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Helping Older Adults With Low Vision to be Health Literate

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Low vision develops in older adults at a time when they are experiencing other chronic diseases that impair ability to engage in activities. Chronic diseases are conditions that last at least one year, limit the person's ability to engage in daily activities, and/or require continuing medical care.[1] Two-thirds of older adults with low vision also have at least one other chronic medical condition that limits the ability to complete activities of daily living.[2,3] Common chronic diseases in older adults include cardiovascular disease, arthritis and hearing loss.[3] Low vision has been found to interact synergistically with chronic conditions to increase the risk of disability and lower quality of life.[3-5] For example, Fried et al.[6] found that the combination of low vision and arthritis caused nearly a twofold greater risk of mobility impairment, although neither condition alone produced a statistically significant increase in risk.

Older adults with age-related eye disease must also manage their eye disease to reduce the risk of further vision loss. Each of the three prevalent age-related eye diseases requires a specific knowledge set and skills to successfully manage the condition. For example, AMD is now considered a disease of circulation with the same modifiable risk factors as heart disease.[7] Self-management of AMD focuses on engaging in the lifestyle changes recommended for heart disease, including regulation of diet, blood pressure and exercise levels, and smoking cessation.[7-12] Persons with diabetes must maintain stable blood glucose and blood pressure levels to reduce onset and severity of diabetic retinopathy.[13] Persons with glaucoma often must adhere to a complex daily medication regimen that includes multiple different eye

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ABOUT ENVISION UNIVERSITY

The mission of Envision University is to provide multi-disciplinary continuing education and research opportunities for low vision rehabilitation professionals, establishing best practices to ensure continued research and clinical care for individuals who are blind or visually impaired. Our promise is to collaborate with vision rehabilitation and research professionals to provide relevant multi-disciplinary continuing education and research opportunities that address practice gaps in current standards of care and research.

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Helping Older Adults With Low Vision to be Health Literate ... continued from front page

drops to control the disease.[14]

Older visually impaired adults who adhere to medication regimens, exercise regularly, eat a healthy diet, lose weight, and lower blood pressure and blood glucose levels improve the odds that they will be able to preserve vision and functional ability as they age. Health care providers and public health officials have begun to focus on the relationship between healthy eyes and a healthy body and the importance of reducing modifiable risk factors. The CDC Vision Health Initiative in the publication, *Improving the Nation's Vision Health: A Coordinated Public Health Approach*,[15] urged health care providers to associate vision health with management of diabetes and high blood pressure and cardiovascular disease.

LOW VISION AND FUNCTIONAL HEALTH LITERACY

Persons with chronic diseases are taught how to make lifestyle changes to *self-manage* symptoms, reduce risk factors and limit disability.[16] Self-management requires an informed patient capable of recognizing symptoms, managing medications and navigating the health care system to obtain needed services.[16] Health literacy, especially *functional* health literacy, is a key component of the self-management process. Functional health literacy is dependent on reading and requires the person to be able to read prose (e.g. instructions), locate and use information in documents (e.g. graphs and forms) and use numbers (e.g. identify correct dosages).[17] Health care providers rely heavily on printed materials to educate persons about their health and self-management procedures leading to questions about how well patients with limited reading ability benefit from this instruction.[18]

Beverly, Bath and Booth[19] completed a systematic literature review to identify the health information needs of persons with visual impairment. They found that the

needs of visually impaired persons varied little from those without vision loss. People with vision impairment needed health education on how to manage co-morbid conditions as well as information about their specific eye condition. They wanted this information so that they could engage in effective self-management and participate fully in the health decision-making process. Like other health consumers, they wanted the information delivered to them in "plain English."

Older adults with low vision have reported two primary barriers to receiving adequate education and instructions from health care providers: (1) poor and rushed communication including the perception that the health care provider did not think that they could participate in their health care, and (2) receiving health materials in inaccessible formats.[20-28] Persons with vision impairment are more likely than those with other disabilities to report that physicians are hurrying them during medical encounters.[28] They also report difficulty keeping up with the "fast pace" of encounters with rehabilitation professionals.[23] Visually impaired older adults reported frequently

encountering health care providers who did not understand their limited ability to read print or watch videos and demonstrations; this hindered their understanding of health issues and their ability to participate fully in the self-management process.[20,24,28]

Significant efforts have been made to train health care providers to recognize the signs of low literacy in patient interactions.[29] However, little has been done to help health care providers understand the effect of low vision on interactions or recognize the signs of low vision in older patients.

Low vision presents a unique challenge to interactions between the provider and patient because it is a hidden disability.[30] The average older adult with low vision looks just like the average older adult without low vision. As a result, when the behavior changes that characterize low vision are observed in older adults, they are often attributed to aging instead of vision loss.[31] If the verbal instructions are vague (e.g. "look over there" or "see this number") or given quickly, the visually impaired older adult may miss the point. To the health care provider, the person often appears slow and somewhat confused, two behaviors associated with aging. In the rushed environment of the office visit, rather than take the health care provider's time, visually impaired older adults often just accept brochures and printed instructions and hope that they can make sense out of the materials when they get home.

ACCESSIBLE HEALTH EDUCATION FOR PERSONS WITH VISION IMPAIRMENT

Vision rehabilitation professionals can help their patients by educating other health care providers on how to instruct and interact with persons with vision impairment. Qualitative studies conducted with visually impaired adults using either a focus group or interview format have suggested guidelines to facilitate communication during patient encounters.[20-28] The take home message of these studies is the importance of creating an accepting environment that accommodates the person's vision impairment without making it the focus of the encounter. Health care staff should understand how visual impairment might affect the person's ability to provide and receive health information. They should acknowledge the person's vision loss by offering some of the simple accommodations listed below.

GUIDELINES FOR PATIENT ENCOUNTERS

1. *Ask the patient about how he/she manages health and medical conditions.* Harrison, Mackert and Watkin[26] found that communication was often hampered by two assumptions on the part of the provider: (1) the patient could not see well enough to manage medications or use devices to perform self-management and (2) the patient had a personal caregiver to help manage health conditions. In reality, older adults with low vision have varied visual abilities and many older adults with low vision live in their own homes without family support, and are responsible for managing their health conditions.[32,33]

2. *Ask the patient if he/she has difficulty seeing printed materials.* Visually impaired older adults often don't inform health care providers about their limitations for various reasons. They may associate vision loss with growing older and feel it is inappropriate to bring attention to it by using magnifying devices in public places.[30] They may also want to avoid unwanted sympathy,[34] being defined by their inabilities[34] or making vision impairment the focus of the health encounter.[20, 26]

Table 1

Suggestions for Increasing the Visibility of Printed Materials

COMPONENT	RECOMMENDATION
Print size	16-18 point
Font	• Avoid complicated, fancy or italic font styles. • Sans serif (block) print is generally recommended over serif type fonts. Examples include: Arial, Courier, Tahoma, Lucinda or Helvetica
Letter spacing	• Avoid condensed fonts; look for fonts with good spacing between letters.
Case	• Combination of uppercase and lowercase words is more legible than all uppercase words.
Contrast	• White on black may be more legible, but black on white is more acceptable.
Line spacing	• A minimum of 1.25 spaces between lines or 25-30% of the point size
Headings	• Larger and bolder to set them apart from the text
Margins	• Wide margins are best; at least 1 inch.
Style	• No columns • No divided words • Use extra white space to separate sections.
Graphics	• High-quality full color or black line art • Avoid shaded drawings.
Paper finish	• Matte finish; avoid glossy paper • White, ivory, cream or yellow colors; avoid dark-colored paper

Source: Kitchel E. *APH research: Large print guidelines.* http://www.aph.org/edresearch/lpguide.htm

Reprinted with permission from: Jones GC, Crews JE, Roberts D, Warren M, Barstow EA, Riddering AT (2011). Living successfully with low vision. In Warren M, Barstow EA (Eds.). Occupational therapy interventions for adults with low vision (pp.359-402). Bethesda MD: American Occupational Therapy Association.

