

An overview of multidisciplinary rehabilitation for age-related macular degeneration at the Henry Ford Center for Visual Rehabilitation and Research

Ramanpal K Deol

Henry Ford Center for Vision
Rehabilitation and Research,
Livonia, MI, USA

Abstract: Age-related macular degeneration (ARMD) is a leading cause of legal blindness in the United States. With the aging population increasing in numbers, there is a greater need for comprehensive low vision services. Visual impairment from ARMD can affect all aspects of living, from safety to well-being to participation in everyday and leisure activities. Low vision intervention is necessary for individuals with ARMD complaining of difficulty with any activities of daily living, so that such difficulties may be addressed. This paper outlines the multidisciplinary model for ARMD rehabilitation at the Henry Ford Center for Vision Rehabilitation and Research, located in the Metropolitan Detroit area, MI, designed to address all aspects of seniors' lives affected by visual impairment, allowing them to live fully and independently.

Keywords: macular degeneration, low vision, rehabilitation

Introduction

The need for vision rehabilitation

Imagine my grandmother, a pleasant 82-year-old woman who was having difficulty reading her prayer book. She figured, like most individuals who are having trouble with their vision, that she needed new glasses. She asked me to take her to her ophthalmology appointment and serve as her translator, because she did not speak fluent English. The ophthalmic technician spent about 3 minutes performing an unsuccessful refraction. She was then evaluated by the ophthalmologist for another 5 minutes, who informed me that my grandmother had early dry macular degeneration and that he could not offer any solution to improve her vision. He left the exam room after explaining that macular degeneration was a progressive disease that can lead to legal blindness, and that my grandmother should have an eye check at least once a year. To me, a first-year undergraduate student, this meant that my grandmother would no longer be able to read her prayer book and that eventually she would be blind. To me, this meant that there was no hope. I was in the awful situation of explaining this hopeless diagnosis to my grandmother. I am not quite sure whether she understood that her vision would progressively become worse, but I am positive that she did not understand why new glasses would not help. At the time, I did not have enough knowledge to explain this to her. Unfortunately, my grandmother passed away before I gained the expertise to help her read her prayer book, regardless of her "hopeless" diagnosis.

Correspondence: Ramanpal K Deol
Henry Ford Center for Vision
Rehabilitation and Research,
29200 Schoolcraft Road, Livonia,
MI 48150, USA
Tel +1 734 523 1070
Email ramandeolod@yahoo.com

The fact that visually impaired seniors like my grandmother are not always offered low vision rehabilitation is inexcusable. It is about more than just vision. A cross-sectional European study of best eye and worst eye visual acuity in patients with age-related macular degeneration (ARMD) showed that vision loss is strongly associated with decreased health-related quality of life.¹ This calls for the primary eye care provider to address treatment options for the whole person, not just the eye disease. For patients with visual impairment, low vision services are an essential part of the treatment plan. Think about it. We live in a sighted society. The majority of us have learnt to do almost everything using full vision: from managing finances to cooking dinner to personal grooming to participating in community life. Does this mean that individuals with poor vision must rely on others? No; even individuals who are completely blind can be totally independent with the right toolkit and training, but these skills do not develop on their own, nor do necessary skills develop on their own for seniors with vision loss from ARMD. Comprehensive vision rehabilitation is necessary to provide the tools, strategies, and training that will maximize the independence of so many seniors with vision loss.

Epidemiology of ARMD

My grandmother is not the only one. In 2000, roughly 1.75 million Americans were reported to suffer from advanced stages of ARMD, and up to 7 million were estimated to suffer from early stages of the disease.² Data from the Beaver Dam Eye Study suggests that 1.6 million new cases of dry ARMD and about 150,000 new cases of wet ARMD develop in the United States each year.² A study of late ARMD cases in Switzerland suggests that the expected age shift in the population will create a 2.5-fold increase in late ARMD cases until 2050.³ Another study, which simulated five possible treatment scenarios for early ARMD, suggests that across all scenarios, cases of early ARMD increased from 9.1 million in 2010 to 17.8 million in 2050.⁴ This supports the need for further research and development of new therapies in order to reduce the impact of a potentially high prevalence of legal blindness in the increasing elderly population.⁴ The most recent breakthrough in treatment was the development of antivascular endothelial growth factor therapies that, via intravitreal injection, provide treatment for neovascular ARMD; however, despite such intervention, individuals with neovascular ARMD may still experience sufficient visual impairment to affect their lifestyles. The expected age shift in the population and an increased prevalence of late ARMD will also increase the

need for low vision services and intervention. Currently, rehabilitation is the primary treatment option for persons with visual impairment.⁵

