

PREFERRED PRACTICE PATTERN®



**Vision
Rehabilitation**

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VISION REHABILITATION PREFERRED PRACTICE PATTERN DEVELOPMENT PROCESS AND PARTICIPANTS

The **Vision Rehabilitation Committee** members wrote the Vision Rehabilitation for Adults Preferred Practice Pattern® guidelines (“PPP”). The Committee members discussed and reviewed successive drafts of the document, meeting in person once and conducting other review by e-mail discussion, to develop a consensus over the final version of the document.

Vision Rehabilitation Committee 2011-2012

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The **Preferred Practice Patterns Committee** members reviewed and discussed the document during a meeting in March 2012. The document was edited in response to the discussion and comments.

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The Vision Rehabilitation for Adults PPP was then sent for review to additional internal and external groups and individuals in June 2012. All those returning comments were required to provide disclosure of relevant relationships with industry to have their comments considered. Members of the Vision Rehabilitation Committee reviewed and discussed these comments and determined revisions to the document. The following organizations and individuals returned comments.

Academy Reviewers

Board of Trustees and Committee of Secretaries
Council
General Counsel
Practicing Ophthalmologists Advisory Committee
for Education

Invited Reviewers

American Academy of Family Physicians
American Academy of Pediatrics, Section on
Ophthalmology
American Glaucoma Society
American Occupational Therapy Association
American Society of Cataract & Refractive Surgery
American Uveitis Society
European Society of Cataract and Refractive Surgeons
The Cornea Society
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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. A majority (93%) of the participants had no financial relationship to disclose. The Academy has Relationship with Industry Procedures to comply with the Code (available at <http://one.aao.org/CE/PracticeGuidelines/PPP.aspx>).

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The disclosures of relevant relationships to industry of other reviewers of the document from January to July 2012 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 (“PPP”) 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 assure 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 any 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 before publication. The PPPs are developed in compliance with the Council of Medical Speciality Societies’ Code for Interactions with Companies. The Academy has Relationship with Industry Procedures (available at <http://one.aao.org/CE/PracticeGuidelines/PPP.aspx>) to comply with the Code.

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 Network¹ (SIGN) and the Grading of Recommendations Assessment, Development and Evaluation² (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 SIGN¹ 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 GRADE² 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 GRADE² 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 Recommendations for Care section lists points determined by the PPP Panel to be of particular importance to vision and quality of life outcomes.
- ◆ Literature searches to update the PPP were undertaken in February 2011 in PubMed and the Cochrane Library and updated in January 2012. Complete details of the literature search are available at www.aao.org/ppp.



HIGHLIGHTED RECOMMENDATIONS FOR CARE

All ophthalmologists are encouraged to provide information about rehabilitation resources for patients who have vision loss. Even early or moderate vision loss causes disability, and it can cause great anxiety and affect visual performance. When available, consider referral for multidisciplinary vision rehabilitation. There is emerging evidence that vision rehabilitation improves visual performance and, hence, quality of life. (*strong recommendation, moderate evidence*)

SmartSight™ (www.aao.org/smartsight) has patient information on vision rehabilitation and a web link for a listing of services by location. Ophthalmologists who provide vision rehabilitation services are listed at Find an Eye MD (www.aao.org/find_eyemd.cfm). It is essential that the patient understand that vision rehabilitation can offer many helpful tools, tips, and resources even when ocular treatments cannot restore visual function.

All ophthalmologists can encourage patients who have central field loss by advising them that peripheral intact retina can be used effectively when central vision is lost.

(*strong recommendation, good evidence*)

Most patients with a central scotoma use nonfoveal fixation (preferred retinal location, or PRL); however, magnification is required in order to read.

Ophthalmologists who subspecialize in providing vision rehabilitation should provide rehabilitation care that considers reading, activities of daily living, patient safety, interventions that support patient participation in their community despite vision loss, and psychosocial well-being. Vision rehabilitation should go beyond device recommendations and sales to assess and address the broader impact of vision loss on patients' lives. (*strong recommendation, moderate evidence*)

Ophthalmologists who subspecialize in providing vision rehabilitation should ask about visual hallucinations when taking an initial history, particularly for older patients with vision loss.

(*strong recommendation, good evidence*)

Patients with any level of vision impairment may experience recurrent hallucinations if they have Charles Bonnet syndrome (CBS), a condition that causes them to see images of objects that are not real. Other neurological symptoms should prompt referral for consideration of other diagnoses. Patients who have CBS should be reassured that it occurs in up to one-quarter of patients who have visual acuity, contrast sensitivity, or visual field loss.

Ophthalmologists who subspecialize in providing vision rehabilitation should encourage patients with vision loss to attend groups that offer problem-solving or self-management skills, if available, because such support groups have a proven ability to improve quality of life and mood.

(*strong recommendation, good evidence*)

(See resources about peer-support groups in the SmartSight™ Patient Handout in Appendix 2.)



INTRODUCTION

SMARTSIGHT™ MODEL OF VISION REHABILITATION

The rehabilitative needs of patients vary considerably. The level of care and disciplines required depend on the complexity of the problems, goals, psychosocial status, and personal attributes, not solely on visual acuity. The Academy outlines how vision rehabilitation can be incorporated in the continuum of ophthalmic care in its SmartSight™ two-level model of vision rehabilitation (www.aao.org/smartsight).⁴ (See also Appendix 3: SmartSight™ Rehabilitation as Part of the Continuum of Ophthalmic Care.)

The most important part of the SmartSight model for all ophthalmologists is Level 1, which asks all ophthalmologists who see patients with less than 20/40 visual acuity in the better eye, contrast sensitivity loss, scotoma, or field loss to “recognize” and “respond.” The comprehensive ophthalmologist should recognize the impact of even modest uncorrectable partial vision loss and respond by assuring the patient that much can be offered with rehabilitation as described in the SmartSight Patient Handout. (See Appendix 2.) The SmartSight Patient Handout offers essential tips for making the most of a patient’s remaining vision and provides information about services in the community. It is essential that the patient understand that, although no further ocular treatments may be available, much can be done to improve quality of life.

Level 2 of the Smartsight model describes the comprehensive vision rehabilitation that is provided by ophthalmologists who subspecialize in vision rehabilitation and by a multidisciplinary team, as indicated and available. Comprehensive vision rehabilitation is a multidisciplinary service that includes evaluation, rehabilitation training, and psychosocial support services. (See Care Process for Ophthalmologists Who Subspecialize in Vision Rehabilitation section.)

It should be emphasized that level of visual acuity alone does not determine who will benefit from multidisciplinary care. Multidisciplinary care is not reserved for patients who have advanced vision loss; it may often be important for those with modest loss to assure them that they are on a positive path at the outset. This is particularly true for individuals who face progressive vision loss. Medicare reimburses for the low vision evaluation by an ophthalmologist or optometrist, for rehabilitation training by an occupational therapist, and for individual counseling by a social worker or psychologist. The extent of the patient’s goals, the individual impact of vision loss for that individual, and the availability of other individual resources determine the need for vision rehabilitation.

DISEASE DEFINITION

Low vision is the term for vision impairment that is not corrected by standard eyeglasses, or by medical or surgical treatment. Low vision may result from many different ocular and neurological disorders.

