitation services for preschool and school-aged children. The low vision evaluation may overlap with the evaluation by the pediatric or comprehensive ophthalmologist. Assessment of accommodation, eye movements, stereopsis, color perception, contrast sensitivity threshold, dark adaptation, and visual field are critical assessments for diagnosis and a complete picture of the child's functional vision. Age appropriate evaluation of visual function should be conducted. With school-aged or older children, the assessment is similar to the evaluation for adults and can include fundus-related macular perimetry or microperimetry visual field testing, dark adaptometry, and measures of literacy (e.g., reading speed, fluency, comprehension, and stamina). Regardless of the child's age, offering family support, connections with support organizations, referrals to early-vision intervention, and rehabilitation promptly at the time of initial diagnosis is key.

Birth to Three

When a young child is diagnosed with bilateral visual impairment, the family should be referred for enrollment in an early-intervention program. An Individual Family Service Plan will be designed to address the needs of the child and the family. These programs offer important interventions and support for both the child and family as well as provide insight into options for effective habilitation. These programs can also facilitate development of an Individualized Educational Plan (IEP) when the child transitions to preschool.

Preschool Child

When a preschool-age child is diagnosed with bilateral visual impairment, consideration should also be given to enrollment in an early-intervention program. Such a program can be supportive for the family, and it can offer important stimulation for the child and provide insight into options for effective rehabilitation. Early-intervention programs can also facilitate development of an IEP when the child transitions to elementary school. In preschool, preferential seating close to instruction, introduction to simple optical magnification (e.g., low-power monocular telescopes and dome magnifiers), or using a second copy of a book that the teacher may read to the class, allows the child visual access to instruction, which is essential for success. Children who have extremely poor vision or a disorder that causes progressive vision loss can be introduced to tactile methods for sensory stimulation that can be a prelude to learning braille. Orientation and mobility instruction may be offered to help with safe travel in school and outdoors. The ophthalmologist can request that an orientation and mobility assessment be performed. Children with CVI will need a specialized functional vision assessment. These children often have other comorbidities (e.g., cerebral palsy) and require other specialized services.

School-aged Child

Education can pose challenges for the visually impaired child. A bright child with a moderate visual disability might not be recognized as having special needs and might fall through the cracks, thus failing to receive supportive services.[144] The vision rehabilitation clinical team and the vision resource teacher in the child's school may collaborate to provide an assessment of visual performance and recommendations for devices, training, and accommodations. In the early grades, print size may be sufficient for the child to see, although the child will adopt a closer focal distance than normal. Children wearing a high myopic refractive correction may prefer to look over the top of their glasses or remove their glasses to read small print. As children progress to higher grades, visual access to distance learning and print may require magnification such as monocular telescope; optical character recognition (OCR) programs that

will read text aloud; a tablet or smartphone with applications to allow access to presentations (e.g., SMART Boards [SMART Technologies, Inc., Calgary, Canada], PowerPoint [Microsoft, Redmond, WA]) and manipulation and completion of worksheets; a bifocal; or, less commonly, large print.

Learning to write can be a challenge for visually impaired children. Video magnification will allow them to view their handwriting in real time. Using a dark felt-tip pen and paper with bold, high-contrast lines can also help. When children lean over the desk to read or write, a slant board can raise books and papers to improve posture. Early keyboarding should be encouraged to optimize computer accessibility options. Computer keyboards that are available in large-print display are preferred by some children with visual impairment. Electronic readers, tablet and laptop computers, and video magnifiers are important tools in a classroom or home setting for the child with low vision. Students with severe vision loss learn braille to enhance literacy. Refreshable braille, an electronic-mechanical device that physically displays output braille by means of rounded pins, can be useful on computer keyboards.

In general, children with low vision should receive preferential seating close to instruction in the classroom. If a significant head turn is noted, the teacher should generally be positioned opposite the direction of the head turn (e.g., a child with a marked left head turn should have the teacher or paraprofessional to the child's right side). The child with photophobia should be seated with his or her back to the window.

