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LOW VISION REHABILITATION: Assessment & Treatment Strategies for Older Adults

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Low Vision Rehabilitation: Assessment & Treatment Strategies for Older Adults

I. Introduction to Low Vision

I. Low Vision Evaluation

I. Low Vision Treatment

INTRODUCTION
WHAT IS LOW VISION?

Low vision is a visual impairment that cannot be corrected by medical or surgical intervention and is severe enough to interfere with the performance of activities of daily living (ADL), but still allows some usable vision.
The impact of low vision on a person’s quality of life is severe.

80-90% of new learning typically occurs through our visual pathways!!!

Vision provides a building block onto which we develop and hone our cognition and motor skills.

Vision directs our search and navigation of the environment.
Vision is our primary sense and is the first to alert us to danger.

Vision provides us information at a faster speed than any other sense.

Currently, almost 34 million Americans are more than 65 years of age, and this number will more than double by the year 2030. (National Eye Institute)
The population of 85 years of age and older is the fastest growing segment of the U.S. population.

There are three main eye diseases which account for 76% of low vision cases:
- Age-related macular degeneration
- Diabetic retinopathy
- Glaucoma
LEGAL BLINDNESS

- Strictly defined, legal blindness is a term that the federal government uses to identify conditions that qualify persons for government services and benefits.

LEGAL BLINDNESS (cont’d.)

- To be considered legally blind, a person must have a best corrected visual acuity of 20/200 or less, or a visual field of 20 degrees or less in the better seeing eye.
SERVICE PROVIDERS IN THE HEALTHCARE SYSTEM

- Ophthalmologists
- Optometrists
- Certified Ophthalmic Technicians
- Occupational Therapists

THE KEY PLAYERS:

- Ophthalmologists - diagnose and medically manage various conditions. Many become specialists who treat specific areas of the eye.
Optometrists-

Also are able to diagnose and medically manage various eye conditions. Optometrists provide 2/3 of the vision care in the U.S. and have also led the way for the development of low vision services.

Occupational Therapists-

- OT addresses the physical limitations (visual included) that impact a patient’s ability to perform necessary activities of daily living.
- OT’s can provide services with a prescription from the referring MD or OD.*
**REIMBURSEMENT SOURCES IN THE HEALTHCARE SYSTEM**

- Medical Insurance - Medicare is a primary payor since most of the recipients of low vision care are over the age of 65. Services are covered at a rate of 80%.

**OT CERTIFICATIONS**

OT’s are not currently required to obtain any specific certifications to work in the field of low vision.
Currently there are two main certifications available:

- **SCLV**: Specialty certification in low vision, available through AOTA since 2006
- **CLVT**: Certified low vision therapist, available through ACVREP
- Graduate programs at UAB and Salus U.

**WORLD HEALTH ORGANIZATION LEVELS OF IMPAIRMENT**
WHO LEVELS OF IMPAIRMENT

- Normal vision- ranges between 20/12 and 20/25 on the Snellen chart.

- Near-normal vision- ranges between 20/30 and 20/60.

- Moderate low vision- ranges between 20/70 and 20/160.

- Severe low vision- ranges between 20/200 and 20/400.

WHO LEVELS OF IMPAIRMENT (CONT’D.)

- Profound vision loss- ranges from 20/500 and 20/1000.

- Near blindness- persons with Snellen acuity less than 20/1000 but who are still able to perceive form and light.

- Total blindness- persons without vision and without light or form perception.
**TYPICAL FREQUENCY AND DURATION OF TREATMENT***

- Frequency: 1-2 times per week
- Duration: 30 – 60 minutes each session
- Length of stay: Typically less than 10 visits total.

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**ANATOMY AND PHYSIOLOGY OF THE EYE**
The eye functions as a camera.

The anterior portion of the eye focuses the picture by refracting the light rays onto the retina.
HOW THE EYE WORKS (cont’d.)

- The posterior part of the eye is the film in the camera and captures the image, sending it through the optic nerve to the occipital lobe of the brain for analysis and interpretation.

HOW THE EYE WORKS (cont’d.)

Once the image is interpreted, information is sent to the frontal lobe of the brain where feelings/opinions are attached and decision making is implemented to initiate a response.
Skills First Education

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Normal Vision

Continued
Central Field Loss

Peripheral Field Loss

continued™
Multiple Field Loss

LOW VISION EVALUATION
SIGNS AND SYMPTOMS OF LOW VISION

- Unusual head movements
- Lack of eye contact
- Inability to recognize familiar objects/faces
- Frequent falls, bumps, scrapes, burns, and cuts
- Inattention
- Social isolation

QUESTIONS FOR YOUR PATIENTS...

