Current Trends in Brain Injury and Low Vision Rehabilitation

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Current Trends in Brain Injury and Low Vision Rehabilitation

We have no relevant financial relationships with any commercial interest. Our interest is to provide the best occupational therapy service delivery model to our patients as they face vision impairment.
Learning objectives:

Demonstrate understanding of:
- vision impairment related to brain injury or chronic low vision
- impact and prevalence of functional vision deficits in brain injuries and chronic low vision conditions
- behavioral patterns indicative of functional vision impairment
- value of the interdisciplinary team to address the functional vision deficits
- ability to create interventions and discharge plans to support the functional vision needs of those experiencing brain injury and chronic low vision conditions
- available resources and identify needs for referral
What is low vision OT?

• Humans are hard-wired to use their vision, even if it’s impaired (Warren, 2011)

• Low vision OT helps patients optimize their remaining vision to regain independence during daily activities
Occupational therapy low vision rehab: how it helps

- Teach people to use their remaining vision for ADL/IADL
- Strategies, environmental safety, devices, to compensate with functional vision
- Teach strategies for low vision
  - Goal: improve use of functional vision, improve self-management of chronic condition
- Teach use of functional vision for safety, fall prevention, ADL, IADL
  - Goal: reduce caregiver burden, remain home, reduce health care system costs

Electronic magnification
Environmental safety
Eccentric viewing
Glare reduction

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http://www.lowvision.org/filters.htm
Interventions

OT low vision rehab

Primary Referral sources: Low Vision Optometry, Ophthalmology

PM&R, PCP, MD, PA, CRNP

Vision disease & chronic disease Management Team(s): MD, rehab: OT, PT, SLP

Technology resources

Support services: Health Care Plan CHC, Community resources

Self-management training

Fall prevention Med management

Visual skills Functional Vision

Low Vision OT

Home modification Telerehab

Technology and resources

Strategies and Adaptive equipment

Patient

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OT low vision evaluation

Functional vision assessments

• Reading: Critical Print Size, Writing
• Contrast Sensitivity
• Oculomotor/Visual Field, Depth perception
• Lighting/Glare
• Visual Attention
• ADL/IADL, Functional mobility/fall prevention
• Technology
• Patient Health Questionnaire (PHQ-9)
• Revised Self Report Assessment of Functional Visual Performance (R-SRAFVP)
• Observational Assessment of Functional Vision Performance
• PSFS: Patient Specific Functional Scale

Contrast Sensitivity

Reading Acuity

LuxIQ lighting
Assistive technology

Blurring the boundaries between assistive tech and companionship

Amazon Echo Show: Identifies Products
Apps: Seeing AI

- OCR: optical character recognition
- Free and available on IOS only
- Reads short text, document, handwriting
- Describes scene
- Describes person
- Currency Reader
- Color identification
- Lighting identification
OT low vision rehab research and projects

- Iris Vision Study
- Beckwith Institute COVID-19 Grant

“iSee: The Future of Low Vision Rehab”
Future of low vision

Pixium study

GenSight study

Image taken from MedGadget interview
Slide compliments of Dr. William Smith
What is bioptic driving?

PA HB 2296
LOOKING AHEAD

Improving Our Vision for the Future

VISION & EYE PROBLEMS ARE INCREASING AS AMERICA AGES

90 MILLION
Americans over 40 have vision and eye problems

That's more than 3 in 5

By 2050, without effective interventions:
- Diabetic retinopathy ↑72%
- Cataracts ↑87%
- Glaucoma ↑100%
- Age-related macular degeneration ↑100%
- Vision impairment & blindness ↑150%

VISION LOSS TOUCHES EVERY PART OF PEOPLE'S LIVES

People with vision loss are more likely to have:
- Type 2 diabetes
- Depression
- Stroke
- Hearing loss
- Chronic kidney disease

Vision loss is also related to:
- Isolation
- Balance problems
- Falls & fall-related injuries
- Risk of early death