Appropriate referral to vision rehabilitation services

Vision rehabilitation is warranted for any individual who is having difficulty performing one or more activities of daily living because of visual impairment that cannot be resolved with conventional refractive techniques. The subjective complaint is a key component, not the level of visual acuity. Individuals with 20/20 to 20/40 visual acuity who have a paracentral or ring scotoma or poor contrast sensitivity can have significant difficulty with tasks, whereas others with much poorer acuity may have minimal complaints if their contrast sensitivity is good or their desired tasks do not require detailed vision. It is also important to note that individuals with vision loss to just 20/50 acuity, which is the requirement for driving privileges in most states, are at significantly higher risk for falls, depression, and social isolation.⁶

Comprehensive vision rehabilitation: the Henry Ford model

The Henry Ford Center for Vision Rehabilitation and Research (HFCVR), part of the Henry Ford Health System, addresses the needs of all patients with visual impairment, regardless of cause or level of vision loss, through comprehensive vision rehabilitation conducted by a multidisciplinary team which includes an optometrist and an ophthalmologist who refer to in-house occupational therapists (OTs) who are also certified low vision therapists (CLVTs). One is, in addition, a certified orientation and mobility specialist, and another is a certified aging in place specialist. The services begin with a comprehensive low vision evaluation and proceed to vision rehabilitation training with the OT staff, conducted in the centers, in patients' homes, and in their communities. Services have recently been expanded to include support groups for younger individuals and for seniors.

The low vision examination

Preliminary materials

Upon making an appointment, the patient receives a questionnaire regarding health history and functional complaints to complete and bring with them, as well as a map and directions to the center and a reminder of their

appointment time. This helps patients identify specific tasks that are problematic rather than a generalized complaint like “My vision is blurry”.

Intake

The low vision evaluation itself begins with a patient interview, which includes the chief complaint(s), functional goals, a functional difficulty checklist, a thorough health history, including comorbid impairments, and a social history, including living situation, supports, and responsibilities, and the presence or otherwise of Charles Bonnet Syndrome, the benign visual hallucinations experienced by approximately 30% of those with vision loss. It is important to include Charles Bonnet Syndrome, as patients who experience the hallucinations may be concerned about them but rarely mention them to family, friends, or physicians, because of the risk of being suspected of cognitive impairment. Depression screening may also be included if time permits. It is important to note that, ideally, depression and cognitive status are important items to address during a low vision evaluation for an ARMD patient, as these are common comorbidities that can affect the treatment approach and rehabilitation potential.

The patient interview is followed by a thorough assessment of visual status. For patients with ARMD, this includes measurement of visual acuity, binocular vision assessment, refractive error, contrast sensitivity, and microperimetry.

Visual acuity/binocular vision/refraction

Visual acuity measurement during a low vision evaluation is indeed an art, as patient and target positioning can change the results of the measurement. There are different visual acuity charts appropriate for different patients. For adults we use the Early Treatment of Diabetic Retinopathy Study distance chart at 1 and 2 meters, the Lighthouse Early Treatment of Diabetic Retinopathy Study individual letter and continuous print reading cards for near acuity, and the Colenbrander chart for patients with acuities of less than 20/800. Close observation of patients as they read through a chart can offer insight into their efficiency in using residual vision. Using both single letter and continuous print cards for near assessment demonstrates to the examiner, the patient, and the family the common discrepancy between single letter acuity and continuous print acuity.