- Have you noticed changes in your vision?
- Can you see the food on your plate?
- Can you read your mail, newspaper, etc.?
- Do you travel on your own?
- Do you recognize people’s faces?
- How close do you sit to the T.V.?
MD/OD EVALUATION

- MD and/or OD must evaluate the patient first, prior to referring him/her for low vision services.
- The MD or OD will also prescribe the appropriate optical devices and diopteric strength for the patient.

PATIENT INTERVIEW

- Interview- active/past medical history, social history, (inc. family involvement), driving status, and patient complaints/goals.
- Note patient’s cognitive status during evaluation process to assess potential for carryover.
PRIMARY OBJECTIVES OF EVALUATION

The 4 Most Important Aspects:

› Acuity
› Contrast sensitivity function
› Visual field integrity
› Color vision

SECONDARY OBJECTIVES

Other changes in visual function: usually informally assessed by questioning
› Dark light adaptation
› Sensitivity to glare and light (photophobia)
› Presence of phantom vision (Charles Bonnet Syndrome)
COMPONENTS OF VISION

- Acuity - the level of detail and clarity with which a person can see objects.

- Visual Field - the range of area one sees in a single view (without turning the head or eyes)

- Contrast discrimination - the capacity to distinguish between similar shades of light and dark.

Glare modulation - the capacity to regulate light and control glare.

Interpretation - correctly interpreting the information the brain receives from the eyes.

The eye conditions or diseases that cause low vision affect one or more of these 5 elements of vision.
EYE DOMINANCE TEST

- Cross your hands and hold them straight out in front of you in shape of a narrow triangle, and focus on a distant target. Close one eye and then alternately close the other.

- Whichever eye still sees the target is the dominant eye, as opposed to the other eye, where the object shifts out of the triangle.

Eye Terms

- OD- Ocular dextrus
- OS- Ocular sinister
- OU- Ocular uterque
ACUITY TESTING

- Ability to see small detail at a specified distance
  - Acuity is a fraction representing distance over letter size
  - Two types of acuities are measured
    - Distance (no accommodation)
    - Reading (requires accommodation)

ACUITY MEASUREMENT

- In U.S. acuity is most commonly expressed as Snellen equivalent fraction
  - (20/20 is considered normal vision)

- Familiar notation to most people.
- Often described/compared to what the average person can see at 20 feet.
Subjective measurements tend to be utilized using the tester’s hand as a target:
- Count Fingers at X number feet (CF)
- Hand movement (HM or HMO)
- Light Perception Only (LPO)
- No Light Perception (NLP)

NOT MEASURABLE!!!
LOW VISION ACUITY CHARTS

- Provides more accurate assessment of acuity.

- Acuity is measured at an intermediate distance of 1 meter instead of the standard 10 or 20 feet.

- Some charts allow measurement up to 20/1200.

Low Vision Distance Acuity Tests

[Images of low vision distance acuity charts]
TEST INSTRUCTIONS: DISTANT OR INTERMEDIATE ACUITY TEST (cont’d.)

- Instruct the client to start at the TOP of the chart and read the numbers down row by row continuing to the back side of the chart.
- Record the Snellen and metric fractions for the last line on which the client could read the majority of letters accurately.

NEAR ACUITY TESTING

- Reading is the primary activity that occurs at near distances.
- Reading is a better assessment than having patient read individual letters at near.
NEAR ACUITY TESTING (cont’d.)

- READING REQUIRES ACCOMMODATION!

(Accommodation- The process by which the eye increases optical power to maintain a clear image on an object as it draws near the eye.)

CONTRAST SENSITIVITY TESTING

- Very important test!
- Determines a person’s ability to see details even in the presence of diminishing contrast.
- It is a good predictor of patient’s visual function, even better than acuity measurements.
- Various tests are available- MARS, Peli-Robson, and LEA numbers contrast sensitivity tests.
Test is completed using both eyes together (OU) with eyeglasses on if normally worn.

Test first at 1 meter distance (100 cm), then reading distance (40 cm or 16 inches), then at 3 meters (300 cm).
1.2% level- Good contrast sensitivity function for communication, orientation and mobility, special modifications of the environment will not be necessary.

2.5% level- Client will have difficulty seeing facial expressions, recognizing friends across the street, difficulty detecting curbs, and other low contrast drop offs. Improved illumination and contrast can be helpful.

