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Review Article

Low vision rehabilitation: An update

Mark E. Wilkinson [a,*]; Khadija S. Shahid [b]

Abstract

This article provides information concerning issues related to the care of individuals who are visually impaired. Issues reviewed include determining who should be referred for vision rehabilitation services, Charles Bonnet syndrome, visual acuity, contrast sensitivity and visual field testing along with Useful Field of View testing. This article also discusses technology advances that can enhance the visual functioning of individuals who are visually impaired, including how these advances can help drivers with visual impairments to continue to safely operate motor vehicles, at least on a limited basis. Finally, resources that are available to both encourage and motivate patients to take advantages of vision rehabilitation services are reviewed.

Keywords: Visual impairment, Low vision rehabilitation, Charles bonnet syndrome, Useful field of view

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Introduction

In the past, low vision was defined by visual acuity of 20/70 (6/21) or less.[1–3] The problem with this numeric definition is that it did not take into account the functional problems many individuals with better than 20/70 vision have with conditions that cause glare and/or contrast loss that are not evident during high contrast visual acuity testing routinely performed by eye care providers. As a result of this, the National Eye Institute adopted a functional definition of low vision.[4] Based on this functional definition, low vision rehabilitation care is more inclusive now then in the past, encompassing the management of individuals of all ages, who have a congenital or acquired impairment of visual acuity and/or visual field and/or other functionally disabling factors, in the better seeing eye, in which the loss of vision interferes with the process of learning, vocational or avocational pursuits, social interaction, or the activities of daily living. This vision loss is not correctable by standard glasses, contact lenses, medicine, or surgery.

Low vision rehabilitation should be considered part of the continuum of eye care that includes refractive, medical and surgical eye care, which begins at birth and carries forward throughout life. The goal of vision rehabilitation is to maximize an individual's functional vision. In so doing, the individual's functional potential will be enhanced, resulting in increase independence and improved quality of life.

Vision rehabilitation often requires a team approach. The vision rehabilitation team may include, but is not limited to, medical, optometric, allied health (Occupational Therapist/Physical Therapist), social, educational/rehabilitative, mobility and psychological services. Potential additional team members may include psychologist, speech and hearing specialist, nurse/nurse educator and adaptive/technology consultant. The vision rehabilitation team is lead by the vision rehabilitation doctor – an optometrist or ophthalmologist

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[a] University of Iowa Carver College of Medicine, Department of Ophthalmology & Visual Sciences, Director, Vision Rehabilitation Services, Wynn Institute of Vision Research, 200 Hawkins Drive, Iowa City, IA 52242, United States
[b] University of Iowa Carver College of Medicine, Department of Ophthalmology & Visual Sciences, 201 Hawkins Drive, Iowa City, IA 52242, United States

* Corresponding author.
e-mail address: mark-wilkinson@uiowa.edu (M.E. Wilkinson).

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(OD, MD, DO) with special training and interest in the care of individuals who are visually impaired.

Who needs vision rehabilitation services?

Roy G. Cole, OD[5] developed the following simply screening protocol for determining who needs vision rehabilitation services. The following series of questions allows rapid screening of individuals to determine if they would benefit from vision rehabilitation services.

- Do you have trouble doing what you want to do because of your vision? For example:
  - Reading your mail?
  - Watching television?
  - Recognizing people?
  - Paying your bills?
  - Signing your name?
  - Walking stairs, curbs, crossing the street or driving?
- During the past month, have you often been bothered by:
  - Feeling down, depressed or hopeless?
  - Having little interest or pleasure in doing things?

These last two questions are ~90% effective in detecting depression.[6] It is important to be aware that depression is not uncommon among the elderly in general. Up to 3% experience major depression, with another 8–16% experiencing clinical depressive symptoms.[7] However, the risk of depression in those with vision loss increases significantly, with some studies suggesting there is a 4-fold increase in developing depression in those with vision loss.[8]

If the answer to any of the above 8 questions is ''yes,'' and these difficulties cannot be ameliorated refractively, medically and/or surgically, the patient should be referred for additional vision care and/or low vision rehabilitation services and/or counseling, education and/or problem-solving therapy services.