The ICD-9 and ICD-10 CM definitions of low vision rely on visual acuity and visual field (see Appendix 4). Aspects of visual impairment other than visual acuity and visual field may also be independent contributing factors.^{5,6} For example, contrast sensitivity loss or glare can interfere substantially with day-to-day tasks.^{5,7} It should be emphasized that even at levels of visual acuity better than 20/70, the ability to perform visual tasks can be affected.^{5,8} Maintaining an unrestricted driving license is at risk for patients who have visual acuities of 20/50 to 20/70 in many states.⁹ 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. Early vision loss may also be associated with anxiety or depression and have a significant impact on quality of life.

Patients with severe, profound, near-total, or total visual impairment are classified as legally blind, a designation that has traditionally been used to determine an individual’s eligibility for disability benefits in the United States,¹⁰ qualification for extra dependent status for federal income tax purposes, and additional benefits that vary from state to state. (See ICD-9 definitions in Appendix 2.) The determination of legal blindness using both automated visual fields and visual acuity charts that measure lower levels of acuity has been recently clarified by the Social Security Administration.¹⁰

Vision Rehabilitation PPP: Background

Individuals who cannot read any letters on the 20/100 line using a visual acuity chart, such as the ETDRS, are considered legally blind. The term *legal blindness* can be confusing, because patients with legal blindness may have partial vision. They are not blind. They are candidates for vision rehabilitation. In some states, only individuals who are legally blind can access state rehabilitation services. Blind rehabilitation uses sight substitutes and may include Braille instruction or training to use a guide dog. Vision rehabilitation optimizes the use of residual vision. 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, we use the term *visual function* to refer to visual acuity, contrast sensitivity, and visual field. *Visual performance* refers to how one uses vision, and it includes 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 OBJECTIVES FOR ALL OPHTHALMOLOGISTS

- ◆ Identify patients with low vision and advise 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
- ◆ 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

EPIDEMIOLOGY

Based on prevalence rates and 2010 U.S. census data, it is estimated that 2.9 million individuals in the U.S. over the age of 40 had low vision (defined as visual acuity less than 20/40 in the better-seeing eye)¹¹ and 1.3 million had less than or equal to 20/200 visual acuity.¹² It is also estimated that, since 2000, there has been a 23% increase in the number of individuals in the U.S. 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 less than 20/160), yet they represent only 7.7% of the population.¹³

The aged sector of the U.S. population is rapidly expanding. It is estimated that approximately 3.5% of individuals over age 65 in the United States are candidates for vision rehabilitation and that this age group will increase from 33.2 million in 1994 to 80 million in 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 U.S. have AMD¹⁵ and that this will rise to 2.95 million by 2020 due to the aging of the population. The future impact of new treatments for AMD is unknown.

At present, at least 1 in every 10 persons over the age of 80 has advanced AMD.¹⁶ With the improvements in the treatment of exudative AMD, fewer patients may become legally blind, but most still have some degree of vision impairment that can be addressed by rehabilitation. Other causes of low vision in the United States include glaucoma, diabetic retinopathy, and cataract. Since 2000, it is estimated that there has been an 89% increase in the number of individuals 40 and older who have diabetic retinopathy and a 22% increase in people 40 and older who have open-angle glaucoma. 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 brain injury and neurological disease, including trauma, stroke, Parkinson's disease, and tumors, often have significant limitations that result from visual impairment. Patients with these conditions may be overlooked in the vision rehabilitation referral process.^{17,18} The vision rehabilitation specialist can play a vital role for them.¹⁹

While 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.^{20,21} These limitations lead to decreased participation in routine activities and a lower quality of life.

Not all patients who could benefit from vision rehabilitation have access to services.²² Access barriers to vision rehabilitation services include lack of awareness of services, lack of appreciation of what services provide, lack of appreciation that one can benefit from available services, lack of transportation to services, and lack of financial resources to purchase devices.^{23,24}

RATIONALE FOR TREATMENT

Vision impairment has a major impact on quality of life.²⁵⁻³¹ Individuals with vision impairment have twice the risk of falling and four times or more increased risk of sustaining a hip fracture.³²⁻³⁴ Controlling for confounding variables, people with impaired vision have increased mortality³⁵; are admitted to nursing homes 3 years earlier³⁶; make greater use of community services²¹; have increased social isolation⁶; have three times the prevalence of depression^{19,37-39}; and have great difficulty reading, which causes problems in accessing information and errors in self-administering medications.⁴⁰⁻⁴² More than 25% of glaucoma patients with relatively minor binocular field loss report difficulty with mobility.⁴³ Even moderate vision loss is associated with depression in up to 30% of patients.³⁸

Five systematic reviews relevant to vision rehabilitation interventions are reported in Table 1. In a systematic review of interventions to prevent falling in older adults, Michael, et al found that exercise or physical therapy, vitamin D supplementation, and home-hazard modification reduced the risk of falling.⁴⁴ Overall, the reviews indicate increasing evidence that supports the effectiveness of vision rehabilitation, but note an overall current paucity of methodologically strong research.

TABLE 1. Findings from Studies of the Effectiveness of Vision Rehabilitation for Adults

Review	Service Models	Reading	Devices	Psychosocial Wellbeing	Overall Function
Binns et al, 2012 ⁴⁵	Unable to assess relative benefits of different service models because of different outcome measures, follow-up times, and diverse populations studied	Good evidence that low vision services result in improved reading ability	Good evidence that patients value and use low vision aids	Good evidence that a structured peer-led program may reduce depressive symptoms	Good evidence that low vision services improve functional ability
Virgili and Rubin, 2010 ⁴⁶	Evidence lacking to determine relative benefits of orientation and mobility training				
Jutai, Strong, and Russell-Minda, 2006 ⁴⁷	Moderately strong evidence that a home visit from a vision rehabilitation specialist to demonstrate an optical device for spot reading confers no additional benefit		Moderately strong evidence that optical aids plus training is effective Moderate evidence that computer task accuracy and performance is linked with measures of visual function, icon sizes, and other graphical user-interface design considerations Strong evidence that prism spectacles are no more effective than conventional glasses for individuals with AMD		
Agency for Healthcare Research and Quality, 2004 ¹⁴	Structured peer-support groups improve patient outcomes Studies suggest a benefit from comprehensive vision rehabilitation service	Optical devices and low vision aids improve reading performance			
Teasell et al, 2011 ⁴⁸	Strong evidence that enhanced visual scanning techniques improve visual neglect post-stroke with associated improvements in function		Strong evidence that treatment with prisms increases visual perception scores in patients with homonymous hemianopsia and visual neglect following stroke, but not improvement in activities of daily living scores Strong evidence that right half-field eye patches improve left visual neglect, moderate evidence that monocular, opaque patching produces inconsistent results, and conflicting evidence that bilateral half-field eye patches improve functional ability		

AMD = age-related macular degeneration



CARE PROCESS FOR ALL OPHTHALMOLOGISTS

All ophthalmologists are encouraged to recommend vision rehabilitation as a continuum of their care and to provide information about rehabilitation resources for patients with vision loss. Vision rehabilitation improves the patient’s ability to compensate for vision loss.⁴⁹ Rehabilitation 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 Preferred Practice Pattern guidelines (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 SmartSight Initiative in Vision Rehabilitation that is available on the Academy web site (www.aao.org/smartsight). (See also Appendix 2.) A patient education brochure on low vision is also available from the Academy (www.aao.org/store).



