Canadian Stroke Best Practices

CANADIAN STROKE BEST PRACTICE RECOMMENDATIONS

Rehabilitation, Recovery and Community Participation Following Stroke

Part Two: Delivery of Stroke Rehabilitation to Optimize Functional Recovery Evidence Tables

7th edition, update 2025

Rehabilitation of Visual Perceptual Deficits

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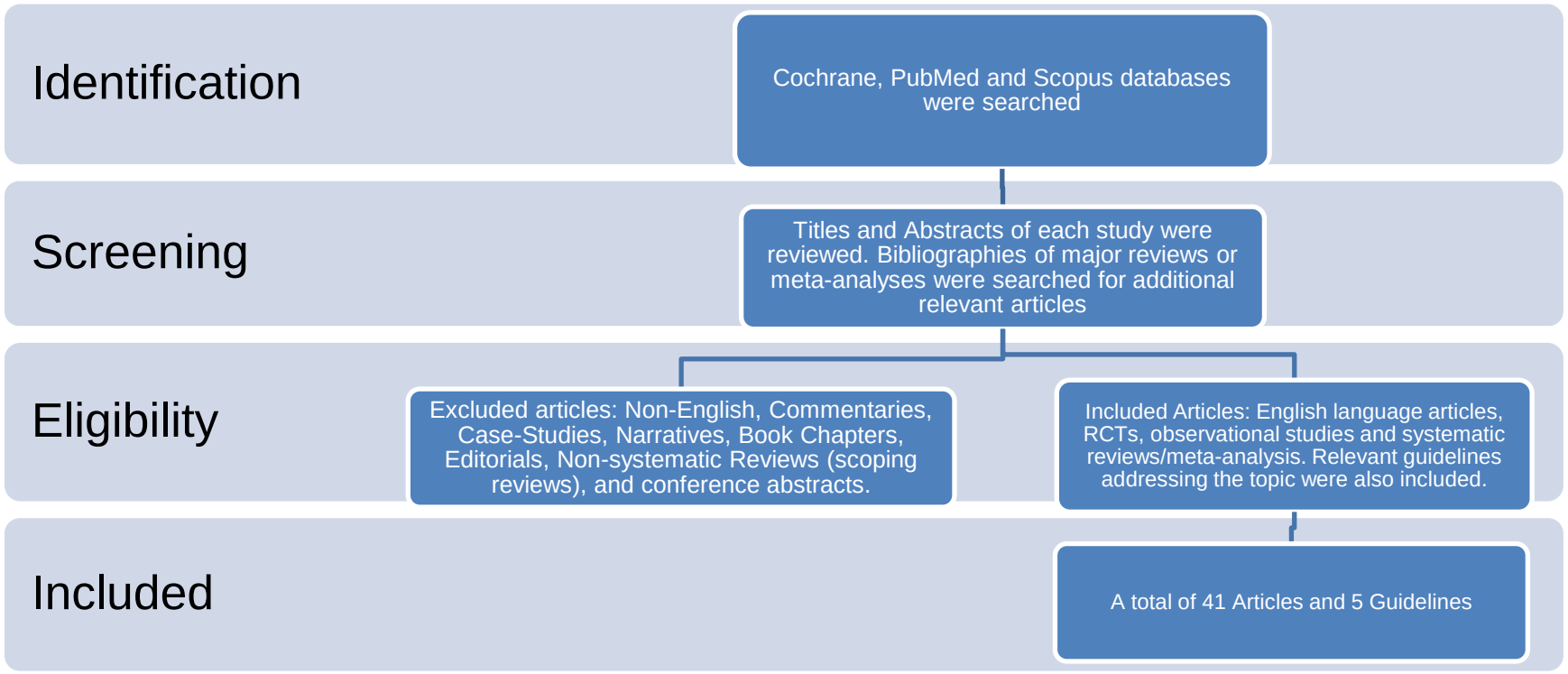
Table of Contents

Search Strategy



Cochrane, PubMed and Scopus databases were searched using terms such as Stroke AND (“Visual Disorder” OR “Perception Disorder” OR “Unilateral Neglect” OR Visuoperception”) AND (rehabilitation OR therapy OR intervention). Titles and abstract of each article were reviewed for relevance. Bibliographies were reviewed to find additional relevant articles. Articles were excluded if they were: non-English, commentaries, case-studies, narrative, book chapters, editorials, non-systematic review, or conference abstracts. Additional searches for relevant best practice guidelines were completed and included in a separate section of the review. A total of 41 articles and 5 guidelines were included and were separated into categories designed to answer specific questions.

Published Guidelines

Guideline	Recommendations
Management of Stroke Rehabilitation Working Group. VA/DoD clinical practice guideline for the management of stroke rehabilitation. Washington (DC): Veterans Health Administration, Department of Defense; Version 5.0 – 2024. **Available at:** https://www.healthquality.va.gov/guidelines/Rehab/stroke/	36. There is insufficient evidence to recommend for or against hemifield eye patching in addition to traditional therapy to improve functional outcomes in patients with unilateral spatial neglect. (Neither for nor against) 37. There is insufficient evidence to recommend for or against the use of prism adaptation therapy for patients with unilateral spatial neglect. (Neither for nor against)
National Clinical Guideline for Stroke for the UK and Ireland. London: Intercollegiate Stroke Working Party; 2023 May 4. **Available at:** www.strokeguideline.org. **(selected)**	*Perception* A People with stroke should be: – assessed for visual acuity whilst wearing the appropriate glasses to check their ability to read newspaper text and see distant objects clearly; – examined for the presence of visual field deficit (e.g. hemianopia) and eye movement disorders (e.g. strabismus and motility deficit). B People with altered vision, visual field defects or eye movement disorders after stroke should receive information, support and advice from an orthoptist and/or an ophthalmologist. C People with visual loss due to retinal artery occlusion should be jointly managed by an ophthalmologist and a stroke physician. *Neglect* People with impaired awareness to one side after stroke should: – have the impairment explained to them, their family/carers and the multidisciplinary team – be trained in compensatory strategies to reduce the impact on their activities; – be given cues to draw attention to the affected side during therapy and nursing activities – be monitored to ensure that they do not eat too little through missing food on one side of the plate *Vision* A People with stroke should be: - screened for visual changes by a professional with appropriate knowledge and skills, using a standardised approach. [2023]

Guideline	Recommendations
	B People with stroke should be: - assessed for visual acuity whilst wearing their usual glasses or contact lenses to check their ability to read newspaper text and see distant objects clearly; - examined for the presence of visual field deficit (e.g. hemianopia) and eye movement disorders (e.g. strabismus and motility deficit); - assessed using adapted visual tests for those with communication impairment. [2023] C People with altered vision, visual field defects or eye movement disorders after stroke should receive information, support and advice from an orthoptist and/or an ophthalmologist. [2023] D People reporting visual disturbance following stroke should be assessed by an occupational therapist to assess its impact on their ability to carry out functional tasks independently, their confidence and safety. [2023] E People with visual loss due to retinal artery occlusion should be jointly managed by an ophthalmologist and a stroke physician. [2023] *Sensation* A People with stroke should be screened for altered sensation and if present, assessed for sensory impairments using standardised measures. [2016] B People with sensory loss after stroke should be trained in how to avoid injury to the affected body parts. [2016]
Moore M, Milosevich E, Beisteiner R, Bowen A, Checketts M, Demeyere N et al. **Rapid screening for neglect following stroke: A systematic search and European Academy of Neurology recommendations.** ***Eur J Neurol*. 2022 Sep;29(9):2596-2606.**	Consensus recommendations for neglect screening Primary recommendation One of the following cancellation tests BIT Star Cancellation Task Bells Cancellation Test OCS Hearts Cancellation Test BCoS Apples Cancellation Task Secondary recommendations If time permits & test available consider one/more of Figure copying Line bisection Baking tray task Functional/ecological assessment of neglect If longer assessment of everyday activity possible Catherine Bergego Scale