Visual acuity assessment is followed by binocular vision assessment, if appropriate, and measurement of refractive error. It is important to note that one must not assume that a thorough refraction was completed prior to low vision

referral, especially if the referral is from an outside source. Retinal specialists, for example, are frequent referrers but do not routinely perform refractions.

Both trial frame and phoropter refraction may be useful, although a trial frame refraction is ideal and usually necessary in the presence of a central scotoma. In addition to offering best correction, the refraction serves the important role of assuring the patient that new glasses have been considered, as most individuals with low vision are hoping for a new glasses prescription that will miraculously solve all of their functional difficulties. Comparing their current correction with the refraction in a trial frame allows them to assess whether or not a change in correction would result in a perceptible or significant improvement. A small change in the presence of severe visual impairment is unlikely to affect function significantly, and those patients may be well advised to spend their money on devices that would have a clearly beneficial impact.

Contrast sensitivity

Another component of the visual status assessment during low vision evaluation is measurement of contrast sensitivity and patient education regarding the impact of reduced contrast sensitivity on various activities of daily living, ie, pouring coffee into a black mug or eating mashed potatoes off a white plate. Explaining the importance of enhanced contrast to patients is another step toward gaining trust and likelihood of compliance with visual rehabilitation. Upon such explanation, patients often realize that the examiner has a good sense of the difficulties created by their visual impairment, and thus are more likely to be open to recommendations. At the HFCVR, the Pelli-Robson contrast sensitivity chart is used for this assessment.

Microperimetry

Testing for macular field deficits and the location of the preferred retinal locus (PRL) in the place of central field loss is also a crucial component of the low vision evaluation. This is important both for examiner insight into which types of low vision aids will be practical and also for training patients to use the PRL efficiently when performing activities such as reading.

At the HFCVR, a Rodenstock scanning laser ophthalmoscope (SLO) is used to evaluate the size, shape, and location of a central or paracentral scotoma. This instrument also shows the location of a preferred retinal locus in the case that the fovea is no longer functional. While administering

the test, the examiner views a live image of the retina and the stimulus that is scanned directly on to it.⁷ This allows the examiner to create an exact diagram of any macular scotomas and the exact location of a PRL.

Although the SLO is by far the most accurate macular mapping technique, it is not commonly found in the clinical setting and is an expensive device to acquire. Alternative methods for macular scotoma evaluation include the Macular Mapping Test, the Foolproof Flashcard Method, the Fletcher Central Field Test, and Face Fields.⁷⁻¹⁰ These tests are performed monocularly and are described as follows.

- The Fletcher Central Field Test employs a modified tangent field and a laser pointer as the target.
- The Foolproof Flashcard Method involves using letters on index cards that are presented at all clock hours, 12 o'clock being at the same level as the patient's forehead, while the patient maintains steady fixation toward the center of the examiner's face. This helps the patient to realize that there are "blind spots" in their central vision, and creates the foundation for pursuit scotoma and PRL awareness training.⁸
- The Macular Mapping Test employs a wagon wheel pattern on a computer monitor.
- Face Fields do not require any special equipment. This technique maps out the blurred areas of a face relative to fixation.¹⁰

Customary tests that are used to follow disease progression, such as the Amsler grid, Humphrey perimetry, and Goldmann perimetry, can be used as screening tools for the detection of macular scotomas; however, it is important to note that these techniques are not as sensitive for very small scotomas. The Amsler grid, in particular, may not reveal a small scotoma, due to perceptual completion.¹¹ Also, when using these methods, the clinician cannot be certain whether the patient is using the fovea for fixation or whether they are using a parafoveal retinal locus. Variation of fixation may also occur during the test, creating an inaccurate map of the scotoma in question.

Peripheral perimetry

Formal mapping of the peripheral field may be beneficial for individuals who specifically complain of difficulty with mobility or missing objects in their peripheral field. This may occur in patients with comorbidities such as stroke or glaucoma. Peripheral and midperipheral field defects can be accurately and quickly recorded using Goldmann kinetic perimetry.

