The Overlooked Deficits of Acquired Brain Injury: Bringing Visual Rehabilitation Into Focus

Assessments Listed in Literature Search

PICO: What is the evidence to support occupational therapy interventions for neurovisual deficits in adults with acquired brain injury to improve participation in valued occupations?

Aimola, L., Lane, A., Smith, D., Kerkhoff, G., Ford, G., & Schenk, T. (2014). Efficacy and feasibility of home-based training for individuals with homonymous visual field defects. *Neurorehabilitation and Neural Repair,* 28(3), 207-218. doi: 10.1177/1545968313503219.

- Oculus Twinfield 2 perimeter and Esterman preset program repeated for each eye – used to assess monocular visual fields.
- Fixation was monitored using a video-camera and central probe stimuli
- Suprathreshold Binocular Kinetic Perimetry – measured in 40 patients. See pg 3. – used when Esterman could not determine spatial resolution of the visual field border,.
- Visual search – find the number – used as a primary outcome task – looking for numbers 1-4 on a black background with distractors.
- Reading – 200 work passage was read and number of errors was counted.
- ADL Task simulation:
    - Driving hazard perception, obstacle avoidance, visualmotor obstacle.
- Attention Tasks
    - **Sustained Attention to Response** (SART)
    - **Test of Everyday Attention** (TEA) -
- Subjective Questionnaires
    - Visual Functioning Questionnaire (how participants rated their difficulty carrying out specific activities)
    - Visual Impairments Questionnaire (how helpful the training was)

Bowen, A., Knapp, P., Gillespie, D., Nicolson, D. J., & Vail, A. (2011). Non-pharmacological interventions for perceptual disorders following stroke and other adult-acquired, non-progressive brain injury. *Cochrane Database of Systematic Reviews*, *4, 1-52*.

- Primary
    - ADLS-FIM, Modified Barthel Index, Assessment of Motor Process Skills (AMPS);
- Secondary outcomes included:
    - Independence in ADL at the scheduled end of the intervention (ordinal)

- Performance on standardized impairment level measures of perception e.g. RPAB, BORB, VOSP at end of intervention and at six months (ordinal)
- Quality of life measures at six months (ordinal)
- Effects on carer at six months (ordinal);
- Destination on discharge: institutional care setting or not (binary)
- Adverse events, such as death, fatigue, falls, accident rates (binary)

Han, Y., Ciuffreda, K. J., & Kapoor, N. (2004). Reading-related oculomotor testing and training protocols for   acquired brain injury in humans. *Brain research protocols*, *14*(1), 1-12.
- Phoropter for refractive state
- Ophthalmoscopes - direct and indirect - assess ocular health
- Reading rating questionnaire
- OBER 2
- Visagraph II -reading assessment

Hayes, A., Chen, C. S., Clarke, G., & Thompson, A. (2012). Functional improvements following the use of NVT vision rehabilitation program for patients with hemianopia following stroke. *Neuro Rehabilitation*, *31*, 19-30. Retrieved from doi: 10.3233/NRE-2012-0771
- Visual fields (Medmont computerized field analyzer)
- Mars Perceptual Contrast Sensitivity Letter Test
- VA LV VFQ-48 (QOL)
- Pepper Visual Skills Reading Test for speed and accuracy
- NEI-VFQ-25 (QOL)
- Mayo Portland Adaptability Index (QOL)
- Static Scanning (listed as "outcome measure"--no other details provided)
- Mobility Assessment Course (see article for more details)
- The Behavioral Inattention Test-BIT
- The Mars CS Test

Kapoor, N., Ciuffreda, K. J., & Han, Y. (2004). Oculomotor rehabilitation in acquired brain injury: A case series.   *Arch Phys Med Rehabil*, *85*, 1667-78.
- Full optometric assessment measuring: fixational accuracy, saccadic gain and latency, pursuit gain, mean saccade frequency ratio for simulated reading (DEM Test)
- Reading eye movement parameters: words per minute, grade level equivalent, fixations per 100 words, regressions per 100 words, percentage of reading comprehension, duration of fixation in seconds
- Subjective Outcome measures:
  - Reading rating scale questionnaire

Keller, I., Lefin-Rank, G. (2010). Improvement in visual search after audiovisual exploration training in hemianopic patients. *Neural Rehabilitation and Neural Repair, 24*(7), 666-673. doi: 10.1177/1545968310372774
- **Goldmann perimeter examination**-- before and after training for possible changes in visual fields
  - Performed by same medical assistant