Guideline	Recommendations
Clinical Guidelines for Stroke Management 2022. Melbourne (Australia): National Stroke Foundation. Part 5: Rehabilitation	Weak recommendation Updated For stroke survivors with symptoms of unilateral neglect, cognitive rehabilitation (e.g. computerised scanning training, pen and paper tasks, visual scanning training, eye patching, mental practice) may be provided. Weak recommendation New For stroke survivors with symptoms of unilateral neglect, mirror therapy may be used to improve arm function and ADL performance. Weak recommendation AGAINST New Non-invasive brain stimulation should not be used in routine clinical practice to decrease unilateral neglect, but may be used within a research framework
Winstein CJ, Stein J, Arena R, Bates B, Cherney LR, Cramer SC et al; on behalf of the American Heart Association Stroke Council, Council on Cardiovascular and Stroke Nursing, Council on Clinical Cardiology, and Council on Quality of Care and Outcomes Research. **Guidelines for adult stroke rehabilitation and recovery: a guideline for healthcare professionals from the American Heart Association/American Stroke Association.** ***Stroke* 2016;47:e98–e169**	Evaluation of stroke patients for sensory impairments, including touch, vision, and hearing, is probably indicated. Class IIa; LOE B Strategy training or gesture training for apraxia may be considered. Class IIb; LOE B Task practice for apraxia with and without mental rehearsal may be considered. Class IIb; LOE C It is reasonable to provide repeated top-down and bottom-up interventions such as prism adaptation, visual scanning training, optokinetic stimulation, virtual reality, limb activation, mental imagery, and neck vibration combined with prism adaptation to improve neglect symptoms. Class IIa; LOE A Right visual field testing may be considered. Class IIb; LOE B Repetitive transcranial magnetic stimulation of various forms may be considered to ameliorate neglect symptoms. Class IIb; LOE B Multimodal audiovisual spatial exploration training appears to be more effective than visual spatial exploration training alone and is recommended to improve visual scanning. Class I; LOE B There is insufficient evidence to support or refute any specific intervention as effective at reducing the impact of impaired perceptual functioning. Class IIb; LOE B The use of virtual reality environments to improve visual-spatial/perceptual functioning may be considered. Class IIb; LOE B The use of behavioral optometry approaches involving eye exercises and the use of lenses and colored filters to improve eye movement control, eye focusing, and eye coordination is not recommended. Class III; LOE B For deficits in eye movements: Eye exercises for treatment of convergence insufficiency are recommended. Class I; LOE A Compensatory scanning training may be considered for improving functional ADLs. Class IIb; LOE B Compensatory scanning training may be considered for improving scanning and reading outcomes. Class IIb; LOE C For deficits in visual fields: Yoked prisms may be useful to help patients compensate for visual field cuts. Class IIb; LOE B

Guideline	Recommendations
	Compensatory scanning training may be considered for improving functional deficits after visual field loss but is not effective at reducing visual field deficits. Class IIb; LOE B Computerized vision restoration training may be considered to expand visual fields, but evidence of its usefulness is lacking. Class IIb; LOE C

Evidence Tables

Screening Methods for Post-Stroke Visual Impairment

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Rowe et al. 2020 **UK** **Validation study**	NA	221 patients recruited from acute stroke units in 4 centres who agreed to undergo vision screening. Mean age was approximately 67 years, 63% were men. Mean time to vision assessment post stroke was one week.	The test characteristics of the Vision Impairment Screening Assessment (VISA) tool were estimated using a specialist reference vision assessment as the reference standard. Both the print version and the app of VISA were used (1:1). Each patient underwent two vision assessments in random order: the routine orthoptic specialist vision assessment and the VISA screening assessment, typically within 24 hours of each other. VISA included an assessment that included case history, and visual acuity, eye alignment, eye movements, visual field and visual inattention. Routine screenings were performed by the hospital stroke orthoptists and VISA, by one of the study's authors.	**Primary outcome:** Agreement whether referral to specialist service for visual impairment is required. **Secondary outcomes:** Sensitivity, specificity, positive predictive value (PPV0, negative predictive value (NPV), agreement	VISA print was completed by 101 patients, the app version of VISA, by 100. Using the print version of VISA, sensitivity was 97.7% (95%CI 91.9% to 99.7%), specificity was 60.0% (95%CI 32.3% to 83.7%), PPV was 93.3% (95% CI 88.3% to 96.3%) and NPV was 81.2% (95% CI 95.1% to 95.9%). The overall agreement (K) whether to make a referral for full vision assessment based on the print version of VISA was 0.65 (95% CI 0.42 to 0.87). Agreement for individual items ranged from 0.24 (near visual acuity) to 0.57 (distance visual acuity). Using the app version of VISA, sensitivity was 88.3% (95% CI 78.9% to 94.5%), specificity was 86.9% (95% CI 66.4% to 97.2%), PPV was 97.8% (95% CI 88.7% to 98.5%) and NPV was 68.9% (95% CI 54.1 to 80.7%). The overall agreement (K) whether to make a referral for full vision assessment was 0.69 (95% CI 0.53 to 0.85). Agreement for individual items ranged from 0.32 (visual inattention) to 0.78 (distance visual acuity).
Hanna et al. 2017 **UK** **Systematic review**	Using 18 of 22 possible STROBE checklist items, 2 studies fulfilled all	25 studies including 2,924 participants with a visual impairment as a direct cause of a stroke. Summaries of the participant demographics were not reported.	The screening tools used within the included studies were identified and classified by the visual impairment assessed.	**Primary outcome:** Screening tools	Tools which screened for all potential stroke related visual impairments included the Vision in Stroke (VIS) Standardised Screening Form and the Checklist for Vision Problems Post-stroke. Five tools were identified that included vision as a component of a broader screening tool

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	criteria, 17 studies fulfilled ≥75% of the criteria, 3 fulfilled ≥50% and 3 fulfilled <50% of the criteria.				(NIHSS, The Functional Impairment Battery, The Rivermead Perceptual Assessment Battery, The shortened Rivermead Perceptual Assessment Battery and The Hemispheric Stroke Scale). Visual acuity screening tools included the MIS Pocket Vision Guide Visual field loss screening tools included the Oculokinetic Perimetry method and the NIHSS confrontation method of finger counting. Visual perceptual or neglect screening tools included MMSE, MoCA, Oxford Cognitive Screen, Occupational Therapy Perceptual Screening Test, The Leuven Perceptual Organisation Screening Test, The Test of Visual Perceptual Skills – third edition, The Sunnybrook Neglect Assessment, The French Test Battery for Unilateral neglect, Virtual Reality Diagnostic Test, The Line Bisection Test, Cancellation tests, Text reading, and Figure copying and drawing tasks.
Rowe et al. 2016 **UK** ***Screening process for the Visual Impairment in Stroke; Intervention Or Not (VISION) trial***	NA	87 participants who had sustained a stroke within the previous 2 to 26 weeks with suspected homonymous hemianopia and had best-corrected visual acuity of ≥6/18 in either eye.	The stroke team within participating stroke units identified stroke survivors suspected of having a homonymous hemianopia (i.e, eligible participants)	**Primary outcome:** Number of eligible participants who consented to participate in the trial.	Of 1,171 patients identified by the stroke team as having suspected homonymous hemianopia, 993 did not meet the eligibility criteria or could not be recruited. Of the 178 patients who were eligible, 91 did not provide consent. Overall recruitment was 7.4%. The most common ineligibility reason was recovery of hemianopia.

Rehabilitation of Perceptual Disorders

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Hazelton et al. 2022 **UK** **Cochrane Review**	Using the Cochrane RoB tool, the domains with the highest risk of bias were blinding of participants and for "other bias."	18 RCTs including 541 participants with impaired perception (hearing, smell, somatosensation, touch, taste and/or vision), following stroke. Mean age ranged from 49 to 75.5 years. Time since stroke ranged from 8 days to 4.3 years.	7 RCTs examined 13 interventions including robot-assisted gait training, standard physiotherapy, mirror therapy, and transcranial direct current stimulation for somatosensation perception disorders. Sessions lasted for 30-60 minutes and were provided 3-5x/week for 2-4 weeks. 3 RCTs examined 5 rehabilitation interventions for touch perception disorders including pressure sense training and hand exercises with an assistive glove. Sessions varied from 30-minute, provided 3 days/week to 3-hour sessions, provided 7 days/week. Total duration ranged from 4 to 8 weeks. 7 RCTs examined 12 rehabilitation interventions for visual perception disorders including repeated figure drawing, computer-based games, and therapist-led functional activities. In 2 trials, a single 90-minute session was provided. In the remaining trials, sessions lasted 30 minutes and were provided 3-5 days/week for 4-6 weeks.	**Primary outcome:** Performance in ADL assessed immediately post intervention. **Secondary outcomes:** Extended ADL, quality of life (QoL), mental health and psychological well-being, and perceptual function	*Somatosensory perception disorders* Rehabilitation interventions were not associated with significantly higher ADL scores compared with a control condition (Korean MBI: MD=10.08, 95% CI -2.47 to 22.63; 1 trial, n=24). GRADE: very low quality. *Tactile perception disorders* Rehabilitation interventions were not associated with significantly higher QoL, assessed using Timed-up-and-Go test compared with a control condition (MD=6.50 m/s, 95% CI -4.81 to 17.81; 2 trials, n=30). GRADE: very low quality but was associated with significantly higher perception score (pressure error, assessed using a hand-held dynamometer: MD=4.64, 95% CI 3.06 to 6.21; 2 trials, n=30). GRADE: very low quality. *Vision perception disorders* Rehabilitation interventions were not associated with significantly higher EADL scores compared with a control condition (Rivermead ADL: MD=0.94, 95% CI -1.60 to 3.48; 1 trial, n=33). GRADE: very low quality, nor were perception scores higher (Motor - Free Visual Perception Test: MD= -1.75, 95% CI -5.39 to 1.89; 1 trial, n=27). GRADE: very low quality

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			There were no RCTs that examined interventions for hearing, taste, or smell perception disorders.		
Edmans et al. 2000 **UK** **RCT**	CA: ☑ Blinding: Patient ☒ Assessor ☑ ITT: ☒	80 patients, admitted to a stroke unit, an average of 34 days post stroke, with perceptual problems and who had functional use of one hand. Mean age was Participants were 69 years, 50% were men. Patients with both left and right-sided strokes were included.	Patients were randomized to receive one of two treatment approaches: 1) transfer of training approach focusing on a perceptual task, i.e. feedback and cueing (n=40) or 2) to a functional approach group focusing on a specific ADL task for 2.5 hours per week (n=40). Perceptual treatment was provided for 6 weeks in addition to general occupational therapy.	**Primary outcome:** Rivermead Perceptual Assessment Battery (RPAB) **Secondary outcomes:** Barthel Index and Edmans ADL Index. Assessments were conducted at baseline and the end of treatment (6 weeks).	There were no significant between group differences reported in terms of inpatient length of stay, number of visits made by the attending occupational therapists or the treatment time spent with participants by occupational therapists. By the end of treatment, patients in both groups demonstrated improvements in ADL tasks and perceptual tasks. There were no significant differences between groups in median RPAB, BI or Edmans ADL Index scores at baseline or the end of treatment.

