CANADIAN STROKE BEST PRACTICE RECOMMENDATIONS

Stroke Rehabilitation Evidence Tables

Rehabilitation to Improve Language and Communication

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on Behalf of the Canadian Stroke Best Practice Recommendations
STROKE REHABILITATION Writing Group

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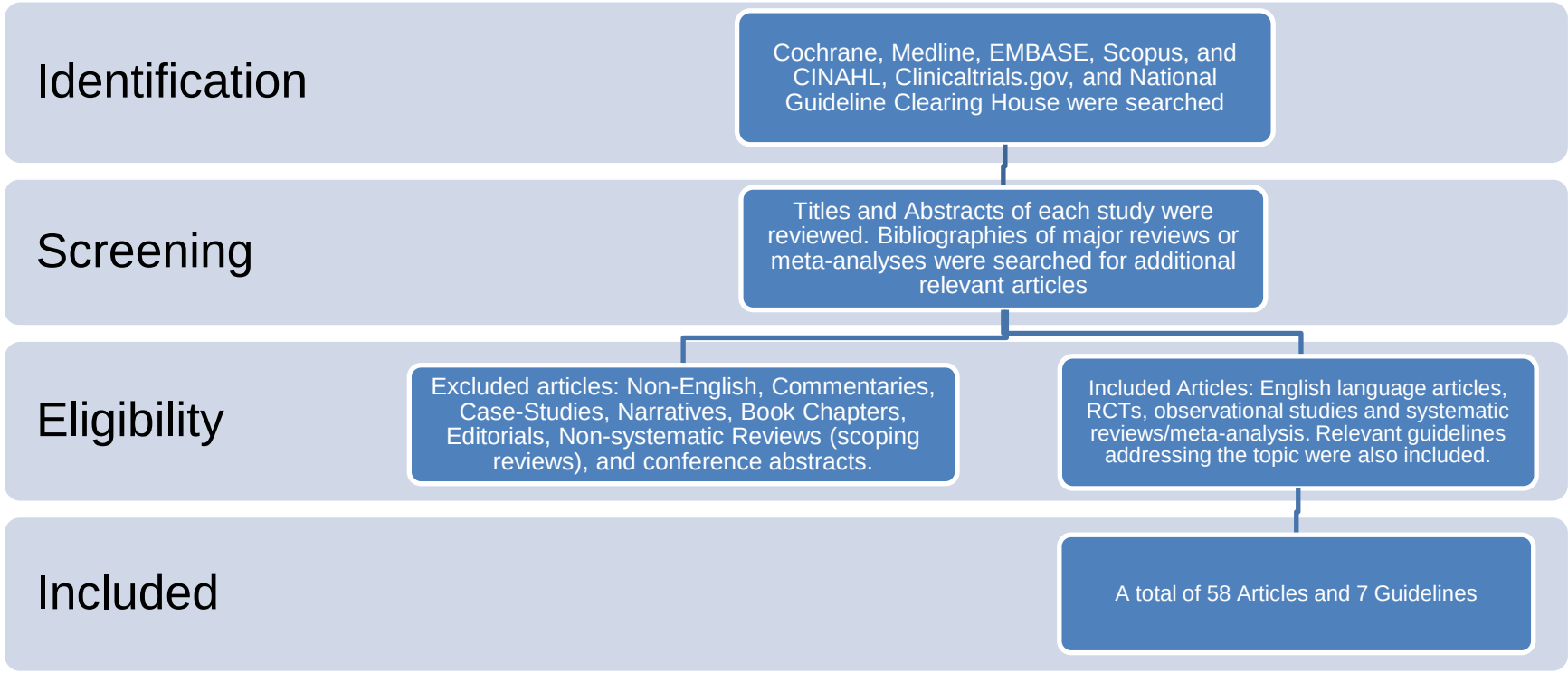
Search Strategy



Cochrane, Medline, and CINAHL, Clinicaltrials.gov, and National Guideline Clearing House, Scopus and EMBASE were searched using the key terms: Stroke AND (rehabilitation OR therapy OR intervention OR “assistive devices”) AND (communication OR aphasia OR speech OR language OR “speech-language” OR conversation OR discourse OR reading OR writing). The same databases were searched to identify paediatric related evidence using the additional keywords: “(paediatric OR paediatrics OR youth OR child OR children OR young)”. 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 58 articles and 7 guidelines were included and were separated into categories designed to answer specific questions.

Published Guidelines

Guideline	Recommendations
Stroke Council of American Heart Association; Veteran's Health Administration, DoD **Duncan et al., 2005** **USA**	<u>Assessment: Language</u> Recommend that the assessment of communication ability address the following areas: listening, speaking, reading, writing and pragmatics. The Working Group does not recommend for or against the use of any specific tools to assess communication. Several screening and assessment tools exist. <u>Treatment: Language</u> Recommend that patients with communication disorders receive early treatment and monitory of change in communication ability is order to optimize recovery of communication skills, develop useful compensatory strategies, when needed, and facilitate improvements in functional communication. (Level B evidence) Recommend that the SLP educate the rehabilitation staff and family/caregivers in techniques to enhance communication with patients who have communication disorders (Level I Evidence)
Clinical Guidelines for Stroke Rehabilitation and Recovery **National Stroke Foundation, Clinical Guidelines for Stroke Management, 2010** **Australia**	• All patients should be screened for communication deficits using a screening tool that is valid and reliable (Grade C) • Those patients with suspected communication difficulties should receive formal comprehensive assessment by a specialist clinician (Good Practice Point) • Where a patient is found to have aphasia, the clinician should: i) document the provisional diagnosis, ii) explain and discuss the nature of the impairment with the patient, family/carers, treatment team and discuss/teach strategies which may enhance communication iii) In collaboration with the patient and family/carer, identify goals for therapy and develop and initiate a tailored intervention plan. The goals and plans would be reassessed at appropriate intervals over time (Good practice points). • All written information on health, aphasia, social and community supports (such as that available from the Australian Aphasia Association or local agencies) should be available in an aphasia-friendly format (Grade D) • Alternative means of communications (such as gesture, drawing, writing, use of augmentative and alternative communication devices) should be used as appropriate (good practice point) • Interventions should be individually tailored buy can include: i) treatment of aspects of language (including phonological and semantic deficits, sentence-level processing, reading and writing) following models derived from cognitive neuropsychology (Grade C), ii) constraint-induced language therapy (Grade B), iii) the use of gesture (Grade D), iii) supported conversation techniques (Grade D), iv) delivery of therapy programs via computer (Grade C). • The routine use of piracetam is NOT recommended (Grade B). • Group therapy and conversation groups can be used for people with aphasia and should be available in the longer term for those with chronic and persisting aphasia (Grade C). • People with chronic and persisting aphasia should have their mood monitored. (Good practice point) • Environmental barriers facing people with aphasia should be addressed through training communication partners, raising awareness of and educating about aphasia in order to reduce negative attitudes, and promoting access and inclusion by providing aphasia-friendly formats or other environmental adaptations, people with aphasia from culturally and linguistically diverse backgrounds may need special attentions, for example, from trained healthcare

