Strategies to Maximize Your Client’s Vision: Anatomy, Common Diagnoses, and Adaptations

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Learning Objectives:

- Understand Basic Anatomy and Function of the Eye
- Learn the Common Low Vision Diagnoses
- Learn the Areas Typically affected by the Common Diagnoses
- Learn Adaptations to use with Clients to Maximize their Vision

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The Eye

- Provides the CNS with 90% of sensory input.
- It allows us to quickly bring in information from our surroundings.

Above:
The eyelid, eyelashes, cornea, pupil, iris, and sclera.

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Function

- The eyelids and eyelashes protect the eye from objects in the environment, help nourish the eye, and assist in filtering light.
- The cornea allows light to enter the eye and focus images on the retina through refraction.
- The iris allows the pupil to constrict and dilate to control the amount of light entering the eye.
- The sclera encloses the eye to maintain the shape of the eye. It does not enclose the cornea.
Anatomy of the Eye

- The image to the right shows the basic anatomy of the eye.
- It consists of: the iris, aqueous, lens, ciliary muscle, vitreous, retina, macula, & optic nerve.

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Anatomy Continued

- **Cornea**
  - Is the slight bulge on the left of the diagram.
  - It directs light and the image into the eye.

- **Iris/Pupil**
  - The iris then controls the amount of light entering the eye by dilating or constricting the pupil.

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Anatomy Continued

- **Aqueous**
  - Is produced by the ciliary body to maintain nutrition of the anterior eye.
  - It also maintains the shape of the eye.

- **Ciliary Muscle**
  - The ciliary muscle and ciliary process make up the ciliary body.
  - The ciliary muscle thickens and flattens the lens.

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Anatomy Continued

- Lens
  - Refracts light to allow images to land on the retina.
  - The lens flattens or thickens to ensure the image lands on the retina.
  - It consists of water and protein.

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Anatomy Continued

- **Vitreous**
  - Is a transparent gel.
  - It holds the retina to eye.
- **Retina**
  - Consists of rods and cones.
  - Images from the world land on the retina.
Anatomy Continued

- The retina holds information from central and peripheral vision.
- The macula is a small area on the retina which allows for central vision: color, & detailed information.
- The fovea is located on the macula and is the point that images are focused on.
- The surrounding area of the retina captures the images of the peripheral vision.
Field of Vision (Retina)

- **Central Vision**
  - Macula and Fovea
  - Consists mainly of cones, some rods
  - Allows us to read (fine detailed information)
  - Accounts for about 20 degrees of the visual field

- **Peripheral Vision**
  - Consists of rods
  - Provides information about objects moving in the environment/background information

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Anatomy Continued

- The optic nerve carries the information captured on the retina to the visual cortex.
- Appropriate areas of the brain then process the information.

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Questions???
The Aging Process:

- As we age, changes occur in the eye.
  - The lens starts to thicken and harden. This decreases the ability for the eye to accommodate (see near distances).
  - The fluid in the lens starts to yellow changing the appearance/color of the objects that we see.
  - Changes in BP, Cholesterol, Diabetes, and other conditions have an affect on vision.

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Common Diagnoses in the Elderly

- Macular Degeneration
- Cataracts
- Glaucoma
- Diabetic Retinopathy

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Macular Degeneration

- Is the most common eye disease in adults.
- It results in a decrease in central vision.
- The area affected is called a scotoma.

- Its effects on ADLs:
  - unable to see details (faces or signs are not clear)
  - print is distorted or blurred
  - color vision is reduced
Scotomas

- Can occur on the macula or the fovea.
- There are three types of scotomas.
  - Central: occur on the fovea
  - Para-Central: occur on the macula
  - Ring Scotomas: which surround the fovea
- They can be relative or dense.
  - Relative allow for some information to be processed with increased light.
  - Dense do not respond with light.

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Scotomas

Knowing the type and location of the scotoma is important when completing ADLs and I-ADLs with clients.

A clock face may be used to assist in locating scotomas.
- Have your client look at the center of a clock.
- Have your client tell you which numbers they see most clearly.
- Numbers that are not seen are where scotomas are located.

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Scotomas Continued

- Another way to locate scotomas is to have clients read for you.
  - Look for parts of words that are missing.
  - Look to see if there are problems locating the next line to read.
  - Take note of any problems that occur.

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When a scotoma occurs on the fovea, the CNS picks up another spot on the macula which serves as the PRL (Preferred Retinal Locus).

- This allows the person to remain oriented in the environment.
- With training persons with macular degeneration are able to use their PRL to allow for better vision.
PRL Training

- With a clock face, have your client look at your hand when it is placed above, below, to the left, and to the right of the clock face.
- Ask your client when they are able to see the clock face the best.
- Use the results of this test to start training. (look above, below, to the left or to the right of the object)

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Questions???
Glaucoma

- Is chronic elevated pressure in the eye.
- It may cause optic nerve atrophy and loss of peripheral vision.