All ophthalmologists are encouraged to provide information about rehabilitation resources for patients who have vision loss. Even early or moderate vision loss causes disability, and it can cause great anxiety and affect visual performance. When available, consider referral for multidisciplinary vision rehabilitation. There is emerging evidence that vision rehabilitation improves visual performance and, hence, quality of life.
(strong recommendation, moderate evidence)

The role of the referring ophthalmologist is to evaluate and initiate treatment of eye disease before advising the patient about vision rehabilitation. Many conditions that result in low vision are progressive. The referring ophthalmologist also will 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 ophthalmologist 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 peripheral intact retina can be used effectively when central vision is lost.
(strong recommendation, good evidence)

It is important for all ophthalmologists to be aware that the Center for Medicare and Medicaid Services (CMS) reimburses for rehabilitation services provided by licensed health care providers, notably for occupational therapy. Occupational therapists adhere to the same requirements for treatment, documentation, and reimbursement as required for rehabilitation services that are provided following a cerebral vascular accident or orthopedic procedures. 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 beyond 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.⁵⁰ and occupational therapists are trained to consider and address such comorbidities.

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. While rehabilitation services are covered by CMS, devices 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

**Vision Rehabilitation PPP:
Care Process for Ophthalmologists Who Subspecialize in Vision Rehabilitation**

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 dementia 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

Level 2 of the SmartSight model incorporates the comprehensive multidisciplinary vision rehabilitation care process as part of the continuum of ophthalmic care and is outlined below. The care process 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, recommendations for rehabilitation interventions, 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 caregivers) and must address reading, activities of daily living, safety, participation in home and community activities despite vision loss, and psychosocial well-being.

PATIENT OUTCOME CRITERIA

Patient outcome criteria for vision rehabilitation include the following:

- ◆ Maximized access to printed materials
- ◆ Improved ability to perform tasks and participate in activities of daily living
- ◆ 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 of vision loss
- ◆ How the patient's life has changed since the onset of vision loss
- ◆ What bothers the patient most about 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

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- ◆ 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
- ◆ Living setting, 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,⁵¹ cognitive deficit, and restricted mobility)



Ophthalmologists who subspecialize in providing vision rehabilitation should ask about visual hallucinations when taking an initial history, particularly for older patients with vision loss. *(strong recommendation, good evidence)*

Evaluation

A comprehensive adult medical eye evaluation⁵² is conducted by the referring ophthalmologist before referring for the low vision evaluation. Elements of the ocular examination relevant to vision rehabilitation may occasionally be done 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 patients due to their 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, such as the Early Treatment Diabetic

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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). Such 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. One M-unit 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, 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 eyeglasses.⁵³ Often, a prescription for new eyeglasses is best delayed until completion of occupational therapy intervention, when the potential benefit of new eyeglasses can be reassessed relative to other devices, unless the refraction varies substantially from the current.

Contrast Sensitivity

Contrast sensitivity should be measured, since it provides insight into the patient’s performance and helps in planning rehabilitation interventions.⁵⁴ 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.^{55,56}

Contrast sensitivity tests include those that test a single spatial frequency or a range of spatial frequencies. The Pelli-Robson Contrast Sensitivity Chart (Haag-Streit AG, Koeniz, Switzerland) 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.

Patients with severe contrast loss may require devices that supply high levels of illumination and contrast enhancement, such as an illuminated stand magnifier or a video magnifier. 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.⁵⁷

Visual Field

Measurement of the central field includes assessment of scotomas (areas that are not seen using a determined testing target) and fixation characteristics. The location of eccentric fixation is called a preferred retinal locus (PRL). The size, shape, and position of the central scotoma and the position of fixation relative to the scotoma impact performance on tasks, choice of device, and training to use the PRL. Assessment of the scotoma and fixation are informative for optimal rehabilitation.

Central field can be assessed using automated field tests; however, unstable or nonfoveal fixation in patients with macular disease limits the use of these tests in vision rehabilitation. Fixation behavior is difficult to ascertain or monitor if a traditional tangent screen is used to assess central field. Both fixation and central scotoma details can be precisely mapped using fundus-related macular perimetry that monitors fixation during testing. Three devices are commercially available (OCT SLO [Optos, Dunfermline, Scotland], MAIA [CenterVue S.p.a., Padova, Italy], NIDEK MP-1 [NIDEK Co., Ltd., Gamagori, Japan]).^{58,59} Each of these devices tests monocular central field. While not as sensitive as fundus-related macular perimetry, a California Central Visual Field test (Mattingly Low Vision, Inc., Escondido, CA), that uses an 8.5-inch-by-11-inch paper target and a laser pointer projecting stimuli, can provide valuable information about binocular central field. The patient's fixation can be monitored during the testing if the target is held between the patient and the examiner, although clinically it is difficult to discern an eccentric viewing angle of less than 5 degrees. A 1-centimeter target corresponds to 1 degree when a 57-centimeter test distance is used. An Amsler grid can be used, but it will detect only about half of central scotomas owing to perceptual completion.⁶⁰

Scotomas can also be located with central confrontation fields using single-letter targets mounted on flash cards.⁶¹ Observing obscured and clear areas on a clock face or human face may also identify scotomas, although this is possibly less precise than letter flash cards. The Worth 4-dot test can be used to confirm which eye, under binocular conditions, is perceiving stimuli presented centrally.

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, or neurological disease such as cerebral vascular accidents.

Other visual functions such as glare, color vision or, motion detection may be considered.

Assessment of the Patient's Ability to Perform Visual Tasks

The patient may be observed doing such tasks as the following:

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

Much information can be gained by assessing the quality of the patient's continuous reading. Reading speeds with 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. 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.

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Assessment of Cognitive/Psychological Status

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

- ◆ Mood, depression, and adjustment to vision loss (Geriatric Depression Scale, Depression, Anxiety and Stress Scale, or other screening questions may be used)
- ◆ Cognitive or memory deficits

Assessment of Risks


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

- ◆ Medication errors⁶²
- ◆ Label misidentification/product misuse
- ◆ Risk of mismanaging diabetes by the patient
- ◆ 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

- ◆ Motivation, stamina
- ◆ Barriers to attending rehabilitation^{23,24}
- ◆ Assessment of comorbidities, including tremor, weakness, hearing deficit, cognitive deficit, mobility, chronic illnesses, depression, and anxiety

REHABILITATION

	<p>Ophthalmologists who subspecialize in providing vision rehabilitation should provide rehabilitation care that considers reading, activities of daily living, patient safety, interventions that support patient participation in their community despite vision loss, and psychosocial well-being. Vision rehabilitation should go beyond device recommendations and sales to assess and address the broader impact of vision loss on patients’ lives. <i>(strong recommendation, moderate evidence)</i></p>
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Reading Rehabilitation

Reading is the most common goal that patients bring to rehabilitation and this goal should be assessed and addressed.⁶³ There is emerging research about how visual function assessment directs reading rehabilitation, optimal device selection, and effective training interventions. Visual acuity levels offer some prediction of the power of the add that will be required, however, this estimation will often be modified by variation in levels of contrast sensitivity and central field disruptions. Fixation characteristics and scotoma patterns impact reading. Patients with central scotomas may benefit from fixation with an alternate, “next-best” area of nonfoveal retina.⁶⁴ Many patients find a PRL and use it spontaneously.⁶⁴ Occasionally, patients use more than one PRL depending on the task being performed or the illumination.⁶⁵ The location of a scotoma relative to fixation is important.^{66,67} Scotomas to the right of fixation may obscure the end of words or have an impact on saccades required for reading, whereas scotomas to the left of fixation more often impede finding the beginning of the next line of print. Scotomas positioned above or below the PRL may impact reading columns of numbers or navigating a page of text.