Guideline	Recommendations
	interpreters. (Good practice point) • The impact of aphasia on functional activities, participation and quality of life, including the impact upon relationships, vocation and leisure, should be assessed and addressed as appropriate from early post-onset and over time for those chronically affected (Good practice point).
Stroke: Clinical Practice Guideline **Catalan Agency for Health Technology Assessment and Research, 2007** **Spain**	Assessment/Diagnosis – Language: All patients with a lesion in the dominant hemisphere that present language alterations should be assessed by a speech and language therapist using valid and reliable methods (Grade C evidence) Treatment – Language: If the patient presents aphasia, the speech and language therapist must inform the staff and the family of such deficiencies and disabilities and facilitate communication techniques that are suitable for the deficit (Grade A evidence) As long as there are identifiable objectives and demonstrable progress, the patient with communication disabilities should continue to receive suitable treatment, and periodical assessments of this programme must be made (Grade D evidence)
Royal College of Physicians, National Clinical Guidelines for Stroke **Intercollegiate Stroke Working Party 2012** **United Kingdom**	**Aphasia (6.20.1.1)** 6.20.1.1 Recommendations A All patients with communication problems following stroke should have an initial assessment by a speech and language therapist to diagnose the communication problem and to explain the nature and implications to the patient, family and multidisciplinary team. Routine reassessment of the impairment or diagnosis in the early stages of stroke (immediate and up to 4 months) should not be performed unless there is a specific purpose, eg to assess mental capacity. B In the early stages of stroke (immediate and up to 4 months) patients identified as having aphasia as the cause of the impairment should be given the opportunity to practise their language and communication skills as tolerated by the patient. C Beyond the early stages of stroke (immediate and up to 4 months), patients with communication problems caused by aphasia should be reassessed to determine whether they are more suitable for more intensive treatment with the aim of developing greater participation in social activities. This may include a range of approaches such as using an assistant or volunteer, family member or communication partner guided by the speech and language therapist, computer-based practice programmes and other functional methods. D Patients with impaired communication should be considered for assistive technology and communication aids by an appropriately trained clinician. E Patients with aphasia whose first language is not English should be offered assessment and communication practice in their preferred language. F Education and training of health/social care staff, carers and relatives regarding the stroke patient's communication impairments should be provided by a speech and language therapist. Any education and training should enable communication partners to use appropriate communication strategies to optimise patient engagement and choice, and

Guideline	Recommendations
	the delivery of other rehabilitation programmes. G Any person with stroke at home who has continuing communication difficulty due to aphasia and whose social interactions are limited by it should be provided with information about any local or national groups for people with long-term aphasia, and referred to the group as appropriate. **6.20.2 Dysarthria** *6.20.2.1 Recommendations* A Any patient whose speech is unclear or unintelligible following stroke so that communication is limited or unreliable should be assessed by a speech and language therapist to determine the nature and cause of the speech impairment and communication restriction. B Any person who has dysarthria following stroke which is sufficiently severe to limit communication should: • be taught techniques to improve the clarity of their speech • be assessed for compensatory alternative and augmentative communication techniques (eg letter board, communication aids) if speech remains unintelligible. C The communication partners (eg carers, staff) of a person with severe dysarthria following stroke should be taught how to assist the person in their communication. 6.20.3 Apraxia of speech 6.20.3.1 Recommendations A Any stroke patient who has marked difficulty articulating words should be formally assessed for apraxia of speech and treated to maximise articulation of targeted words and rate of speech to improve intelligibility. B Any stroke patient with severe communication difficulties but reasonable cognition and language function should be assessed for and provided with appropriate alternative or augmentative communication strategies or aids.
Evidence-based stroke rehabilitation: Expanded Guidance document from the European Stroke Organization (ESO) **Quinn et al. 2009** **Europe**	"A systematic review of SL therapy input for aphasia reported insufficient good quality evidence to recommend formal or informal interventions over placebo (Greener 2000). The studies included in this review were community-based and had an average time to therapy of 3 months: they offer little to inform acute ward-based rehabilitation. A related meta-analysis with less rigorous inclusion criteria concluded that improvement in speech is greater if SL therapy is initiated early (Robey 1998). However, the quasi-experimental design of many of the included studies weakens the strength of this conclusion. Similarly a review of treatment for post-brain injury aphasia that was mainly based on patients after stroke supported use of SL therapy strategies over control (Cicerone et al. 2005). The ACTNoW (Assessing Communication Therapy in the North West (of England)) prospective multicentre randomized controlled trial of SL therapy in aphasia and dysarthria is currently recruiting." <u>Key Point</u>: Small-scale studies have suggested that efficacy of therapy for aphasia is dependent on timing an intensity.
Management of Patients with Stroke: Rehabilitation, Prevention and Management	<u>Assessment – Speech (no language recommendation):</u> Patients with dysarthria should be referred to an appropriate speech and language therapy service for assessment and

Guideline	Recommendations
of Complications, and Discharge Planning. **Scottish Intercollegiate Guidelines Network, 2010** **SIGN Publication No. 108** **Scotland**	management (Grade D evidence). Treatment – Dosage: Aphasic stroke patients should be referred for speech and language therapy. Where the patient is sufficiently well and motivated, a minimum of two hours per week should be provided. (Grade B evidence). These treatments may require at least six months to be completely effective (good practice point).
South African Guideline for Stroke Management **SAMJ, 2010, 100(11), pp775-778 (stroke rehabilitation)**	In patients who have language difficulties, the involvement of speech and language therapists from the onset is important. Alternative communication techniques may be explored, and education of family members, particularly about the levels of frustration experienced by people who are aphasic, must be discussed.

