Management of Low Vision in the Elderly
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The premise
“Vision is the single most important sense upon which the nation’s elderly depend. Certainly its deterioration or loss dramatically reduces the quality of life and seriously threatens the ability of the aged to function independently.”
Congressman Claude Pepper, Chairman, Comment on HR 3009 and 3010, 1/84

The back story…view to retirement
• Leisure time activities become increasingly more important as we age. Oftentimes, the thought process of those looking forward to their golden years is,
  “When I retire and have more time, I will read more, travel more, and (sometimes) get a bit more exercise.”
• It is as if we have a contract with nature for continued good health.

The set up
Aging is “a progressive, generalized impairment of function resulting in an increased vulnerability to environmental challenge and a growing risk of disease and death.”

General care for seniors
• Understand the basic “natural” fundamentals of aging.
• Understand the disease specific impact in the aging population.
• Understand the complexity of the interaction of multidisciplinary coordination of care: eye examinations.

Are all eye examinations the same?
• Patient comes to you for…(state your specialty) and you do a review of systems.
• Eye questions: How are you seeing?
• Now what…?
Senior eye care

Senior eye care addresses the influence of the natural aging processes of the eyes and visual system, as well as the influence of co-morbidities that occur as we age. These variables can modify the visual system both anatomically and functionally, possibly creating difficulties with performing instrumental activities of daily living (IADL).

All eye doctors assess eye diseases and the impairments they create…but the functional relationship between the impairment, the disability, and the handicap are the things that also need to be considered in low vision rehabilitation…because the latter, which is very patient specific, is what we need to address, to maintain quality of life and independence for our seniors.

Are all eye examinations the same?

- Patient comes to you for…(state your specialty) and you do a review of systems.
- Eye questions: How are you seeing?
- So, what’s next?
- First some questions to be answered...

What is low vision?

The inability to see a task with conventional eye glasses or contact lenses, even after medical and/or surgical care.

ICD-10 divides visual impairment into
- Moderate visual impairment (20/70-20/200)
- Severe visual impairment— including legal blindness (20/200-20/400)
- Blindness (20/400-no light perception)

Low vision rehabilitation

“Vision rehabilitation is the process of treatment and education that helps individuals who are visually disabled attain maximum function, a sense of well being, a personally satisfying level of independence, and optimum quality of life. Function is maximized by evaluation, diagnosis and treatment including, but not limited to, the prescription of optical, non-optical, electronic and/or other treatments. The rehabilitation process includes the development of an individual rehabilitation plan specifying clinical therapy and/or instruction in compensatory approaches.” American Optometric Association 2004

Both optometry and ophthalmology consider this part of mainstream eye care and recognize this population exists
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2014 Prevalence of vision problems by age

Age related macular degeneration

AMD creates decreased central vision. 2+ million Americans, age 50 years and older have late AMD; by 2020, the number is expected to be 3 million. Vision Problems in the U.S. 2010

AMD occurs in ~10% of people 65-75 and increases to ~30% of people 70 years or older.


Starting in 2016 second level of the aging tsunami will hit: 70 year olds.

Age related macular degeneration

There are therapies for both wet and dry AMD, but “…existing medical therapies have the potential to reduce the visual impairment and blindness attributable to AMD by as much as 35%... (in 2050)"

Rein DB, Wittenborn JS, Zhang X. et al. Forecasting age-related macular degeneration through the year 2050, Arch Ophth 4/09

Diabetic retinopathy (DR)

DR creates decreased central vision. 1 out of 11 Pennsylvanians has diabetes. 12.2 million 60 years or older (23.1% of all people in that age group) have diabetes.

http://www.cdc.gov/diabetes/pubs/estimates07.htm#1

Of patients with diabetic retinopathy, diabetic macular edema (DME) is the most frequent cause of vision impairment and affects nearly 30% of patients who have diabetes for at least 20 years.

EBNETER A, WOLF S, ABHISHEK J, ZINKERNAGEL MS, RETINAL LAYER RESPONSE TO RANIBIZUMAB DURING TREATMENT OF DIABETIC MACULAR EDEMA, RETINA 2015

Estimated number of visually impaired and blind adults by PA county

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<th>County</th>
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<th>VI and Blind - %</th>
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Do I have low vision patients in my practice?