Patients with homonymous hemianopsia from brain injury also frequently experience difficulty reading.⁶⁸ Loss of vision within 1 to 2 degrees of fovea causes the patient to miss the beginnings (left hemianopia) or endings of words (right hemianopia) and disrupts the reading saccade pattern.⁶⁸ The patient subsequently experiences decreased accuracy and reading speed.⁶⁹

Various interventions for training reading have been studied, including training oculomotor function,⁷⁰ addressing perceptual span,⁷¹ and training alternate-fixation location.⁷² However, further study with strong research design is required to understand what are optimal interventions.⁷² There is controversy about the use of prisms to improve visual acuity.⁷³ One well-designed study reported that prisms do not improve visual acuity or reading.⁷⁴

It is important for patients to be aware of the large array of device options 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 alternatives for accessing text can be very useful. Patients may use magnification for some reading tasks and audio for other texts.

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

- ◆ Reading eyeglasses
- ◆ Handheld magnifiers with or without illumination
- ◆ Stand magnifiers with or without illumination
- ◆ Video magnifiers
- ◆ Electronic books/readers
- ◆ Computer tablets
- ◆ Text-to-speech devices, audio books, audio newspapers
- ◆ Large print
- ◆ Telescopic devices for near
- ◆ Lighting
- ◆ Braille for individuals with little or no vision

The clinician can guide a patient's optical and nonoptical options, 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 rehabilitation 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 eyeglasses will not correct low vision that is due to ocular disease

Activities of Daily Living

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.

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The effectiveness, ergonomics, and appropriateness of the devices listed in the Reading Rehabilitation 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 or Braille labeling
- ◆ Computer adaptations using magnification, audio-screen readers and text to speech using optical character recognition
- ◆ Cell phone accessibility options
- ◆ Strategies and devices for completing desired daily activities, including personal care, home management, financial management, meal preparation, and shopping

Visual deficits from acquired brain injury frequently intermix with motor, language, and cognitive deficits to create a complex disability picture that requires a multidisciplinary approach to rehabilitation, including occupational therapy. (For discussion about occupational therapy, see Appendix 6.) Vision impairment from brain injury often affects both reading and mobility. Because these skills are integral components of many independent activities of daily living, the individual often experiences significant limitations in a broad range of daily activities, including medication management, meal preparation, financial management, homemaking, working, driving, and shopping.

Patient Safety

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

- ◆ Safety preparing meals, 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 self-monitor glucose using a glucometer or 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.
- ◆ Risk of falling, which is addressed by facilitating safe participation in physical exercise and modifying the environment (home safety)^{44,75}
- ◆ Independent ambulation with a white cane or support cane instruction from the orientation and mobility specialist. Orientation and mobility services and white-cane instruction are available through most state 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 one's community, such as difficulty with individual visual tasks, mood disorders, and limited opportunities for employment,⁷⁶ but, transportation is the most common barrier to continued participation that is reported by patients. Driving is seen as a key element in maintaining independence.^{77,78} Driving requires a composite of visual, cognitive, and motor functions.⁷⁷ 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.⁷⁹ Further evaluation and training with a driver rehabilitation specialist may be appropriate for some patients. In some states, training programs enable people demonstrating good skills to continue driving with visual acuities somewhat lower than the required levels, and bioptic driving is allowed in some states. Driving retirements 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, and anger. Even early or moderate vision loss causes disability and can cause great anxiety.³⁸ Early referral to vision rehabilitation can be very important. The evaluation and assessment in vision rehabilitation concludes with a comprehensive discussion of patients questions and concerns.⁸⁰ 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
- ◆ How to prevent further vision loss⁸¹
- ◆ Emotional support systems
- ◆ Visual hallucinations (CBS)
- ◆ Situations that arise when the disability is not apparent to others

Many communities and organizations offer support groups for people who are discouraged and frustrated by their vision loss. These groups provide positive role models of successful rehabilitation and help patients realize that they are not alone with the challenge of vision loss. Although not widely available, group programs, self-management programs, and problem solving interventions have been shown to have positive benefit for patients with vision loss.⁴⁵ Professional assessment should be recommended for patients who report severe changes in their mood or suicidal ideation.



Ophthalmologists who subspecialize in providing vision rehabilitation should encourage patients with vision loss to attend groups that offer problem-solving or self-management skills, if available, because such support groups have a proven ability to improve quality of life and mood. (*strong recommendation, good evidence*)

Patients with any level of vision impairment may also experience recurrent episodes of CBS, in which they see images of objects that they realize are not real.^{83,84} Patients who have CBS and family/caregivers should be reassured that this phantom vision is common in visually impaired people. Charles Bonnet syndrome occurs in up to one-quarter of patients who have visual acuity, contrast sensitivity, or visual field loss. Atypical features that should raise suspicion of a diagnosis other than CBS include lack of insight into the unreal nature of the images in spite of an explanation of CBS, or other associated neurological signs or symptoms. Patients with these atypical features require a neuropsychiatric evaluation for accurate diagnosis.

The vision rehabilitation clinician often has a role in communicating information to patients that the patient perceives as bad news, such as the information that the patient cannot continue to drive or that vision cannot be improved to normal with eyeglasses or treatment. The skill of breaking bad news can be trained⁸² and several models of communicating bad news have been outlined.⁸³ The interest and the skills to empathize, communicate with sensitivity, and convey hope to patients are keys to successful 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, 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 SmartSight Patient Handout (see Appendix 2).

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Internists, family practice physicians, and geriatricians should be informed that vision loss is irreversible and about plans for rehabilitation.

Family members are often very appreciative of education to avoid misunderstanding the nature of the vision loss and can, in addition, be positive team players in a rehabilitation process.⁸⁴

They may benefit from training in how to assist a visually impaired person with walking using a sighted guide technique.