Evidence Tables

Conventional Speech and Language Therapy

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Brady et al. (2012) **United Kingdom** **Systematic Review and Meta-Analysis (Cochrane Review)**	N/A	39 RCTs evaluating the effectiveness of speech and language therapy (SLT). 19 randomised comparisons evaluated SLT (9 of which were classified as "conventional" vs. no SLT (n=1414 participants). An additional 7 comparisons examined the impact of SLT compared to a social support and stimulation condition. 25 randomised comparisons were identified that examined the comparative effectiveness of 2 approaches to SLT. **Note**: *SLT is defined as "any form of targeted practice tasks or methodologies with the aim of improving language or communication abilities" (p.5).*	RCTs examining the effectiveness of speech and language therapy in the treatment of aphasia following stroke were identified (using electronic and hand-searching techniques (as per Cochrane method). Quasi-randomised trials were not included. Identified trials were rated for quality in order to assess risk of bias. Pooled analyses were conducted where possible using RevMan 5.1 software. Heterogeneity was assessed using the I^2 statistic. Where important heterogeneity was observed, random effects models were employed, otherwise, analyses used fixed effects models. Pooled effects are reported as ORs or SMDs as appropriate. This publication represents the latest update of a systematic review and meta-analysis that began with Greener 1999. The most recent	Primary outcome measures chosen reflected "functional communication", although the authors acknowledged that this is difficult to define. Formal examples of assessments identified as functional communication measures included the CADL (Communicative Abilities of Daily Living) and the CETI (Communicative Effectiveness Index). Other outcomes included formal measures of receptive and expressive language or overall level of severity of aphasia (e.g. Western Aphasia Batter or the Porch Index of Communicative Ability).	11 of 19 trials assessed functional communication outcomes using the WAB, the ANELT, the CADL, the FCP and the Chinese version of the FCP. 8 trials could be included in a pooled analysis. When compared to no SLT, there was significant benefit associated with receipt of SLT in terms of functional communication (SMD=0.30, 95% CI 0.08, 0.52, p=0.008). 7 trials were identified in which SLT was compared to the provision of support and stimulation conditions; 3 assessed functional communication, but there was no evidence of benefit associated with SLT (SMD=0.04, 95% CI -0.22, 0.29). The authors identified 25 randomised comparisons of one SLT interventions with a second SLT intervention. 11 trials focused on the comparison of an experimental approach to a more conventional form of SLT. The authors note that these trials were often small and assessed a range of interventions and outcomes for which suitable statistical data was not reported. *These trials will be addressed separately where possible in tables that follow*. **Time since stroke**: Variable (and not always reported).