3. *Offer accommodations to assist the person to use vision more effectively.* Visually impaired adults who participated in a focus group on how to improve encounters with health care providers identified several important accommodations. These included providing large-print appointment cards, allowing patients to audiotape visits – especially instructions on how to take medications or complete procedures – and offering health education materials in alternate formats including large print, Braille and audiotape.[24] The group also suggested that office personnel provide assistance to complete intake forms in a separate area away from the front desk to ensure the person's privacy, or complete the paperwork over the phone prior to the appointment.

4. *Verbally describe all information that is presented visually.* When using audiovisual teaching aids (e.g. models, videos, demonstrations), a verbal explanation should accompany all essential information provided visually.[24]

5. *Avoid using gestures.* Persons with vision impairment often miss subtle visual cues like gestures.[24]

Health care providers should announce themselves as they enter or exit a room and tell the person when the appointment is over. They should also inform the person which way to turn when exiting a room alone or when following the health care provider to another room.[26]

6. *Use precise and descriptive language to explain procedures.* Health care providers should use precise language and avoid medical jargon and technical terms.[24,25] Older adults with age-related eye disease who spent the majority of their lives as sighted persons have a rich store of visual memory available to them. Health care providers can tap into those memories and facilitate learning by telling the person to "shake the bottle like a baby rattle" or "move your arms like you are kneading bread."

7. *Slow down the pace of the encounter.* The teach back method, which is a strategy to help ensure that patients understand instructions,[24] has the added benefit of slowing down the patient encounter. To use this method, the health care provider asks the patient to repeat back or demonstrate the instructions or information provided during the session.[34] For example, the patient repeats back the instructions for operating a medical device like a glucose monitor.

8. *Assist the person with transportation.* Focus groups identified staff assistance with transportation as an essential accommodation for older patients without family or friends who could accompany them to appointments.[22,24,26] Assistance was needed even for persons using a door-to-door transit service for persons with disabilities. Staff should inquire about transportation needs when scheduling the patient and be prepared to provide assistance on the day of the appointment.[25]

Table 2

Suggestions for Improving Text Readability

COMPONENT	RECOMMENDATIONS
Word choices	• Use commonplace everyday words and replace words with multiple syllables with simpler alternatives. For example, use "must" instead of "shall" and "do" instead of "perform." A extensive list of simple words and phrases can be found at **www.plainlanguage.gov.** • Use personal pronouns such as "you." • Use action verbs. • Use the present tense. • Avoid undefined technical words and medical jargon. • Use positive rather than negative words (for example "do" instead of "don't"). • Avoid abbreviations and acronyms.
Sentence and paragraph structure	• Use short sentences (15 words or less). • Keep paragraphs short (6 lines or less). • Avoid semicolons (easily missed by a client with low vision). • Avoid double negatives; instead of "don't forget to turn on the light in your magnifier," use "turn on the light in your magnifier." • Limit each paragraph to one main idea. • Include only what the reader needs to know. • Provide examples for difficult concepts (such as eccentric viewing). • Be direct; instead of "it's a good idea to try to keep cupboard doors shut to avoid accidently running into them and hitting your head," say "keep cupboard doors shut." • Put context first by stating the action needed followed by descriptive information. For example, instead of "to avoid straining your eyes, rest every 15 minutes when you read," use "rest every 15 minutes when you read to avoid straining your eyes."

Source: *Pfizer Clear Communication Initiative Principles for Clear Health Communication*, 2nd ed. http://www.pfizerhealthliteracy.com/asset/pdf/PfizerPrinciples.pdf

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PRINTED HEALTH MATERIALS

Persons with visual impairment report that they commonly receive health materials in inaccessible formats or are offered only part of the materials in an accessible format.[19,20,22,24,25,26] For example, the person is given a large print pamphlet on their health condition and a separate sheet of referral information in standard print.[25] Because persons with vision impairment have diverse reading capabilities, health information should be available in several formats.

When preparing written materials, health care providers should consider the reading grade level of the target population and the readability level of the text. Most American adults with high school diplomas read at the 8th grade reading level, and a quarter of Americans read at the 5th grade level.[36] Readability level refers to the ease with which the text can be read and depends on the number and types of words in sentences. Most health information has a readability of 10th grade level or higher, which exceeds the skills of the average high school graduate.[17,36,37]

INCREASING THE VISIBILITY OF PRINTED MATERIALS

Print visibility can be increased using a simple set of guidelines to enhance the quality of the typeface and formatting of the printed materials. Table 1 summarizes guidelines compiled from the American Printing House for the Blind Inc. (APH) website.[38]

INCREASING THE READABILITY OF PRINT MATERIALS

Persons with low vision read more slowly than normally sighted readers and must allocate more attentional resources. This added effort can reduce reading speed and strain comprehension.[39] The adage "less is more" applies when preparing readable documents for low vision readers. Writers should aim to convey information using as few words and sentences as possible. Guidelines developed for persons with low literacy provide a valuable resource for developing readable materials for persons with low vision. Several national organizations have launched initiatives to help health care professionals improve the readability of printed health information for patients with low literacy. Table 2 includes suggestions compiled from the *Pfizer Principles for Clear Health Communication, 2nd Edition*[40] and the APH website.[38]

CONCLUSION

Persons with low vision are less likely to attain adequate health literacy if they believe that their vision loss creates an insurmountable barrier to their ability to self-manage their health conditions.[26] Health care professionals can facilitate health literacy by understanding how vision impairment hinders reading performance and patient encounters and making modifications to how health education is delivered.