- Its effects on ADLs:
  - Difficulty in orientation in environment
  - Poor vision in dim illumination
  - Poor night vision
  - Glare
  - Slow light and dark adaptation
  - Bumping into objects
  - Putting things down and losing them
  - Difficultly reading

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Glaucoma

- Occurs a few ways:
  - The ciliary body secretes too much aqueous.
  - The cornea and iris form a narrow angle decreasing the ability of the aqueous to drain.
  - Or scar tissue from inflammation or surgery decreases the ability of the aqueous to drain. (Most common cause)
Glaucoma is Serious

- It can lead to blindness.
- Increase of pressure damages the peripheral retina and optic nerve.
- Routine eye exams measure the intra-ocular pressure.
- Medical intervention is available to decrease the intra-ocular pressure.
Patient Education

- It is important to educate our clients about glaucoma and other eye disorders.
- Glaucoma is more prevalent in persons over 40 years of age.
- It typically is painless, and it is often too late when the person experiences vision deficits to decrease further vision loss.
Questions???
Cataracts

- Opacity of the lens, which results in diminished acuity.
- The person’s field of vision is not affected.
- The person’s vision has an overall haziness, especially in glaring light.

- Its effects on ADLs:
  - Blurred hazy vision (distance)
  - Print appears faded or blurred
  - Lack of contrast indoors and outdoors
  - Colors appear faded
  - Glare sensitivity
  - Slow light and dark adaptation

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Cataracts

- Occur in 50% of people between the ages of 64-74.
- 70% of people over 75 have cataracts.
- Over a million cataract surgeries occur a year.
- 90% of the time surgery results in improved vision.
Cataracts

- Central vision predominantly is affected because of the glare, haziness, and decrease in contrast that occurs.
- When surgery is opted, the lens is removed an intra-ocular lens is inserted. (Plastic implant)

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Cataracts

- Occupational therapists typically do not treat persons for the diagnosis of cataracts. It is a co-morbid condition that affects our clients.

- Because surgery is effective, there often is no need for intervention.

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Questions???
Diabetic Retinopathy

- Causes blurred and hazy vision.
- It can lead to total blindness and is the leading cause of total blindness in adults over 18 years of age in the US.
- Affects central and peripheral vision.
- Two forms of diabetic retinopathy:
  - Non-proliferative diabetic retinopathy
  - Proliferative diabetic retinopathy

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## Diabetic Retinopathy

<table>
<thead>
<tr>
<th>Non-Proliferative Diabetic Retinopathy</th>
<th>Proliferative Diabetic Retinopathy</th>
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<tbody>
<tr>
<td>- Is the milder form</td>
<td>- Is the severe form</td>
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<tr>
<td>- Vision becomes blurred and hazy in the central and peripheral areas.</td>
<td>- Leaking blood vessels cause scar formation, retinal detachment, and can lead to total blindness.</td>
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Diabetic Retinopathy

- Client education is extremely important.
  - Maintaining control of blood glucose levels helps prevent vision loss.
  - Referrals to CDE (Certified Diabetes Educators) helps provide the training and education required in specific meal plans and use of medications to manage glucose levels.

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Diabetic Retinopathy

- The longer a person has diabetes the greater the chance the person will have visual deficits.
- The CDC reported in 2005 that 3.2 million adults with diabetes reported problems seeing even after using eye glasses or contact lenses.

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Questions???
Every low vision evaluation needs to include the following:

- Assessing visual acuity
- Assessing visual fields
- Assessing eye dominance
- Assessing contrast sensitivity

The information gained is necessary to provide proper intervention and treatment.
BIVABA

- Brain Injury Visual Assessment for Adults
  - Designed as a practical clinical tool to screen a client’s visual processing following brain injury.
  - It allows the therapist to gather information to make appropriate referrals.
  - It contains the assessments needed for a low vision evaluation.

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Review Components of the BiVABA

- Acuity
- Pupil Response
- Eye Dominance
- Intermediate Acuity
- Reading Acuity
- Contrast Sensitivity Function
- Visual Field

- Oculomotor Function
  - Corneal Reflections
  - Eye Movement
  - Diplopia

- Visual Attention
  - Near space
  - Attention to Detail
  - Extrapersonal Space

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Occupational Therapy’s Goal

- Allowing the elderly to age in place and remain independent in their purposeful and meaningful activities.
- We are not low vision therapists or doctors. We work with the information provided by other members of the team.

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Intervention Approaches

- **Client Centered**
  - Emphasis is on changing the client
  - Improving the ability to take in and process visual information

- **Environment Centered**
  - Emphasis is on altering the environment to achieve a better person-environment fit
  - Allowing the client to respond with their remaining capabilities
Client Centered

- Evaluating the remaining vision and maximizing its use. (PRL training)
- Using other senses to bring in information from the environment.
Environment Centered

- Changing items in the client’s surrounding to allow them to independently use them.