5% level- Client will have difficulty detecting subtle changes in the support surface, reading materials printed in low contrast formats, seeing black and white photographs, facial features, water, etc. Magnification and improved illuminated may be helpful to assist client in seeing low contrast features. Driving performance should be carefully evaluated esp. with regards to night driving and driving in cloudy conditions.
10% level - Enhancement of contrast is needed for client to function safely and independently. Client may require assistance to ambulate safely in environments.

25% level - Contrast sensitivity function is extremely limited and enhancement of contrast is needed for client to function.

The impression gained from this analysis will assist the therapist in determining the modifications (in lighting, magnification, and contrast), needed to improve the client’s functional performance.
OCULOMOTOR ASSESSMENT

- Have 2 targets available (I like pencils with large brightly colored erasers)
- Assess monocularly and then binocularly
- ROM
- Pursuits
- Saccades
- Convergence

PERIPHERAL FIELD AWARENESS

Formal Test:
Humphrey Visual Field Analyzer

Informal Test Procedures:
- Confrontation test
- Two person kinetic test
READING PERFORMANCE

- Very important to get a baseline of a patient’s reading speed and accuracy.
- Helps to determine if there is a central scotoma interfering with accurate word identification or locating next line of text.

READING COMPREHENSION

- For comprehension to occur
  - Word recognition must be completed within a specific time period
  - Words must be read with fluency (accuracy and rhythm)
- The fewer the fixations and the shorter their duration, the faster the reading speed
READING ACUITY TEST

- Visual Skills for Reading Test (VSRT)
- MN Read
- Morgan Low Vision Reading Comprehension Test
- Informal timed reading tests

MNREAD ACUITY TEST

- Most important reading performance test
  - Always completed with every client
  - Leveled at 2nd-3rd grade reading level
- Measures three components of reading
1. Reading acuity - Smallest print client can read w/o making significant errors.

2. Critical print size - Smallest print client can read with maximum speed.

3. Maximum reading speed - Reading speed when reading is not limited by print size.
VISUAL SKILLS READING TEST (aka Pepper Test)

- Assesses letter/word recognition
- The ability to make accurate return eye sweep movements to read the next line of text
- Gives clues as to the location and interference of central scotomas
LOW VISION READING COMPREHENSION ASSESSMENT

- aka LVCRA or Morgan
- Measure of reading comprehension
- Used to select appropriately leveled reading material

EXAMPLES OF LVRCA SENTENCES

- He who is quick to borrow is slow to ________.
- Friendly words cost ______.
- Animals tend to develop social organization; the herd offers greater ________ than could be achieved in a solitary life.
**EXAMPLES OF LVCRA SENTENCES**

- He who is quick to borrow is slow to lend.
- Friendly words cost nothing.
- Animals tend to develop social organization; the herd offers greater protection than could be achieved in a solitary life.

**IMPORTANCE OF STANDARDIZED TESTS**

- Evidence based research
- Functional outcomes tool (Pre- and post- tests)
INFORMAL ASSESSMENTS
One Minute Reading Speed

- Select typical reading material
- Time for one minute as person reads silently or out loud
- Count number of words read
- Record under various conditions
  - With and without additional illumination
  - With magnification
  - On large print or regular print

WRITING ASSESSMENT

- Collin Low Vision Writing Assessment
  1. Writing a grocery list- 10 items
  2. Writing and recording checks
  3. Written language expression
     (friendship, water, a season of the year)
  4. Reading notes to self- (i.e.- grocery list)
  5. Completing a written form
     (Each item is graded 10 points each)
SCOTOMA AWARENESS/PRL ASSESSMENT

- Caused by ARMD and DR.
- Formal test – Scanning Laser Ophthalmoscope*
- Informal test- Simple method to determine if a scotoma exists and if a patient can learn how to compensate for it.

DEFINITION OF PRL

- Preferred Retinal Locus- Alternate location attached to the foveal area (pseudo-fovea) that allows a patient to fixate and track objects. Part of the re-organization of the CNS after vision loss has occurred.
SCOTOMA AWARENESS (cont’d.)

- Good reference that explains this:
  “Macular Degeneration: The Complete Guide to Saving and Maximizing your Sight.” written by Dr. Lylas and Marja Mogk.
- Use of a picture of a clock
- Use of Flashcards with 1 or 2” vinyl letters

USE OF ECCENTRIC VIEWING TECHNIQUES

- With practice, clients can learn to perform fixation, pursuits, and saccades using a preferred retinal locus, which requires looking off-center of a specific target.
“Focus on the ‘X’ only”

“While looking at the ‘X’, what number can you see on the right?”
“While still looking at the ‘X’, now what number can you see on the right?”