ACCESS TO EYE CARE + EARLY DETECTION = IMPROVED VISION HEALTH + LOWER COSTS

CDC’s Vision Health Initiative

ASSESSES the impact of vision loss and identifies populations at risk
AIMS to increase awareness of vision and eye health, improve access to vision care, and promote the health of people with vision loss
Uses APPLIED public health research to develop evidence-based interventions and understand the costs of vision loss
ADVANCES vision and eye health as a public health priority through support of state and territorial health department activities

cdc.gov/visionhealth
Treating neurological based vision deficits

• Vision is learned through experience

• Between a $\frac{1}{3}$ to $\frac{1}{2}$ of our brain is devoted to VISION!

• All humans are primarily visual learners

• Humans will always try to use their vision, no matter how impaired it is!

(Warren, 2016)
Treating neurological based vision deficits

(Warren, 2016)
Normal vs abnormal search patterns

Normal Search Pattern

- Efficient
- Symmetrical
- Comprehensive
- Visual attention is expressed through search and scanning

(Warren, 2016)
OT eval: neurologically based visual impairment

- “Look and Listen Approach”
- Ocular History
- Brain Injury Visual Symptoms Survey (BIVSS)
- Brain Injury Visual Assessment Battery for Adults (BiVABA)
- Utilize the interdisciplinary team (MD, OD, OT, PT, and SLP)
Hemianopsia

(Gillen, 2011)
Hemianopsia

Clinical Evaluation
• Medical History (70% of all PCAs, 30% of all CVAs)
• Confrontation Testing
• Cancellation Tests (BITs, Bell’s Cancellation)
• Examine reading saccades, fluency, and comprehension
• Observation of impaired search patterns during ADLs, IADLs, and transfers

Treatment
• Increase awareness of deficits
• Increase amplitude of scanning pattern

*Can co-occur with neglect*

(Warren, 2016; Gillen, 2011)
Neglect

(Warren, 2016; Gillen, 2009)
Diplopia or “double-vision”

- Occurs when eyes are not aligned, and the image projected onto the retina misalign
- If a patient reports diplopia when one-eye is occluded then there are additional deficits that are not diplopia

Cover-Uncover Test

- With one eye occluded, a patient fixates at a distant object
- When the occluder is moved to the other eye, observe if there is a fixational change (i.e. the eye moves) and observe what direction it moves
- If a change in fixation occurs, diplopia is present

(Gillen, 2011)
Diplopia

**Functional challenges during ADLs**
- Over or undershooting during reaching (decreased depth perception)
- Unsteady gait
- Closing one eye
- Difficulty reading
- Avoiding near tasks

**Optometrist prescribed treatments may include**
- Fresnel Prisms
- Visual Therapy

(Gillen, 2011)
Compensatory Methods That Do NOT Require Optometrist Oversight

- **Taping**
  - Tape non-dominant eye if possible
  - Use opaque tape
  - Pros: cost effective, patient can use peripheral vision during mobility, and functionally prevents diplopia
  - Cons: impairs depth perception by creating monocular vision, body image issues, only masks diplopia

- **Increasing size of objects**

- **Positioning objects in best field of view**

- **Using tactile cues to compensate**

(Gillen, 2011)
Oscillopsia from vestibular changes

• What is oscillopsia?
  – Illusory movement of the visual world
  – This can occur from vestibular changes and/or nystagmus and cause blurred vision

• Treatment
  – Incorporate habituation exercises
    • Create functional activities that require repetitive head turning such as sorting tasks
  – Address dynamic balance during daily activities
  – Help identify signs of Benign Paroxysmal Positional Vertigo (BPPV) and use reposition maneuvers
  – Incorporate environmental changes and adaptive equipment

Video of woman with nystagmus

(Cohen, 2011)
Cortical visual impairment: CVI

Cortical Visual Impairment = cerebral visual impairment = cortical blindness

A person with CVI’s view of the world may be like looking through a changing kaleidoscope
CVI causes and behaviors