Patient education

Once pertinent information regarding the patient's visual status is collected, the examiner has a better idea as to why the patient is having difficulty and why new glasses may not solve this difficulty; however, the patient is often still in the dark and awaiting that slip for the magical new glasses prescription. The rehabilitation process must begin by explaining to the patient the nature of their eye disease and the implications of the test results collected thus far during the evaluation. This process is much better received and offers more positive outcomes if the patient can understand why new glasses do not improve their vision. Once the patient has made peace with this concept, they will likely be more tolerant of the need and limitations of low vision aids. Ideally, the primary eye care provider should offer this education prior to referring to low vision services. In my experience, however, either this does not occur or the patients just do not understand the first time around.

Recommendations

The treatment plan for patients with ARMD following evaluation of visual status requires inquiry about safety, patient participation in activities in their home and community, and well-being. Scotoma and PRL awareness and training, prescription of low vision aids, recommendations for adaptations, in-home evaluation, and rehabilitation training may also be included in the treatment plan.

Inquiry of safety issues includes driving, history of falls, sensitivity to glare, environmental hazards such as poor lighting and contrast, and management of medications. Rehabilitation therapy is prescribed to implement recommended modifications. Environmental modifications, such as painting the edge of low contrast steps with yellow paint, and adaptations, such as using a cane, are important, as visual impairment is known to increase older patients' risk of injury due to falls.¹²

Patient participation in activities, both within and outside of their homes, is important to assess. The ultimate goal of any type of low vision intervention is to increase independence and quality of life. Measures to motivate patients to remain active will reduce the risk of downward spiral into depression, as depression associated with vision loss is directly a result of reduced level of activity.⁸

Patient well-being is addressed with patient education regarding minimizing risk factors associated with a higher rate of progression of ARMD, assessment of family and community support available to the patient, and assessment

of the patient's state of mind, including possible depression, frustration because of difficulties resulting from ARMD, and cognitive impairment. Patients who are depressed or frustrated may be referred to a senior support group, a geriatric counselor, their primary care physicians, or psychiatrists. The latter two may be necessary for medical evaluation and treatment of depression. Cognitive impairment is a common comorbidity of ARMD, which the examiner must be aware of, as recommendations and goals for rehabilitation may be altered depending on level of cognition.¹³ Family and caregiver education are also important when cognitive impairment is suspected. A relatively quick cognitive assessment can be performed using the Mini-Mental State Exam for Cognition.

Rehabilitation therapy for scotoma and PRL awareness training is prescribed to individuals who have poor reading fluency or "head fish" while reading, making continuous and unsuccessful head movements and turns when trying to read continuous print. The OT uses the Foolproof Flashcard Method while working with the patient to further demonstrate the size, shape, and location of scotomas apparent upon macular perimetry with SLO.⁸ The patients are then educated on how to position themselves relative to what they are trying to read or view, in order to minimize scotoma interference. A recent study also reported that eye movement control exercises including saccade tasks increased reading speed in subjects with ARMD.¹⁴ Rehabilitation therapy may also include such exercises prescribed by the low vision practitioner.

Low vision aids may be required for tasks such as reading, writing, playing cards, and doing crafts, for example. The HFCVR offers up-to-date availability of the entire spectrum of low vision aids for demonstration. Different aids work for different people, depending on cognitive status, visual demands, physical limitations, and motivation. For example, a handheld device will not be suitable for someone with tremor. Regardless of the level of vision loss, I find it appropriate to expose the patient to a majority of the spectrum of low vision aids available. As optometrists, we are well aware as to why microscopic spectacles may not be practical for use with patients who have very large central scotomas, yet the patient may not understand this until the concept can be demonstrated in office. In other words, patients benefit from demonstration of aids that are not recommended, as well as those that are practical. For the patient, this is a process of elimination that allows them closure and acceptance of those aids that are suitable. In addition to magnification devices,

exposure to large-print materials, such as large-print checks, and voice output software are offered when appropriate.