- Approximate the number of patients you see each year.
- Take ~ 3% (based on data from PA)
- Canada: it is predicted that 2.25% of all Canadians will be VI by 2025.
  (underreported because does not include younger than 65).
- The number is….

What most (visually impaired) seniors want/need to do...

- Read
- Drive
- Get around in the environment without getting hurt in general
- Recognize and interact with others
- Watch TV
- See medications
- Self care
- Leisure activities in general

“All my instincts are one way and all the facts are the other.”

Sherlock Holmes

Macular degeneration
Instinct: person cannot see clearly, and because it is an old age disease, nothing more can be done.
Fact: only central vision is affected, peripheral vision is still intact.
“Every problem becomes very childish when once it is explained to you….”
So if something can’t be seen, make it bigger so it can be seen. How?

Goals of low vision rehabilitation

Prevent the loss of the ability to visually stay in touch with the world…eliminate the ageism phrase that “nothing more can be done because it’s your age.”
Prevent learned helplessness.
Maximize quality of life by helping seniors maintain independence, become self reliant, have a purpose, all while preserving dignity and self respect.

Functional evaluation objectives

- First: What can the patient see/what does the patient want to see?
- Then: Assess the visual skills needed to perform the patient’s “wants”? “needs.”
- Finally: Supply the methods and allow adequate time for enhancing those visual skills.

History and Assessment

- Chief complaint
- Last eye examination
- Distance/near visual abilities (present and past)
- Independent travel
- Social/ emotional review
- General health review
- Environmental challenges (present and past)
- Education and/or vocation and avocation (present and past)
- Specific visual goals and desires in a prioritized order
- Visual acuity measurement- distance and near regardless of diagnosed pathology
- Contrast sensitivity function testing
- Color vision testing
- Glare recovery testing
- Oculomotor evaluation, especially convergence ability
- Refraction
- Visual field testing
- Stereo vs. depth evaluation
- Sensory motor testing (UFOV)
- Eye health assessment
- Magnification/minification assessment
Distance and near visual acuity

Important to remember: This testing says nothing about ability

Eccentric viewing visual acuity

20/20 (6/6) ~0° from fovea, 20/100 (6/30) ~ 25° from foveal fixation, 20/200 (6/60) ~ 40° from foveal fixation. These are approximations to appreciate decreased visual acuity with an intact periphery.

Glare

Difficulty adjusting to different light levels, especially walking or driving “into the sun” dawn or dusk when the sun is lowest in the sky, headlights, or simply walking into or out of a building.

Mrs. R (86 YO)

- Female, lives alone
- Hobbies: reading, driving around the country side
- Chief visual complaint: “I know my vision is changing but my doctor says it is the same. My family thinks I’m crazy. I have difficulty in general in doing some things, especially driving. Light seems to help.”

Mars Letter Contrast Sensitivity Test

- Set of 3 near charts
  - Each letter fades by 0.04 log units
- Norms for different levels of loss
  - Profound (<0.48)
  - Severe (0.52-1.00)
  - Moderate (1.04-1.48)
  - Normal > age 60 (1.52-1.76)
  - Normal < age 60 (1.72-1.92)

Why refract?

“Refractive error has been identified … as the leading cause of visual impairment in the developed world and a leading cause of blindness in the developing world…”

Congdon, Friedman, Lietman, Important causes of visual impairment in the world today, JAMA Vol 290, Oct 2003
Hx: Brain aneurysm causing a decrease in VA—also had hydrocephalus at the same time.

Mrs. G.

- **Initial evaluation**
  (3/20/07): OD <20/400; OS 20/200
- **Most recent evaluation**
  (8/2012): OS +1.25-0.75 x 105, 20/20, +3.00 add 5 pt @ 33 cm.