There is potential for confusion with the terminology of vision rehabilitation and the various terms for addressing reading difficulties of normally sighted children. In the latter, the terms *vision therapy*, *visual training*, *visual therapy*, or *vision training* are used. These activities 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

Optometrists and ophthalmologists subspecialize in providing low vision evaluation in the U.S. Either can provide the order for Medicare-reimbursed occupational therapy. The referral indicates the level of impairment as a primary code, the disease-causing impairment as the secondary code, statement of need for rehabilitation, problems with performing specific tasks, recommendations for therapeutic activities, techniques and devices, and 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.⁸⁵ Other professionals who may be involved in the rehabilitation care process include certified low vision therapists (CLVTs), certified orientation and mobility specialists (COMS), certified vision rehabilitation therapists (CVRTs), teachers of the visually impaired, social workers, psychologists, and nurses. A multidisciplinary team approach is recommended to address the disability and psychological problems caused by vision loss. The physician 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 must offer hope to patients whose lives have been significantly affected by vision loss.

A 2012 editorial in the *Archives of Ophthalmology*⁸⁶ 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." The ophthalmologist has a very important role to play in ensuring that patients under their care maintain quality of life despite vision loss. The goal is that care by the vision rehabilitation specialist is incorporated into the continuum of ophthalmic care just as stroke or orthopedic rehabilitation has been incorporated into the care process of those domains. Such a goal can be supported by enhancing physician-patient communication skills, facilitating the referral process for vision rehabilitation services, and supporting well-designed research that will create a more robust evidence base for vision rehabilitation interventions.



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 alternate 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.

Vision Rehabilitation PPP

Appendix 1. Quality of Ophthalmic Care Core Criteria

- ◆ 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. SMARTSIGHT™ INITIATIVE IN VISION REHABILITATION – PATIENT HANDOUT

SMARTSIGHT™ – Patient Handout

An American Academy of Ophthalmology Initiative in Vision Rehabilitation

Locate services near you at

www.visionaware.org

Click on "Find Services Near You"

MAKING THE MOST OF REMAINING VISION

Is it difficult to read newspapers and price tags, set dials or manage glare? If so, SmartSight™ information can help with tips about the tools, techniques, and resources of vision rehabilitation. Losing vision does not mean giving up your activities, but it does mean applying new ways of doing them.

Patterns of Vision and Vision Loss

- ◆ **Central vision** is the detailed vision we use when we look directly at something. Age-related macular degeneration (AMD) affects central vision.
- ◆ **Peripheral vision** is the less-detailed vision we use to see everything to the sides. Glaucoma affects peripheral vision first. Strokes can affect one side of the peripheral vision.
- ◆ **Contrast sensitivity** is the ability to distinguish between objects of similar shades such as coffee in a black cup or facial features. All eye problems can decrease contrast sensitivity.

The Experience of Vision Loss

It is always a shock to learn that your vision loss is irreversible. It is important to acknowledge the loss, anger or frustration you may feel, get help working through these feelings, and apply the strategies of vision rehabilitation in order to stay active to avoid isolation and depression, which may appear to you as fatigue or lack of interest. If depression occurs, address it with treatment and counseling. A support group can help you recognize that your value to yourself and others does not depend on your vision. You are worth the effort to make the most of your remaining vision.

The Phantom Visions: Charles Bonnet Syndrome

About 25% of people with vision loss see lifelike images they know are not real. This is called Charles Bonnet syndrome. It is not a loss of mental capacity but just part of vision loss for some. If there are additional neurological problems, the hallucinations may be due to other diseases.

**Vision Rehabilitation PPP:
Appendix 2. SmartSight – Patient Handout**

Making the Most of Remaining Vision

The following practical suggestions help many patients.

Use Your “Next-Best Spot”

When the center of your vision is obscured by a blind spot (scotoma), you use more peripheral vision in which you may find your "next best spot" (preferred retinal locus, or PRL). Most patients find this automatically, but many may benefit from training to use the spot more effectively.

Make Things Brighter

- ◆ *Improve lighting.* Use a lamp directed toward your task. Carry a penlight.
- ◆ *Reduce glare.* Indoors you can cover tables and shiny counters. Many wear yellow clip-on or fit-over glasses. Outdoors, try dark plum or amber glasses and visors.
- ◆ *Increase contrast.* Use a black ink gel or felt pen, not a ballpoint. Draw a dark line where you need to sign. Use a white cup for coffee.

Make Things Bigger

- ◆ *Move closer.* Sit close to the TV and at the front for performances.
- ◆ *Enlarge.* Get large-print playing cards, bingo cards, crosswords, checks, TV remotes, calendars, keyboards, and books.
- ◆ *Magnify.* Magnifiers are available in many powers and types that are suited to individual needs and to different tasks. There are hand-held magnifiers, stand magnifiers, video camera magnifiers, magnifiers using the cameras in cell phones, and a magnifier computer mouse.

Organize

Designate particular spots to place your keys and wallet and for items in your refrigerator. Minimize clutter. Keep black clothes in a separate area from blue ones.

Label

Mark thermostats and dials with high-contrast markers and label medications with markers or rubber bands.

Substituting: Let’s Hear It for Ears!

There are many free audio books and magazines available. You can purchase talking watches, glucometers, and memo recorders. You can change text on a computer monitor to an audio presentation.

Participating

Don’t isolate yourself. Keep your social group, volunteer job, or golf game. It might require lighting, large-print cards, a magnifier, a ride, or someone to help you, but ask for the help you need. There is nothing independent about staying home to avoid asking for help.

Driving

Pick your times and consider using a GPS or tinted lenses. Ask yourself: Do cars appear unexpectedly? Do drivers honk at you? Are you having fender-benders? If the answer is yes, consider an on-road driving assessment, driving rehabilitation, or the following transportation alternatives.

Transportation Alternatives: Be Creative!

Hire a driver, arrange for a taxi, buy gas for a friend who drives, or use senior or public transit. Try a three-wheel bike or battery-powered scooter at walking speed. Walk if you are able. Set the pace for your peers by using these alternatives now. The future will offer even more solutions.

Vision Rehabilitation

A low vision evaluation and rehabilitation training can help you make the most of your vision. Ask providers if their services include the following:

- ◆ A low vision evaluation by an ophthalmologist or optometrist.
- ◆ Advice about devices. Are some devices loaned before purchase or returnable?
- ◆ Rehabilitation training for reading, writing, shopping, cooking, lighting, and glare control.
- ◆ Home assessment, mobility training, information about support groups.
- ◆ Are services free, or billed to Medicare or other insurances? If not, what is the charge? Medicare covers services provided by licensed health care providers, such as occupational therapists, but it does not cover devices. Be a smart consumer and remember that a vendor's job is to sell you something. Consult family or friends you trust before you make expensive purchases.

Advice for Family and Friends

Your loved one with vision loss needs to be empowered to do as much as possible independently. Recognize the challenge of vision loss and don't take over their tasks. Instead, help identify the adjustments they need to make to maximize their independence.