Rehabilitation of Visual Field Deficits Post Stroke

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Pollock et al. 2019 **UK** **Cochrane Review**	Using the Cochrane RoB tool, only one trial was at low risk of bias across all 4 domains assessed. Risk of bias was high or unclear in 1-4 domains in all other trials.	20 RCTs including 732 participants (547 with stroke) with visual field deficits, defined as a homonymous loss of vision contralateral to the side of the lesion, post stroke. In 14 trials, participants had mixed diagnoses, and in 5 trials, only persons with stroke were included. In 14 trials, only persons with visual field defects	Trials examined 4 categories of intervention: restitution (n=9), compensation (n=8), substitution (n=5) and screening or assessment (n=1). 10 trials compared an active intervention vs. control, while 10 trials compared active treatments vs. another active treatment.	**Primary outcome:** Performance in ADL **Secondary outcomes:** Extended ADL, visual acuity, visual field, balance, falls, depression/anxiety, quality of life (QoL)/social isolation, discharge destination, and adverse events.	Data from 8 trials were available for pooled analyses. *Restitutive interventions vs. no treatment, placebo, or control (n=1).* There was no significant difference between groups in the visual field outcome of Tuebingen Automated Perimeter border position in degrees of visual angle from zero vertical meridian post intervention (MD=1.02, 95% CI -1.37 to 3.41). GRADE: very low The odds of improvement in QoL were significantly higher in the intervention group (OR=13.00, 95% CI 2.07 to 81.48). GRADE: very

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		were included (i.e., no neglect) while 4 trials included participants who had visual neglect in addition to, or instead of, visual field defects. In 2 trials, it was unclear if participants had neglect. Mean/median age ranged from 39 to 73 years. In all trials there were more men than women. Mean/median time since stroke was highly variable from 4 weeks to 7.5 years.			low No data were available for the other outcomes. *Compensatory (scanning) interventions vs no treatment, placebo, or control (n=2)* There was no significant difference between groups in the visual field outcome (SMD= -0.11, 95% CI -0.92 to 0.70). GRADE: very low or Extended ADL score (SMD=0.49, 95% CI -0.01 to 0.99). GRADE: very low There was significantly greater improvement in QoL in the intervention group, assessed using the National Eye Institute Visual Function Questionnaire (NEI - VFQ-25) total score (MD=9.36, 95% CI 3.10 to 15.62). GRADE: very low There was no significant difference between groups for any of other outcomes (reading ability, scanning-cancellation, adverse events). *Substitutive interventions vs. no treatment, placebo, or control (n=2)* Wearing prisms during assessment was not associated with a significant improvement in mean Barthel Index scores or Extended ADL scores (MD=-4.00, 95% CI -17.86 to 9.86 and SMD=0.24, 95% CI -0.26 to 0.75. respectively). GRADE: very low Wearing prisms was associated with a significant improvement in visual field outcomes during assessment (SMD=1.12, 95% CI 0.44 to 1.80). GRADE: very low Wearing prisms was not associated with a significant improvement in the odds of falls reduction (OR=1.21, 95% CI 0.26 to 5.76). GRADE: very low, or in improved QoL (MD=

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
					8.40, 95% CI -4.18 to 20.98). GRADE: low Wearing prisms was associated with a significant improvement in the scanning cancellation test (MD=9.80, 95% CI 1.91 to 17.69). GRADE: very low *Assessment or screening vs. no treatment, placebo, or control (n=1)* Assessment by an orthoptist was not associated with a significant improvement in mean FIM score change (MD= -6.97, 95% CI -23.78 to 9.84). GRADE: very low. No data were available for the other outcomes
Rowe et al. 2016 **UK** ***RCT Visual Impairment in Stroke; Intervention Or Not (VISION) trial***	CA: ☑ Blinding: Patient ☒ Assessor ☑ ITT: ☑	87 participants with stable hemianopia, following stroke within onset of f2-26 weeks with previous visual acuity better than 0.5 logMAR, and refractive error within ±5 dioptres, Mean age was 69 years, 69.4% were men. Mean recruitment was 11 weeks post stroke.	Participants were randomized to one of 3 groups: Arm a (Fresnel prisms, n=27) for minimum 2 hours, 5 days per week over 6 weeks; Arm b (visual search training, n=30) for minimum 30 minutes, 5 days per week over 6 weeks and Arm c (standard care—information only, n=30).	**Primary outcome:** Change in visual field area from baseline to 26 weeks **Secondary outcomes:** Rivermead Mobility Index, Visual Function Questionnaire 25/10 (VFQ25), Nottingham Extended Activities of Daily Living, Euro Qual, Short Form-12 questionnaires and Radner reading ability Outcomes were assessed at baseline and 6, 12 and 26 weeks.	There was a significant improvement in the primary outcome within the visual search training arm only (8% improvement). Mean improvement in the other two arms was 5% (prism) and 3.5% (standard care). The mean improvement between groups was not significant. Mean VFQ25 scores at baseline and week 26 were 68.5 to 68.2 (prism), 60.0 to 68.4 (visual search training) and 63.7 to 59.8 (standard care. Mean change scores were significantly greater in the visual search training arm, compared with the other two treatment groups. There were no significant differences between groups for the other secondary outcomes. The most common adverse events were experienced by participants in the prism group and included headaches (n=28), diplopia (n=5) and visual confusion (n=4).

Unilateral Spatial Neglect

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Systematic Reviews					
Longley et al. 2021 **UK** **Cochrane review**	Using the Cochrane RoB tool, the domains with highest risk of bias were blinding of participants, study personnel and outcome assessors. Only 2 trials were considered to be at low risk of bias across all domains.	65 RCTs including 1,951 participants with spatial neglect following stroke. In 18 trials, which reported this variable, time since stroke ranged from 9 days to 19 months.	Interventions of interest included visual interventions (visual scanning training, half-field eye patching, optokinetic stimulation, eye movement feedback training, and smooth pursuit eye movement training), prism adaptation, body awareness interventions (sensory cueing, limb activation, trunk rotation, cueing and feedback, mirror therapy, neck taping, and a combination of visual, auditory, and sensory stimuli), mental function interventions (mental imagery, virtual reality training, and general cognitive rehabilitation without a specific visual search focus), movement interventions (robotic upper limb treatment, a robotic kinaesthetic ability training programme, constraint-induced movement therapy, and visuomotor feedback training), non-invasive brain stimulation (NIBS, rTMS and tDCS), electrical stimulation (TENS, galvanic vestibular stimulation, FES and EMG-triggered electrical stimulation), and acupuncture. The number of sessions varied from one to 40,	**Primary outcome:** Performance of ADL one month post intervention **Secondary outcomes:** Performance of ADL post intervention, and neglect	*Visual interventions vs. any control* Active interventions were not associated with significantly better ADL scores at one month post intervention compared with a control condition (SMD= -0.04, 95% CI -0.57 to 0.49; 2 trials, n=55), or immediately post intervention (SMD=-0.15, 95% CI -0.6 to 0.3; 3 trials, n=75). Active interventions were not associated with significantly better measures of neglect either one month post intervention (SMD=0.14, 95% CI -0.26 to 0.55; 5 trials, n=98), or immediately post intervention (SMD=0.08, 95% CI -0.26 to 0.42; 7 trials, n=142). *Prism adaptation training vs. any control* Active interventions were not associated with significantly better ADL scores at one month post intervention compared with a control condition (SMD= -0.29, 95% CI -0.93 to 0.35; 2 trials, n=39), or immediately post intervention (SMD=0.20, 95% CI -0.12to 0.51; 5 trials, n=158). Active interventions were not associated with significantly better measures of neglect either one month post intervention (SMD=0.05, 95% CI -0.96 to 1.06; 1 trial, n=16), or immediately post intervention (SMD=0.28, 95% CI -0.05 to 0.60; 5 trials, n=154). *Body awareness interventions vs. any control* Active interventions were associated with significantly better ADL scores at one month post intervention compared with a control condition (SMD=0.61, 95% CI 0.24 to 0.97; 5 trials, n=125), but not immediately post intervention (SMD=0.26, 95% CI -0.01 to 0.53; 7 trials,