References:

1. Johns Hopkins University Partnership for Solutions. Chronic conditions: Making the case for ongoing care. 2004. Available from http://www.partnershipforsolutions.org/ Accessed May 24, 2012.
2. Brody BL, Gamst AC, Williams RA, Smith AR, Lau PW, Dolnak D et al. Depression, visual acuity comorbidity and disability associated with age-related macular degeneration. *Ophthalmology* 2001;108(10): 1893-1901.
3. Crews JE, Jones GC, Kim JH. The effects of comorbid conditions among older people with vision loss. *J Vis Imp Blind* 2006;100: 824-848.
4. Vogeli C, Shields AE, Lee TA, Gibson TB, Marder WD, Weiss KB, Blumenthal D. Multiple chronic conditions: Prevalence, health consequences, and implications for quality, care management, and costs. *J Gen Intern Med* 2007;22 Suppl 3, 391-395.
5. van Nispen RM, de Boer MR, Hoeijmakers JG, Ringens PJ, van Rens GH. Co-morbidity and visual acuity are risk factors for health-related quality of life decline: five-month follow-up EQ-5D data of visually impaired older patients. *Health Qual Life Outcomes* 2009 Feb 25;7:18.
6. Fried LP, Bandeen-Roche K, Kasper JD, Guralnik, JM. Association of comorbidity with disability in older women: The women's health and aging study. *J Clin Epi* 1999; 52(1):27-37.
7. Anand R, Bressler SB, Davis MD, Ferris FL, Klein R. Risk factors associated with age-related macular degeneration: A case-control study in the age-related eye disease study: AREDS Report Number 3. *Ophthalmology* 2000;107(12):2224-2232.
8. Chiu CJ, Milton RC, Gensler G, Taylor A. Association between dietary glycemic index and age-related macular degeneration in nondiabetic participants in the Age-Related Eye Disease Study. *Am J Clin Nutr* 2007;86(1):180-188.
9. Klein R, Klein BEK, Knudtson MD, Meuer SM, Swift M, Gangnon RE. Fifteen-year cumulative incidence of age-related macular degeneration: The Beaver Dam Eye Study. *Ophthalmology* 2007;114(2), 253-262.
10. Seddon JM, Cote J, Davis N, Rosner B. Progression of age-related macular degeneration: Association with body mass index, waist circumference, and waist-hip ratio. *Arch Ophthalmol* 2003;121(6), 785-792.
11. Thornton J, Edwards R, Mitchell P, Harrison RA, Buchan I, Kelly SP. Smoking and age-related macular degeneration: A review of association. *Eye* 2005;19(9): 935-944.
12. Wong T, Mitchell P. The eye in hypertension. *Lancet* 2007;369: 425-435.
13. United Kingdom Prospective Diabetes Study Group. Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). *Lancet* 1998;352(9131):837-853.
14. Muir KW, Santiago-Turla C, Stinnett SS, Herndon LW, Allingham RR, Challa P, Lee PP. Health literacy and adherence to glaucoma therapy. *Am J Ophthalmol* 2006;142(2), 223-226.
15. Centers for Disease Control and Prevention. Improving the nation's vision health: A coordinated public health approach. 2007. Available from http://www.cdc.gov/visionhealth/pdf/improving_nations_vision_health.pdf Accessed May 24, 2012.
16. Clark NM. Management of chronic disease by patients. *Annu Rev Public Health* 2003;24:289-313.
17. Rudd RE. Health literacy skills of U.S. Adults. *Am J Health Behav* 2007; 31(Supplement 1): S8-S18.
18. Parker R. Health literacy: A challenge for American patients and their health care providers. *Health Promot Int* 2000;15(4): 278-283.
19. Beverley CA, Bath PA, Booth A. Health information needs of visually impaired people: A systematic review of the literature. *Health Soc Care Community* 2004;12(1):1-24.
20. O'Day BL, Killeen M, Lezzoni LI. Improving health care experiences of persons who are blind or have low vision: Suggestions from focus groups. *Am J Med Qual* 2004;19(5):193-200.
21. Pollard TL, Simpson JA, Lamoureux EL, Keefee JE. Barriers to accessing low vision services. *Ophthalmic Physio Opt* 2003;23(4): 321-327.
22. Sharts-Hopko NC, Smeltzer S, Ott BB, Zimmerman V, Duffin J. Healthcare experiences of women with vision impairment. *Clin Nurse Spec* 2010;24(3):149-153.
23. Whitson HE, Cousins SW, Burchett BM, Hybels CF, Pieper CF, Cohen HJ. The combined effect of visual impairment and cognitive impairment on disability in older people. *J Am Geriatr Soc* 2007;55(6):885-891.
24. Williams AS. A focus group study of accessibility and related psychosocial issues in diabetes education for people with visual impairment. *Diabetes Educ* 2002;28(6): 999-1008.
25. Cupples ME, Hart PM, Johnston A, Jackson AJ. Improving healthcare access for people with visual impairment and blindness. *BMJ* 2012; 344. http://www.bmj.com/content/344/bmj.e542?view=long&pmid=22290101 Accessed May 24, 2012.
26. Harrison TC, Mackert M, Watkins C. Health literacy issues among women with visual impairments. *Res Gerontol Nurs* 2010; 3(1): 49-60.
27. Rees G, Saw CL, Lamoureux EL, Keeffe JE. Self-management programs for adults with low vision: Needs and challenges. *Patient Ed Couns* 2006;69:39-46.
28. Iezzoni LI, Davis RB, Soukup J, O'Day B. Satisfaction with quality and access to health care among people with disabling conditions. *Int J Qual Health Care* 2002;14(5):369-381.
29. Nielsen-Bohlman L, Panzer AM, Kindig DA. Health literacy: A prescription to end confusion. Washington DC: National Academies Press; 2004.
30. Mogk M. The difference that age makes: Cultural factors that shape older adult's response to age-related macular degeneration. *J Vis Imp Blind* 2008;102:581-590.
31. Fletcher DC, Shindell S, Hindman T, Schaffrath M. Low vision rehabilitation. Finding capable people behind damaged eyeballs. *M West J Med* 1991;154(5):554-556.
32. Elliot DB, Trukolo-Ilic M, Strong JG, Pace R, Plotkin R, Bevers P. Demographic characteristics of the vision-disabled elderly. *Invest Ophthalmol Vis Sci* 1997;38(12): 2566-2575.
33. Sloan FA, Ostermann J, Brown DS, Lee PP. Effect of changes in self-reported vision on cognitive, affective, and function status and living arrangements among the elderly. *Am J Ophthalmol* 2005;140(4): 618-627.
34. Moore LW, Miller M. Older men's experiences of living with severe visual impairment. *J Adv Nurs* 2003; 43:10–18.
35. Nath C. Literacy and diabetes self-management. *Am J Nurs* 2007;107(6 Supplement): 43-49.
36. Berkman ND, DeWalt DA, Pignone MP, Sheridan SL, Lohr KN, Lux L, Bonito AJ. Literacy and health outcomes: Summary. Rockville MD: Agency for Healthcare Research and Quality Evidence Report Summaries. 2004. Available from http://www.ncbi.nlm.nih.gov/books/NBK11942/ Accessed May 24, 2012.
37. Cutilli CC. Health literacy in the geriatric patient: An integrative review of the literature. *Orthop Nurs* 2007; 26(1): 43-48.
38. American Printing House for the Blind. APH guidelines for print document design[APH website n.d.] Available from http://www.aph.org/accessible-media-guidelines/ Accessed May 24, 2012.
39. Legge GE. Psychophysics of reading in normal and low vision. Mahwah NJ: Lawrence Erlbaum Associates Inc; 2007.
40. Doak LG, Doak, CC (eds.). *Pfizer Principles for Clear Health Communication, 2nd ed.* 2008 Available from: http://www.pfizerhealthliteracy.com/asset/pdf/PfizerPrinciples.pdf Accessed May 24, 2012.