Individuals with very small central field defects may demonstrate immediate success upon presentation of a low vision adaptation, whether it is simply a high add power for reading glasses or a lighted stand magnifier. These individuals may be prescribed the low vision adaptation for trial at home. Patients who do not require rehabilitation therapy to implement modifications for enhanced safety or adaptations for increased participation in activities of daily living are instructed to return for evaluation should they begin to notice further difficulty. Patients are reminded that should their vision decline, they may require alternative aids or adaptations for continued independent and active lifestyles.

Referral for visual rehabilitation training

The vast majority of patients with ARMD can benefit from rehabilitation training beyond the low vision evaluation and prescription of devices. This may include those having difficulty with multiple activities of daily living and/or those with significant central scotomas, ring scotomas, large paracentral scotomas, or those closely bordering fixation and those with severe compromise of contrast sensitivity. Full rehabilitation for them cannot be accomplished solely by optometric evaluation and prescription of devices in the office setting. The Low Vision Intervention Trial demonstrated that visual rehabilitation training, including a home visit and assigned homework, reported significant improvement in performing activities of daily living when compared with a control group.¹⁵ Another controlled trial including 206 patients with recent diagnoses of neovascular ARMD determined that problem-solving treatment provided by therapists in patients' homes prevented depressive disorders and loss of valued activities.¹⁶ Ultimately, if a patient is sent home with low vision aids after a low vision evaluation and without adaptive training, it is not assured that their multiple and varied complaints will be alleviated. This is apparent when patients present to the office with a bag full of magnifiers that they indicate "were never useful".

Beyond this, it is seniors who have ARMD, and many of them face challenges beyond vision loss: physical challenges such as hearing, balance, and neuromuscular deficits affecting mobility and increasing the risk of falls; reduced energy levels with multiple medications; psychosocial challenges like caretaking for a spouse, transportation issues, and social isolation; and subtle deficits in memory

and cognition. This population requires vision rehabilitation that incorporates the spectrum of their physical and cognitive capabilities and needs with the attention to energy output, ergonomics, medication management, and safety at home and in the community. The professionals uniquely equipped for this complex task are OTs who specialize in vision rehabilitation and provide services by prescription from a physician. As mentioned earlier, the HFCVR team includes seven OTs, who are an integral part of our service. With the ability to perform site visits, OTs can make suggestions for optimal lighting, enhanced contrast, and other environmental modifications within and around the patient's home, to minimize hazards and thus reduce the risk for falls. They can also address specific complaints such as setting appliance dials or finding items at the local grocery store.

Medicare reimburses OT services when prescribed by an optometrist for those with visual acuity of 20/70 or less or those with any type of visual deficit, including small central scotomas. Other insurances may also offer reimbursement depending upon the diagnosis and impairment code. OT staff can thus extend the reach and reimbursement of a low vision optometrist.

Driving privileges for those with ARMD

Maintenance of driving privileges is a significant concern among patients with ARMD. Most of these individuals have held a driver's license for a greater part of their lives and are accustomed to the independence that comes along with driving privileges. Many would consider it devastating to have to rely on family or friends for transportation. Individuals who cannot drive are less likely to leave their homes, ie, in part because public transportation is not as widespread in the United States, and hiring private transportation, such as a cab, can be costly. In turn, individuals confined to their homes are less likely to be active, and ultimately may be at greater risk of depression.

At present, visual acuity is the most common screening criterion for granting driver licenses.¹⁷ Although it is obvious that some amount of vision is essential for safe driving, there is no conclusive research as to the exact level of visual acuity needed.¹⁸ Many studies conclude that level of visual acuity is weakly related to crash rates, and it is not an accurate determinant of safe driving potential.^{18,19} In fact, a study of 24 participants who drove around a closed road circuit found that recognition performance was more strongly predicted by contrast sensitivity than visual acuity measured under standard photopic conditions.²⁰ Another study comparing ten ARMD patients with average visual acuity of 20/70

with a control group of eleven age-matched counterparts with normal vision found the control group to have a higher incidence of accidents in a 5-year period.²¹ The study results indicate that the ARMD group may have had lower incidence of accidents due to compensatory attitudes, such as driving at slow speeds, limitation of driving to good conditions, and driving in familiar areas.^{18,21}

Although a certain level of visual acuity may be important for successful driving, additional skills are necessary for safety with this task. Driving requires not only good visual perception but also good visual processing time and visual scanning.²² Nonvisual skills include good cognition and motor function.²³ In addition, the International Council of Ophthalmology suggests the routine testing of contrast sensitivity and glare in older drivers.¹⁸ The HFCVR offers a thorough off-road driving evaluation that tests perceptual, cognitive, and motor skills.