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			update had been Kelly et al. 2010. An additional 9 trials were added in this update.		
Godecke et al. (2013) **Australia** **Review**	N/A	79 total acute stroke patients (from 2 trials) within 14-days of stroke who scored less than 93.8 on the Aphasia Quotient (AQ) of the Western Aphasia Battery (WAB) Study 1 (n=59); Study 2 (n=20) Total Cohort (n=79): Mean age (69.5 ± 14, 52% male)	Secondary analysis of merged data from two randomized, single-blind trials: Study 1: Investigated therapy frequency; randomized moderate to severe aphasia patients to either daily therapy (mean 7.5 sessions of 45 minutes therapy over 22 days, n =32) or standard ward-based usual care (23 or 27 patients received no care, while 4 received a total of 4.9 hours over 7 sessions over 22 days for an average of 11 minutes therapy per day n = 27) Study 2: Investigated very early aphasia therapy; randomized mild to severe aphasia patients to daily group therapy or daily 1:1 therapy (up to 20 1-hour sessions over 5 weeks in patients, n =20)	Primary Outcomes: Study 1&2: The Western Aphasia Battery Quotient (AQ) at therapy completion. Secondary Outcomes: Regression modeling to examine the effects of age, baseline AQ and baseline modified Rankin Scale (mRS), average therapy amount, therapy intensity, and number of therapy sessions on aphasia recovery. Timing of Assessment: Study 1: Baseline and 4 weeks post-stroke Study 2: Baseline and 5 weeks post-stroke	Regression Model Findings: The forward selection process yielded a regression model that explained 30% of the aphasia recovery ($R^2 = 0.294$, $p < 0.001$). Predictors of Aphasia Recovery: Baseline AQ ($B = 0.29$, $p = 0.047$), initial stroke severity ($B = -7.5$, $p = 0.043$), and average therapy amount ($B = 0.63$, $p = 0.030$). Therapy intensity and average therapy amount were highly correlated ($r = 0.928$, $p < 0.001$) Non-Predictors of Aphasia Recovery: Frequency of service and age did not have a significant effect, and were not a factor in the final model. Key Points: The amount of very early aphasia treatment received was a significant predictor of recovery as were baseline aphasia severity and initial stroke-related disability.
Godecke et al. (2014) **Australia** **Prospective Cohort Study**	N/A	47 total acute stroke patients (from 2 cohorts) within 48 hours of stroke who scored less than 13/20 on the shortened Frenchay Aphasia Screening Tool (FAST)	Compared the communication outcomes of two independent cohorts using the Generalized Estimating Equations (GEE) Models:	Primary Outcome: The Western Aphasia Battery Quotient (AQ) and Discourse Analysis (DA) score at therapy completion. Timing of Assessments:	GEE models controlled for initial aphasia and stroke disability: Therapy Completion: VER participants achieved 18% greater recovery on the AQ and 1.5% higher DA scores than those in UC.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		Cohort 1 (n=20, mean age: 70.7±14.3, 60% male) Cohort 2 (n=27, mean age: 67.7 ± 15.4, 56% male)	Very Early Rehabilitation (VER) n=20: Mild to severe aphasia receiving up to 20 1-h sessions of impairment-based aphasia therapy, up to 5 weeks post-stroke Usual Care Therapy (UC) n=27: Mild to severe aphasia receiving usual care for up to 4 weeks post-stroke	Baseline, therapy completion & 6 months post-stroke.	6 Months Post-Stroke: VER participants maintained a 16% advantage in recovery on the AQ and 0.6% more on DA scores over than those in UC. Key Points: A prescribed, impairment-based aphasia therapy regimen, provided daily in very early post-stroke recovery, resulted in significantly greater communication gains in people with mild–severe aphasia at completion of therapy and at 6 months, when compared with a historical control cohort.
Godecke et al. (2012) **Australia** **RCT**	CA: ☑ Blinding: Patient ☒ Therapist☒ Assessor☑ ITT:	59 acute stroke patients within 5-days of stroke onset who have aphasia, as determined by the Frenchay Aphasia Screening Test.	Participants were randomized to receive either daily aphasia therapy (five sessions/week for a total of 5-20 sessions; n=32) or usual care (up to 1 session/week with a maximum of 4 sessions; n=27). One or more of the following three therapy types were used in the treatment condition: Lexical-semantic therapy, mapping therapy, and semantic feature analysis. **Duration of Intervention**: 4 weeks.	The primary outcome was the Aphasia Quotient of the Western Aphasia Battery and the Functional Communication Profile. Timing of assessment: Baseline and at 4 weeks post-stroke or at acute hospital discharge (whichever came first). A 6-month follow-up assessment was also conducted.	Participants in the daily therapy group received an overall mean of 331 minutes of therapy, whereas 85% of participants in the usual care group received no therapy. After controlling for baseline severity, participants who received daily therapy scored significantly higher on both the Aphasia Quotient (difference = 15.1 points; $p<0.05$) and the Functional Communication Profile (difference = 11.3 points; $p<0.01$) at four weeks post-stroke or discharge from hospital. However, significant between group differences were not maintained at the 6-month follow-up on either the Aphasia Quotient (difference = 5.9 points) or the Functional Communication Profile (difference = 7.4 points).
Bowen et al. (2012) **United Kingdom** **RCT**	CA: ☑ Blinding: Patient ☒ Therapist☒ Assessor☑ ITT: ☑	170 acute stroke (>2 weeks) patients with impaired communication due to aphasia or dysarthria.	Participants were randomized within 2 weeks post-stroke to receive either enhanced communication therapy (n=85) or unstructured social contact (n=85), for	The primary outcome was functional communicative ability as rated on the activity subscale of the Therapy Outcome Measure (TOM). Secondary outcomes included patient	Individuals in the treatment group received an average of 22 visits (18 hours) over the 13 week treatment period and demonstrated an overall improvement of 0.8 on the activity subscale of the TOM. Similar gains were observed for participants in the control group. No significant differences were found between the two groups at the six

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			up to 3 sessions per week for a maximum of 16 weeks. Enhanced communication therapy was consensus-based, best practice guided, and individually tailored. **Duration of Intervention**: 16 weeks.	and carers' perceptions of functional communication on the Communication Outcomes After Stroke Scale (COAST). Timing of assessment: baseline and 6 months following study entry.	month follow up on mean TOM scores (mean difference = 0.25 95% CI -0.19, 0.69; p=0.27). This observation was maintained in sensitivity analyses adjusting for several variables. Similarly, no significant between group differences were found with respect to the secondary outcomes.
Prins et al. (1989) **The Netherlands** **RCT**	CA: ☒ Blinding: Patient ☒ Therapist☒ Assessor☒ ITT: ☒	32 patients with a unilateral left hemispheric stroke and aphasia of more than 3 months duration. Patients with a score above 80% on a composite index of a word and sentence completion test were excluded.	21 participants were randomized to receive either systematic therapy (STAC) or conventional stimulation therapy (STIM) twice a week for 5 months. The STAC program involved a series of 28 tasks representing four domains: nonverbal, phonology, lexical-semantics and morphosyntax. 11 patients whose treatment had been previously discontinued but who met the same inclusion criteria were recruited as a no-treatment control group. **Duration of Intervention**: 6 months.	The primary outcome was a two-part test battery. Part I included 3 composite indices: phonology, lexical semantics, and morphosyntactic. Part II also included 3 composite indices: auditory comprehension, reading comprehension, and oral expression. Items in Part I were used as practice material in the STAC condition whereas items in Part II were only used for pre- and post-intervention assessment. Timing of assessment: 2-4 week before and after the intervention.	With the exception of one significant difference on the sentence completion subtest in Part II of the assessment battery, in which both the STAC (rank order (RO)=20.1) and the control group (RO=19.6) outperformed the STIM group (RO=10.1; $p<0.02$), no significant differences were found between the three groups on either of the test batteries. The authors concluded that the interventions provided to the STAC and STIM groups did not result in significant gains when compared to those in the control group.
Shewan et al. (1984) **Canada**	CA: ☒ Blinding: Patient ☒ Therapist☒	100 aphasic stroke patients within 2-4 weeks following the onset of their first, unilateral	Participants were randomised to one of 3 treatment groups: (1) language oriented	Primary outcomes included the Western Aphasia Battery (including the Language Quotient and the Cortical	No significant differences were found between the 3 active treatment groups on the Western Aphasia Battery (WAB), the WAB Language Quotient (LQ) or Cortical Quotient (CQ), or the Auditory