History taking

An often-unrecognized issue experiencing by individuals with vision loss is the phantom vision condition known as Charles Bonnet Syndrome (CBS), a condition that may represent a type of release or deprivation phenomenon in those with sudden, and, or severe, acquired vision loss. Bonnet first described CBS in 1760s when he noted the symptoms in his visually impaired grandfather.[9] Core features of CBS include vivid and complex hallucinations that are usually recognized as unreal by the patient and occur in the absence of any other psychiatric syndrome. Images that have been described by patients include dwarf people, animals, plants, buildings and scenery. These images may be static or moving. The images may have no personal meaning and last for a few seconds to most of a day and can occur for a few days to several years. Often the images may change in frequency and complexity. For some patients, the onset of visual hallucinations can be distressing without knowledge that this is a known association of vision loss. Therefore, direct questioning, education, and reassurance are important when treating patients with vision loss at risk for CBS. Others describe the images as interesting. The images are exclusively visual, making no noise and causing no other sensations, unlike hallucinations associated with more concerning neurological diseases such as Alzheimer's, Parkinson's, or psychosis which will have associated sounds or smell.[10]

The cause of CBS is unknown. Zuckerman and Cohen[11] reported that 19% of normal individuals experienced visual hallucinations during sensory deprivation experiments. Common factors associated with CBS are sensory deprivation (bilateral vision loss), social isolation, advanced age (mean age 75.7 years) and the experience of a recent loss of vision.[12]

It is important to know about CBS because it occurs in up to 38% of patients with age-related macular degeneration.[13] A study done at the Henry Ford Health System Vision Rehabilitation Research Center found that those experienced CBS images initially do not admit to them when questioned.[13] Yet, all patients welcomed validation of their experience and the opportunity to describe their images when subsequently questioned.

Many patients choose to keep their experience of seeing objects they know are not real concealed, for fear others would believe they were mentally compromised or developing dementia. With this in mind, Menon suggested the use of indirect or direct questioning to detect CBS[14]:

- (Indirect question) Apart from blurred vision, have you noticed anything unusual about your vision? Have you had any unusual visual experiences?
- (Direct question) It is well known that some people with blurred vision can sometimes see things that they know are not real. Have you experienced anything like this?

Reported visual hallucinations should not be disregarded altogether, because they can signal the presence of undiagnosed organic pathology (tumor or lesion), untreated mental disorder and/or possible substance abuse. Finally, it is important to know that a reduction in visual acuity alone cannot be the sole source of CBS because not all individuals who are visually impaired have hallucinations.[15]

Currently, there is no effective treatment for CBS. For most, management that includes physician recognition, empathy, reassurance and patient education are enough to help the patient and form the cornerstone of treatment for CBS. When patients are increasingly affected by CBS, a referral for psychological counsel can help as well as addressing social factors since we know isolation can affect the occurrence. Pharmaceutical agents are rarely effective.[15]

Visual acuity testing (Distance and Near)

Accurately measuring visual acuity is important for determining best-corrected acuity with refraction; monitoring the effect of treatment and/or progression of the disease, and to estimate the dioptric power of optical devices necessary for reading regular size print. Additionally, visual acuity testing is used to verify eligibility for tasks such as driving and to verify eligibility as ''legally blind.'' Inaccurately measuring visual acuity underestimates ability.

It is important to realize that when we test visual acuity, we are only quantifying the degree of high contrast vision loss. Visual acuity testing does not tell us about the individual's quality of vision. A person's quality of vision is determined

by contrast sensitivity testing, which will be discussed later in this article.

When measuring visual acuity, if you must use ''counts fingers'', it is important to document what the testing distance was. Even better, if the patient can see fingers, they can read the larger numbers or letters on a low vision eye chart. If your office does not have an ETDRS (acuity testing to 20/800) or a Feinbloom chart (acuity testing to 1/700 = 20/14,000) for measuring lower levels of visual acuity, now is the time to acquire one.

For near acuity testing, M-unit is the only letter size unit that is well defined.[16] A 1 M letter subtends 5′ of arc at 1 m, versus a 20/20 Snellen letter, which subtends 5′ of arc at 6 m (20 feet). Near acuities are recorded as M units at test distance (e.g. 1.25 M @ 40 cm or 16″). M-unit near acuity testing is useful for easily determining how much magnification is needed for a patient to read a specific size print. For example, if a patient can read 4 M print at 40 cm, and they want to read 1 M sized print, they will need to use a 4× magnifier or hold the reading material 4× closer (10 cm). Remember, at 10 cm, the accommodative demand will be 10 diopters, an important consideration for adults with reduced accommodative abilities including but not limited to individuals with presbyopia and pseudophakia.