Those individuals who solely fail to meet the visual acuity requirement and otherwise have the necessary skills to drive safely may benefit from assessment to use a bioptic telescope system (BTS) to maintain driving privileges. As of 2008, 36 out of 51 legal jurisdictions allow the use of a BTS to meet the visual acuity requirements. Driving restrictions such as daytime only or geographic radius, however, may be enforced and vary by state.

Not all individuals, however, are good candidates for driving with a BTS. One must remember that driving involves more than just good vision, and driving with a BTS is not an exception. At the HFCVR, a thorough in-office driving skills evaluation is required of all patients prior to ordering a BTS. A bioptic driver must have normal visual processing skills, cognition, reaction time, and motor skills. These skills should be assessed by the prescribing clinician prior to recommending the device for driving. It is also appropriate for the patient to work with an OT for in-office and on-road passenger training, allowing the patient to make a better decision as to whether they are a good candidate for using this device while driving. Ultimately, the patient will benefit from working with a certified driver rehabilitation specialist for on-road driver training as well. A study has shown that improvement in visual skills with the use of a BTS was greater with adaptive training.²⁴ Prior to ordering this device, patients must have realistic expectations and be informed of individual state laws concerning the licensing and restrictions involved when using a BTS for driving. Many states require on-road training to be followed by a strict on-road evaluation prior to issuing a bioptic driver license.

Despite the obvious benefits of maintaining a driver's license, seniors with visual impairment resulting from ARMD may need to seek alternative transportation should they fail to meet the legal requirements for driving or should they demonstrate other physical or cognitive impairments that may interfere with safe driving. At the HFCVR, the examiners and OTs are often in a place where they must recommend limitations to driving or give instructions for driving cessation. Patients who must give up driving benefit from working with our OTs to explore transportation alternatives, ie, community resources such as the local Area Agency on Aging.

In-office rehabilitation clinic

The HFCVR provides access to tools and demonstration rooms for in-office therapy when in-home visual rehabilitation training is not feasible. This includes, for example, a demonstration kitchen to offer training for setting appliance dials and preparing meals; a therapy room equipped with furniture and tools to offer training to use various devices for reading; hall space, which the OTs often use to work on mobility, scanning, and multitasking; and a Dynavision device (large, computerized version of a Wayne Saccadic Fixator) for training to improve scanning techniques and field awareness. The HFCVR also offers access to all aids used in the assessment to determine a patient's skills for safe driving, such as a virtual driving program to assess reaction time and decision-making skills.

Generating support: communicating with referral sources

The HFCVR provides timely reports to referral sources to promote a good relationship and provide awareness as to the extensive amount of services offered to our mutual patients. For those patients who are prescribed OT, the order for OT is included with the initial consult letter provided to the referral source. A final letter to the referral source, which includes a summary of treatment outcome once OT visits are completed, is also provided.

The HFCVR partners with primary and specialty eye care professionals, primary physicians, geriatricians, and any other community organizations that work with the geriatric and visually impaired population. The importance of comprehensive low vision evaluation and training to make the most of remaining vision is promoted throughout the Metropolitan Detroit community. Dr Lylas Mogk, who is our department chair and ophthalmologist and who performs low vision evaluations, me as the optometrist

in our group performing low vision evaluations, and the OTs are all involved in this campaign for awareness of rehabilitation services via community presentations and other activities.

