OT Role in Visual Screening and Referral for Individuals with Neurological Impairment in an Inpatient Setting

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Neurovisual Deficit Statistics

8 million people per year suffer a TBI with 1.5 million of those injuries categorized as “major”

500,000 individuals are affected by a CVA each year

20-40% of people with a brain injury experience related vision disorders

(Kerkhoff, 2000)
Neurovisual Deficit Statistics

Individuals with a moderate to severe TBI have a 1/3 chance to have a visual impairment.

Common deficits include:
- Reduced visual acuity
- Visual field loss
- Binocular dysfunction
- Spatial perceptual deficit

(Kerkhoff, 2000)
Session Objectives:

1) Learn how to administer a basic visual screen and recognize the impact of visual deficit on safety and functional performance

2) Articulate OT role in visual screening and impact of individual's visual deficits on functional performance to caregivers

3) Understand the role of visual rehabilitation team members and identify need for referral
Mary Warren’s Hierarchical Model of Visual Processing
Visual Screen Components

- Clinical Observation!
- Informal Interview:
  - Eye Health Hx
  - Subjective Symptoms
- Symptom Questionnaire
- Oculomotor, Visual Fields & Visual Acuity Screening
Oculomotor Screening Procedures

**Oculomotor Control:** Efficient movement of the eyes in a coordinated manner allowing for perceptual stability.

- **Alignment**
- **Fixation**
- **Convergence/Divergence**
- **Accommodation**
- **Saccades**
- **Smooth pursuits**
- **Range of Motion**
Ocular Alignment & Visual Fixation

**Ocular alignment**
Position of the eyes in relation to one another.

**Visual fixation**
Ability to maintain gaze on an object.
Convergence, Divergence and Accommodation

Vergence and Accommodation
System that aligns the eyes to allow for binocular vision.

Deficits may result in:
visual fatigue, headache.

Deficits may look like:
Decreased concentration or comprehension.
Saccades

Saccades –
Sequenced rapid eye movements

Deficits may look like:
undershooting/overshooting
targets, difficulty shifting gaze,
inability to isolate head/eye
movements.
Smooth Pursuits/Visual Scanning

**Smooth Pursuit**
Continuous fixation on a moving target within the central field

*Deficits may look like:*
Inability or impaired ability to track across visual field or coordinate both eyes to move in the same direction symmetrically.
Oculomotor Range of Motion

Oculomotor range of motion

Ability to achieve the extreme movements of gaze in various directions.

![Diagram showing oculomotor range of motion with labels RSR, LIO, RSR+RIO, LSR+LIO, RIO, LSR, RLR, LMR, RMR, LIR, RIR, LSO, RIR+RSO, LIR-LSO, RSO, LIR.](image)
Visual Fields: Confrontation Testing

**Visual field**
Extent of an area visible to an eye in a certain position.
## Visual Field Loss Vs. Neglect

<table>
<thead>
<tr>
<th>Visual Field Loss</th>
<th>Neglect</th>
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</thead>
<tbody>
<tr>
<td>Confrontation Testing</td>
<td>Assess personal, extrapersonal and motor neglect</td>
</tr>
<tr>
<td>Awareness of deficits</td>
<td>Lack of deficit awareness</td>
</tr>
<tr>
<td>Compensatory strategies effective</td>
<td>Compensatory strategies tougher to comprehend</td>
</tr>
<tr>
<td>Visual deficit only</td>
<td>Multi-sensory deficit</td>
</tr>
<tr>
<td>Postural alignment ok</td>
<td>Posture misaligned</td>
</tr>
</tbody>
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Visual Midline Shift Syndrome

A neurological event that often corresponds with hemiplegia or hemiparesis in which the visual field is shifted, resulting in the client leaning away from the affected side.
Visual Acuity

**Distance visual acuity** Ability to discriminate small details while far away from an object.

**Near visual acuity** Ability to discriminate details at close range.

*Functional Screening*: Reading a menu, channel guide, name tag, clock on the wall, room signage
It’s More than Acuity!

“Good Vision Is More Than 20/20... it is seeing without effort” – Donald Studt, O.D.
Visual Perceptual Screening

- **Catherine Bergego Scale (CBS)** (Azouvi, 1996)
- **Comb and Razor Test**
- **Line Bisection Test/Albert’s Test**
- **Star Cancellation Test**
- **Baking Tray Test**
- **Arrow Orientation**
- **Trail Making Test**
- **Randot Stereopsis**
- **Motor Free Visual Perceptual Test**
- **Developmental Test of Visual Perception**
- **Test of Visual Perceptual Skills**
- **Beery-Buktenica Developmental Test of Visual Motor Integration**
What is an Occupational Therapist’s Role in Visual Screening?

• **Generalists** treat by providing recommendations for general adaptations (increased lighting, increased contrast, line guides, etc...).

• **Specialists** treat by training use of residual vision during ADLs, environmental adaptation, compensatory techniques, community reintegration, caregiver training and training w/ optical (prisms, magnifiers) and non-optical devices (assistive tech).
  
  • Remediation, compensation, adaptation
Vision Team Members
How do you know who to refer to?

When to refer a patient to Neuro-Optometry?
Questions for Caregivers to ask during the initial Neuro-optometry visit

• How long will it take for my eye(s) to regain the vision that was lost?
• Are there any cranial nerves that were damaged? If so, what purpose does that nerve serve in being able to see?
• Will I be able to drive again?
• Is surgery an option? What would be the goal of surgery?
• Will my double vision ever go away?
• Is there any recommended eye exercises I should be doing now with my OT or at home?
• Should I get a second opinion?
Relevance of different visual abilities for four main types of activities (binocular vision, reading, mobility, visual memory) in a neurorehabilitative context.

- Binocular vision
  - Depth perception
  - Fusion
  - Stereopsis
  - Vergence

- Mobility
  - Space perception
  - Visual search
  - Visual field

- Vision
  - Acuity
  - Faces
  - Objects
  - Environments

- Reading
  - Eye movements

- Visual memory

Georg Kerkhoff J Neurol Neurosurg Psychiatry
2000;68:691-706

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References