Four step introduction to optical success

- Obtain best visual acuity with conventional optics (and note eye dominance)
- Calculate magnification
- Calculate optics based on magnification
- Demonstrate, educate, and when appropriate prescribe

Four step introduction to optical success

- For near: determine desired print size and reading rate
  - **Spot reading**—one line smaller than desired size (80 wpm)
  - **Fluent reading**—three lines smaller than desired size (160 wpm)
  - **Maximum reading**—five lines smaller than desired size (320 wpm)

Four step introduction to optical success

- Calculate optics for near
  - If someone sees 8M (20/400) at 16 inches but wants to see .8M (20/40 equivalent)
  - 400/40 is 10, therefore we need 10 times magnification
- Demonstrate, educate, and when appropriate prescribe

Microscopic evaluation

Caveat: Patient will determine the final prescription based on magnification and useful field of view in relation to the task, desired reading speed, and environment.
MS (75 YO)

- Chief complaint: cannot read and vision fluctuates, cannot see to monitor her diabetes, photophobic, eyes are dry
- Med Hx: Heart problems, post stroke, insulin dependent diabetic (over 20 years, A1C 10, blood sugars range 80 – 180+), arthritis
- Eye Hx: Bilateral pseudophake, POAG (Alphagan bid, Xalatan qhs OS), PRP

Vision rehabilitation training

Rehabilitation is an interactive process to maximize the use of an individual’s impaired vision.

It is a complex product of what type of situation is presented to a person and what that person brings to the task, i.e., visual (or other) impairment, experience, desire, emotion.

Vision rehabilitation is task specific with transference to other tasks or functions.

Vision rehabilitation training is usually more effective if started as soon as functional visual difficulties are identified.

Pre microscopic activity

- Material: paper
- Goal: to be able to get comfortable with close viewing
- Activity:
  - Find a dimly lit area.
  - Sit comfortably.
  - Take deep slow breaths.
  - Tense then relax, starting with the face.
  - Visualize a comfortable surrounding.
  - Bring your hands up to your face with your eyes closed.
  - Visualize reading the numbers 1-30 from your hand. When you are done put your hands down.
  - Feel that the activity is effortless.
  - Do this activity 12 times over the course of the day.
  - When this becomes automatic, do the same activity holding a piece of paper: remember to keep your eyes closed!

Tracking with a microscopic

- Materials: a microscope of appropriate power, tracking activities, stopwatch or watch with a second hand.
- Goal: to use the microscopic lens smoothly and efficiently.
- Activity:
  - Put the microscope on and bring the material to the focal length of the system.
  - Hold the material parallel to the face. Use a clipboard for stability if necessary.
  - Learn the functional field of view/mobility limitations.
  - Good light (vary the lighting to determine what is best for you); watch contrast and glare.
  - Call out letters, numbers, or words in sequence under untimed conditions.
  - When this is accomplished with relative ease, do the activity under timed conditions to increase automaticity of movement.
  - When comfortable try to read.
  - Practice 15 minutes, three times a day in a relaxed way.
Other optical options: equivalent powers

Hand held electro optical options: equivalent powers

Table mounted electro optical options: equivalent powers

Four step introduction to optical success

- Calculate magnification for distance
- If someone sees a 20/400 letter and wants to see a 20/40 letter (street sign)
  - \[ M: \frac{400}{40} = 10X \]

Caveat: Patient will determine the final prescription based on magnification and useful field of view in relation to the task and environment.

Telescope evaluation

Pre telescopic activity

- Sit comfortably.
- Locate a stationary target.
- Place a tube (or make a “tube” with your hand) in front of the eye you want to use with the telescope; cover your other eye.
- Spot a target and describe how much you can see around it as well.
- Track a moving target.
- Visually move from object to object.
- Now do the same while standing.
- Now begin to walk, and when you want to look or someone tells you to look, do the same activity, but first stop before you look.
- Do all of the above with a narrower tube.
Tracking with a telescopic

- **Materials:** a telescope, chalkboard, or other writing surface
- **Goals:** to teach the use of efficiently using a telescope for systematic tracking and localization.
- **Activity:**
  - Place a series of numbers or letters or combination on the surface. Connect the characters with arrows.
  - With the telescope, follow the path from left to right calling out each character.
  - This should be performed at multiple distances.
  - Repeat steps one through three without lines between the characters.
  - When you’ve done this successfully, place characters in random locations and have someone call out the characters to be found.

Telescopic Scanning

![Diagram of telescopic scanning with characters and numbers]

And the end result...