Implementing comprehensive rehabilitation

Just like any medical rehabilitation model, this model of rehabilitation for vision impairment includes a physician who evaluates the impairment, recommends appropriate interventions, and orders the OT to conduct rehabilitation therapy to maximize the patient's independence and safety in daily activities. The physician's evaluation is billed under Centers for Medicare and Medicaid Services Evaluation and Management codes. As it is the impairment, not the disease, being evaluated, the primary code is the impairment code and the secondary code is the disease. The diagnosis, however, should be well established and treatment ongoing prior to the low vision evaluation, either by the low vision provider or by the referring physician.

The physician may also bill for microperimetry. Agreeably, the Rodenstock or Nidek SLOs are costly to acquire; however, newer technology such as the Macular Integrity Assessment by Ellex (MAIA) holds promise of including low vision software at a lower cost. Manual methods such as the California Central Field Test are also billable as a field.

Currently, OTs are the only vision rehabilitation professionals who are reimbursed by Medicare. OTs have the background to approach vision rehabilitation training from a holistic viewpoint, as they are trained to consider common cognitive and physical comorbidities to ARMD as well as ergonomic requirements and risks. A practitioner performing low vision evaluations full time can keep two OTs busy. It is therefore both medically and economically beneficial to include an OT in a busy low vision practice, as the 1-hour optometric evaluation can be complemented by several hours of OT time. Although there are currently few OTs who specialize in low vision, the interest in such specialization is growing among these professionals. OTs may obtain certification in low vision therapy through an apprentice/mentor program of the Academy for Certification of Vision Rehabilitation and Education Professionals or through a graduate program at Salus University, Elkins Park, PA. They may also obtain graduate certification in vision rehabilitation from the Occupational Therapy School of the University of Alabama, Birmingham, AL. Certification in vision rehabilitation is not necessary for OT reimbursement, but it is a confirmation of their knowledge and expertise.

Comprehensive vision rehabilitation as provided at the HFCVR is well suited to large practices and academic optometry and ophthalmology departments that can attract referrals from multiple community sources while offering excellent experience to optometry and ophthalmology students and residents. For low vision practitioners who do not have the internal resources to offer rehabilitation training, it is beneficial to partner with a state or private agency in their area with rehabilitation professionals who will conduct training in activities of daily living pursuant to their low vision evaluation. Such comprehensive intervention is necessary because despite acquisition of low vision devices, without training, seniors with ARMD continue to have difficulty performing activities of daily living independently and safely. For example, a low vision device will not improve one's ability to identify a low contrast curb or step, nor is a device always the practical solution to one's difficulty with cutting vegetables, grooming, dressing, and doing laundry, for example; training is required for such difficulties.

Conclusion

The HFCVR is a state-of-the-art multidisciplinary program that allows its visually impaired clients to maximize their functional potential. Any type of low vision service should be comprehensive, without exception. Some eye care providers may offer exposure only to magnification aids in office, whereas others may refer just to the local agency for the blind. This limited low vision intervention can be a disservice to the ARMD population. Sending someone home with a magnifier calculated to be appropriate given their level of acuity, without addressing safety, participation, well-being, and everyday activities such as grooming, does not set that person up for success in regards to improved quality of life. Similarly, referring a visually impaired patient to a service that is equipped to work only with nearly or totally blind individuals is a disservice, as they are not provided with tools and training to maximize the potential use of their remaining vision. It is our responsibility as optometrists to increase awareness of the benefits of comprehensive visual rehabilitation services that allow seniors with ARMD to live independent and full lifestyles.

Disclosure

No conflict of interest other than an affiliation with the Henry Ford Center for Visual Rehabilitation and Research, as I am

employed by the Henry Ford Health System at the following address: 29200 Schoolcraft Rd, Livonia, MI 48150, USA.

