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

# 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.

#### 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.



#### 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.



#### 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.



#### 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.



#### 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.



- 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

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





# **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.

# Common Diagnoses in the Elderly

Macular Degeneration

Cataracts

Glaucoma

Diabetic Retinopathy

### **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.



- 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.

#### **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.

# **Our Amazing CNS**

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)



#### 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

#### 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 intraocular 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.



- 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

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.

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)

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.



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

#### Non-Proliferative Diabetic Retinopathy

**Proliferative Diabetic Retinopathy** 

- Is the milder form
- Vision becomes blurred and hazy in the central and peripheral areas.
- Is the severe form
- Leaking blood vessels cause scar formation, retinal detachment, and can lead to total blindness.

 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.

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. Questions???

#### **Evaluation**

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.

# **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

# 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.



### **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 personenvironment 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.



# Different Types of Adaptations

#### Lighting:

- increase light intensity avoiding glare
- incandescent rather then fluorescent
- area lighting (stairs, entrances, etc)



#### <u>Contrast</u>:

- 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

#### Continued...

#### ■ <u>Glare</u>:

- 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



### **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.

### **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.

# **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.

### **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.

# **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.

#### **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.

### 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.

### 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.

### **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 hump dots or high markers on

Put bump dots or high markers on settings frequently used.

#### **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.

### 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

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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