Refraction

The cornerstone and starting point for all vision rehabilitation care is a careful, often trial frame based, refraction. The indications for prescribing spectacles for individuals with reduced vision include when the patient sees a qualitative improvement in their vision with the RX; for intermediate needs such as writing, sewing, using a video magnifier, a computer or a tablet/smart phone; and/or to facilitate the use of optical devices.

Contrast sensitivity testing

Contrast sensitivity testing provides the clinician with a longitudinal measurement of visual function beyond visual acuity. Additionally, it provides the vision rehabilitation clinician with diagnostic/functional information concerning which eye has better functional vision, not just better high contrast vision as is measured with standard acuity testing. Contrast sensitivity testing helps to establish binocular potential and will also show the effects of corneal opacities or cataracts on visual function. Finally, contrast sensitivity testing is an excellent tool for patient/family education because it explains so many of the patient's visual difficulties/complaints, which are not explainable by high contrast distance acuity testing alone.

The Mars letter contrast sensitivity test is considered the test of choice for measuring contrast sensitivity in individuals who are visually impaired.[17,18] The Mars test consists of a set of 3 charts (OD/OS/OU) that are viewed at 50 cm (20 in.). On these charts, each letter fades by 0.04 log units. Norms have been established for different levels of contrast loss from profound, to severe, moderate, and normal for those both above and below 60 years of age.

When a person's contrast sensitivity function is reduced, they will require increased illumination for activities of daily living, as well as for reading, recognizing objects and avoiding collisions and falls.[19,20] Additionally, with improved lighting, individuals with vision loss have been found to have increased well-being.[21] With this in mind, it is important to discuss task lighting with all patients who are visually impaired.

Visual field testing

It is important to use the right test when doing visual field testing on individuals with vision loss. Goldmann perimetry is still considered the best testing strategy for individuals that are visually impaired.[22,23] However, Goldmann perimetry is not readily available in most locations and requires trained technicians to perform. With this in mind, to quickly screen a person's visual fields for unrecognized peripheral defects, confrontation testing is still of value. It is also a useful educational tool for individuals with central loss, to demonstrate that their periphery vision is still normal.

Automated perimetry is the mainstream testing strategy now employed by most eye care providers. It offers standardized testing protocols with llongitudinal databases. However, the problem with standardized databases is that threshold related visual field-testing over-estimates visual field loss for individuals who are visually impaired. This happens because the individual with a visual impairment is compared to individuals with normal visual fields. To get a more accurate assessment of the extent of your patient's peripheral visual fields, consider using the SSA Kinetic testing protocol on the Humphrey Visual field analyzer or do kinetic testing with an Octopus automated perimeter.

Useful field of view testing

The Useful Field of View (UFOV) test is a specialized visual field test used to determine how well an individual is able to process both central and peripheral visual information and can be specifically used to predict driving performance in patients who are visually impaired.[24–29] It differs from other tests of peripheral visual function by incorporating measures of reaction time, stimulus localization, simultaneous central and peripheral visual tasks (multitasking), target identification, and complex decision making. The UFOV test provides a means of evaluating a driver's ability to perform multiple tasks accurately and quickly as they relate to the task of safely driving. Studies have determined that UFOV testing correlates well with driving performance.[24–29] The authors find UFOV testing very helpful when there are concerns about safe driving with cognitive decline.

Vision enhancement options

Magnification is the main treatment option for enhancing the visual functioning of individuals with vision loss. There are 4 types of magnification individuals with visual impairments employ to enhance their visual abilities.[30]

1. Relative distance magnification – by holding the materials closer to the eye, they appear bigger. Children with visual impairments do this naturally. An adult will require the appropriate powered reading correction or bifocal for this to work efficiently, due to limited accommodative abilities.

2. Angular magnification – occurs when using a low vision device, such as a hand-held magnifier or telescope.
3. Electronic magnification – is available in hand held, desk or arm mounted electronic magnification devices, computer software, as well as built in accessibility options on smart phones and tablets. Electronic magnification can make the image both larger and with greater contrast.
4. Relative size magnification – makes the object larger, such as with large print materials. The problem with large print is that it is not readily available in the myriad of materials that individuals with a visual impairment need to read on a regular/daily basis (i.e. bank statements, bills, most other general mail, work related materials, etc.).