RESOURCES

Audio digital books, magazines, and textbooks:

- ◆ Public libraries
- ◆ National Library Service for the Blind and Physically Handicapped, www.loc.gov/nls
- ◆ 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
- ◆ Learning Ally, www.learningally.org

**Vision Rehabilitation PPP:
Appendix 2. SmartSight – Patient Handout**

Large-print books, newspapers, and checks:

- ◆ Public libraries
- ◆ Checks/registers: your bank or check catalog
- ◆ *New York Times Large Print Weekly*: 1-800-NYTIMES (1-800-698-4637), <http://homedelivery.nytimes.com>
- ◆ eReaders

Large-print materials – crosswords, bingo cards, address books, calendars:

- ◆ American Printing House for the Blind, Inc.: 1-800-223-1839, www.aph.org
- ◆ Carroll Store: 1-800-852-3131, ext. 240, <http://carroll.org/the-carroll-store>
- ◆ Independent Living Aids: 1-800-537-2118, www.independentliving.com
- ◆ Learning Sight & Sound (LS&S): 1-800-468-4789, www.lssgroup.com
- ◆ Lighthouse International: 1-800-829-0500, <http://shop.lighthouse.org>
- ◆ MaxiAids: 1-800-522-6294, www.maxiaids.com
- ◆ Shoplowvision: 1-800-826-4200, www.shoplowvision.com
- ◆ Perkins Products: www.perkins.org/store/about/perkins-products-brand.html

Computer enlargement:

- ◆ Accessibility features built into your computer, www.microsoft.com/enable/products/default.aspx
www.apple.com/accessibility/
- ◆ Magnification software: Ai Squared, www.aisquared.com

Video magnifiers:

- ◆ List of vendors provided by the American Foundation for the Blind, www.afb.org/ProdBrowseCatResults.asp?CatID=53

Other:

- ◆ Accessible cell phones, www.accessiblephones.com
- ◆ Accessible GPS, <http://senderogroup.com>

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 Occupational Therapy Association (AOTA), www.aota.org
- ◆ American Macular Degeneration Foundation, www.macular.org
- ◆ The Association for Driver Rehabilitation Specialists (ADED): 1-866-672-9466, www.driver-ed.org/i4a/pages/index.cfm?pageid=1
- ◆ Association for Macular Diseases, www.macula.org

- ◆ Centers for Disease Control and Prevention (CDC):
 - Fall prevention brochure, www.cdc.gov/HomeandRecreationalSafety/pubs/English/brochure_Eng_desktop-a.pdf
 - Vision Health Initiative (VHI), www.cdc.gov/visionhealth
- ◆ Clinical trials, <http://clinicaltrials.gov>
- ◆ Foundation Fighting Blindness: 1-800-683-5555, www.blindness.org
- ◆ Glaucoma Research Foundation: 1-800-826-6693, www.glaucoma.org
- ◆ Hadley School for the Blind online courses: 1-800-323-4238, www.hadley.edu
- ◆ Macular Degeneration Partnership: 1-888-430-9898, www.amd.org
- ◆ MD Support (listing of support groups): 816-761-7080 (toll call), www.mdsupport.org
- ◆ National Association for Parents of Children with Visual Impairment (NAPVI): 1-800-562-7441, www.spedex.com/napvi
- ◆ National Dissemination Center for Children with Disabilities (NICHCY): 1-800-695-0285, <http://nichcy.org>
- ◆ National Eye Institute, www.nei.nih.gov
- ◆ National Federation of the Blind, www.nfb.org; news by phone: 1-866-504-7300
- ◆ National Organization for Albinism and Hypopigmentation (NOAH): 1-800-473-2310, www.albinism.org
- ◆ Prevent Blindness America: 1-800-331-2020, www.preventblindness.org
- ◆ Vision Aware, www.visionaware.org

Self-Help Books:

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

Eligible Veterans:

Contact U.S. Department of Veterans Affairs: 1-877-222-8387, www.va.gov/blindrehab

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To view this handout in larger print, visit the SmartSight web site, www.aao.org/smartsight.



APPENDIX 3. SMARTSIGHT™ VISION REHABILITATION AS PART OF THE CONTINUUM OF OPHTHALMIC CARE

SMARTSIGHT™ OVERVIEW

The SmartSight™ model of vision rehabilitation provides useful information about vision rehabilitation for patients as well as an outline for the care process for the ophthalmologist who is providing rehabilitative care.

Materials for Patients

The SmartSight 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

SmartSight also outlines for ophthalmologists the model of how vision rehabilitation can be incorporated in the continuum of ophthalmic care.

- ◆ **Level 1** of vision rehabilitation calls on all ophthalmologists to recognize that vision loss due to the following visual problems impacts their patients' ability to function:
 - Acuity less than 20/40
 - Scotoma
 - Visual field loss
 - Loss of contrast sensitivity

Level 1 of this model also calls on all ophthalmologists to respond by offering patients a copy of the SmartSight™ Patient Handout and to encourage them to read it and act on it. The handout directs patients to services in their community. Many academic ophthalmic departments in the United States have comprehensive vision rehabilitation services where patients can be referred directly.

- ◆ **Level 2** of the model includes the multidisciplinary vision rehabilitation services that are important to follow when vision loss impacts more than reading fine print. (These are outlined in the Academy's Vision Rehabilitation Preferred Practice Pattern® Guidelines, available at www.aao.org/ppp). 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 early vision loss may benefit not only from using available strategies and devices but also from the opportunity to discuss the impact of their vision on their life and to receive patient education that supports them as well as training that can allow them to continue to participate in activities despite ocular disease.

Please contact the Academy at smartsight@aao.org with any questions about vision rehabilitation or SmartSight.

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APPENDIX 4. INTERNATIONAL STATISTICAL CLASSIFICATION OF DISEASES AND RELATED HEALTH PROBLEMS (ICD) CODES

	ICD-9 CM	ICD-10 CM
Total, near-total, and profound visual impairment in better eye	369.00	H54.0 Blindness both eyes Visual impairment categories 3, 4, 5 in both eyes
Better eye: total impairment Lesser eye: total impairment	369.01	H54.0 Blindness, both eyes Visual impairment categories 3, 4, 5 in both eyes
Better eye: near-total impairment Lesser eye: total impairment	369.03	Visual impairment categories 3, 4, 5 in one eye, with categories 1 or 2 in the other eye. H54.10 Blindness one eye, low vision other eye, unspecified eyes H54.11 Blindness, right eye, low vision left eye H54.12 Blindness, left eye, low vision right eye
Better eye: near-total impairment Lesser eye: near-total impairment	369.04	Visual impairment categories 3, 4, 5 in one eye, with categories 1 or 2 in the other eye. H54.10 Blindness one eye, low vision other eye, unspecified eyes H54.11 Blindness right eye, low vision left eye H54.12 Blindness left eye, low vision right eye
Better eye: near-total impairment Lesser eye: near-total impairment	369.06	Visual impairment categories 3, 4, 5 in one eye, with categories 1 or 2 in the other eye. H54.10 Blindness one eye, low vision other eye, unspecified eyes H54.11 Blindness right eye, low vision left eye H54.12 Blindness left eye, low vision right eye
Better eye: near-total impairment Lesser eye: near-total impairment	369.07	Visual impairment categories 3, 4, 5 in one eye, with categories 1 or 2 in the other eye. H54.10 Blindness one eye, low vision other eye, unspecified eyes H54.11 Blindness right eye, low vision left eye H54.12 Blindness left eye, low vision right eye
Better eye: profound impairment Lesser eye: profound impairment	369.08	Visual impairment categories 3, 4, 5 in one eye, with categories 1 or 2 in the other eye. H54.10 Blindness one eye, low vision other eye, unspecified eyes H54.11 Blindness right eye, low vision left eye H54.12 Blindness left eye, low vision right eye
Severe or moderate impairment in better eye	369.10	Visual impairment categories 3, 4, 5 in one eye, with categories 1 or 2 in the other eye. H54.10 Blindness one eye, low vision other eye, unspecified eyes H54.11 Blindness right eye, low vision left eye H54.12 Blindness left eye, low vision right eye
Better eye: severe impairment Lesser eye: total impairment	369.12	Visual impairment categories 3, 4, 5 in one eye; categories 1 or 2 in the other eye. H54.10 Blindness one eye, low vision other eye, unspecified eyes H54.11 Blindness right eye, low vision left eye H54.12 Blindness left eye, low vision right eye