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Diabetic Retinopathy Screening in England

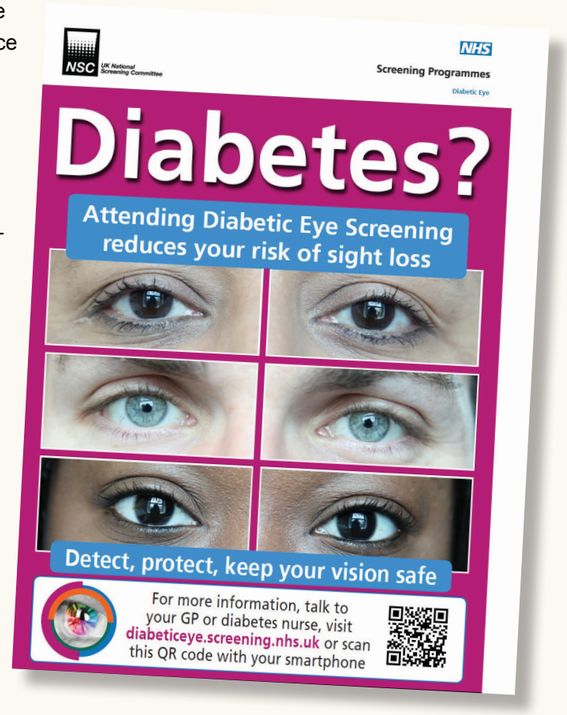
Phil Gardner, Retinal Screener

Diabetic retinopathy (DR) is the leading cause of sight loss amongst the working age population, with an estimated 93 million people worldwide currently living with the condition.[1] DR is asymptomatic until it is in its advanced stages, and without some form of screening, people with diabetes are at risk of serious, and possibly irreversible, vision loss.

A reduction in diabetes-related blindness of at least one-third was declared a primary objective for Europe in the 1989 St. Vincent Declaration, and a number of reports subsequently supported the introduction of a national screening program for sight-threatening DR.[2,3,4] One such report was commissioned by the United Kingdom's National Screening Committee in 2000,[5] and in 2002 the National Institute for Clinic Excellence (NICE) guidance on retinopathy screening and early management recommended participation in a formal screening program.[6] The following year, a study published by the Royal Society of Medicine reviewed the rationale and supporting evidence for the development of such a screening program, concluding that a service based on digital retinal photography should be established.[7]

Implementation of a national screening program for DR in England was announced by the Department of Health in 2003,[8] with the stated aim of significantly reducing the prevalence of sight loss through the prompt identification and effective treatment of the disease. Its target was to offer screening to at least 80% of people with diabetes in the first three years. Funded entirely by the National Health Service (NHS), the program was implemented across England between 2003 and early 2008. This was the first time a population-based screening program had been introduced on such a large scale.[9]

Ten years later, screening is now delivered by more than 80 local programs, which together form the NHS Diabetic Eye Screening Programme. They vary in size and precise method of delivery, but general standards and criteria are uniform across the country, and further efforts are being made to move each local program to a common pathway by the spring of 2013.



The program in which I work, based in the south of England, is responsible for a screening population of more than 31,000 people, each of whom has been identified as having diabetes by their general practitioner (GP). Our area covers more than 100 GP practices, whose responsibility it is to refer diabetic patients for screening in the first instance, after which they are managed independently within the program.

Screening is offered on an annual basis and takes place, as far as is practical, within the community. In addition to local hospitals, screening clinics are held in GP surgeries, health centers and, in certain programs, optometry practices and community centers. Some programs provide mobile screening via the use of vans equipped with fundus cameras, computers, and everything required to run a clinic. The intention is to bring the screening

UK RETINOPATHY GRADING STANDARDS

Retinopathy (R)		
Level 0	None	
Level 1	Background	microaneurysm(s); retinal haemorrhage(s) ± any exudate not within the definition of maculopathy
Level 2	Pre-proliferative	venous beading; venous loop or reduplication; intraretinal microvascular abnormality (IRMA); multiple deep, round or blot haemorrhages
Level 3	Proliferative	new vessels on disc (NVD); new vessels elsewhere (NVE); pre-retinal or vitreous haemorrhage; pre-retinal fibrosis ± tractional retinal detachment
Maculopathy (M)		exudate within 1 disc diameter (DD) of the center of the fovea; circinate or group of exudates within the macula; retinal thickening within 1DD of the center of the fovea (if stereo available); any microaneurysm or haemorrhage within 1DD of the center of the fovea only if associated with a best VA of ≤ 6/12 (if no stereo)
Photocoagulation (P)		evidence of focal/grid laser to macula; evidence of peripheral scatter laser
Unclassifiable (U)		Unobtainable/ungradeable

service to the people as much as possible. In coastal areas, this may even involve visiting island communities to deliver screening. Each year, for example, the Cornwall program in the southwest of England flies a team of screeners to the Isles of Scilly, 28 miles from the British mainland, to provide screening to the local population.

At the screening appointment, the patient's visual acuity is tested and their best corrected visual acuity (using spectacles or pinholes, if necessary) is recorded. The pupils are then dilated, most commonly with Tropicamide 1% eye drops. Phenylephrine 2.5% is occasionally used for those patients with a history of poor dilation. Having allowed sufficient time for the pupils to dilate, two photographs are taken of each eye. These are 45 degree fields of the retina, one centered on the fovea, the other on the optic disc. Anterior segment views may also be taken, for example to document the presence of cataracts.

Following image capture, the photographs are transferred to a central server for assessment by a qualified retinopathy grader. Some programs employ a combination of screeners and graders, while others retain staff qualified to do both, with the individual's time divided between clinics and grading. My own view is that it's useful for staff to be trained in both aspects of screening, as one inevitably informs the other, resulting in an improvement to overall knowledge and an increased understanding of the service.

The images are assessed for retinopathy according to a set of nationally defined grading standards (see fig 1), and each eye is given a grade from R0 to R3, where R0 indicates no disease, R1 is background retinopathy, R2 is pre-proliferative and R3 means proliferative disease. In addition to a retinopathy (R) grade, each eye is checked for signs of diabetic macular edema (DME), and given a grade of either M0 for no maculopathy, or M1, meaning markers for DME are present. Since fundus photography gives only a two-dimensional view, it is not possible to establish the presence of DME with complete certainty through routine screening alone. Patients who receive a grade of M1 are considered to have markers which may indicate the presence of DME, and are then referred on for further investigation, often involving an OCT scan.