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			provided over a duration of one day to 12 weeks. Sessions ranged from 10x/day to once a week and lasted from 5 minutes to constant application of a wearable device for the entire intervention period.		n=221) Active interventions were associated with significantly better measures of neglect one month post intervention (SMD=0.36, 95% CI 0.0 to 0.72; 5 trials, n=125), but not immediately post intervention (SMD=0.16, 95% CI -0.07 to 0.39; 10 trials, n=311). *Mental function interventions vs. any control* No trials assessed the primary outcome. In one RCT (n=24) active interventions were not associated with significantly better ADL scores post intervention compared with a control condition (SMD=0.32, 95% CI -0.49 to 1.12). Active interventions were not associated with significantly better measures of neglect post intervention (SMD=0.10, 95% CI -0.32 to 0.53; 3 trials, n=60). *Movement interventions vs. any control* No trials assessed the primary outcome. Active interventions were associated with significantly better ADL and neglect scores post intervention compared with a control condition (SMD=0.57, 95% CI 0.09 to 1.04; 3 trials, n=75 and SMD=0.57, 95% CI 0.04 to 1.10; 2 trials, n=58). *NIBS vs. any control* Active interventions were not associated with significantly better ADL scores at one month post intervention compared with a control condition (SMD=0.38, 95% CI -0.08 to 0.77; 3 trials, n=92), but were immediately post intervention (SMD=0.61, 95% CI 0.27 to 0.94; 6 trials, n=160). Active interventions were associated with significantly better measures of neglect one month post intervention (SMD=0.77, 95% CI 0.29

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
					to 1.24; 3 trials, n=102), and immediately post intervention (SMD=0.75, 95% CI 0.47 to 1.04; 10 trials, n=244). *Electrical stimulation vs. any control* Active interventions were associated with significantly better measures of neglect post intervention (SMD=0.99, 95% CI 0.44 to 1.53; 2 trials, n=60). *Acupuncture vs. any control* No trials assessed the primary outcome. Active interventions were associated with significantly better ADL and neglect scores post intervention compared with a control condition (SMD=0.65, 95% CI 0.26 to 1.05; 2 trials, n=104 and SMD=0.57, 95% CI 0.18 to 0.97; 2 trials, n=104). GRADE for all outcomes was very low certainty.
Kwon et al. 2018 **South Korea** **Systematic review & meta-analysis**	PEDro scores ranged from 7-9	8 RCTs including 237 participants with spatial neglect following stroke. Mean ages ranged from 46 to 85 years. Mean time since stroke ranged from 37.5 days to 4.1 months.	The study groups were computer-based cognitive rehabilitation (CBT) + right hemifield eye patching vs. CBT; conventional rehabilitation therapy (CRT) + rTMS vs. CRT + sham rTMS; CRT+ limb activation + sensory cueing with wristwatch vibration device vs. CRT + limb activation; CRT + cTBS CRT + sham cTBS; CRT+ prism adaptation training vs. CRT + adaptation training without prism; visuomotor feedback training vs. visuomotor training without feedback; vestibular stimulation therapy (VST) + galvanic vestibular stimulation (GVS) vs. VST + sham GVS.	**Primary outcome:** Activity and participation (A/P) outcomes (Box and Block Test, Catherine Bergego Scale, Bell Cancelation Test, Baking Tray Task, line bisection task, Stroke Impact Scale-Activities of Daily Living/Social Participation, modified BI, and BI) **Secondary outcome:** Mental function tests + activity and participation tests, combined.	For the A/P outcome, the effect size (SMD) was 0.536 (95% CI 0.196 - 0.877), favouring the intervention group when combining the results across all interventions. For the A/P + mental function outcome, the effect size (SMD) was 0.728 (95% CI 0.336 to 1.119), favouring the intervention group, when combining the results across all interventions.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			Treatment duration ranged from 2-4 weeks.		
Lisa et al. 2013 **Belgium** **Systematic Review**	N/A	15 RCTs, including persons aged 20-80 years, with unilateral neglect following stroke in the sub acute or chronic stage. All trials, with one exception included persons with sub acute stroke.	The experimental groups included mirror therapy, feedback glasses, trunk rotation, virtual reality, limb activation, prism adaptation, TENS optokinetic stimulation, eye patching, somatosensory stimulation, visual scanning training (VST), and a combination of ≥1 therapy. The duration of the described treatments varies from two to twelve weeks. Therapy for the control group included usual care, no specific treatment for neglect or sham therapy. In most trials, treatments were given five times a week.	**Primary outcome:** Traditional measures of neglect	In almost all studies there were improvements in both the experimental and control groups, but in only 7 trials were there statistically significant between group differences, in favor of the experimental group. Large effect sizes (d > 0.80). were found in only four studies: virtual reality vs. VST (d=0.90), somatosensory electrical stimulation + VST vs. sham +VST (d=1.63), TENS vs. control (d=0.87) and OKS vs. control (d=1.59), and individual and group mirror therapy vs. sham (d=2.84 and d= 1.25)
Visual Scanning Training					
Batool et al. 2022 **Pakistan** **RCT**	CA: ☑ Blinding: Patient ☑ Assessor ☑ ITT: ☑	64 patients with eye movement disorder following first-ever stroke (within previous 3-6 months), with a MMSE score of ≥25 and able to walk ≥10 m. Mean age was 55 years, 56% were men.	Patients were randomized to an experimental group and received visual scanning exercises (performance of eye movements [upward, downward, towards midline, laterally and diagonal movement of eyes] and exercises using the HART chart) + task-specific therapy or to a control group that received task-specific therapy + placebo eye exercises. Patients in both groups received task-specific exercises for 30 minutes, 6 days/week for one month and	**Primary outcomes:** Berg Balance Scale (BBS) 0-56 and Barthel Index (BI) 0-100 points Assessments were conducted at baseline and post treatment	The difference between groups in mean change scores was significant for both outcomes, favouring the experimental group. Mean total BBS scores Intervention group: 10.8 (baseline), 16.3 (post intervention), Δ=5.6 points Control group: 11.2 (baseline), 12.6 (post intervention), Δ=1.4 points Mean total BI scores Intervention group: 18.3 (baseline), 32.7 (post intervention), Δ=14.4 points Control group: 20.3 (baseline), 26.3 (post intervention), Δ=5.9 points

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			15 minutes of visual scanning exercises or eye movement exercises.		
Chan et al. 2013 **China** **RCT**	CA: ☒ Blinding: Subjects ☒ Assessor ☑ ITT: ☒	40 patients recruited from 2 inpatient rehabilitation units following with right-sided stroke and associated unilateral neglect. Mean age was 60 years, 90% were men. Mean time from stroke onset was 15 days.	Patients were randomized to receive 12-sessions, (3x/week for 45 minutes) of a visual scanning training program for 4 weeks (including cancellation worksheets, reading and copying training, description of a room/finding groceries in kitchen cabinet/locating objects on a table and upper-limb range of movement) + standard rehabilitation or standard rehabilitation services only (control).	**Primary Outcomes:** Modified Barthel Index (MBI), Mini-Mental State Examination (MMSE) Behavioural Inattention Test Conventional (BIT-C), Catherine Bergego Scale (CBS). Outcomes were assessed at baseline and immediately post-intervention.	There was significant improvement from baseline to post intervention in mean MBI, BIT-C and CBS scores among patients in the visual scanning group. There was significant improvement from baseline to post intervention in mean MMSE, MBI, BIT-C and CBS scores among patients in the control group. There were no significant differences between groups in the mean post intervention BIT-C scores (p=0.052), or the mean BIT-C change scores (26.03 vs. 23) Mean CBS scores for patients in the visual scanning group improved significantly more than those in the control group (-11.3 vs. -5.6, p=0.04).
Ferreira et al. 2011 **Brazil** **RCT**	CA: ☒ Blinding: Patient ☒ Assessor ☒ ITT: ☑	10 right-handed patients with hemispatial neglect following right hemisphere ischemic stroke, occurring ≥ 3 months. Ages ranged from 46-80 years. 5 patients with hemispatial neglect who declined to participate in the trial were included in a control group. Ages ranged from 54 to 73 years.	Participants were randomized to receive either visual scanning (VS, n=5) or mental practice (MP, n=5) training. Visual scanning involved scanning from the left side and touching/ mentioning figures or objects. Mental practice involved 2 motor imagery tasks and 2 visual imagery tasks. For both groups, training was provided over 10, 1-hour sessions for 5 weeks.	**Primary outcomes:** Behavioral Inattention Test (BIT), FIM. Assessments were conducted before and after the intervention period and at a 3-month follow-up. Control group participants were evaluated twice within a 2-month interval.	Participants in the VS group demonstrated a significantly greater change (improvement) in median BIT score from baseline to end of treatment (p<0.05) and at follow-up, compared with the control group (p=0.008). There was no significant difference in median BIT change scores from baseline to end of treatment or baseline to follow-up for patients in the VS vs. MP groups. There were no significant differences between groups in median FIM scores at baseline, post intervention, or follow-up.
Prisms					
Choi et al. 2021 **South Korea**	CA: ☒ Blinding:	30 patients with unilateral neglect following stroke with onset <3 months. Mean age	In addition to OT, patients were randomized 1:1:1 to one of 3 groups: prism adaptation	**Primary outcomes:** Albert test, Motor-free Visual Perception Test	There was significant improvement from baseline to post intervention in mean scores for all outcomes among patients in all 3 groups, with