The needs of individual children differ, and an IEP is recommended to facilitate an educational environment appropriate for each child's visual needs. The Individuals with Disabilities Act mandates that schools provide education in the "least restrictive environment" for the child. The ophthalmologist, the vision rehabilitation clinician, and the parents all need to advocate for the child to receive educational adaptations to facilitate learning, healthy peer relationships, and opportunities to engage in physical activity for social and emotional growth and development.

Teenager and Young Adult

Students in higher grades may become very self-conscious about using devices and large print. Technology options such as smartphones, tablet and laptop computers, and OCR programs are often more acceptable.[145] In these grades, teachers should ensure that answer sheets for standardized tests are available in the preferred format (e.g., uploaded into tablet or computer, enlarged print, audio, or braille). When teenagers reach driving age, the ophthalmologist should address such additional issues as whether the patient meets the state's requirements for a driving license, driving with a bioptic (eyeglass-mounted) telescope, what the local resources are for driving assessment and training for the visually impaired, and completing forms for a limited license. During the teenage years, children increasingly become their own advocate.

GENERAL RECOMMENDATIONS

At any age, referral to support networks specific to the child's diagnosis can also be useful. Letters requesting referral for early-vision intervention or to qualify the child for vision services through the school are important and should include enough detail for service providers to have a complete picture of the child's visual impairment. Learning media assessment should be requested through the school to determine whether print or braille is the better approach for literacy.

In some cases of severe visual impairment, children learn best with braille, and in other cases a combination of print, audio, and braille learning may be used. Texts can be made available in an e-Textbook format with text enlarging and OCR capability or in audio format. Test taking may require additional time, and the IEP can specify that tests be given in a separate room. Access to distance viewing in the classroom can be accomplished with a video magnifier. A SMART Board, which allows digital entry and projection on a white board, combined with a tablet or laptop computer at the child's desk, can be used successfully by many visually impaired children to view and interact with presentations. To improve contrast, chalkboards should be washed daily and only dark, saturated markers (e.g., black and purple) should be used on white boards. Children may be provided copies of material that is projected overhead so they can more easily follow the teacher. For distance spotting, a monocular telescope can be used, particularly if it is small enough to be used inconspicuously. Even though children may be reluctant to use a magnifier or receive enlarged print to avoid drawing

attention from their peers, they often embrace the use of technology as less stigmatizing, such as an iPad to view the blackboard rather than a monocular.

Protective eyeglasses are recommended; they may include correction of significant refractive errors and photochromic lenses, tinted lenses, or tinted contact lenses if the child is photophobic. Reversing the polarity (white print on black background) on a computer or a video magnifier can be helpful for the child who is photophobic or has poor contrast sensitivity. Use of a cap or visor pulled down low on the forehead or a brimmed hat can also reduce photosensitivity. Sports and school physical education should be modified to ensure safety and participation. Visually impaired children need to learn to advocate for themselves in the educational arena. They should let the teacher know when they cannot see the visual target. In many situations, letting the other children know about their visual disability can reduce socially inappropriate comments.

SUMMARY

Visual rehabilitation of the child depends on age, the nature and degree of visual impairment, and other comorbid disabilities. Children with visual impairment have individual needs that typically require multiple adaptations in the classroom environment. The ophthalmologist can provide written documentation on the level and nature of visual impairment, the cause of reduced vision, and whether the condition is likely to progress. The combined efforts of the ophthalmologist, vision rehabilitation clinician, and the vision teacher can all contribute to the modification of the school environment to facilitate learning. At planned follow-up visits the ophthalmologist can address subsequent needs at each developmental stage, ensure that eyeglass correction is accurate, provide new information about the cause and management of the child's specific visual impairment, make recommended changes to an Individual Family Service Plan or IEP, allow new technologies to be introduced, encourage the child to be a self-advocate, and continue to support the family.