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Different Types of Adaptations

- **Lighting:**
  - increase light intensity
  - avoiding glare
  - incandescent rather than fluorescent
  - area lighting (stairs, entrances, etc)

- **Contrast:**
  - signs with contrasting background (black and white best)
  - color cues (yellow and orange)
  - contrasting colors for walls/doors/table linens/plates
  - using primary colors in activities
  - mark exits and stair treads
  - use floor tiles to indicate changes in area

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Continued...

- **Glare:**
  - low gloss finishes
  - painted or textured fabrics
  - avoid spot illumination at eye level
  - suggest brim hat or visor, umbrella or other shading device
  - outdoor tasks in shaded areas

- **Print:**
  - large print signs
  - large numbers for telephone dials
  - indicators for floor and elevator numbers

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Strategies by Room:

- Home Sweet Home
Bathroom: Bathing

- Use contrasting containers in bath tub.
- Use different shaped bottles to identify the objects.
- Safety awareness with the water (it is hard to see water on surfaces).
- Get into the tub with water off.
- Dry off before getting out of tub.
- Use contrasting grab bars.

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Bathroom: Toileting

- Feel for surface to sit on.
- Keep supplies in same area.
- Use contrast:
  - Have the color of toilet paper contrast against the holder and wall.
  - Have the toilet seat cover contrast from the floor color.

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Bathroom: Grooming

- Put toothpaste in a jar.
- Have additional lighting in the room.
- Use magnifying mirrors.
- Organize make-up.
- Put lipstick on finger and then apply to lips.
- Use a system for shaving (left to right) or (right to left).
- Choose easy hair styles.

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Kitchen: Cooking

- Use box mixes.
- Do meal prep over a tray.
- Organize items in the refrigerator and drawers.
- Put electrical tape around handles of knives.
- Use contrasting materials.
- Dip the measuring spoon into the object as opposed to pouring the object onto the measuring spoon.

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Kitchen: Eating

- Use contrasting placemats, plates, utensils.
- Decrease patterns (it is hard to find objects on patterned table cloths).
- Describe the position of objects on the plate.
- Finger foods are easier to eat when out with friends.
- Have chef pre-cut meal.
- Keep the fork in the food and cut around the fork.

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Bedroom: Dressing

- Put extra lighting in the closets.
- Use a system to organize clothes.
- Sew buttons in shirts.
- Write down the color of the shoe inside the shoe.
- Keep a flashlight handy.
Living Room: Reading

- Have good lighting in the room.
- Use spot lighting to increase the amount of light.
- Use lap trays or other positioning devices to position materials appropriately.
- Make sure the client has proper training in any devices used.

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Living Room: TV

- When possible use a large screen television.
- Move the chair closer to the television.
- Use blinds or shades to decrease the glare from windows.
- Make sure electric cords or wires are not loose in the room.
- Remove clutter or hazards in room.

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Strategies for Other Activities
Telephone

- Put a bump dot on the number 5.
- Program frequently used phone numbers.
- Large print telephones are available.
- Directory Assistance is free for the visually impaired when documentation is provided by a healthcare professional.
Check Writing

- Large print checks
- Check guides
  - There are also writing guides, envelope guides, and typoscopes.
Money Management

- New money has larger print.
- Fold the different denominations different ways.
- Quarters and dimes have ridges on the sides.
- Pennies and nickels are smooth on the sides.

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Medication Management

- Large print bottles.
- Mark containers.
- Count-A-Dose for diabetics.
- Label readers.
- Pill containers.
Cleaning

- Use an organized system.
- Safety awareness.
- Keep all supplies for a specific room together in the room.
Laundry

- Safety pin socks together.
- Have different hampers for different colored clothes.
- Put bump dots or high markers on settings frequently used.

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Overall

- Make sure there is good lighting, good contrast, organization, and elimination of clutter.

- The system developed has to be purposeful to the individual otherwise the individual will not use the system.
Case Study

- D.L. is a 91 y/o female who lives alone in a house. She has had Macular Degeneration for 7 years. Her visual acuity is 20/400 (she is unable to see the big E on the Snellen Chart). She is able to read one inch numbers approximately 8 inches away from her using her PRL.

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D.L.’s Goals

- D.L. will be able to play bridge with her friends using adaptive techniques in 1 month.
- D.L. will pick-out matching clothing in her closet using adaptive techniques in 2 weeks.
- D.L. will apply toothpaste on her toothbrush using adaptive techniques in 1 week.
D.L. will be able to play bridge with her friends using adaptive techniques in 1 month.

- **Client Centered**
  - Scotoma Awareness
  - Determine her PRL
  - Using her PRL to scan cards

- **Environment Centered**
  - Low Vision Playing Cards
  - Playing Card Rack
  - Increased Lighting
  - Telescope?
D.L. will pick-out matching clothing in her closet using adaptive techniques in 2 weeks.

- Environment Centered
  - Small buttons/shapes sewn into clothes
  - Different hangers
  - Organization of clothes
  - Increased lighting in her closet

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D.L. will apply toothpaste on her toothbrush using adaptive techniques in 1 week.

- Environment Centered
  - Place toothpaste in a jar with a lid
  - Increased lighting
  - Toothbrush with shaped handle
Questions???

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