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
RCT	Patient ☒ Assessor ☒ ITT: ☑	across groups ranged from 36 to 68 years (p=0.58). There were 13 men (43%).	(PA) with deflection of the axis of vision to the right by 15 degrees + FES applied to the upper limb, with sufficient intensity to produce finger and wrist movements; PA only or FES only. Therapy was provided for 50 minutes/day, 5x/week, for 3 weeks.	(MVPT), Catherine Bergego Scale (CBS)	the greatest improvement in among those in the PA+FES group.
Rode et al. 2015 **France** **RCT**	CA: ☒ Blinding: Patient ☑ Assessor ☑ ITT: ☑	20 patients aged 18-90 years, with left spatial neglect, following a stroke with onset of ≥1 month. 10 patients had mild neglect, 10 had severe neglect.	Patient were randomized to a prism adaptation (PA) or control group. Patients in the PA group wore a pair of glasses producing a 10-degree rightward optical deviation of the visual field. During prism exposure, the patient had to execute 80 rapid pointing movements towards visual targets located 10 degrees to the left or right of the middle of their body. The task took 6-10 minutes to complete, and was completed 4 times (baseline, days 7, 14 and 21). Patients in the control group completed the same task with a pair of placebo glasses	**Primary outcome:** FIM **Secondary outcome:** Behavioural Inattention Test (BIT) Outcomes were assessed before treatment and at 1, 3 and 6 months	Patients in both groups improved over time, with no significant differences in mean total FIM or BIT scores between groups.
Mancuso et al. 2012 **Italy** **RCT**	CA: ☒ Blinding: Patient ☒ Assessor ☑ ITT: ☑	29 patients with left visual neglect; however, data is only presented for 22 patients (6 dropouts and 1 outlier were excluded). Patients with severe cognitive impairment were excluded.	Participants were randomized to wear receive either prismatic lenses (n=13) or neutral lenses (n=9) for one week. The prismatic lenses produced a 5-degree deviation to the right of the fixation point. Participants in both groups received pointing	**Primary outcomes:** Albert Test, Bells Test, Line Bisection Test, Bit Test, Object Searching Test, Orientation of Lines Test, and the Deal test. Assessments were conducted before and	There was no significant effect of treatment x time for any of the 7 outcome measures. Participants in both groups demonstrated significant improvement on all outcomes over the study period, except for the Albert Test.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			exercises during 5, 30-minute sessions.	after treatment.	
Mizuno et al. 2011 **Japan** **RCT**	CA: ☒ Blinding: Patient ☑ Assessor ☑ ITT: ☒	38 patients, aged 41-89 years, admitted to a rehabilitation unit with first-ever hemiparetic stroke occurring within the previous 3 months with no or mild cognitive impairment (MMSE >15), scoring less than the cut-off value in ≥1 Behavioral Inattention Test items. Mean age was 66 years, 75% were men. 65% of patients had mild neglect. (mild ≥ 55 BIT-B) and the remainder had severe neglect (BIT-B <55).	Patients were randomized to complete a series of pointing tasks with and without prism glasses that shifted their visual field 12° to the right (n=18) vs. pointing tasks with and without neutral plastic glasses (n=20). Patients completed 20 sessions (20 minutes each), over 2 weeks. All patients participated in conventional rehabilitation therapies.	**Primary outcome:** Behavioral Inattention Test (BIT); BIT Conventional sub test and BIT Behavioral sub test **Secondary outcomes:** Catherine Bergego Scale (CBS), FIM, Stroke Impairment Assessment Set (SIAS) Assessments were conducted before and after treatment and at follow-up (hospital discharge)	Patients in both groups improved over time but there were no significant differences between groups in the mean change in BIT-C, BIT-B or CBS scores from baseline and follow-up. There were no significant differences between groups in mean total FIM scores at baseline, the end of treatment or at follow-up. The mean discharge FIM score of patients with mild USN in the prism group was significantly higher, compared the control condition. 31 patients completed follow-up assessments.
Turton et al. 2010 **UK** **RCT**	CA: ☑ Blinding: Patient ☒ Assessor ☑ ITT: ☒	36 patients consecutively admitted with right hemispheric stroke, occurring ≥ 20 days, with confirmed spatial neglect. Mean age was 72 years, 56% were men.	Patients were randomized to complete a series of pointing tasks with and without prism glasses that shifted their visual field 6° to the right (n=17) vs. pointing tasks with and without flat neutral glasses (n=19). Patients completed 20 sessions (20 minutes each), over 2 weeks. All patients participated in conventional rehabilitation therapies.	**Primary outcomes:** Catherine Bergego Scale (CBS), Behavioral Inattention Test-Conventional (BIT-C) Assessments were conducted before, and 4 days after treatment and at 8-weeks follow-up.	There were significant improvements in mean CBS and BIT-B change scores in both groups over time, but no significant differences between groups. 28 patients completed follow-up assessments
Nys et al. 2008 **The Netherlands** **RCT**	CA: ☒ Blinding: Patient ☒ Assessor ☑ ITT: ☒	16 patients admitted to a stroke unit, recruited within 4 weeks of stroke, with neglect based on performance on 4 tasks of the Behavioral Inattention Test. Mean age was 62 years, 63% were men.	Patients were randomized to complete a series of pointing tasks wearing prism glasses that shifted their visual field 10° to the right (n=10) vs. glasses that shifted their visual field 0° (n=6). Patients completed 4 sessions over 4	**Primary outcomes:** Schenkenberg Line Bisection, Letter Cancellation, Gainotti Scene Copying, assessed before and after treatment each day	Patients in the prism group demonstrated significantly better performance on the line bisection test (fewer line deviations and omissions) and on the letter cancellation test, but not the scene copying test. At one month, there were no significant differences between groups in mean BIT-C or

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			days, each session lasting 30 minutes.	**Secondary outcomes:** Behavioural Inattention Test (BIT), assessed before treatment and at one month	BIT-B scores.
Eye Patching					
Aparicio-Lopez et al. 2015 **Spain** **RCT**	CA: ☑ Blinding: Patient ☒ Assessor ☒ ITT: ☒	12 patients, ≥18 years, with right hemispheric stroke, recruited from a rehabilitation hospital, with visual-spatial neglect. Mean age was 48 years, 50% were men. Mean time from stroke onset to treatment was 90 days.	Patients were randomized to receive a cognitive rehabilitation programme using a computer-based platform (n=5) vs. the same programme + right hemifield eye-patching (RHEP, n=7). Patients participated in a mean of 15.17, hour-long sessions.	**Primary outcomes:** Bell Cancellation Test, Figure Copying of Ogden, Line Bisection, Baking Tray Task, a Reading test and Catherine Bergego scale (CBS)	In the group that received a single treatment, there was significant improvement from pre-to post testing for one outcome (Line Bisection Test-lines omitted). In the group that received dual therapy, there was significant improvement from baseline in 2 outcomes (The Bells Test and Line Bisection [percent positively for rightward deviations]). There was a significant difference between groups, favouring the dual intervention group in the mean change from baseline for a single outcome (Reading task)
Tsang et al. 2009 **Hong Kong** **RCT**	CA: ☑ Blinding: Patient ☒ Assessor ☑ ITT: ☑	35 patients with right hemispheric stroke, recruited from a rehabilitation hospital within 8 weeks of stroke onset, with spatial neglect. Mean age was 75 years, 68% were men.	Patients were randomized 1:1 to a control or intervention group. Patients in the intervention group received 4 weeks of conventional occupational therapy with right half-field eye-patching glasses, which were worn throughout the occupational therapy treatment session. Patients in the control group received the same rehabilitation therapies, without eye-patching. All patients also received physical therapy, and speech therapy, as required.	**Primary outcomes:** Behavioral Inattention Test-Conventional (BIT-C), FIM, assessed at baseline and at the end of treatment	Patients in both groups demonstrated significant gains from baseline in BIT and FIM scores. Mean BIT-C change scores were significantly greater for patients in the intervention group (mean change from baseline 25.1 vs. 8.3, p=0.046). There was no significant difference between groups in mean total FIM gain from baseline (16.0 vs. 12.4, p=0.47), with patients in the intervention group achieving significantly greater gains in 3 individual items (eating, bathing, and lower-body dressing).
Fong et al. 2007 **Hong Kong**	CA: ☒ Blinding:	60 patients admitted to a rehabilitation hospital following a right	Patients were randomized to one of 3 groups. Patients in the voluntary trunk rotation	**Primary outcomes:** The Behavioural Inattention Test (BIT)	There were no significant differences in mean scores, or mean change scores between groups at days 30 or 60 for any of the outcomes.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
RCT	Patient ☒ Assessor ☑ ITT: ☒	hemispheric stroke with duration of onset <8 weeks, with left visual field neglect. Mean age was 69.7 years, 57% were men. Mean time from stroke onset to admission was 12 days.	(TR) group (n= 19) received 45 minutes of voluntary trunk rotation + 15 minutes of ADL training 5x/week for 30 days. Patients in the voluntary trunk rotation and half-field eye-patching (TR + EP) group (n= 20) received the same training as the trunk rotation group except they had half-field eye patching to the ipsilesional (right) hemifield by wearing specific goggles during training. Patients in the control group (n=15) received conventional occupational therapy, which consisted of 15 minutes of training in ADL and 45 minutes of training in hemiplegic upper extremity. All patients also received other rehabilitation therapies, as required.	**Secondary outcomes:** Clock Drawing Test (CDT), FIM Motor subscale Assessments were conducted at baseline and days 30 and 60.	There were 14 dropouts or losses to follow-up.
Virtual Reality					
Kim et al. 2011 **Korea** **RCT**	CA: ☒ Blinding: Patient ☒ Assessor ☒ ITT: ☒	24 patients admitted to a rehabilitation unit with unilateral spatial neglect, resulting from a right hemisphere stroke. Patients with severe cognitive impairment or aphasia, severely damaged eyesight or sitting balance, or problems with cervical movement were excluded. Mean age was 64.7 years, 58% were men. Mean time from stroke onset to admission to rehabilitation was 24 days.	Patients were randomized to receive either virtual reality training (n=12) or conventional therapy (n=12). Virtual reality training utilized the IREX system® which involves the use of computer-recognizing gloves that transfer participant responses to a virtual environment. Both groups received therapy for 30 minutes a day, five times a week for 3 weeks. Other rehabilitation therapies were provided to all patients, as needed.	**Primary outcomes:** Star cancellation test, the line bisection test, the Catherine Bergego Scale (CBS) and the Korean version of the modified Barthel Index (K-MBI). Assessments were conducted before and after treatment.	Following treatment, both groups demonstrated significant improvement on all outcome measures ($p<0.05$). Mean change in scores on the star cancellation test and CBS were significantly greater for those in the virtual reality training group (8.7 vs. 4.1 and 9.1 vs. 4.6, respectively; both at $p<0.05$). There were no between group differences for the line bisection test or the K-MBI; however, only 3 participants from the intervention group and 7 from the control group completed the line bisection test