To promote the evaluation and education of a child with visual impairment, children are considered to have low vision if it cannot be corrected to 20/40, at both near and at distance, or have significant scotoma, visual field constriction, hemianopia, photophobia, nyctalopia, color vision impairment, or other conditions (e.g., CVI) interfering with vision. These children should have a clinical low vision evaluation by a qualified ophthalmologist or optometrist trained and active in low vision rehabilitation, receive prescribed optical devices and/or electronic video magnifiers (assistive technology), and be given educational instruction in the use of any prescribed devices. Assessments for determining a child's reading medium or media allow for the use of these devices. Learning media assessment should be undertaken to determine whether braille or print reading is most effective for the student.[146] There should be emphasis on literacy, incidental learning by being able to visually access the environment, and computer competency.[147] This will promote inclusion of these students into the general education curriculum and will maximize their ability to integrate into society and gain employment. There may be children with multiple disabilities, such as deaf-blindness, where special media and curricula are required and the general curriculum may not be accessible.

INFORMATION RESOURCES

- American Foundation for the Blind, 1-800-AFB-LINE (1-800-232-5463), www.afb.org
- American Printing House for the Blind (APH), 1-800-223-1839, www.aph.org
- Family Connect (presented by the American Foundation for the Blind and the National Association for Parents of Children with Visual Impairments), www.familyconnect.org/parentsitehome.asp
- Learning Ally, www.learningally.org
- Center for Patient Information and Resources, http://www.parentcenterhub.org/
- National Association of Parents of Children with Visual Impairments (NAPVI), 1-800-562-7441, http://www.napvi.org/
- National Organization for Albinism and Hypopigmentation (NOAH), 1-800-473-2310, www.albinism.org
- National Eye Institute, www.nei.nih.gov, NEI for Kids, https://nei.nih.gov/kids, Eye Health Information, www.nei.nih.gov/health

APPENDIX 6. OCCUPATIONAL THERAPY FOR PATIENTS WITH VISION LOSS*

INTRODUCTION

Occupational therapy focuses on enabling persons with impairments to participate in their desired daily "roles, habits, and routines in the home, school, workplace, community and other settings."[148] For individuals with vision impairment, the occupational therapist helps them to develop skills and strategies to use remaining vision as effectively as possible to complete their daily occupations. Occupational therapists typically provide medically based rehabilitation services that are reimbursed by Medicare and other medical insurance. The American Occupational Therapy Association initiated systematic reviews on occupational therapy interventions for older adults with low vision related to reading, driving, leisure and activities of daily living.

OCCUPATIONAL THERAPY EVALUATION

The rehabilitation process begins with evaluation. The primary purpose of the occupational therapy evaluation is to develop an intervention plan that will lead to optimal patient outcomes. The therapist determines the patient's current ability to complete desired and necessary activities of daily living and identifies the multiple factors that may influence the patient's performance, including visual, physical, cognitive, psychosocial, and environmental. The therapist uses assessments to identify the client's strengths and weaknesses in completing daily occupations. This information is then used to set explicit achievable goals in collaboration with the patient and develop a tailored, intervention plan that will enable the patient to participate fully in desired activities.

OCCUPATIONAL THERAPY INTERVENTION

Intervention incorporates any or all of the following:

- Modification of the environment and task to enhance safety and enable the patient to complete desired and needed daily activities. Modifications include enhancing lighting, contrast and organization; minimizing pattern and glare; and removing potential hazards to reduce risk of falls or injury.
- Modifications to enable independence that allows patients to manage themselves and occupations in their home such as self-care, cooking, cleaning, financial management, and yard and home maintenance
- Modifications to enable participation in valued leisure and social activities to decrease risk for depression and isolation
- Modifications to enable engagement in activities that promote health and well-being including physical activity (e.g., walking, swimming, yoga) and exercise
- Training in strategies and modifications to enable safe and accurate medication management and device use to monitor medical conditions (e.g., glucose level, blood pressure, diet, weight)
- Visual-skills training to enhance the ability to compensate for vision loss and use remaining vision more effectively for daily activities. Training includes ability to use the preferred retinal location for reading and visual scanning to compensate for peripheral field loss.
- Training in strategies to improve reading accuracy and fluency, and handwriting legibility
- Training in the use of optical devices and assistive technology (e.g., electronic readers) to complete specific daily tasks
- Training in the use of nonoptical devices to complete specific daily tasks
- Modifications of smartphone and computer settings to facilitate access to these devices; training in the use of applications, software, and hardware applications to enable the patient to use digital media to complete daily occupations
- Guidance on safe functional mobility within the home and for undertaking activities of daily living in the community, such as shopping or attending social functions. Occupational therapists do not address street crossing or outdoor mobility; this requires the skill set of an orientation mobility specialist.