The outcome for each patient depends on the screening result they receive. Currently, patients who are graded as R0 or R1, with a grade of M0 in both eyes, will be screened on an annual basis. This policy is currently under review, however, and a study published this year has concluded that it is both safe and cost-effective to screen patients with R0 every two years, rather than annually.[10] Patients receiving a grade of R2 or M1 are routinely referred to the local Hospital Eye Service (HES), and those graded as R3 are given an urgent referral. There are plans to introduce an additional grade of R3S, for those patients with stable proliferative disease which does not require further treatment. These patients would continue to be screened annually.

Patients found to have proliferative disease will be seen by an ophthalmologist, usually within two weeks, with the aim that more than 90% will receive laser treatment within four weeks of their original screening appointment.

Increasingly, patients given a grade of R2 or M1 are being passed into "virtual" assessment clinics, known as Ophthalmic Photographic Diabetic Review (OPDR) clinics. Here, the patient's photographs will be reviewed by an ophthalmologist who will make a decision on the outcome for that patient, either referring them on to the HES, placing them back into the screening program, or monitoring them more closely from within the OPDR clinic. Often referred to as a surveillance clinic, this form of OPDR is expected to become standard practice across England by 2013, and will involve the use of slit-lamp biomicroscopy (SLB) and OCT scans in addition to retinal photography, making it particularly useful for M1 patients. Maculopathy is more prevalent in type 2 diabetics than type 1,[11] and with type 2 diabetes on the rise, surveillance clinics are set to become an increasingly significant part of the screening program.

Patients whose photographs are deemed ungradeable (often due to the presence of cataracts or other pathology) may also be referred into a surveillance clinic where they can be examined using SLB.

Screening on such a large scale requires robust quality assurance at every stage, and this is provided in a number of ways. All staff, whether screeners, graders or administrators, are required to complete relevant accreditation units from the City & Guilds Diploma in Diabetic Retinopathy Screening. Only accredited staff are permitted to grade patients' photographs, and when disease is deemed to be present, the images will be assessed by a second qualified grader to ensure the accuracy of that result. Standards of grading are continually monitored via the use of a national "Test & Training" website (http://www.drseqa.org/), which requires graders to assess 20 image sets each month, with the results recorded and compared both locally and nationally.

(continued on page 13)

Phil Gardner is a screener and grader with the Brighton & Sussex Diabetic Eye Screening Service, part of the UK national program. He holds a Level 3 Diploma in Diabetic Retinopathy Screening, and is a member of the British Association for Retinal Screening. He runs the websites Diabetic-Retinopathy.org and RetinalScreener.com.

References:

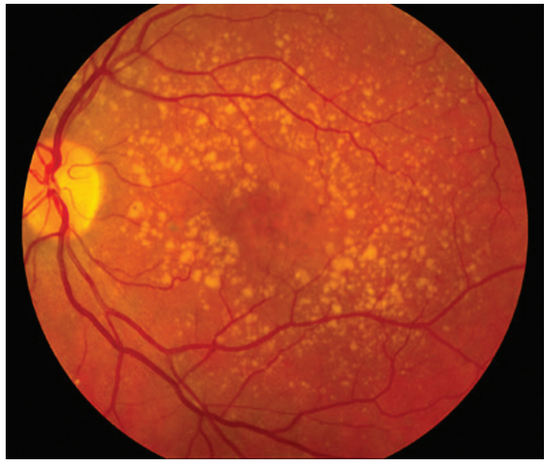
1. Yau J, Rogers S, Kawasaki R, et al. Global Prevalence and Major Risk Factors of Diabetic Retinopathy. *Diabetes Care* published ahead of print February 1, 2012, doi:10.2337/dc11-1909
2. Rohan TE, Frost CD, Wald NJ. Prevention of blindness by screening for diabetic retinopathy: a quantitative assessment. *BMJ* 1989;299:1198-201
3. Bachmann M, Nelson SJ. Screening for Diabetic Retinopathy: A Quantitative Overview of the Evidence, Applied to the Populations of Health Authorities and Boards. Bristol: Health Care Evaluation Unit, University of Bristol, 1996:1-46
4. Hutchinson A, McIntosh A, Peters J, et al. Effectiveness of screening and monitoring tests for diabetic retinopathy – a systematic review. *Diabet Med* 2000;17:495-506
5. Gillow JT, Gray JA. The National Screening Committee review of diabetic retinopathy screening. *Eye* 2001;15:1-2.
6. NICE. Inherited Clinical Guideline E. Management of type 2 diabetes: Retinopathy – screening and early management. London: National Institute for Clinical Excellence, 2002.
7. Squirrell D, Talbot F. Screening for Diabetic Retinopathy. *J R Soc Med* 2003 June; 96(6): 273-276.
8. Department of Health. National Service Framework for Diabetes: Delivery Strategy. London, January 2003.
9. Department of Health. Diabetic Retinopathy Screening Statement. London, April 2008.
10. Chalk D, Pitt M, Vaidya B, et al. Can the retinal screening interval be safely increased to 2 years for type 2 diabetic patients without retinopathy? *Diabetes Care* published ahead of print May 7, 2012, doi:10.2337/dc11-2282.
11. Zander E, Herfurth S, Bohl B, et al. Maculopathy in patients with Diabetes Mellitus type 1 and type 2: associations with risk factors. *Br J Ophthalmol* 2000;84:871 876 doi:10.1136/bjo.84.8.871.
12. Cormach TG, Grant B, MacDonald MJ, Steel J, Campbell IW. Incidence of blindness due to diabetic eye disease in file 1990–9. *Br J Ophthalmol* 2001;85(3):354-6
13. Stefansson E, Bek T, Porta M, Larsen N, Kristinsson JK, Agardh E.Screening and prevention of diabetic blindness. *Acta Ophthalmol Scand* 2000;78:374-85

Handheld Shape Discrimination Hyperacuity Test on a Mobile Device for Remote Monitoring of Visual Function in Maculopathy

Yi-Zhong Wang, PhD

PURPOSE

Patients with maculopathy often report seeing distortion in visual targets. Given the inhomogeneous nature of abnormal changes of retinal morphology in maculopathy, we have hypothesized that it may be more difficult for patients to perform visual tasks that require global integration of visual stimuli over a large retinal area than to perform a localized task such as visual acuity. A global shape discrimination hyperacuity (SDH) test was developed to test this hypothesis. The feasibility of using a handheld version (hSDH) of this test implemented on a mobile (iOS) platform for the use by patients for remote monitoring of their visual function was also assessed.



National Eye Institute, National Institutes of Health.

METHODS

The shape discrimination test consists of perfect and distorted circular contours as visual stimuli. The amount of distortion from circularity is generated by modulating the radius of a circle sinusoidally. In this shape discrimination test, the threshold to be determined is the minimal radial modulation amplitude that allows a subject to distinguish a distorted circular contour from a perfect one. Normal threshold for detecting such radial modulation is typically in the hyperacuity range. An important feature about this task is that the optimal performance of this shape discrimination involves global visual integration. By measuring the threshold for detecting radial modulation, patients' ability to detect visual distortion and their ability to integrate visual information can be quantified. A cross-sectional study was conducted to compare the hSDH test with a previously established desktop PC-based SDH testing protocol and to assess the effect of disease severity on hSDH. A six-month pilot longitudinal study was conducted with 46 patients, 37 with diabetic retinopathy (DR) and nine with age-related macular degeneration (AMD), who were asked to take a hSDH test at least once a week at home.