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
RCT	Assessor☒ ITT: ☒	stroke.	therapy (LOT) provided by a speech-language pathologist (SLP), (2) stimulation facilitation therapy (ST) provided by a SLP and (3) unstructured settings therapy (UNST) provided by nurses. Patients who did not want/were unable to participate formed a control group. All 3 active treatment groups received 3, 1-hour sessions per week. **Duration of Intervention**: 1 Year.	Quotient) and the Auditory Comprehension Test for Sentences. Timing of assessment: Baseline and at 3, 6, and 12 months.	Comprehension Test for Sentences. The LQ scores of patients in the treatment groups were significantly higher compared to the control groups (estimated adjusted mean difference = 12.23, SD=4.66; p<0.01). Individually, LOT and ST patients significantly improved compared to the control patients, but no significant differences were observed between the UNST and the control group. The CQ scores of the treatment groups were significantly higher compared to patients in the control group (estimated adjusted mean difference = 9.21, SD=4.02; p<0.05). Individually, as compared to those in the control group, ST patients had higher LQ and CQ and LOT patients had higher LQ scores (all at p<0.05). No other between group comparisons were significant.
Lincoln et al. (1984) **United Kingdom** **RCT**	CA: ☒ Blinding: Patient ☒ Therapist☒ Assessor☑ ITT: ☒	327 aphasic stroke patients who were able to cope with language testing assessment. Patients with mild aphasia or severe dysarthria were excluded.	Participants were randomised at 10 weeks post-stroke to receive either 2, 1-hour speech therapy sessions per week (in-hospital or in-home; n = 163) or no treatment (n = 164) for 24 weeks. No specific type of speech therapy was advocated. **Duration of Intervention**: 24 weeks.	Primary outcomes included the Poarch Index of Communicative Ability (PICA) and the Functional Communication Profile (FCP). Timing of assessment: Baseline and 12 and 24 weeks following initiation of the intervention.	Patients in both groups demonstrated improvement; however, no significant differences in language recovery were noted between the groups on the PICA or the FCP at either the 12 or 24 week follow-up.
David et al. (1982) **United Kingdom** **RCT**	CA: ☒ Blinding: Patient ☒ Therapist☒ Assessor☒ ITT: ☒	155 stroke patients referred for speech therapy. Patients with baseline assessments above the 85% on the Functional Communication Profile were excluded.	Participants were randomized 3+ weeks post-stroke to receive 30 hours of speech therapy by either a qualified speech therapist or an untrained volunteer.	The primary outcome was the Functional Communication Profile. Timing of assessment: Baseline, at 2, 4, 8, and 12 weeks following therapy initiation, and immediately	Although participants in both treatment groups improved over the course of the study, no significant between group differences were found at any of the assessment points.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			Duration of Intervention: 15-20 weeks.	following the last treatment session.	
Wertz et al. (1981) **USA** **RCT**	CA: ☒ Blinding: Patient ☒ Therapist ☒ Assessor ☑ ITT: ☒	67 male veterans following their first stroke who scored between the 15th and 75th percentile on a language assessment (PICA). Patients with right hemispheric damage were excluded.	Participants were randomized within 4 weeks post-stroke to receive 8 hours per week of either individual speech therapy (n = 35; direct, stimulus-response manipulation of deficits) or group speech therapy (n = 32; language stimulated through social interaction with no direct manipulation of deficits). **Duration of Intervention**: 44 weeks.	Outcomes included a clinical neurologic examination, the Porch Index of Communicative Ability (PICA), the Token Test, the Word Fluency Measure, the Coloured Progressive Matrices, a rating of conversation ability, and an informant rating of functional language ability. Timing of assessment: Baseline and 11, 22, 33, and 44 weeks following initiation of the intervention.	Participants in the individual treatment condition obtained significantly higher scores on the total PICA at weeks 26 and 37, the verbal subsection of the PICA at weeks 15 and 26, and the graphics subsection of the PICA at all assessment points, as compared to participants in the group treatment condition (all at $p<0.05$). No other between group differences were found on the PICA or the other outcome measures at any assessment point. It should be noted that 51% of those randomized did not complete the study. Results were analysed with participants grouped in cohorts based on the last assessment period completed, with only 34 participants remaining in the final cohort.

Intensity of Conventional Speech and Language Therapy

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Brady et al. (2012) **United Kingdom** **Systematic Review and Meta-Analysis (Cochrane Review)**	N/A	39 RCTs evaluating the effectiveness of speech and language therapy (SLT). 6 studies were identified that compared high-intensity and low-intensity SLT interventions. **Note**: *SLT is defined as "any form of targeted practice tasks or*	RCTs examining the effectiveness of speech and language therapy in the treatment of aphasia following stroke were identified (using electronic and hand-searching techniques (as per Cochrane method). Quasi-randomised trials were not included. Identified trials were	Primary outcome measures chosen reflected "functional communication", although the authors acknowledged that this is difficult to define. Formal examples of assessments identified as functional communication measures included the CADL (Communicative Abilities of Daily Living) and the CETI (Communicative	The amount of therapy provided in "high-intensity" conditions ranged from 4-20 hours per week while the amount of therapy provided in "low-intensity" conditions ranged from 1-15 hours per week. On the basis of 5 trials, participants who received high-intensity therapy demonstrated significantly less impairment on the WAB and the AAT following the intervention, as compared to those who received low-intensity therapy (SMD=0.35, 95% CI 0.04-0.66, p<0.05). Participants who received high-intensity SLT also demonstrated significantly better functional communication (as measured by the