**Vision Rehabilitation PPP:
Appendix 4. ICD Codes**

(continued)	ICD-9 CM	ICD-10 CM
Better eye: severe impairment Lesser eye: near-total impairment	369.13	Visual impairment categories 3, 4, 5 in one eye; categories 1 or 2 in the other eye. H54.10 Blindness one eye, low vision other eye, unspecified eyes H54.11 Blindness right eye, low vision left eye H54.12 Blindness left eye, low vision right eye
Better eye: severe impairment Lesser eye: profound impairment	369.14	Visual impairment categories 3, 4, 5 in one eye; categories 1 or 2 in the other eye. H54.10 Blindness one eye, low vision other eye, unspecified eyes H54.11 Blindness right eye, low vision left eye H54.12 Blindness left eye, low vision right eye
Better eye: moderate impairment Lesser eye: total impairment	369.16	Visual impairment categories 3, 4, 5 in one eye; categories 1 or 2 in the other eye. H54.10 Blindness one eye, low vision other eye, unspecified eyes H54.11 Blindness right eye, low vision left eye H54.12 Blindness left eye, low vision right eye
Better eye: moderate impairment Lesser eye: near-total impairment	369.17	Visual impairment categories 3, 4, 5 in one eye; categories 1 or 2 in the other eye. H54.10 Blindness one eye, low vision other eye, unspecified eyes H54.11 Blindness right eye, low vision left eye H54.12 Blindness left eye, low vision right eye
Better eye: moderate impairment Lesser eye: profound impairment	369.18	Visual impairment categories 3, 4, 5 in one eye; categories 1 or 2 in the other eye. H54.10 Blindness one eye, low vision other eye, unspecified eyes H54.11 Blindness right eye, low vision left eye H54.12 Blindness left eye, low vision right eye
Severe or moderate impairment in both eyes	369.20	H54.2 Low vision both eyes Visual impairment categories 1 or 2 in both eyes
Better eye: severe impairment Lesser eye: severe impairment	369.22	Visual impairment categories 3, 4, 5 in one eye; categories 1 or 2 in the other eye. H54.10 Blindness one eye, low vision other eye, unspecified eyes H54.11 Blindness right eye, low vision left eye H54.12 Blindness left eye, low vision right eye
Better eye: moderate impairment Lesser eye: severe impairment	369.24	Visual impairment categories 3, 4, 5 in one eye; categories 1 or 2 in the other eye. H54.10 Blindness one eye, low vision other eye, unspecified eyes H54.11 Blindness right eye, low vision left eye H54.12 Blindness left eye, low vision right eye
Better eye: moderate impairment Lesser eye: moderate impairment	369.25	H54.2 Low vision both eyes Visual impairment categories 1 or 2 in both eyes.
Homonymous bilateral field defects (blind spots in the right or left halves of the visual fields of both eyes: hemianopsia, quadrantanopia, altitudinal)	368.46	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)	368.47	H53.47 Heteronymous bilateral field defects Heteronymous hemianop(s)ia

**Vision Rehabilitation PPP:
Appendix 4. ICD Codes**

(continued)	ICD-9 CM	ICD-10 CM
		<i>Code any associated underlying cause of the blindness first.</i>
Scotoma involving the central area (within 10 degrees of fixation)	368.41	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	368.45	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

The following definitions apply to the above ICD-9 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 1972.

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 (CF at 1 meter) 1/50 (0.02) 5/300 (20/1200)
4	1/60 (CF at 1 meter) 1/50 (0.02) 5/300	Light perception
5	No light perception	
9	Undetermined/unspecified	

CF = central fixation

The term *low vision* in category H54 comprises categories 1 and 2 of the table, the term *blindness* categories 3, 4, and 5, and the term *unqualified visual loss* 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 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 includes ophthalmologists, pediatric ophthalmologists, vision rehabilitation clinicians, occupational therapists, orientation and mobility instructors, teachers, and others working with the child and family. Fortunately, fewer children than adults have bilateral visual impairment. 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, in the future, a 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), and acquired abnormalities (e.g., uncontrolled glaucoma, severe residua of retinopathy of prematurity, ocular and/or cerebral trauma, and uveitis). Parents and caregivers may note that children have difficulty identifying the parent across the room, particularly when multiple adults are present, or that they seem to have even more reduced visual function in a visually crowded environment such as a shopping mall. In addition, these children may be photosensitive or have more difficulty seeing in unfamiliar environments that have reduced illumination. Some children may have reduced contrast sensitivity and have difficulty with steps or curbs, or they may trip over objects on the floor. Reports of delayed visual development are also common. Parents of children with severe visual impairment (e.g., Leber congenital amaurosis) will often volunteer that the children push on their eyes with their thumbs or fingers, which the ophthalmologist recognizes as the oculodigital sign of severe vision loss. Some diseases, such as Stargardt's disease, may involve very subtle fundus changes initially. Significant time may elapse, and the child may undergo neurological and even psychiatric evaluation before the true diagnosis is made.

OPHTHALMIC CARE

Many children with visual impairment will have nystagmus. They may use a compensatory head posture to dampen the nystagmus and afford improved vision. When measuring visual acuity, it is important not only to assess monocular acuity but also to measure binocular visual acuity, because monocular occlusion can increase the amplitude of nystagmus, further reducing visual acuity. The preferred method of visual acuity testing for all children involves linear or crowded optotypes, although the test distance may need to be reduced for children with visual impairment. (See Pediatric Eye Evaluations PPP.⁸⁷) The acuity card procedure can be used to estimate visual acuity, and comparing with normative values can be helpful, but the results of the acuity card test may not predict optotype visual acuity. All children require cycloplegic retinoscopy as part of a comprehensive eye examination because correction of significant refractive errors may improve visual acuity, even for in children with visual impairment. A child may prefer one eye, and amblyopia therapy may be indicated, but if ocular abnormalities severely limit vision in the second eye, adherence to amblyopia therapy may be challenging.

Discussion of the cause of visual impairment often requires the ophthalmologist to spend an increased amount of time with the parent/caregiver. The ophthalmologist should also discuss additional necessary testing (e.g., cerebral imaging of the pituitary in optic nerve hypoplasia, genetic testing for inherited disorders, renal ultrasound for aniridia). Parents can, understandably, 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

Depending on services available locally, the evaluation by the clinician providing rehabilitation may overlap with the evaluation by the pediatric or comprehensive ophthalmologist. An accurate evaluation of current visual function (visual acuity, contrast sensitivity, and visual field) appropriate to the child's age and overall status 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, visual field testing, and reading evaluation. Regardless of the age, offering family support and rehabilitation promptly at the time of initial diagnosis is key.