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Katz et al. 2005 **Israel** **RCT**	CA: ☒ Blinding: Patient ☒ Assessor ☒ ITT: ☒	19 patients with first-ever right hemispheric stroke, with residual unilateral spatial neglect, recruited from a rehabilitation hospital. Mean age was 63 years, 63% were men. Mean time from stroke onset to treatment was <48 days.	Patients were randomized to a virtual reality (n=11) or a control group (n=8). Patients in the VR group performed a street-crossing exercise using a desk-top computer, with increasing levels of difficulty. Patients in the control group performed computer-based visual scanning tasks. Patients in both groups received the same intensity and duration of treatment (a total of 9 hours over 4 weeks (45 minutes per session, 3x/week).	**Primary outcome:** Star cancellation item from the Behavioral Inattention Test **Secondary outcomes:** Mesulam Symbol Cancellation test, ADL checklist, Street crossing test Assessments were conducted before and after treatment	Patients in both groups improved over time. There were no significant differences between groups in mean change score from baseline to end of treatment for any of the USN measures (star cancellation, symbol cancellation) or the ADL checklist. Patients in the VR group made significantly fewer accidents in the street-crossing test from pre- to post test (mean 7.9 to 3.8 vs. 3.8 to 3.4, p=0.035). In the real street-crossing test, the mean number of times persons in the VR group looked left increased from pre-to post test (4.0 to 5.4), while there was a decrease in the control group (6.3 to 5.8). There was no change in the mean decision time to cross the street per vehicle in the VR group over the study period and a slight decrease in the control group. The difference between groups was not significant.
Mirror Therapy					
Zhang et al. 2022 **China** **Systematic review & meta-analysis**	Using the Cochrane RoB tool, risk of bias was high for failure to blind patients and low or unclear for all other 6 domains assessed	5 RCTs including 238 inpatients with post-stroke unilateral neglect. The mean age of patients was >60 years. Mean time since stroke was < 1 month.	Included trials compared mirror therapy +/- cointervention vs. sham mirror therapy or no treatment +/- cointervention. Cointerventions included limb activation, routine rehabilitation, and acupuncture. Interventions were provided for 3 to 6 weeks.	**Primary outcomes:** Neglect, ADL	Mirror therapy was associated with significant improvement in standardized measures of spatial neglect (SMD=1.62, 95% CI 1.03–2.21) and ADL (SMD=2.09, 95% CI 0.63–3.56).
Pandian et al. 2014	CA: ☑	48 patients, admitted to hospital with thalamic and	Patients were randomized to one of two groups: 1) mirror	**Primary Outcomes:** Star Cancellation Test	Significantly greater improvement was reported across all outcome measures (SCT, LBT and

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
India **RCT**	Blinding: Patient ☒ Assessor ☑ ITT: ☒	parietal lobe lesions, occurring within the previous 48 hours, with upper-limb weakness. Mean age was 63.5 years, 58% were men. 23% of patients had left hemispheric lesions.	therapy + limb activation (MT, n=27) group or 2) control (sham MT+ limb activation, n=21) group. Treatment sessions lasted 1-2 hours and were given once a day, 5 days a week for 4 weeks.	(SCT), Line Bisection Test (LBT), Picture Identification Task (PIT). Outcomes were assessed at baseline, and at 1, 3 and 6 months.	PIT) for patients in the MR group after 1 month ($p<0.0001$, $p=0.002$, $p<0.0001$, respectively), 3 months ($p<0.0001$, $p=0.005$. $p<0.0001$, respectively) and 6 months ($p<0.0001$, $p=0.006$, $p<0.0001$, respectively)
Thieme et al. 2013 **Germany** **RCT**	CA: ☑ Blinding: Patient ☒ Assessor ☒ ITT: ☑	60 patients aged 18-80 years, with a first supratentorial stroke occurring within the previous three months, admitted for inpatient rehabilitation with severe distal hemiparesis of the arm. Mean age was 67.2 years, 58% were men. 37% of patients had left hemispheric lesions. Mean time since stroke was 45 days.	In addition to receiving standard rehabilitation therapies, participants were randomized to one of 3 treatment groups: individual mirror therapy (n=18), group mirror therapy in which one therapist treated 2-6 patients at the same time (n=21), or control, using a sham (i.e., turned mirror) (n=21). Treatment was provided for 30 minutes, 4x/week for 5 weeks (20 sessions)	**Primary outcomes:** Fugl-Meyer Test-arm section, Action Research Arm Test (ARAT) **Visuospatial Neglect outcome:** Star Cancellation Test (SCT) Outcomes were assessed before and after treatment	There were no significant differences in mean change scores for any of the motor outcomes. 14 patients had visuospatial neglect. Of these, 3 patients received individual mirror therapy, 5 received group mirror therapy and 6 patients received the control condition. The mean increases in SCT scores were 20.0 for patients in the individual mirror therapy group, 4.4 for patients in the group therapy group and -2.3 for patients in the control group. The difference in means between the individual mirror therapy and control groups was statistically significant ($p<0.01$).
Dohle et al. 2009 **Germany** **RCT**	CA: ☑ Blinding: Patients ☑ Assessor ☑ ITT:☒	36 patients, age 25-80 years with severe hemiparesis, resulting from a first-ever MCA ischemic stroke, with onset no more than 8 weeks prior to study entry. Mean age was 56 years, 72% were men.	Participants were randomized to either a mirror therapy (MT) where they watched the mirror image of the unaffected arm as if it were the affected arm; or a control therapy (CT) where no mirror was present. Therapy was provided for 30 minutes, 5x/week for 6 weeks. All patients also participated in a standard therapy program	**Primary Outcomes:** Fugl-Meyer Assessment (upper-extremity), Action Research Arm Test (ARAT) **Visuospatial Neglect outcome:** A 5-point neglect score, based on Behavioral Inattention Test items and tests of attentional performance	48 participants were randomized, but there were 12 dropouts over the study period. 20/24 right-handed patients with right hemispheric lesions had signs of hemineglect at the beginning of the study. There was significantly greater improvement in mean neglect scores at the end of treatment among patients in the mirror group (0.9, 95 % CI 0.6-1.2 vs. 0.2, 95% CI -0.2-0.5, $p=0.005$).
rTMS					
Yang et al. 2017 **China**	CA: ☑ Blinding:	60 patients, ≥18 years admitted for inpatient rehabilitation following a	Patients were randomized 1:1:1 to one of 3 groups: low frequency (1Hz) rTMS at 90%	**Primary outcomes:** Behavioural Inattention Test (BIT)-Conventional,	Patient in all groups improved over the study period.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
RCT	Patient ☒ Assessor ☑ ITT: ☑	right hemispheric stroke, with duration of onset >1 week and neglect (score ≥128 on Behavioural Inattention Test) and a MMSE score ≥17. Mean age was 58 years, 28% were men. Mean duration since stroke onset was 42 days.	of motor threshold + conventional rehabilitation, low frequency rTMS + sensory cueing (using a wearable device on the left wrist, which vibrated every 5 minutes, for 3 hours a day, 5 days a week) + conventional rehabilitation or conventional rehabilitation for 2 weeks. Conventional rehabilitation consisted of 30 sessions, each lasting 45 minutes (2 PT, 1OT) daily, 5 days a week.	The Catherine Bergego Scale (CBS) **Secondary outcomes:** Fugl-Meyer Assessment (FMA)-upper extremity, Action Research Arm Test, Modified Barthel index Assessments were conducted at baseline, post intervention and at 6 weeks	Mean BIT scores of the rTMS + sensory cueing group were significantly better immediately post intervention (p=0.025) and at follow-up (p=0.003) compared to the control group. Mean BIT scores of the rTMS group were significantly better at follow-up compared with the control group (p=0.048). There were no significant differences between groups in mean CBS scores or for any of the secondary outcomes.
Kim et al. 2013 **Korea** **RCT**	CA: ☑ Blinding: Patient ☑ Assessor ☒ ITT: ☑	27 patients admitted for inpatient rehabilitation, following acute cortical or subcortical stroke, with visuospatial neglect (confirmed via Line Bisection Test). Mean age was 67 years, 56% were men. Mean time since stroke onset was approximately 15 days	Patients were randomized to receive 10, 20-minute sessions over 2 weeks of 1) low-frequency (1Hz) rTMS over the non-lesioned posterior parietal cortex (PPC), 2) high-frequency (10Hz) rTMS over the lesioned PPC, or 3) sham stimulation. All patients received conventional rehabilitation	**Primary Outcomes:** Motor-Free Visual Perception Test (MFVPT) Line Bisection Test (LBT), Star Cancellation Test (SCT), Catherine Bergego Scale (CBS), Korean-Modified Barthel Index (K-MBI). Outcomes were assessed at baseline and post treatment.	There were no significant differences between groups in mean changes in MFVPT, SCT or CBS scores. There was a significant difference among groups in LBT change scores (p=0.049). Post-hoc analysis indicated the improvement was significantly greater in the high-frequency rTMS group compared to sham-stimulation group (-36.9 vs. 8.3, p=0.03). There was a significant difference among groups in K-MBI change scores (p<0.01). Post-hoc analysis indicated the improvement was significantly greater in the high-frequency rTMS group compared with the sham-stimulation group (30.6 vs. 15.1, p<0.01), and in the low-frequency rTMS group compared with the sham stimulation group. (27.6 vs. 15.1, <0.02).
Limb Activation					
Fong et al. 2013 **China** **RCT**	CA: ☑ Blinding: Patient ☒ Assessor ☑	40 patients, recruited within 8 weeks from 2 rehabilitation hospitals following left hemiplegic stroke, with evidence of	Patients were randomized 1:1 to one of two groups: 1) adornment of a sensory wristwatch cueing device, which emitted vibration and	**Primary Outcomes:** Behavioural Inattention Test (BIT) [cancellation task, drawing task]**,** Fugl-Meyer Assessment (FMA)	Patients in both groups improved over the study period, but the only significantly different difference between groups at the end of follow-up was the mean BIT- neglect drawing task, in which the experimental group performed better