- o   Fixation monitored throughout, using the telescope
- Visual Exploration Test
  - o   Apparatus composed of 48 red LEDs served as visual targets, each presented 3x for 100 milliseconds
  - o   Instructed patient to press button after detecting target
  - o   "Number of omissions measured separately for each hemifield" (p.668)
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- Reading Test
  - o   Examines transfer to a nontrained visual task, 2 standardized reading tests were developed for the assessment of reading time
    - ▪   Each had 180 words arranged in 20 lines
    - ▪   Mean reading time of healthy controls is 65 s, with SD of 8.5 seconds.
  - o   Instructed to read the text aloud as accurately as possible without using fingers
  - o   Time a patient needed to read whole text was measured
- Search Task
  - o   Visually explore a rectangular board with 18 objects (egg, pen, button) that were evenly distributed
  - o   Asked to find 9/18 objects (3 specific targets in each third of the board which had 6 objects per third) within 1 minute for each target
  - o   Verbally indicate found target and examiner measured search time for each detected object
  - o   Patients had to find different objects during pre and post testing
- Evaluation of Activities of Daily Living
  - o   Questionnaire with 5 items describing frequent visual impairments of those with visual field defects
  - o   Assessed: finding objects on the table, avoiding bumping into objects/persons, eye contact, seeing obstacles, and reading
  - o   Pre and post training by an OT
  - o   OT judged each item on a 5-point scale to what extend each patient exhibited the problem in question (OT blinded to group assignments)
- Electro-oculography
  - o   Used to evaluate changes in oculomotor behavior, EOG recorded while subjects performed visual exploration test pre and post
  - o   The number of saccades and mean amplitude of saccades to the hemianopic side were analyzed

Riggs, R. V., Andrews, K., Roberts, P., & Gilewski, M. (2007). Visual deficit interventions in adult stroke and brain injury: A systematic review. *American Journal of Physical Medicine & Rehabilitation*, *86*(10), 853-860.
- Systematic Review(which is why some are listed more than once):
- Mini-Mental State Exam (MMSE)
- Stroop Neuropsychological Screening Test (SNST)
- BIT
- Balloons Test
- Cancellation tests
- Reading tests

- Fluff test
- Room description and object-reaching test
- Line, letter, and bell cancellation tasks, copying, line bisection test
- Functional Independence Measure (FIM)
- Analysis or right eye movements
- Line bisection
- Line cancellation, copying a drawing, drawing from memory, reading simple text
- Rivermead Perceptual Assessment Battery (RPAB) 16 subtests, length of hospital say, BADL score, Functional Improvement (Rivermead Mobility Index, Barthel Index and Canadian Neurological Scale)
- Evaluation of hemispatial neglect (letter cancellation test, Barrage test, Wundt–Jastrow Area Illusion Test, sentence-reading test)
- Eye movements
- Rey–Osterreith complex figure copy
- Neale reading test
- Picture completion
- Block design
- Observers report of neglect
- Modified Mini Mental Status Exam
- Motor Free Visual Perception Test (MVPT)
- Harrington Flocks Visual Screener
- Tangent screen exam
- Varthel ADL mobility score
- Route-finding performance

Modden, C., Behrens, M., Damke, I., Eilers, N., Kastrup, A., & Hildebrandt, H. (2012). A Randomized Controlled Trial Comparing 2 Interventions for Visual Field Loss With Standard Occupational Therapy During Inpatient Stroke Rehabilitaiton. *Neurorehabil Neural Repair* 26: 463

Standardized Assessment/Evaluation Tool	Purpose/ Measuring For:
Test Battery of Attentional Performance (TAP)	Visual Field Assessment / Fields of View
Behavioral Inattention Test (BIT): Cancellation tasks only including line, stars, and letter cancellation tests	Visual Search Performance
Wechsler Memory Test	Reading ability: speed (words per second)
Wechsler Memory Test	Reading Accuracy (number of Errors)
TAP Phasic Alertness Test	Attention/Alertness
TAP Conjunction Search/ Visual Scanning	Visual Scanning (errors in exploration tasks)
Extended Barthel Index	ADL/Self-care

*Remaining studies not listed were level V evidence and did not address specific assessments