ADL ASSESSMENT

- Detailed interview with patient and families.
- Clinical observation skills
1. Modify the home environment

2. Maximize the effective use of remaining vision

3. Teach the client to use compensatory techniques using the remaining senses with non-visual adaptations.
LOW VISION TREATMENT

- Patient/Family Education in environmental modifications to increase household safety.
- Adjust lighting
- Create contrast
- Decrease clutter
- Use labeling/marketing systems

MANIPULATE LIGHTING

- Older persons need about 3 times as much lighting as those who are younger.
- The challenge in providing light is to increase illumination without increasing glare.
- Use of blinds/shades to control the amount of light entering a room. Client should face away from windows while working in the home.
MANIPULATE LIGHTING (cont’d.)

- Use of ambient room lighting- to provide even illumination without creating shadows.

- Use of task lighting- such as an adjustable arm or gooseneck lamp to concentrate light onto a particular surface for various activities.

  Task lighting should generally be positioned over the client’s shoulder alongside his/her dominant eye and not be directed into the eyes.

  During writing tasks, task lighting should be placed on opposite side of writing hand to avoid creating shadows.
MANIPULATE LIGHTING
(cont’d.)

- Newer compact fluorescent gooseneck lighting is cooler and doesn’t usually flicker. Verilux Happy Eyes and Ott Lite are excellent choices. They are typically found in craft stores.

- Indoor 50 watt floodlight bulb directs rays downward in the same direction.

MANIPULATE LIGHTING
(cont’d.)

- Bad choices—clear bulbs without any protective coating and some traditional incandescent bulbs—create glare; halogen bulbs can become extremely hot and pose a safety risk.
SENSITIVITY TO GLARE/LIGHT

- aka- Photophobia

- Causes abnormal sensitivity/discomfort to light

GLARE FILTERS

indoor

outdoor
The key to using contrast effectively is to determine the critical items in the environment needed for orientation or identification and then increasing their contrast to surrounding features.

- Minimize patterns
- Some examples...
Poor Contrast

Effective Contrast
Poor Visibility of Appliances

Contrasting Tape on Appliances
Measuring Liquids

Improved Visibility
Camouflage Effect of Patterns

Use of Solid Colors
Poor Contrast

Effective Contrast
Poor Visibility of Stairs

Improved Visibility of Stairs
FACILITATE THE USE OF THE PHYSICAL ENVIRONMENT

- Move furniture to make clear pathways in the home.
- Eliminate hazards such as throw rugs, floor plants, low ottomans that a client may not see while navigating the home.
- Encourage clients to return everything to the same location each day.

(FACILITATE THE USE OF THE PHYSICAL ENVIRONMENT (cont’d.)

- Push chairs in immediately after getting up from them.
- Close cupboard doors and drawers after immediately after opening them.
- Wash knives and other sharp utensils immediately after using them.)
MAXIMIZE THE EFFECTIVE USE OF REMAINING VISION

- Enlargement- increased size of reading materials, pill bottles, large clocks/watches, etc.

- Use of eccentric viewing techniques to locate and use remaining areas of visual field.

Enlargement
Labeling/Enlargement

Large Labels on Food Items
USE OF NON-OPTICAL AIDS

- Liquid Level Indicators
- Bump Dots
- Talking watches/Talking alarm clocks
- Talking scales
- Talking blood pressure cuffs
- Talking glucometers
  (etc.)

Tactile Adaptations
Use of Bump Dots on Dials

Use of Rubber Bands
DIABETIC MANAGEMENT

- Glucose Monitoring
  (BS levels should be maintained between 70-150 mg/dL)
- Insulin administration
- Skin and foot care
- Referral to a Certified Diabetic Educator in your area
- Novo-Nordisk- great website with lots of helpful information-
  www.novonordisk.com

Prodigy Autocode
INSULIN ADMINISTRATION

WRITING ACTIVITIES

- Felt Tip Pen - Black or Red
- Writing Templates and/or Bold Lined Paper
- Appropriate use of task lighting alongside better seeing eye and/or opposite side of writing hand to reduce shadows
Fixation
Scanning
Saccades