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
	ITT: ☑	unilateral neglect, with moderate to severe upper-limb paresis. Mean age was 67 years, 62.5% were men. Mean time from stroke onset to randomization was 23 days.	auditory signals on the hemiplegic arm for 3 hr/d, 5 d/week, followed by consecutive arm movements for 3 weeks + conventional rehabilitation, or 2) adornment of a sham device + conventional rehabilitation (control).	[upper limb, hand], FIM, Functional Test for the Hemiplegic Upper Extremity (FTHUE). Outcomes were assessed at baseline and week 3 and 6.	(p=0.034). The mean gain from baseline in the experimental group was 126.8% vs. 35.84% in the control group. The mean gain from baseline for the BIT-cancellation task in the experimental group was 51.8% vs. 28.4% in the control group, p=0.908) 3 patients were lost to follow-up in the intervention group and 9 in the control group.
Luukkainen-Markkula et al. 2009 **Finland** **RCT**	CA: ☑ Blinding: Patient ☒ Assessor ☒ ITT: ☑	12 patients with left-sided neglect within 6 months of a 1st unilateral right-sided stroke. 42.9% of patients screened were eligible for inclusion. Mean age was 58 years, 42% were men. Mean time since stroke was 3 months.	Participants were randomly assigned to receive either 20 – 30 hours of left arm activation training (n=6) or 10 hours of traditional visual scanning training (n=6) over 3 weeks. Both interventions were offered as part of a comprehensive program of post-stroke rehabilitation.	**Primary outcomes:** Behavioural Inattention Test (BIT), Catherine Bergego Scale (CBS) **Secondary outcomes:** FIM, Modified Motor Assessment Scale, Wolf Motor Function Test, and a neuropsychological assessment battery. Assessments were conducted before and after treatment and at a 6-month follow-up.	In the arm activation condition, visual neglect (BIT) improved significantly over the course of the intervention (p<0.05) and from baseline to 6 months (p<0.05). Patients in the visual scanning condition demonstrated non-significant improvement from baseline to the end of intervention but demonstrated significant improvement from baseline to 6-month follow-up (p<0.05). There was a non-significant trend towards improvement in behavioural neglect (CBS) in both groups over the course of treatment and at 6-month follow-up. Between group comparisons were not reported.

Limb Apraxia

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Ji & Kwon 2023 **South Korea** **Systematic review & meta-analysis**	PEDro scores ranged from 6-8	5 RCTs including 310 participants with motor apraxia following stroke. Mean age ranged from 63 to 75 years. Time since stroke onset ranged from 3 to 17	Trials examined strategy training (n=2) and gesture training (n=3). The control conditions included occupational therapy and aphasia therapy. Duration of treatment was 8	**Primary outcome:** Total apraxia (Upper Limb Apraxia test and De Renzi test, combined), ideomotor apraxia and ideational apraxia (sub-item scores of the De	For the total apraxia outcome, active intervention was not associated with significant improvement (SMD= 0.475, 95% CI -0.151 to 1.102, 4 trials). For the ideational outcome, active intervention was not associated with significant improvement (SMD= 0.289, 95% CI -0.144 to 0.722, 3 trials).

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		months.	weeks and 12 weeks.	Renzi test, combined) and ADL (BI, Lawton and Brody Instrumental Activities of Daily Living scale, ADL observation, and ADL questionnaire, combined).	For the ideomotor outcome, active intervention was not associated with significant improvement (SMD= 0.731, 95% CI -0.062 to 1.525, 3 trials). Active intervention was associated with a significant improvement in performance in ADL (SMD= 0.416, 95% CI 0.159- 0.673, 4 trials).
Aguilar-Ferrándiz et al. 2021 **Spain** **RCT**	CA: ☑ Blinding: Patient ☒ Assessor ☑ ITT: ☑	38 community-dwelling participants with unilateral mild-to-moderate poststroke lesions following stroke and upper-limb apraxia of duration >2months. Mean age was 75 years, 50% were men. Mean time since stroke was 12 months.	Participants were randomized 1:1 to receive a home-based gesture training + compensatory training program (30 minutes/session, 3 days/week for 8 weeks) by an occupational therapist or to a control group that received a home-based educational workshop (once a month) for patients and caregivers in which they were taught the implications of stroke and apraxia.	**Primary outcome:** Barthel Index **Secondary outcomes:** Lawton and Brody Instrumental Activities of Daily Living (IADL) scale, the De Renzi imitating gestures test, TULIA Assessments were conducted at baseline, post intervention and 8-week follow-up.	From baseline to follow-up, there was no significant difference in mean BI change score between groups (MD=-0.556, 95% CI -7.46 to 6.35) or in mean change in Lawton and Brody total scores (MD= -0.41, 95% CI -1.61 to 0.8). There was significantly greater improvement in TULIA scores in the intervention group (mean difference in change -35.4, 95% CI -51.0 to -19.8). There was significantly greater improvement in Ideational and ideomotor apraxia total scores in the intervention group (mean difference in change=-4.37, 95% CI -6.51 to -2.23). There was a single loss to follow-up (intervention group)
West et al. 2008 **UK** **Cochrane Review**	N/A	3 RCTs (n=132), including patients with motor apraxia following stroke. Studies examining apraxia of speech and oral apraxia, were excluded. Studies that included patients with conditions other than stroke were excluded unless >75% of the sample was post-stroke or subgroup analyses were reported.	Trials examined strategy training vs. usual care (n=113), gesture training vs. conventional aphasia treatment (n=10), and transfer of training vs. a functional approach (n=9).	**Primary outcome:** Independence in ADLs (e.g., Barthel Index, Assessment of Motor and Process Skills, and the Functional Independence Measure), at 6 months. **Secondary outcomes:** Death, quality of life, ability to gesture/pantomime/use objects, mood, family/carer well-being, and adverse events,	There was no significant difference between groups in mean BI score change 6 months after the end of treatment (MD=0.17, 95% CI -1.41 to 1.75; 1 trial, n=83). At the end of therapy, mean BI change was significantly greater for patients in the experimental group (MD=1.28, 95% CI 0.19 to 2.38; 2 trials, n=102). There were no significant differences between groups on any of the secondary outcomes.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
				assessed at the end of the intervention period and 12-month follow-up.	

Interventions for Age-related Visual Problems Post Stroke

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Pollock et al. 2012 **UK** **Cochrane review**	NA	RCTs including persons recovering from stroke.	Trials were sought examining interventions for treating or correcting age-related visual problems (such as age-related macular degeneration, glaucoma, cataracts, or diabetic eye disease) or improving the ability of the patient to cope with visual impairment. Potential interventions of interest included environmental modification, activities of daily living training, drugs, surgery, visual aids and equipment, assessment and screening interventions.	**Primary outcome:** Performance in ADL **Secondary outcomes:** Extended ADL, visual acuity, visual field, balance, falls, depression/anxiety, quality of life (QoL)/social isolation, discharge destination, and adverse events.	No trials were identified. The authors concluded there was no evidence to support interventions for age-related visual problems in people with stroke.