RESULTS

While it was much less affected by normal aging when compared with visual acuity and contrast sensitivity, SDH was significantly reduced in patients with DR, AMD, and Stargardt macular dystrophy, even though the patients still had normal visual acuity. The hSDH results obtained with the iPod Touch testing protocol were highly correlated with those obtained with the desktop testing protocol ($r=0.88$, $p<0.0001$). One-way ANOVA analyses indicated that the mean hSDH of the eyes with advanced AMD (n=16) or with severe to very severe non-proliferative DR (NPDR) (n=12) was significantly worse than that of the eyes with high-risk early AMD (n=11) or with mild-to-moderate NPDR (n=11), respectively ($p<0.0001$). During the six-month study, the average weekly compliance rate of the patients who completed the study (n=36) was 0.84±0.20SD, and the average number of tests taken was 1.7±1.2SD per week. For the eyes with no clinically significant change of disease condition over six months (n=30), the average standard deviation of hSDH measurements was 0.10 logMAR±0.028SD.

CONCLUSIONS

These results showed that the portable SDH testing protocol is readily accessible, intuitive to use, low-cost, comparable to the established desktop PC-based testing protocol, and sensitive to macular diseases. It potentially provides patients with maculopathy a new tool to monitor their visual function changes outside of the clinical setting.

Yi-Zhong Wang, PhD, is a research scientist at Retina Foundation of Southwest and has over 20 years of research experience and skills in visual psychophysics, visual optics, computational modeling, computer programming, and development of new visual function tests. He has extensive experience working with seniors and patients with macular degeneration, diabetic retinopathy and Amblyopia.

Commercial Relationships: Vital Art and Science, Inc (Personal Financial Relationship, Patent) Support: NIH Grant 1R43EY020016-01

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Diabetic Retinopathy Screening in England ... continued from page 11

In addition, each program is subjected to an External Quality Assurance visit every three years using a peer review system, whereby a team made up of professionals from other programs assess each aspect of their service, ensuring that standards are being met and making recommendations for improvement.

There are currently 2.5 million people identified as having diabetes by GP practices in England. Based on figures from a 2001 study,[12] it is estimated that in England alone, 5,250 people are at risk of losing their sight to diabetic retinopathy, and that DR could cause 1,600 new cases of blindness every year.

At its launch in 2003, the stated aim of the English National Diabetic Eye Screening Programme was to reduce the incidence of blindness due to DR by 30%. This being the case, it means that more than 500 people a year are being saved from permanent sight loss. In reality, it may be many more. A study in Iceland[13] demonstrated that screening for DR had reduced the prevalence of blindness due to diabetes by around 80%. Accurate figures for England are not currently available, but there is no doubt that the national screening program has succeeded in saving many thousands of people from permanent blindness.

A Clinical Profile of Diabetic Patients With Visual Impairment

William L. Park, OD, FAAO; Shannon Riley, MA

INTRODUCTION

Diabetic retinopathy is one of the leading causes of blindness in the United States and diabetes is the leading cause of new cases of blindness among adults 20-74 years old. As one of the most common causes of vision loss in the US, diabetic retinopathy has an estimated prevalence among patients of 40.3% for any degree of retinopathy and an 8.2% incidence of severe retinopathy. Manifestations of diabetic retinopathy are most often asymptomatic until vision loss occurs; therefore, it is one of the most serious and under-recognized complications of diabetes.[1-2] Even if retinopathy doesn't progress into full blindness, mild visual impairments can significantly reduce one's functional status.

Diabetes is a progressive disease with risks that include impaired range of motion, increased risk of falls, peripheral neuropathy and compromised blood flow, along with decreased wound healing (and potential amputation) – all associated with neurological and cardiovascular disease.[1-3] Currently, the CDC estimates there are nearly 26 million people with diabetes, and an additional 79 million with pre-diabetes, putting them at high risk for developing type 2 diabetes.[4]

The risk for stroke is two to four times greater among people with diabetes. The National Stroke Association estimates that 730,000 persons experience a cerebral vascular accident (CVA) each year in the United States. Of the approximately 570,000 who survive, many have some type of visual disturbance. Functional issues that often manifest include significant visual field loss, post-trauma vision syndrome (PTVS) and visual midline shift syndrome (VMSS).[5-6] Crew, Jones and Kim[6] found that 64.6% of older adults with vision loss and stroke reported difficulty walking; 53.6% reported difficulty climbing stairs; and 40.6% reported difficulty with shopping.

The total cost (direct and indirect) of diabetes in the United States in 2007 was $174 billion. Direct medical costs were $116 billion and indirect costs were $58 billion due to disability, work loss and premature mortality.[7-8] Patients with diabetes, who are at high risk for developing retinopathy, should be targeted as a primary audience for education, counseling and early referral for low vision rehabilitation.[3, 9]

This observational study describes the visual function measurements, co-morbidities of visual impairment and disability, effects on activities of daily living and psychosocial measures, among a sample of diabetic patients that were seen for the very first time in a low vision rehabilitation service.

METHODS

Participants

One hundred patients (49 male, 51 female; mean age = 64.2 yrs; 86 outpatient, 14 inpatient), all with diabetes, were seen at the Wilmer Eye Institute, Johns Hopkins University in Baltimore, Maryland, for a low vision consultation during a six-month period. All study participants were referred for vision rehabilitation, assistive devices, agency resources and patient education concerning diabetic management.

Procedures

Activities Inventory Questionnaire: Before being seen at the low vision service, each participant was asked to complete a questionnaire by mail, or participate in a telephone conversation with a research associate concerning health history, use of assistive visual devices, medication compliance, diabetic education and management history, orientation and mobility, driving issues, and any difficulty with activities of daily living.

These new participants were followed until completion of the baseline segment of low vision rehabilitation, usually involving two to three visits depending on overall health, lab results and establishment of static baseline refractive error and visual acuity.

Clinical Vision Assessments Conducted

Best-corrected visual acuity was established by manifest refraction (Mentor BVAT Acuity System). Stereopsis, binocularity, eye coordination, accommodation, contrast sensitivity, color perception, brightness acuity testing (BAT) and Goldmann visual fields were also assessed.

RESULTS

Forty-nine percent of participants in this study were Caucasian, 46% were African American and 5% were either of Hispanic (3), Asian (1) or Pakistani descent (1). These participants, who were seen for the first time for low vision rehabilitation, had a mean duration of type 2 diabetic disease of 12.6 years and 14.1 years for type 1 diabetes. The mean blood sugar level (BSL) was 152; 58% did not monitor their BSL at all and 26% did not know their last blood sugar reading.