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		methodologies with the aim of improving language or communication abilities" (p.5).	rated for quality in order to assess risk of bias. Pooled analyses were conducted where possible using RevMan 5.1 software. Heterogeneity was assessed using the I2 statistic. Where important heterogeneity was observed, random effects models were employed, otherwise, analyses used fixed effects models. Pooled effects are reported as ORs or SMDs as appropriate. This publication represents the latest update of a systematic review and meta-analysis that began with Greener 1999. The most recent update had been Kelly et al. 2010. An additional 9 trials were added in this update.	Effectiveness Index). Other outcomes included formal measures of receptive and expressive language or overall level of severity of aphasia (e.g. Western Aphasia Battery or the Porch Index of Communicative Ability).	FCP, p<0.01) and superior expressive written language (as measured by the AAT written subtest, MD = 8.9, 95% CI 1.81-15.99, p<0.01), as compared to those who received low-intensity SLT; only a single study was included in each of these analyses. No evidence was found to support a difference between high- and low-intensity SLT in terms of either receptive language or expressive spoken language. **Time since stroke**: Variable (and not always reported).
Cherney et al. (2011) **USA** **Systematic Review**	N/A	11 studies investigating the effects of aphasia treatment intensity in post-stroke patients. This article updates a previous review by including an additional 5 trials published since 2007.	Treatment studies that directly compared conditions of higher and lower intensity therapy for aphasia subsequent to stroke were identified. The PEDro scale was used to assess the methodological quality of each included study.	Outcomes included the Western Aphasia Battery Aphasia Quotient and the Boston Naming Test.	2 trials were included that examined an impairment level outcome following acute aphasia therapy. These trials reported mixed findings, leading the authors to question the feasibility of early acute aphasia therapy. A total of 8 studies examined an impairment level outcome following chronic aphasia therapy. Although the previous review found results in favour of more intensive therapy, the current review reported mixed findings. Similarly, mixed findings were also reported for the 5 studies examining an activity and participation level outcome following chronic aphasia therapy. The authors concluded that results appear to be

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
					are more equivocal than previously reported and that there is no clear benefit associated with more, as compared to less, intensive treatment for aphasia.
Bhogal et al. (2003) **Canada** **Systematic Review**	N/A	10 studies (n=864) investigating speech language therapy for aphasia post-stroke. Studies that included patients with conditions other than stroke were excluded.	Controlled trials examining speech language therapy for aphasia after stroke published from 1975-2002 were identified using a combination of electronic and hand searching techniques. The American Speech-Language-Hearing Association (ASHA) scale, which is an adaptation of the PEDro scale, was used to assess the methodological quality of each included study.	Outcomes included the Porch Index of Communicative Abilities (PICA), Functional Communication Profile (FCP), and the Token Test.	Studies that reported positive treatment effects provided therapy for a mean of 8.8 hours per week for 11.2 weeks whereas negative studies provided a mean of 2 hours per week for 22.9 weeks. On average, positive studies provided a total of 98.4 hours of therapy while negative studies provided a total of 43.6 hours of therapy. Hours of therapy provided in a week and total number of hours of therapy were significantly correlated with greater improvement on both the PICA (r=0.96, p<.01, for both hours per week and total hours of therapy) and the Token Test (r=0.81, p<.05 for hours per week; r=0.96, p<0.01 for total hours of therapy) while total length of therapy (i.e. time) was inversely correlated with mean change in PICA scores (r=-0.95, p<.01).
Laska et al. (2011) **Sweden** **RCT**	CA: ☑ Blinding: Patient ☒ Therapist ☒ Assessor ☑ ITT: ☒	123 stroke patients with aphasia of any severity. Only 114 and 99 patients completed the study and the 6-month follow-up, respectively.	Participants were randomized within 2 days of stroke onset to receive either speech language therapy (n=62) or no therapy (n=61). The treatment consisted of Language Enrichment Therapy (LET), with 45-minute sessions provided 5 days per week. **Duration of Intervention**: 21 days.	The primary outcome was the Amsterdam-Nijmegen everyday language test (ANELT), assessed following the intervention at day 21. The secondary outcome was the aphasia coefficient (AC), which was derived from an adjusted version of the Norsk Grunntest for Afasi (NGA). Timing of assessment: Baseline, 21 days, and 6 months.	No difference was seen between the treatment and control groups on either the ANELT or the AC directly following the intervention or at the 6-month follow-up (p=NS).
Bakheit et al. (2007) **United Kingdom**	CA: ☑ Blinding: Patient ☒ Therapist☒ Assessor☑	97 stroke patients with aphasia, as determined by the Western Aphasia Battery. Patients who had a previous stroke or	Participants were randomized to receive either intensive therapy (5 sessions/week; n=46) or standard therapy (2	The primary outcome was the Western Aphasia Battery (WAB). Timing of assessment:	No significant differences in WAB scores were found between those receiving intensive therapy and those receiving standard therapy at any assessment point. However, none of the patients assigned to the intensive therapy group received

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
RCT	ITT: ☑	who were diagnosed with Parkinson's Disease or Depression were excluded.	sessions/week; n=51). An additional 19 patients received therapy via National Health Service (NHS) therapists, but were not randomized to a treatment condition. Therapy sessions were 45 minutes in duration. **Duration of Intervention**: 12 weeks.	Baseline and at 4, 8, 12, and 24 weeks.	the full course of therapy: only 13/51 received more than 80% of the intended intensity. Nevertheless, subgroup analyses also failed to demonstrate significant differences between these two groups. WAB scores were significantly higher among patients receiving standard therapy as compared to NHS provided therapy at both 12 and 24 weeks (both at $p<0.01$). The NHS group received the least amount of therapy (mean = 6.9 hours over 8.6 sessions as compared to 19.3 hours over 19.3 sessions in the standard therapy group).
Martins et al. (2013) **Portugal** **RCT (SP-I-R-IT)**	CA: ☑ Blinding: Patient ☒ Therapist☒ Assessor☑ ITT: ☑	30 stroke patients with mild to severe aphasia [measured using the Lisbon Aphasia Assessment Battery (BAAL)].	Participants, within three months of a single left hemispheric infarct of the middle cerebral artery territory, were randomized to receive either intensive (IT) or regular (RT) speech and language therapy (SLT). Randomization was stratified by severity of aphasia (severe vs. moderate/mild). **Duration of Intervention:** Each group received 100hr of SLT in total. IT group received 2 h per day x 5 days per week for 10 weeks versus the RT group that received 2 h per week x 50 weeks.	Primary outcomes: Aphasia quotient (AQ; the arithmetic mean of the percentage score obtained in fluency, object naming, word repetition, and sentence comprehension subsets of the BAAL), Aphasia Severity Rating Scale (ASRS) of the Boston Diagnosis Aphasia Examination (BDAE), the Functional Communication Profile (FCP) and Stroke Aphasia Depression Questionnaire (SAD-Q). Timing of assessment: Baseline, 10, 50, and 62 weeks.	No significant differences were found between the groups for any of the outcome measures
Hinckley et al. (2005) **USA** **Non-RCT**	N/A	13 stroke patients with moderately severe, non-fluent type aphasia. Patients with right hemispheric damage, a history of other	Participants at least 3 months following stroke onset were assigned to receive either intensive therapy (20 hours of individual context-based	Primary outcomes included performance on a criterion task (ordering items from a catalogue), the Communicative Abilities in Daily Living sc (CADL-2) and	Although participants in both groups demonstrated significant improvement on the criterion task, no significant between group differences were reported. As compared to those who received non-intensive therapy, participants who received intensive therapy scored higher on the written