Screening for Anosognosia for Activities of Daily Living

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Della Sala et al. 2022 **UK** **Validation study of the *The Visual Analogue Test for Anosognosia for Activities of Daily Living (VATA-ADL)***	NA	In the first study, to validate the VATA-ADL in an older population, 60 dyads were included. Participants were recruited from the general population. The mean age of the participants was 72 years, and 58 years for the informants In the second study, 90 patients recruited from stroke clinics and their informants were included. Mean age of persons with stroke was 60.4 years, 57.5% were men. Mean time since stroke was 26.6 months. MMSE was evaluated in 68 patients. Mean score was 24. 30 persons scored <24 points.	VATA-ADL comprises 23 questions illustrated in simple vignettes. One of the items is used as a practice item to ensure understanding of the task, and 4 are check questions. Participants rate themselves (or the person they are informing on) for current ability in each of the tasks depicted by the vignettes, using a VAS. At each extreme end of the scale, there are drawings of smiling and neutral faces and the scale contains 4 points representing increasing levels of difficulty, from 0 (“No Problem”) to 3 (“Problem”). Total possible score for the 18-target items ranges from 0 to 54, where higher ratings indicate greater difficulties. The patient’s self-rating was compared with that given by informants. A discrepancy score was then obtained by subtracting the participant’s total score from the informant’s total score. (range from −54 to +54), where a value of 0 indicated complete agreement between participant and informant.	**Primary outcome:** Agreement in VATA-ADL scores between participants and informants	In the first validation study, 47 dyads completed the assessment. The overall mean self-rating score of the participants and the informants were 0.84 and 1.51, respectively. The mean discrepancy score between target participants and informants was 0.67. Data from 80 dyads were available for study 2. The mean informant-rated score for the VATA-ADL was 21.66. The mean self-rated score of the patients was 13.92. The mean discrepancy between patient- and informant-rated scores was 7.74. 39 patients overestimated their abilities (anosognosia) whereas 9 underestimated their abilities.

Rehabilitation of Cortical Blindness

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Namgung et al. 2024 **South Kores** **RCT**	CA: ☑ Blinding: Patient ☑ Assessor ☑ ITT: ☒	79 outpatients who had sustained a stroke >6 month previously with visual field deficits were recruited from 5 hospitals. Mean age was 52 years, 59% were men.	Patients were randomized to the Nunap Vision (defective field training-intervention group) system or Nunap Vision (central vision field training-control group) system through a virtual reality head-mounted display, 5 days a week for 12 weeks. Training was completed at home. Outcomes were assessed at baseline and 12 weeks	**Primary outcome:** Humphrey visual field (HVF) tests **Secondary outcome:** Changes in the mean total deviation (MTD) scores from baseline	75 patients completed the trial. There were significant improvements in both groups in the visual areas in the defective hemifield and the whole field in both groups with no significant difference between groups. The mean improved area in the defective hemifield was 100.8 degrees^2 in the NV group and 94.6 (92.0) degrees^2 in the control group. The mean improved area in the whole field was 111.6 degrees^2 in the NV group and 116.2 degrees^2 in the control group. The MTD scores significantly increased in the defective hemifield within the NV group, but not the NV control group. There were no significant differences between groups. The MTD scores did not improve significantly in the whole field in either the NV or control group. There were no significant differences between groups.
Saionz et al. 2022 **USA** **Narrative review**	NA	-	-	**-**	While acknowledging there are currently no standardized, validated, or widely accepted vision restoration treatments for cortically blind patients, visual substitution therapy and compensatory therapies are discussed as alternatives. Visual substitution therapies include the use of eyeglasses with prisms attached to one lens. The limitations of this treatment are discussed. Compensatory strategies include increasing the number of saccades toward the impaired visual field, varying the amplitude of saccades to increase sampling efficiency, developing

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					organized patterns of scanning, and increasing the number and amplitude of head movements. The authors note that neither approach can restore lost vision. Other topics (natural history of occipital stroke, measuring vision loss after stroke et al) are also discussed.
Gaber et al. 2010 **UK** **Case series**	NA	7 patients with cortical blindness secondary to stroke, referred to a local NHS rehabilitation service during the previous 6 years. Mean age was 63 years, 6 patients were men.	The notes of all patients were reviewed.	**Primary outcomes:** Presentation, brain imaging scan result, management, progress and outcome	Patients 1 and 2 both presented with total blindness confusion, unable to sit still, episodic aggressive behaviour and disturbed sleep pattern. Scans revealed bilateral occipital hemorrhages. Management included OT, melatonin and antiepileptics. Therapy was futile and patient 1 was transferred to a nursing home. Patient 2 died 2 years later Patient 3 presented with total blindness confusion, unable to sit still, and disturbed sleep pattern. Scan revealed bilateral occipital infarction/ thalamic infarction. Patient had good response to melatonin and improved in ability to perform ADLs. Patient was discharged to a residential facility. Patients 4-7 presented with partial blindness and memory impairment. Scans revealed occipital infarctions. Patients had good response to OT interventions and sensory rehabilitation. No clinical change but patients were able to return to the community and live with family.

Barriers to Vision Care

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Manhas et al. 2023 **Canada** **Cross-sectional survey**	NA	46 adult stroke survivors who could read and understand English and 87 healthcare providers (HCP) from Alberta. HCP included allied health professionals (48.3%), vision care specialists (10.3%), neurologists (3.4%), and nurses (3.4%), representing HCPs from inpatient rehabilitation, homecare, community-outpatient care, and acute care. Mean age of survivors was 62 years. Mean time since stroke was 27 months.	Survivors were questioned regarding stroke history; impact of stroke on visual function; experiences in health service utilization; engagement with care professionals across the care continuum; perceptions regarding aspects of the poststroke visual impairment (VI) care experience during screening, clinical management and rehabilitation; and perceived utility of a provincial action to remedy care gaps. Provider surveys investigated perceptions of care delivery across the care continuum. All participants were asked to identify their top 3–5 priorities for provincial action.	**Primary outcome:** Survey results	The most-frequently cited VIs included visual field deficits (69.6%), blurred or altered vision (50.0%), reading difficulties (37.0%), inability to drive (32.6%), difficulty recognizing things (21.7%), eye fatigue (17.4%), and light sensitivity (17.4%). The mean number of VI symptoms per person was 3.3. 67.3% of survivors reported receiving treatment, management, or rehabilitation services. Among those who received care, services were provided most frequently within 1 month of stroke (45.2%). Management included noncomputer scanning therapy (39.1%), computer therapy (32.6%), reading strategies (26.1%), compensation strategies (23.9%), mobility strategies (21.7%), and prism glasses (15.2%). 58.1% of survivors reported difficulties accessing educational resources. A minority of survivors were satisfied with the care they received for VI during inpatient rehabilitation (34.8%) or with the timeliness of care received in the acute care setting (29.0%). Top priorities for provincial action identified by survivors were advancing care provision for VI poststroke, better supporting the return to driving process and better professional training. Among HCPs, 81% felt confident in screening patients for visual deficits, while 54.1% felt confident confirming the diagnosis. Only 32.4% of HCPs, felt the referral processes

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					for screening and/or diagnosis or visual deficits was adequate, while 43.2% felt the available resources (e.g. technology, pathways, online resources) available to me for screening and/or diagnosis of visual deficits were adequate. Only 16.3% of HCPs felt the referral processes currently in place for management and/or rehabilitation of visual deficits were adequate. Only 18.4% of HCPs felt educational resources for patients and families on visual deficits were adequate. Top priorities for provincial action identified by HCPs were advancing care provision for VI, professional training, improving the referral processes, developing patient and family educational resources and promoting interprofessional communication.

Incidence/Prevalence of Vision Problems Post Stroke

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Rowe et al. 2019 **UK** ***Prospective study Visual Impairment after Stroke (IVIS) study***	NA	1,295 patients admitted to an acute care centre within 2 weeks of stroke onset, who were able to agree to vision assessment. Mean age was 73 years, 51.5% were men.	A full visual assessment was conducted by a stroke orthoptist, with deficits classified as impaired central vision, ocular motility abnormalities, visual field loss and visual perceptual disorders.	**Primary outcome:** Outcomes of visual assessments	Visual screening was conducted at a mean of 6.5 days after admission, with full assessments completed after a mean of 13.4 days. Baseline visual assessments could be completed on 51.6% of patients. 262 patients were never assessed (e.g., death, impaired cognition, early discharge). 80% of patients completed a visual assessment. Of patients who received an assessment, 56.4% had impaired central vision, 27.6% had visual

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					field loss, 27% had visual inattention, 50.4% had an eye movement disorder and 5.2% had visual perceptual impairment. 54.8% of patients had ≥ type of visual impairment. 27% had a normal eye exam. 136 patients had visual problems that were pre-existing prior to their stroke, 284 had a combination of pre-existent and new onset visual sequelae and 332 had new onset stroke-related visual sequelae. The incidence and prevalence of vision problems among patients who received an assessment were 59.6% and 72.8%, respectively. Diagnosis of visual problems was made for 90% of stroke survivors within 30 days of stroke onset.

Abbreviations

CA: Concealed Allocation	CI: Confidence Interval
FIM: Functional Independence Measure	ITT: Intention to treat
MMSE: Mini Mental State Examination	N/A: Not Assessed
OR: Odds Ratio	RCT: Randomized Controlled Trial
RoB: risk of bias	TULIA: Test of Upper Limb Apraxia
VAS: visual analogue scale	

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