Common Causes of CVI
• Hypoxia
• Ischemia
• Hydrocephalus
• Encephalitis or other infections
• Seizures
• Infection
• Any neurological event that impairs the posterior visual processing system

(The 10 Characteristics of CVI Behavior
(in children) by Christine Roman-Lantzy
1. Color
2. Movement
3. Latency
4. Complexity
5. Visual field preferences
6. Visual novelty
7. Visual reflex response
8. Distance viewing
9. Light gazing
10. Visually directed reach

(Mazel, n.d.)
Cortical visual impairment

- Does your patient have a color preference? If so incorporate it into treatment
- Reduce background stimuli and increase contrast
- As the patient improves, increase the visual complexity of the tasks
- Give your patient increased time to visually locate the desired object
- Begin treatment in patients’ intact field of views, then expand their scanning
- Incorporate touch to stimulate visually guided reach
For more CVI Information

• Perkins School for the Blind in Watertown, MA
• Great FREE online resources for learning more about CVI
• https://www.perkinselearning.org/cvi
Bringing it all together...

- Neurological Vision Impairment
- Low Vision
Optimize outcomes

• Maximize lighting
  • Lighting evaluation
  • Glare filters
• Increase contrast
  • reduce background distraction
• Increase size
  • MN Read
  • non-optical magnification options
• Use compensatory methods that do not require vision
• Reduce spatial orientation demands

(Aravich & Troxell, 2021; Gillen, 2011)
Advocate for optometry services

• Many facilities do not have access to optometry at the in-patient level
  • OD can evaluate prisms
  • OD can prescribe vision therapy
  • OD can prescribe optical devices
  • OD can diagnose visual impairments
• Utilize virtual platforms to increase access to care
  • Keilty et al. 2020
Questions??

Please, please check out the references from this presentation for more information on the functional implications and treatment of neurological related vision impairments!
Thank you for your attention

• Dana Aravich, Holly Stants and Laura Troxell are all graduates of the University of Alabama at Birmingham’s Graduate Certificate in Low Vision Rehabilitation providing interventions for low vision.
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References


Image links and slide number reference

- Future Eye (slide 10)

- Eye chart image (slide 3)
  https://www.123rf.com/visual/search/25872262

- iPad image (slide 9)

- Seeing AI app (slide 8)
  https://www.windowscentral.com/microsofts-seeing-ai-app-visually-impaired-comes-uk-australia

- Accessibility symbol (slide 9)
  https://ipadinsight.com/ipad-tips-tricks/how-to-use-voiceover-to-help-you-better-navigate-your-ipad/

- Contrast test from BiVABA Lea Numbers symbol (slide 6)

- LuxIQ lighting assessment slide 6
  http://www.mattinglylowvision.com/image/luxP2.png

- Glare reduction slide 4
  http://www.lowvision.org/filters.htm

- Iris Vision Glasses Slides 4 and 9
  IrisVision Low Vision Wearable Glasses - New England Low Vision (nelowvision.com)

- Technology slide 7
  Amazon Alexa — Blurring The Boundaries Between Assistive Tech And Companionship (forbes.com)

- Bioptic Driving Ocutech slide 11
  Driving with Biopics – Ocutech

- Bells Cancellation test slide 15
  https://www.semanticscholar.org/paper/The-assessment-of-hemineglect-syndrome-with-tasks%3A-Basagni-Tanti/33a38fc749a10c56a6b30391343176ceba0a5ba7
Figures and Images


Image 1. visABILITIES Rehab Services, Inc. logo by M. Warren Retrieved from https://www.visabilities.com/

Figure 2. Deficits in the visual field produced by lesions at various points in the visual pathway. Managing visual and visuospatial impairments to optimize function” in Stroke rehabilitation a function based approach 3rd edition (p.421) by G. Gillen, 2011, New York, NY: Elsevier, Mosby. [2011].

Image 2. What is left neglect. Retrieved from https://tactustherapy.com/what-is-left-neglect/