Task lighting continues to be the single most important factor in enhancing visual functioning. A study done by Silver found that more than 90% of individuals with vision loss showed some improvement in near or distance visual acuity when the illumination was improved.[31]

Technology

Technology advancements over the past decade have removed significant barriers for all individuals with vision loss, allowing them to engage in activities that would have been impossible in the past. An added advantage of these technology advances is that they are used by individuals with and without vision loss and so don't stigmatize users who are visually impaired. For example, despite their small screens and keypads, several features built into smart phones and tablets make them easily accessible to users who are blind or visually impaired. Leading the industry are Apple products that provide easy accessibility to users with vision loss through their VoiceOver and Zoom programs.

VoiceOver is a screen reader that uses text-to-speech to read aloud what is onscreen, confirm selections, typed letters and commands, and provide keyboard shortcuts to make application and web page navigation easier. The Zoom app magnifies everything onscreen from 1.2 to 15 times its original size, while maintaining their original clarity. Additional options that increase accessibility are the ''Large Text'' option, that allows the user to select a larger font size (20–56 point) for any text appearing on their device.

Many individuals with vision loss see better with the reversed contrast setting of ''White on Black''. Reversing the contrast is often the only change needed to allow an individual with a visual impairment to easily read on their phone or tablet.

Finally, there are free and low-cost apps for smart phones and tablets that can make them function like a hand-held video magnifier. Two of the authors' favorites are the Brighter and Bigger and Better Vision apps.

Driving with a vision loss

There are many issues surrounding driving with a vision loss. As our population continues to age, it is important to note that there are large individual differences in the ability to compensate for a visual impairment when driving. A number of studies have demonstrated that similar visual impairments in groups will affect individuals different. Specifically, some members will not manifest any driving performance deficits, while others will demonstrate significant performance deficits when behind the wheel. Similarly, some drivers may be able to drive safely under certain conditions (e.g., driving locally to navigate their immediate neighborhood for shopping and/or to travel to medical and other appointments) but may be hampered by other situations (e.g. dense urban traffic, unfamiliar environments, night driving, poor weather). The use of restricted driver's licenses has been adopted in some areas as a solution to these situations to aide in the maintenance of independent travel when safe and possible.[32,33]

Now that cost-efficient, talking Global Positioning System (GPS) devices are available in the marketplace, consideration should be given to recommending these devices to older drivers in general, and drivers with visual impairment in particular. Individuals using a talking GPS device are freed from the distraction that takes place when a driver spends time looking for/at road signs, particularly in more complicated driving environments.

Finally, with adaptive cruise control, lane alert warnings and cars that will park themselves already available, it can be expected that continued advances in automobile technologies will allow all drivers to be safer behind the wheel.

Eye care providers have a moral and ethical obligation to report a patient who is at high risk for a motor vehicle accident in order to preserve both patient and public safety. This should remain standard even when working in areas where reporting such risk is not mandatory.[34] Additionally, there is the Duty to Warn,[35] a legal rational intended to provide a means of protecting the patient from an unreasonable risk of harm. This rational indicates that failure to warn patients of conditions that create a risk of injury will be upheld as a cause of action against eye care providers when it can be shown that the failure to warn is the proximate cause of an injury.[35] The patient can argue that they had insufficient warning of their impairment, and because of their impairment, their operation of a motor vehicle or other machinery resulted in an injury. With this in mind, patients whose vision no longer legally qualifies them to operate a motor vehicle should be warned not to drive and a notation to this effect should be entered into the patient's record.[32,33]

The American Medical Association's – Physician's Guide to Assessing and Counseling of Older Drivers (2nd Ed.)[36] states that every physician, (the author would include all eye care providers in the category), should assess risk factors for their older patients who drive. For those individuals at risk for unsafe driving, the practitioner should recommend a formal assessment of vision, cognition and motor skills and also refer for a behind the wheel driving assessment when appropriate.

To appropriately advise patients with vision loss about their driving status, it is important to know if your patients are still driving. The following series of questions concerning driving are an easy way to determine patient driving status.