- Driver evaluation and training, when appropriate, or assistance in transitioning to driving retirement. (Driver training is not reimbursed by Medicare.)
- Access to community resources, such as talking books, radio reader services, and transportation services
- Assessment and modification of the workplace
- Education for the caregiver to enable the patient and caregiver to work together to maximize independence and participation
- Referral to additional services as indicated in consultation with the ophthalmologist and rehabilitation team. These include state services for the blind and visually impaired, Veteran's Administration services, orientation and mobility services, physical therapy, hearing rehabilitation services, psychologic or psychiatric services, and support groups or aging community service agencies.

VISION REHABILITATION AND OCCUPATIONAL THERAPY FOR PATIENTS WITH HEMIANOPIA FROM BRAIN INJURY

Homonymous hemianopia is a commonly occurring visual deficit associated with central nervous system pathology such as stroke or traumatic brain injury. Affected individuals may or may not be aware of their deficit(s). It can significantly limit reading performance and visual search and scanning of the environment, which subsequently impairs the person's ability to complete many daily occupations.[149] Occupational therapists address the limitations in daily activities that the patient experiences because of the field loss. Reading limitations may be addressed using assistive technology and/or training to improve the person's adaptation to the shortened reading perceptual span created by the field deficit. Occupational therapists also train the patient to use compensatory scanning strategies combined with environmental and task modification to complete occupations that require interaction with a broad visual field as needed in driving, shopping, and other community activities.[112] The therapist may also train the patient to use prescribed prisms that expand field awareness on the involved side. Prisms are fitted monocularly to the upper and lower field of eyeglasses to shift objects on the hemianopic side toward the center when the patient looks into the prism.[150] One randomized controlled trial demonstrated evidence that prisms were more helpful in avoiding obstacles in the blind field than a sham device.[114] A recent pilot, randomized controlled trial compared sector prisms on eyeglasses, visual search training, and standard care and found no significant change in hemianopic visual field area, significant improvement in visual function questionnaires in the visual search training group, and more common adverse events with sector Fresnel prisms.[115] Device abandonment is a concern.[151]

Occupational therapists also provide intervention to patients experiencing limitations in daily occupations due to vision impairment from neurodegenerative diseases, such as Parkinson's disease, multiple sclerosis, and visual impairment occurring with concussion. The occupational therapist will help the patient to adjust to light sensitivity, reduced accommodation, decreased contrast sensitivity, and other visual limitations caused by these conditions. In all cases, the occupational therapy intervention includes modifying both task and environment to enhance the person's ability to complete daily activities.

***** With acknowledgement to Mary Warren, PhD, OTR/L, SCLV, representing the American Occupational Therapy Association, who contributed information to this appendix.

APPENDIX 7. LITERATURE SEARCHES FOR THIS PPP

Literature searches of the PubMed and Cochrane databases were conducted in June 2016; the search strategies can be found on www.aao.org/ppp. Specific limited update searches were conducted after June 2016.

SUGGESTED READING

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RELATED ACADEMY MATERIALS

Basic and Clinical Science Course
Clinical Optics (Section 3, 2017-2018)

Patient Education Downloadable Handout
Low Vision Brochure (2016)
Waiting Room Video for the Ophthalmic Practice, Volume 3 (2015)

EyeSmart®
What is Low Vision? - free download available at www.geteyesmart.org/eyesmart/diseases/low-vision.cfm

Smartsight™
Materials for Patients - free download available at https://www.aao.org/assets/e533393e-7af1-4679-9701-57175a882a8b/635755913307230000/smartsight-2015-update-pdf

Preferred Practice Pattern® Guidelines - Free download available at www.aao.org/ppp.
Comprehensive Adult Medical Eye Evaluation (2015)

To order any of these products, except for the free materials, please contact the Academy's Customer Service at 866.561.8558 (U.S. only) or 415.561.8540 or www.aao.org/store.

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