Preschool Child

When a young child is diagnosed with bilateral visual impairment, consideration should 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. These programs can also facilitate development of an Individualized Educational Plan (IEP) when the child reaches primary school. In preschool, the teacher may provide the child with a second copy of a book the teacher is reading to the class so that the child's attention is maintained without obstructing the view of the other children. 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.

School-aged Child

Education can pose particular 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, failing to attain supports that ensure optimal school success. The vision rehabilitation clinical team and the vision resource teacher or consultant in the school district 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, print size may be too small to read with ease and efficiency, and audio books, enlarged print, a bifocal, a video magnifier, or an optical magnifier may be needed. Math text typically requires enlargement because of the small size of the symbols.

Learning to write can be a challenge for visually impaired children. They may find writing with a dark felt-tip pen easier than writing with a pencil. Papers should have bold, high-contrast lines to use as a writing guide. When children lean over the desk to read or write, a slant board can be introduced 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 can be part of efficient computer use.

**Vision Rehabilitation PPP:
Appendix 5. Vision Rehabilitation for Children**

In general, children with low vision should receive preferential seating 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 may prefer to sit in a position where windows in the classroom are behind the child.

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.

Teenagers and Young Adults

Students in higher grades can be offered a full range of technology options such as cell phone accessibility, computer accessibility, optical character recognition, and even accessible global positioning system (GPS) technology. In these grades, teachers should ensure that answer sheets for standardized tests are available in the preferred format (e.g., enlarged print, audio, or Braille). When children reach driving age, the ophthalmologist should address such additional issues as whether the patient meets the state's requirements for a driving license, 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.

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 should be available in audio format for all students who prefer this. Because reading enlarged print or alternate formats takes more time, it is recommended that children take tests in a separate room where they can be given more time without the attention of their peers. Distance viewing in the classroom can also present difficulties for the visually impaired child. A video magnifier to view the blackboard and the teacher is often successful. A SMART Board (SMART Technologies, Inc., Calgary, Canada), which allows digital entry and projection on a white board, combined with a desk computer, can be used successfully by many visually impaired children. 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. In some cases, it is helpful to use a monocular telescope, particularly if it is small enough to be used inconspicuously. While 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 electronic media as less stigmatizing.

Protective eyeglasses are recommended; they may include correction of significant refractive errors and photochromic or tinted 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 of visual impairment and the cause of reduced vision. 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. Planned follow-up visits address the needs at each subsequent 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 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 they cannot be corrected to 20/40, at both near and at distance, **or** have significant scotoma, visual field constriction, hemianopia, photophobia or other conditions 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. Evaluation should be undertaken to determine whether Braille or print reading is most effective for the student and will depend on various characteristics of the visual disability. There should be emphasis on ability to access standard print and electronic communication. 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
- ◆ National Association of Parents of Children with Visual Impairments (NAPVI), 1-800-562-7441, www.spedex.com/napvi
- ◆ National Dissemination Center for Children with Disabilities (NICHCY), 1-800-695-0285, <http://nichcy.org>
- ◆ National Organization for Albinism and Hypopigmentation (NOAH), 1-800-473-2310, www.albinism.org
- ◆ National Eye Institute, www.nei.nih.gov
 - "See All You Can See," <http://isee.nei.nih.gov>
 - Eye Health Information, www.nei.nih.gov/health



APPENDIX 6. OCCUPATIONAL THERAPY FOR PATIENTS WITH VISION LOSS

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 physical, cognitive, psychosocial, and environmental. The therapist uses the information obtained from assessments to set explicit achievable goals in collaboration with the patient and to develop a tailored, client-centered intervention plan to enable the patient to participate fully in desired activities.

OCCUPATIONAL THERAPY INTERVENTION

Intervention incorporates any or all of the following:

- ◆ Visual-skills rehabilitation training, including ability to use eccentric fixation for reading and visual scanning to compensate for peripheral field loss
- ◆ Strategies to improve reading accuracy and fluency, and handwriting legibility
- ◆ Use of optical devices to complete specific daily tasks
- ◆ Use of nonoptical devices to complete specific daily tasks
- ◆ Modification of the environment to enhance safety and ability to complete activities: including lighting, contrast, organization, labeling, glare control, structure, removal of hazards, and other safety measures
- ◆ Modifications to computer software and hardware modifications to enable accessibility and independent use
- ◆ 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 the orientation mobility specialist.
- ◆ Participating in activities of daily living, including avocational activities
- ◆ Strategies for self-management of comorbid conditions to maintain health (e.g., monitoring glucose levels in diabetes, measuring blood pressure and managing medications, engaging in physical activities and exercise)
- ◆ Assessment and modification of the workplace
- ◆ Education for the caregiver to enable the patient and caregiver to work together to maximize independence and participation
- ◆ Driver evaluation and training (usually not reimbursable by Medicare) or assistance transitioning to driving retirement
- ◆ Use of community resources such as talking books, radio reader services, and transportation services
- ◆ Referral to additional services as indicated in consultation with the ophthalmologist/optometrist 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, psychology or psychiatry, and support groups or aging community service agencies.

VISION REHABILITATION AND OCCUPATIONAL THERAPY FOR PERSONS WITH VISION IMPAIRMENT FROM BRAIN INJURY

Homonymous hemianopia and visual neglect are commonly occurring visual deficits associated with stroke and traumatic brain injury. Both conditions can significantly impair visual search and scanning of the environment. Occupational therapists commonly address these limitations using visual scanning training (VST) combined with environmental and task modification. Visual scanning training has been shown to have a strong evidence base to support efficacy as a rehabilitation intervention for brain injury.⁸⁸ Recently, investigators have studied the use of prisms to augment VST by altering the relationship to space in patients with hemianopsia or visual neglect. For hemianopsia, prisms are fitted monocularly to the upper and lower field of eyeglasses to shift objects on the hemianopic side towards the center when the person looks into the prism. Small studies have been completed on the efficacy of the intervention using patient satisfaction and willingness to wear the prism lenses as the primary outcome.⁸⁹⁻⁹¹ Device abandonment is a concern.⁸⁹ For treatment of neglect, the patient wears binocular prisms that shift the visual field between 5 and 20 degrees. Twice-daily training with the prisms for 2 weeks leads to increased awareness and search that persists following treatment. To date, efficacy studies have typically used small samples and produced conflicting results on intervention parameters, although the technique is considered to show promise.⁹²⁻⁹⁴

Acknowledgement: The American Occupational Therapy Association contributed information to this Appendix.



SUGGESTED READING

- ◆ American Academy of Ophthalmology ONE. Web-course: legal blindness, foveal-sparing scotomas, Charles Bonnet Syndrome. <http://one.aaopt.org/CE/EducationalContent/Courses.aspx>.
- ◆ American Academy of Ophthalmology. Clinical Optics. Section 3, Basic and Clinical Science Course. 2012. <http://one.aaopt.org/CE/EducationalProducts/BCSC.aspx>.
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Comprehensive Adult Medical Eye Evaluation (2010)

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