Psychosocially, 25% of participants lived alone with no presence of any support system and 5% lived alone and had a caregiver or a nurse's aide; 70% lived with someone including: 42% with a spouse; 18% with adult children; 4% with a friend or fiancé; and 6% in a nursing home, assisted care facility (ALF) or retirement community. Twenty-nine percent were on total disability while 10% were actively employed, with 50% in job jeopardy due to their vision and systemic health.

Clinical Vision Assessments

The mean entrance best-corrected visual acuity (habitual prescription for glasses or contact lenses) of all participants, excluding four with visual acuity of light perception (<20/14,000) and/or total blindness binocularly, was 20/202. The mean best-corrected visual acuity (BCVA) was 20/184, as a result of refraction determining a new prescription was of benefit.

Visual acuity of light perception (LP) to no light perception (NLP) in one eye was present in 27% of all patients. Of those, 67% were visually impaired (20/69 or worse) in the other eye. The mean age of Caucasians (12) in this group was 65.6 years and for African-Americans (13) the mean age was 59.8 years.

A manifest refraction resulted in a clinically significant visual acuity improvement (p=0.08) in 45% of the participants (improvement of one line in 22%, two lines in 13% and 3 lines or greater in 10%).

Binocularity, eye suppression and depth perception were evaluated, using the Worth 4 Dot Test and Stereo Randot Test (Mentor BVAT System). Intermittent to complete suppression was found in 65% of the patients with 57% demonstrating no presence of stereopsis (excluding LP and NLP patients).

Log contrast sensitivity (Pelli-Robson) was severely impaired by 49.7% (mean log contrast .93) indicating serious implications for falls, safe travel, safe driving skills, and performing simple tasks such as facial recognition and self-grooming, and important tasks such as diabetic management.

Goldmann visual fields demonstrated significant visual field loss (less than 100 degrees) in 65% of the patients tested (n = 49 due to logistics, travel and complexity of patient-institution scheduling), affecting mobility, safe travel, personal safety, independent living and driving.

As a result of patient evaluation and consultation, 84% of all participants expressed having difficulty with orientation and mobility and safe travel – secondary to decreased visual acuity, visual fields, contrast sensitivity loss, presence of glare sensitivity and/or absence of binocularity/depth perception.

CO-MORBIDITIES

Besides diabetic retinopathy, other ocular co-morbidities existed: 17% had age-related macular degeneration (ARMD), 28% glaucoma and 43% pseudoaphakia (with 26% being bilateral).

This study also found 70 different co-morbidities with a mean of 6.3 other co-morbidities (Table 1) besides the primary diagnosis of diabetes mellitus, adversely affecting quality of life and ADLs.

Following the initial low vision evaluation, all participants were referred within the low vision service by the low vision practitioner to a certified low vision therapist (CLVT) and/or occupational therapist for specific patient education concerning the impact of their ocular and systemic disease in performing their occupational,

Systemic Co-morbidity	Percent
Hypertension	74%
Decreased range of motion	69%
Poor gait and balance	57%
Peripheral neuropathy	52%
Depression	43%
Obesity	41%
Hypercholestoremia	37%
Cerebrovascular accident (CVA)	23%
Cardiovascular surgery	21%
Renal failure	20%
Amputation (BTK)	10%

Table 1: Systemic Disease Co-morbidities

Assistive Device	Patients Prescribed
New prescription	50%
Eye protection	18%
Stand/hand magnifier	40%
High plus prismatic lenses	18%
Video magnifier	14%
Hand held telescope	3%
Spectacle mounted telescope	8%
Computer software	19%
Absorptive lenses	13%

Table 2: Assistive Devices Prescribed as a Result of Low Vision Rehabilitation (%)

avocational and activities of daily living (ADL) tasks. This consultation involved discussion of the implications of clinical findings: BCVA, indication for prescription change for uncorrected ammetropia, contrast sensitivity and binocularity/ stereopsis findings, subjective scotopic and photopic functioning, visual field loss, O&M indications, and psychological/psychosocial manifestations.

Patient education was provided in the appropriate use of non-optical devices, assistive optical devices and the reason for referral to other healthcare providers and resources. Assistive devices were prescribed as described (Table 2) based on further interdisciplinary collaboration. Of those, 63% of the patients were followed for further rehabilitation by outpatient occupational therapy.

DISCUSSION

The diabetic epidemic remains unrestrained into the 21st century. It has already taken on extraordinary implications on the US population through its acute and chronic systemic/visual complications, disability and premature death. Trend data suggests that the burden will continue to increase and the effort to prevent and delay the complications of diabetes is urgently necessary.

While it is widely known that elevated HbA1c levels increase the risk of long-term complications associated with diabetic retinopathy, only 27% of participants in this study, when asked (as Do[10] and others have reported), demonstrated knowledge of what their last HbA1c percentage (glycosylated hemoglobin) was and what it meant. Only 19.6% (9/46) of African Americans and 36.7% (18/49) of Caucasians had knowledge of their HbA1c value. The mean HbA1c percent in this study for African Americans was 9.34% and 7.56% for Caucasians.

Therefore, primary care providers, internal and family medicine practitioners, optometrists and ophthalmologists of persons with diabetes and other co-morbidities should be vigilant in their screening of vision changes and implementing referral to low vision rehabilitation specialists, early in the disease process.[11-12]

Massof, Park and Wainapel [11,13-14] have previously described similar interdisciplinary teams. Interventions included new optical prescriptions, visual assistive devices, visual-spatial retraining, orientation and mobility, on-site occupational ergonomic and environmental assessments, home activities of daily living evaluations, IADLs, community re-integration, vocational training, social work consultation, driving evaluations and training and diabetic management.

Diabetes education has long been cited as a cornerstone of effective diabetes care and self-management education and is seen as paramount to any chronic care model. A recent survey of US nurses and physicians identified five key goals that need to be accomplished to improve diabetic outcomes. They are the following: reduce barriers to effective therapy, promote effective self- management, improve psychological care for persons with diabetes, enhance communication between healthcare providers and people with diabetes, and promote communication and coordination between healthcare providers.[15]

It is clear that the historic criteria of blindness does not accurately reflect the level of vision necessary to function effectively in today's society. Economic blindness is the level of impairment that affects employability and/or the ability to live independently and has been shown to occur at visual acuity of 20/69.[9]

Frick et al[16] noted that blindness and visual impairment were significantly associated with higher medical care expenditures, a greater number of informal care days and a decrease in health utility and that the aggregate annual economic impact included $5.5 billion spent for medical care and the value of informal care, as well as a loss of 209,000 quality-adjusted life years.

CONCLUSION

Early referral for low vision rehabilitation of the diabetic patient (and other visually impaired patients) can assist in prevention of decreased quality of life and job performance and diabetic management and depression, which all can result in a significant negative socioeconomic impact to healthcare costs and society. Patient education and global referral from all medical disciplines can assist in negating the impact of their disease and implications of visual impairment.