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		neurologic disease, or a psychiatric diagnosis were excluded.	therapy + 5 hours of group treatment per week; n=8) or non-intensive therapy (4 hours of individual, context-based therapy per week; n=5). Context-based therapy included role-plays, self-generated strategies and context-specific cues. **Duration of Intervention**: not specified.	selected subtests from the Psycholinguistic Assessment of Language Processing in Aphasia (PALPA). Timing of assessment: Baseline and following intervention.	naming subtest of the PALPA (p<0.05). No other significant between group differences were found with respect to the other PALPA subtests. Conversely, participants in the non-intensive treatment group demonstrated more improvement than participants in the intensive group on the CADL-2 (p<0.05).
Hinckley et al. (1998) **USA** **Non-RCT**	N/A	This study reports three studies representing a total of 40 individual patients. Study 1 and 2 each included 15 aphasic patients, 13 of which were post-stroke. Study 3 included 10 patients with aphasia following a left hemispheric stroke.	Participants in each study received a 6-week course of intensive speech/language therapy (15 hrs. individual, 5 hours group, 3 hours computer lab) followed by a 6-8 week period of either no therapy (study 1), <3 hours therapy (study 2) or 3-5 hours therapy (study 3). Following non-intensive therapy, participants received a second 6-week period of intensive therapy. **Duration of Intervention**: 18-20 weeks.	Pre and post-phase assessments included the Boston Naming Test (BNT), and analysis of content units (CU) from the analysis of utterance procedure. Timing of assessment: Before and after each intervention period.	In all 3 studies, the greatest improvements in naming ability as assessed on the BNT were associated with intensive treatment. No or non-intensive treatment was associated with no significant improvement over time. Return to intensive therapy resulted in more significant improvement. Total therapy received in each intensive period = 120 hours while non-intensive therapy provided 12 – 30 hours over 6 weeks.
Denes et al. (1996) **Italy** **RCT**	CA: ☒ Blinding: Patient ☒ Therapist ☒ Assessor ☒ ITT: ☒	17 patients with global aphasia following left hemisphere stroke.	Participants were randomized to receive either standard treatment (n=9) or intensive treatment (n=8). Patients receiving standard	The primary outcome was the Aachen Aphasia Test (AAT) and the following five subtests: the Token Test, Repetition, Written Language, Confrontation	Participants in both groups demonstrated improvement on the overall AAT profile and each of the subtests at the end of 6-months. The largest amount of improvement over time was demonstrated by the intensive therapy group; however, in between-group comparisons, only

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			treatment received an average of 60 therapy sessions over 6 months (approximately 3 per week). Intensive treatment consisted of 130 sessions over the same time period. Therapy was conducted using an "ecological" approach, which focused on the restoration of language in a conversational setting. **Duration of Intervention**: 6 months.	Naming, and Comprehension. Timing of assessment: Baseline and at 6 months.	improvement on the Written Language subtest was found to significantly differ between the two groups (p<0.05). Analysis of individual scores revealed that individuals receiving intensive therapy demonstrated a greater number of improvements for every AAT subtest.
Brindley et al. (1989) **United Kingdom** **RCT**	CA: ☒ Blinding: Patient ☒ Therapist ☒ Assessor ☒ ITT: ☒	10 patients with Broca's aphasia (as determined by assessment with the Boston Diagnostic Aphasic Examination) of at least 1-year duration. Patients with a predominating apraxia were excluded.	Participants were randomized to one of two groups, each of which received 5 hours of language therapy 5 days a week for 12 weeks. Participants also received 12-weeks of "non-intensive" therapy both before and after the intervention. Although participants were randomly assigned to groups, It should be noted that the authors did not specify how study conditions differed. Also, between group comparisons were not presented. **Duration of Intervention**: 12 weeks.	Primary outcomes included the Functional Communication Profile (FCP) and the Language Assessment, Remediation and Screening Procedure (LARSP; based on a 200-word writing sample). Timing of assessment: Baseline and at 3 and 6 months.	Significant improvement on the FCP was observed during the intensive period in terms of movement, speech, reading, and overall score. There was a significant ratio of improvement on the FCP between the intensive period and the 2nd non-intensive period in terms of movement, speech and overall score. Significant improvement on the LARSP was also observed during the intensive period in terms of sentence length increase, reduction in element omission, and increase in percentage of full utterances. In comparison, participants did not demonstrate significant improvement on the FCP or the LARSP during either the 1st or 2nd non-intensive period.