References

1. Sahel J, et al. Health-related quality of life and utility in patients with age-related macular degeneration. *Arch Ophthalmol*. 2007;125(7):945–951.
2. Brown GC, et al. The burden of age-related macular degeneration: a value-based medicine analysis. *Trans Am Ophthalmol Soc*. 2005;103:173–186.
3. Bauer P, et al. The potential effect of population development, smoking and antioxidant supplementation on the future epidemiology of age-related macular degeneration in Switzerland. *Klin Monatsbl Augenheilkd*. 2008;225(5):376–379.
4. Rein D, et al. Forecasting age-related macular degeneration through the year 2050. *Arch Ophthalmol*. 2009;127(4):533–540.
5. Owsley C. Characteristics of low-vision rehabilitation services in the United States. *Arch Ophthalmol*. 2009;127(5):681–689.
6. Jackson M. Vision rehabilitation for Canadians with less than 20/40 acuity: the SmartSight model. *Can J Ophthalmol*. 2006;41: 355–361.
7. MacKeben M. Topographic mapping of residual vision by computer. *J Vis Impair Blind*. 2008;102(10):649–655.
8. Mogk M, Mogk L. *Macular Degeneration: the Complete Guide to Saving and Maximizing your Sight*. 2nd ed. New York, NY: Ballantine Books; 2003.
9. Cole RJ. Modifications to the Fletcher Central Field Test for patients with low vision. *J Vis Impair Blind*. 2008;102(10):659.
10. Sunnes JS, et al. Face Fields and microperimetry for estimating the location of macular disease. *J Vis Impair Blind*. 2008;102(11):679–690.
11. Crossland M, Rubin G. The Amsler Chart: absence of evidence is not evidence of absence. *Br J Ophthalmol*. 2007;91:391–393.
12. Butler RN, Faye EE, Guazzo E, Kupfer C. Keeping an eye on vision: primary care of age-related ocular disease. Part 1. *Geriatrics*. 1997; 52(8):30–41.
13. Whitson HE. Prevalence and patterns of co-morbid cognitive impairment in low vision rehabilitation for macular disease. *Arch Gerontol Geriatr*. 2010;50(2):209–212.
14. Seiple W, Grant P, Szlyk J. Reading rehabilitation of individuals with AMD: relative effectiveness of training approaches. *Invest Ophthalmol Vis Sci*. 2011;52(6):2938–2944.
15. Stelmack JA, et al. Successful outcomes from a structured curriculum used in the Veteran Affairs Low Vision Intervention Trial. *J Vis Impair Blind*. 2008;102(10):636–648.
16. Rovner BW. Preventing depression in age-related macular degeneration. *Arch Gen Psychiatry*. 2007;64(8):884–885.
17. Colenbrander A, De Laey J. Vision requirements for driving safety. International Council of Ophthalmology. Available from: <http://www.icoph.org/standards>. Accessed April 13, 2009.
18. Peli E. Driving with low vision: who, where, when, and why. In: Robert Massof, editor. *Albert and Jakobiec's Principles and Practice of Ophthalmology*. 3rd ed. Philadelphia, PA: Elsevier; 2008;4:5369–5376.
19. Owsley C, McGwin G. Vision impairment and driving. *Surv Ophthalmol*. 1999;43:535–550.
20. Wood JM, Owens DA. Standard measures of visual acuity do not predict drivers' recognition performance under day or night conditions. *Optom Vis Sci*. 2005;82(8):698–705.
21. Szlyk JP, et al. A comparison of driving in older subjects with and without age-related macular degeneration. *Arch Ophthalmol*. 1995;113: 1033–1040.
22. Park WL, et al. A driving program for the visually impaired. *J Am Optom Assoc*. 1992;63:54–59.
23. American Medical Association. Physician's guide to assessing and counseling older drivers. Chicago, IL: AMA; 2003.
24. Szlyk JP, et al. Measuring the effectiveness of bioptic telescopes for persons with central vision loss. *J Rehabil Res Dev*. 2000;37(1):101–108.

Clinical Optometry**Publish your work in this journal**

Clinical Optometry is an international, peer-reviewed, open access journal publishing original research, basic science, clinical and epidemiological studies, reviews and evaluations on clinical optometry. All aspects of patient care are addressed within the journal as well as the practice of optometry including economic and business analyses. Basic and clinical

Submit your manuscript here: <http://www.dovepress.com/clinical-optometry-journal>

research papers are published that cover all aspects of optics, refraction and its application to the theory and practice of optometry. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Dovepress