References:

1. Saaddine JB, Narayan KM, Englegau MM, Aubert RE, Klein R, Beckles GL. Prevalence of self- reported visual impairment among adults with diabetes. *Am J Public Health* 1999; 89(8)1200-05.
2. Cusick M, Meleth AD, Argon E, Fisher MR, Reed GF, Knatterud GL, Barton FB, Davis MD, Ferris FL 3rd, Chew EY. Early Treatment of Diabetic Retinopathy Study Group. Associations of mortality and diabetes complications in patients with type 1 and type 2 diabetes: early treatment diabetic retinopathy study report no. 27. *Diabetes Care* 2005; 28(3):617-25.
3. Sanders, M. *Ergonomics and the Management of Musculoskeletal Disorders*. St. Louis, Missouri: Butteworth Heinemann,2004
4. Access Economics, prepared for AMD Alliance International, *The Global Economic Cost of Visual Impairment*, March 2010.
5. Padula WV, Wu L, Vicci V, Thomas J, Nelson C, Gottlieb D, Suter P, Politzer T, Benabib R. Evaluating and Treating Visual Dysfunction. In: Zasler ND, Katz DI, ZaFonte RD, editors. *Brain Injury Medicine: Principles and Practice*. New York: Demos Medical Publishing;2007:511-528.
6. Crews, JE, Jones, GC, Kim JH. Double jeopardy: The effects of co morbid conditions among older people with vision loss. *J Vis Impair Blind* 2006;100:824-848.
7. Centers for Disease Control and Prevention. National diabetes fact sheet: national estimates and general information on diabetes and pre-diabetes in the United States, 2011. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2011.
8. American Diabetes Association. Economic costs of diabetes in the US in 2007. *Diabetes Care* 2008; 31(3) 596-615
9. West S, Sommer A. Prevention of blindness and priorities for the future. *Bull World Health Org* 2001;79:244-248
10. Do DV, Nguyen QD, Bressler NM, Schachat AP, Solomon SD, Melia M, Bressler SB. Hemoglobin A1c awareness among patients receiving eye care at a tertiary ophthalmic center. *Am J Ophthalm* 2006;141(5):951-3
11. Wainapel SF. Low Vision Rehabilitation and Rehabilitation medicine: A Parable of Parallels. I*ssues in Low Vision Rehabilitation: Service Delivery Policy and Funding*. Massof RW, Lidoff L (Eds) New York: AFB Press 2001;55-70.
12. Englegau MM, Geiss LS, Saadine JB, Boyle JP, Benjamin SM, Gregg EW, Tierney EF, Rios-Burrows N, Mokdad AH, Ford ES, Imperatore G, Narayan KM. The evolving diabetes burden in the United States. *Ann Intern Med* 2004;140(11):945-50.
13. Massof RW, Dagnelie G, Deremeik JT, DeRose, JL, Alibhai SS, Glasner, NM. Low vision rehabilitation in the U.S. health care system. *J Vis Rehabilitation* 1995;9:3-31. [reprinted in *Low Vision Rehabilitation: Service Delivery, Policy and Funding* Massof RW, Lidoff L (Eds) New York: AFB Press 2011;267-306]
14. Park WL, Mayer RS, Moghimi C, Park JM, Deremeik JT. Rehabilitation of hospital inpatients with visual impairments and disabilities from systemic illness. *Arch Phys Med Rehabil* 2005;86:79-81.
15. Siminerio L, Funnell M, Peyrot M, Rubin R. US nurses perceptions of their role in diabetes care: results of the cross-national Diabetes, Attitudes, Wishes, and Needs (DAWN) study. *Diabetes Educ* 2007;33:152-162.
16. Frick KD, Gower EW, Kempen JH, Wolff JL. Economic impact of visual impairment and blindness in the United States. *Arch Ophthalmol* 2007;125:544-550.

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Contact Lenses From Birth: An Adjunct of Vision Rehabilitation

Presented By: William Park, OD, FAAO

Instruction Level: Introductory

Course Description: Contact lenses are often ignored as a component of providing low vision rehabilitation for the visually impaired. This course emphasizes contact lenses should be the first choice for best corrected visual acuity; with high refractive error and/or nystagmus, aniridia, albinism, cone dystrophies and ocular trauma. Age should not be a factor in inclusion or exclusion for fitting a pediatric patient.

CE Units: ACVREP: 1; AOTA: 0.1; COPE: 1

Understanding the PRL | Presented By: Shirin Hassan, BAppsSc(Optom), PhD

Instruction Level: Introductory

Course Description: Patients with macular disease and central scotomas must use a peripheral, preferred retinal locus (PRL) in place of their damaged retina. This presentation will define what the PRL is and detail the findings of microperimeter studies to explain the development of the PRL including where patients place their PRL, the use of multiple PRLs and the relationship between the PRL and stability of fixation. This presentation will also provide information to clinicians on how to assess and measure the PRL and fixation stability in patients with central vision loss and how poor fixation stability and poor use of the PRL impacts on activities of daily living.

CE Units: ACVREP: 1; AOTA: 0.1; COPE: 1

Using Reading Tests to Evaluate Macular Function in Vision Rehabilitation

Presented By: Donald Fletcher, MD

Instruction Level: Introductory

Course Description: Reading performance, utilizing available reading tests, can be a valuable tool in clinical low vision rehabilitation. This course reviews the tests available, methods of administration, and correct interpretation of findings.

CE Units: ACVREP: 1; AOTA: 0.1; COPE: 1

Vision Rehabilitation of Patients Affected by a Neurological Etiology

Presented By: Karen Kendrick, OTR/L, CLVT; William Park, OD, FAAO

Instruction Level: Intermediate

Course Description:

Part I: Interdisciplinary Neurological Rehabilitation, Hospital to Practice-Based: The Crux of the Matter | William Park, OD, FAAO
This presentation focuses on the complexities and efficacy of providing neuro-optometric rehabilitation in a clinical setting, utilizing an interdisciplinary team approach. Case studies of patients presenting with a multitude of complex systemic and/or neurological manifestations related to traumatic brain injury, cerebral vascular accidents and neoplasms will be presented. Diagnosis and the implementation of neuro-optometric rehabilitation techniques involving primary care, neurology, neuro-ophthalmology, occupational therapy, physical therapy, speech language pathology and behavioral health will be emphasized.

Part II. Occupational Therapy Treatment and Management of the Neurological Patient | Karen Kendrick, OTR/L, CLVT
This part of the program will present occupational therapy neurological rehabilitation assessment, treatment and management of vision loss in the neurological patient. Therapeutic interventions are discussed to improve function, reduce limitations and improve the overall well-being of patients who have experienced disease, traumatic injury or disorders of the nervous system. The goal of occupational therapy neurological rehabilitation interventions are to help the patient return to the highest level of functional vision and independence in daily activities.

CE Units: ACVREP: 2; AOTA: 0.2; COPE: 2

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CE – ACCME, AOTA, COPE

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CE – ACCME, AOTA, COPE

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