Use “Pre-Reading and Writing Ex’s”, “LUV Reading Ex’s”, and The Art and Practice of Low Vision to train efficiency with using PRL.
READING ACTIVITIES

- Start with enlarged, high contrast print learning to use PRL
- Use appropriately graded reading material
- Incorporate use of eccentric viewing training
- Introduce device training

TOOLS TO ASSIST WITH READING TASKS

- Typoscope
- Yellow Acetate Contrast Sheet
- Bright Line Reading Guide
Microsoft/Apple built-in modifications under Control Panel
- Increase font size of print/magnifier feature
- Adjust mouse/cursor symbols size and speed
- Reverse contrast to improve visibility

Microsoft Accessibility: [www.microsoft.com/enable/](http://www.microsoft.com/enable/)
COMPUTER ACCESSIBILITY (cont’d)

Products on the Market:
- Various illuminated/large size/high contrast keyboards available
- Larger monitor screens 22” and beyond
- Mouse magnifiers- very inexpensive

- Little tip- Hit “Control” and roll wheel on mouse simultaneously to temporarily enlarge print on monitor on some computers.

COMPUTER ACCESSIBILITY (cont’d)

- Zoom Text- Ai Squared- screen magnification software- [www.aisquared.com](http://www.aisquared.com)- free download of 60 day trial software available
- Magic- Freedom Scientific- screen magnification software- [www.freedomscientific.com](http://www.freedomscientific.com)
- Jaws- Freedom Scientific screen reading software
Use of optical devices-
Various optical devices can be prescribed by a low vision optometrist/ophthalmologist, which can increase the quality of vision. (Not reimbursed by Medicare, but there may be other funding sources available.*)
IMPORATANCE OF HAVING AN UPDATED REFRACTION

- Necessary for MD/OD to determine eligibility for low vision rehabilitation services under Medicare.
- Patients will have most current prescription, which will allow them highest level of correctable acuity.
- Glasses often work as a “system” with other magnification devices, which may allow for a reduction of magnification strength.

FOUR TYPES OF MAGNIFICATION

- Relative Size Magnification
- Relative Distance Magnification
- Angular Magnification
- Projection Magnification
OPTICAL DEVICES FOR NEAR VISION USE

- Hand-Held Magnifier
- Stand Magnifier
- Intermediate Spectacle Correction - eating, writing, computer, etc.
- Near Vision Spectacle Correction - reading, etc.
  The higher the power, the closer the working distance required*

Hand Held Magnifier
(can use w/ distance prescription)
Stand Magnifier (use w/ reading add)

High Powered Spectacles
Various types of lenses - prisms, aspherics, microscopes
ELECTRONIC DEVICES FOR NEAR VISION USE

- Desktop Video Magnifier
- Mid-size Video Magnifier
- Hand Held Video Magnifier
- TV Adaptable Cameras
- Text to Speech Scanners

Desktop Video Magnifier
Portable Video Magnifier

Mid-Size Portable Video Magnifiers
New Generation Portable Hand Held Video Magnifiers

Training with a Hand Held Video Magnifier
Reading with an Electronic Book Reader

Text to Speech Scanners
The KNFB Reader Mobile is truly one of the breakthrough technology products of the decade. Read books, mail, packages, containers, computer screens, currency, and many other items with a single, handheld device. Use with Nokia N86 Phone.

There’s an “App” for that!!

I-phone Apps:
- Zoom-Reader- scan items and it will read back to you
- Color Identifier
- Money Reader
- Digital UPC Reader
- Picture Identifier
- Pedestrian GPS

These Apps are often inexpensive!
OPTICAL DEVICES FOR DISTANCE VISION USE

- Telescopes

- Spectacle Binoculars
REFERRAL SOURCES

- Local Support Groups in the Area

- State Commission for the Blind - must qualify
  - Orientation and Mobility Services
  - Independent Living Services
  - Eye Health Services

- Local diabetes education center - CDE

REFERRAL SOURCES (cont’d.)

- State Library Talking Book and Braille Center - free large print books & books on tape available

- NFB-Newsline - over 300 newspapers

- Free 411 Directory Assistance Access

- Local Transportation services
**DRIVING ISSUES**

- Patient must meet state requirements for driving. In NJ, the state DMV requirements are 20/50 or better in better seeing eye. It varies state by state.

- Important to discuss and document issues related to driving cessation with patients who insist on continuing to drive and are not considered legal to drive. It is your ethical responsibility to inform your patient’s referring MD/OD.

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**For Further Information or Specific Questions:**

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Thank You!!!

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