- Do you drive an automobile?
  - If yes, what type of driving do you do?
- Do problems with your sight cause you to be fearful when you drive?
- During the past six months, have you made any driving errors?
- Is your mobility affected by your vision?

Resources

The National Eye Institute's National Eye Health Education Program (NEHEP) have updated their online low vision resource: Living with Low Vision.[37] Living with Low Vision includes a new booklet and new videos that encourages people with low vision to seek help from a low vision specialist and provides tips to maximize remaining eyesight. The video and booklet contain current testimonials from individuals of various ages (including a child, working age adults and retires), who have used low vision services to maximize their functional abilities and improve their quality of life. The booklet and complementary DVD with videos and patient stories can be ordered and/or downloaded at www.nei.nih.gov/lowvision. There is both a patient-based and practitioner-based video available from NEHEP. Both videos discuss the benefits to patients of vision rehabilitation services.

Conclusion

Comprehensive vision rehabilitation services allow individuals who are visual impaired the ability to gain greater control of their environment, which leads to greater self-confidence, lowered risk of depression and anxiety, and an improved quality of life. Studies have demonstrated the positive effects of maximizing visual function through low vision rehabilitation for patients and families dealing with vision loss.[38–40] Vision rehabilitation services begin with a comprehensive vision rehabilitation evaluation by a low vision doctor.