- **Chief complaint:** difficulty seeing computer, flowers, gardening, faces (feeling isolated)
- **Visual acuity:** OD 20/400, OS 20/200
- **3X Keplerian telescope:** able to see computer, flowers, faces...“this is opening a new world for me!!”

Travel

- “...nearly nine out of ten seniors aged 65 and older (are) still driving...” J. Nelson, AAA director of traffic safety advocacy and research
- More than eight in 10 older adults report driving themselves as their first choice of getting to where they need to go, the survey suggests.
- Even 70 percent of those 75 or older get behind the wheel to get around.
- PA visual driving regulations: 20/100 in the best corrected eye and 120°.
- The most common second choice is getting rides from relatives, friends and neighbors, followed by public transportation, Access, and other senior citizen transit services.

Visual fields for reference

![Visual field images]

Useful field of view (UFOV)

- Speed of processing under increasingly complex visual scenes

  or

- Higher order processing skills such as selective and divided attention and rapid visual processing
Cerebrovascular Accident (Stroke)

- The number of Americans who suffer a CVA each year is ~ 600,000, of which 82% (492,000) are 65 or older. ([www.americanheart.org/statistics/05stroke.html](http://www.americanheart.org/statistics/05stroke.html))

- As many as 1/3 of stroke survivors have either a homonymous hemianopia or hemineglect.

Rossi PW, Kheyfets S, Reding MJ. Fresnel prisms improve visual perception in stroke patients with homonymous hemianopia or unilateral visual neglect. Neurology 1990
"I went for about five years without peripheral vision, and no one ever said there was this doctor down the hall that could help me with my low vision. I don’t walk into people anymore."

Training with an InWave™ prism

- Sit and view into the prism every 8-10 seconds.
- Stand and view into the prism every 8-10 seconds.
- Walk, in a controlled environment, and view into the prism every 8-10 seconds.
- Walk, in an uncontrolled environment, and view into the prism every 8-10 seconds.
- Reach out when viewing through the prism to appreciate the image displacement.

Training with a minifier

- Scan environment without optics, appreciating size and spatial relationships.
- Hand held: view through optics and justify spatial relationships while remaining still.
- Close eyes and describe objects and position.
- Open eyes and move about in the environment. Continue to scan.
- Head mount: move eyes into position and justify spatial relationships while remaining still.
- Close eyes and describe objects and position.
- Open eyes, lift head, and move about in the environment. Continue to scan.

So what do you do with this information?

- Think orthopedic rehabilitation.
- Educate patients to options.
- Refer like you would any other patient/family member/friend with a visual concern.
- Refer without pre select/pre judge value of service for the patient.
- Realize that we can determine the quality of life not only for the patient but family, friends, and others.
Information

Can’t use age as a guide

- 82 year old:
  - can’t hear well
  - difficulty seeing (has Fuch’s dystrophy) but with low vision devices reads well
  - told to exercise but has a bad hip
  - told to socialize but is not interested…
  - “I’ve had a good life, but I am ready to be done.”

- 101 year old:
  - can’t hear well
  - substantial problems with seeing (AMD)
  - uses a walker to get around
  - has a caretaker to get her around to “functions”…
  - “Tell me what I have to do to get back to my reading.”

“Caregiver Syndrome”

Caregivers are “at particular risk for a host of mental and physical illnesses, many of which have roots in stress, exhaustion, and self-neglect.” In fact, 67% of children become clinically depressed when taking care of their parents.

Caregiver Syndrome

Caregiving, Crute S, AARP, 12/07

Where do we go from here?

“When a particular disease is inexorable and forms a continuous threat to a patient’s independence and quality of life, clinicians and researchers should seek ways to help the patient cope with the psychological and functional difficulties experienced as a result of the disease.”

Kiser AK, Pronovost PJ, Management of diseases without current treatment options, JAMA, April 2009

“Improving health goes beyond finding the treatments and cures for diseases, and also involves improving patients’ current functioning with their disease and overall well-being.”

Kiser AK, Pronovost PJ, Management of diseases without current treatment options, JAMA, April 2009

Inside every older person is a younger person wondering, “What the heck happened?”
And finally…

“I really like who I am. And I really like aging…”

If it didn’t lead to death, it would be perfect.” — Eve Ensler

Thank You!