Conflict of interest

The authors declared that there is no conflict of interest

References

1. American Optometric Association. Low vision. Online at: <http://www.aoa.org/patients-and-public/caring-for-your-vision/low-vision?sso=y> accessed on 11 March, 2017.
2. Key definitions of Statistical terms. Blindness statistics. American Foundation for the Blind; 2008. Online at <http://www.afb.org/info/blindness-statistics/key-definitions-of-statistical-terms/25> accessed on 11 March, 2017.
3. Consultation on development of standards for characterization of vision loss and visual function. World Health Organization Prevention of Blindness and Deafness. Geneva; 4–5 Sept. 2003. <http://apps.who.int/iris/bitstream/10665/68601/1/WHO_PBL_03.91.pdf?ua=1> accessed on 11 March, 2017.
4. https://nei.nih.gov/lowvision/content/kno0077 accessed on 11 March 2017.
5. Cole RG. *Remediation and management of low vision*. Mosby; 1996.
6. Whooley MA et al. Case-finding instruments for depression: two questions are as good as many. *J Gen Intern Med* 1997;**12**:439–45.
7. Blazer D. Depression in the elderly. *N Engl J Med* 1989;**320**:164–6.
8. NIH Consensus Development Conference. Diagnosis and treatment of depression of late life. *JAMA* 1992;**268**:1018–29.
9. Rovner BW, Ganguli M. Depression and disability associated with impaired vision: the MoVies Project. *J Am Geriatr Soc* 1998;**46**():617–9.
10. Schadlu AP, Schadlu R, Shepherd JB. Charles Bonnet syndrome: a review. *Curr Opin Ophthalmol* 2009;**20**(3):219–22.
11. Zuckerman M, Cohen N. Sources of reports of visual and auditory sensations in perceptual-isolation experiments. *Psychol Bull* 1964;**62**:1–20.
12. Batra A, Bartels M, Wormstall H. Therapeutic options in Charles Bonnet syndrome. *Acta Psychiatr Scand* 1997;**96**(2):129–33.
13. Mogk LG, Riddering A, Dahl D, Bruce C, Brafford S. Charles Bonnet syndrome in adults with visual impairments from age-related macular degeneration. In: Stuen C et al., editors. Vision rehabilitation: assessment, intervention, and outcomes. Selected papers from Visions '99: international conference on low vision, July 1999. Lisse, Netherlands: Swets & Zeitlinger Publishers; 2000. p: 117–9.
14. Menon GJ. Complex visual hallucinations in the visually impaired: a structured history-taking approach. *Arch Ophthalmol* 2005;**123**():349–55.
15. Menon GJ, Rahman I, Menon SJ, Dutton GN. Complex visual hallucinations in the visually impaired: the Charles Bonnet Syndrome. *Surv Ophthalmol* 2003;**48**(1):58–72.
16. Jose RT, Atcherson RM. Type-size variability for near-point acuity tests. *Opt Vis Sci* 1997;**54**(9).
17. Dougherty BE, Flom RE, Bullimore MA. An evaluation of the mars letter contrast sensitivity test. *Opt Vis Sci* 2005;**82**(11):970–5.
18. Arditi A. Improving the design of the letter contrast sensitivity test. *Invest Ophthalmol Vis Sci* 2005;**46**(6):2225–9. https://doi.org/10.1167/iovs.04-1198.
19. Bowers AR, Meek C, Stewart N. *Clin Exp Optom* 2001;**84**(3):139–47.
20. Cornelissen FW, Bootsma A, Kooijman AC. *Vision Res* 1995;**35**():161–8.
21. Brunnström G, Sörensen S, Alsterstad K, Sjöstrand J. *Ophthalmic Physiol Opt* 2004;**24**(4):274–80.
22. Kedar S, Ghate D, Corbett JJ. Visual fields in neuro-ophthalmology. *Indian J Ophthalmol* 2011;**59**(2):103–9.
23. Dersu I, Wiggins MN, Luther A, Harper R, Chacko J. Understanding visual fields, Part I; Goldmann perimetry. *J Ophthal Med Technol* 2006;**2**(2):10, www.JOMTonline.com.
24. Novack TA, Banos JH, Alderson AL, Schneider JJ, Weed W, Blankenship J, et al. UFOV performance and driving ability following traumatic brain injury. *Brain Inj* 2006;**20**:455–61.
25. Myers RS, Ball KK, Kalina TD, Roth DL, Goode KT. Relation of useful field of view and other screening tests to on-road driving performance. *Percept Mot Skills* 2000;**91**:279–90.
26. Crundall D, Underwood G, Chapman P. Driving experience and the functional field of view. *Perception* 1999;**28**:1075–87.
27. Ball K, Owlsey C, Sloane ME, Roenker DL, Bruni JR. Visual attention problems as a predictor of vehicle crashes in older drivers. *Invest Ophthalmol Vis Sci* 1993;**34**:3110–23.
28. Okonkwo OC, Crowe M, Wasley VG, Ball K. Visual attention and self-regulation of driving among older adults. *Int Psycho Geriatr* 2008;**20**:162–73.
29. Ball K, Owsley C. The useful field of view test: a new technique for evaluating age-related declines in visual function. *J Am Optom Assoc* 1993;**64**:71–9.
30. Wilkinson ME. Low vision rehabilitation – who, when and how. *Saudi J Ophthalmol* 2005;**19**(2):117–24.
31. Silver JH, Gould ES, Irvine D, Cullinan TR. Visual acuity at home and in eye clinics. *Trans Ophthalmol Soc UK* 1978;**98**:262–6.
32. Wilkinson ME. Driving with a visual impairment. *J Am Soc Ophthal Registered Nurses, Insight* 1998;**23**(2):48–52.
33. Johnson CA, Wilkinson ME. Vision and driving: the United States. *Neuro-ophthalmol* 2010;**30**:170–6.
34. Classe JG. Clinicolegal aspects of practice. *Southern J Optom* 1986.
35. Foubister V. To tell or not—physician's dilemma about patient's who drive impaired. *Am Med News* 1999;**November 22–29**:8–9.
36. Physician's guide to assessing and counseling of older drivers. 2nd ed. <www.ama-assn.org/ama1/pub/upload/mm/433/older-drivers-guide.pdf> accessed on 2 May 2013.
37. Living with Low Vision. <https://nei.nih.gov/nehep/programs/lowvision/> accessed on 11 Marh 2017.
38. Ganesh S, Sethi S, Srivastav S, Chaudhary A, Arora P. Impact of low vision rehabiltation on functional vision performance of children with visual impairment. *Oman J Ophthalmol* 2013;**6**(3):170–4.
39. Lamoureux EL, Pallant JF, Pesudovs K, Rees G, Hassell JB, Keeffe JE. The effectiveness of low-vision rehabilitation on participation in daily living and quality of life. *Inv Ophth Vis Sci* 2007;**48**:1476–82. https://doi.org/10.1167/iovs.06-0610.
40. Stelmack JA, Tang XC, Wei Y, Massof RW, for the Low-Vision Intervention Trial Study Group, et al. The effectiveness of low-vision rehabilitation in 2 cohorts derived from the veterans affairs low-vision intervention trial. *Arch Ophthalmol* 2012;**130**(9):1162–8. https://doi.org/10.1001/archophthalmol.2012.1820.