Volunteer-Facilitated Speech Language Therapy

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Brady et al. (2012) **United Kingdom** **Systematic Review and Meta-Analysis (Cochrane Review)**	N/A	39 RCTs evaluating the effectiveness of speech and language therapy (SLT). 4 trials were identified that compared volunteer-facilitated SLT with professional SLT-facilitated SLT (delivered by a speech language pathologist in most cases).	RCTs examining the effectiveness of speech and language therapy in the treatment of aphasia following stroke were identified (using electronic and hand-searching techniques (as per Cochrane method). Quasi-randomised trials were not included. Identified trials were rated for quality in order to assess risk of bias. Pooled analyses were conducted where possible using RevMan 5.1 software. Heterogeneity was assessed using the I^2 statistic. Where important heterogeneity was observed, random effects models were employed, otherwise, analyses used fixed effects models. Pooled effects are reported as ORs or SMDs as appropriate.	Primary outcome measures chosen reflected "functional communication", although the authors acknowledged that this is difficult to define. Formal examples of assessments identified as functional communication measures included the CADL (Communicative Abilities of Daily Living) and the CETI (Communicative Effectiveness Index). Other outcomes included formal measures of receptive and expressive language or overall level of severity of aphasia (e.g. Western Aphasia Battery or the Porch Index of Communicative Ability).	Most volunteers included in trials of volunteer-facilitated SLT were family members, although some were friends and others were recruited specifically as participants in the trial. Volunteers received training in language therapy, access to materials and equipment and support or supervision from an SLP. Measures used to compare the 2 types of therapy delivery included functional communication, reception language, written language and severity of impairment. In terms of functional communication, receptive language (auditory comprehension and reading comprehension), and expressive language (spoken, written), there were no differences between groups of individuals assigned to volunteer-facilitated vs. professional facilitated therapy. Meinzer et al. (2007) reported significantly higher scores on the repetition subtest of the AAT for individuals in the volunteer facilitated group than the professional-facilitated group (MD=13.5, 95% CI 0.19, 26.81, p=0.05). Note: This was the only study in this group to use constrain-induced language therapy (CILT). There was no impact on the severity of impairment following either volunteer- or professionally-facilitated SLT assessed using either the PICA or AAT.
Meinzer et al. 2007 **Germany** **RCT**	CA: ☒ Blinding: Patient ☒ Therapist ☒ Assessor ☑ ITT:☑	20 individuals with chronic aphasia (mean age = 56.1 years, 4 women 16 men) following single left hemisphere stroke where chronic is defined as symptom duration of at least 6 months. Patients with different syndromes were	Participants were placed in groups according to severity of aphasia (mild, moderate or severe). Groups also included relatives of individuals who agreed to participate in the study. Groups (2-3 patients + 2-3 relatives) were then randomly	Language functions were assessed using the Aachen Aphasia Test (AAT), which includes 5 subtests (token test, repetition, written language, naming and comprehension). **Timing of Assessment**: 1 day in advance of and 1 day	Participants assigned to volunteer-facilitated CIAT were significantly older than those who were assigned to treatment by a psychologist ($p<0.012$); however, since age had not been associated with treatment in a previous study, the authors did not include in as a covariate in the current analysis. No other significant between group differences were noted. All patients were able to complete the intervention and all received the same number of CIAT sessions.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		included – sample included individuals with Broca's, Wernicke's, global, amnestic and unclassified aphasias of a range of severity. **Duration of aphasia**: 6 – 79 months.	assigned to receive either constraint-induced aphasia therapy (CIAT) delivered by a psychologist or by a trained volunteer (the participating family member). Relatives (lay person trainers) received 2-hour introductory sessions that included materials, procedures, approaches and information regarding adjustment of task difficulty. Additional training sessions for the layperson volunteers at the end of each CIAT session. **Duration/Intensity of Intervention**: All groups received CIAT sessions (facilitated by lay persons or a trained psychologist) for 3 hours per day for 10 consecutive working days.	following the end of the intervention.	Both groups demonstrated a significant improvement over the 2-week training period based on the AAT profile score obtained before and after completion of the intervention ($F=7.05$, $p<0.0001$ and $F=5.65$, $p<0.002$ for group A and B, respectively]. There was no significant groupXtime interaction for either the total profile score or any of the individual subtest scores of the AAT. The authors note that gains over time were, therefore, similar for participants in each group.
Worrall and Yiu (2000) **Australia** **RCT**	CA: ☒ Blinding: Patient ☒ Therapist ☒ Assessor ☒ ITT:☒	14 matched participant pairs were allocated randomly to one of 2 groups. Participants were matched on basis of Aphasia Quotient from the WAB. To be included participants had to experience aphasia following a stroke at least 12 months previously and have discontinued other speech therapy for at	The Speaking Out program consisted of 10-scripted modules addressing issues in everyday functional communication. The Speaking Out program was conducted by a trained volunteer in the participants' home, individually – 1 module per week, one session per week. Each session	A test battery consisting of the Western Aphasia Battery, the ASHA FACS, CETI, FCTP and SF36 was used. **Timing of Assessments**: All participants were assessed using a test battery at study entry and at the end of each of the four study phases (after each intervention or recreational	For both groups, there was a significant change in scores on the WAB over the course of the Speaking Out intervention (group A $p=0.046$; group B, $p=0.036$). Within group B, participation in Speaking out was associated with significant positive improvement in scores on the ASHA-FACS ($p=0.018$). For group A, there was a significant difference in general health perception assessed on the SF36 before and after participation in Speaking Out ($p=0.028$). Analyses performed to compare the Speaking Out intervention with the provision of recreational activities, no significant between-group differences

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		least 1 month prior to study entry. In addition, participants were community-based and not experiencing dementia, severe hearing or vision loss and were English speaking. 15 volunteers were recruited to provide the program of functional communication therapy.	lasted approximately 1-2 hours. Participants participated in both a recreational activity and intervention condition in a cross over design in which each 10-week intervention phase was separated from the next by a 10-week withdrawal phase. The recreational activity phase consisted of 10 weekly home visits in which the volunteer engaged in non-language based activities (e.g. chess, puzzles, gardening, etc.). Group A participated in the Speaking Out intervention first, while Group B began with recreational activities. Both groups ended with a 10-week withdrawal phase.	phase and after each 10-week withdrawal phase) for a total of 4 complete assessments.	were reported for any of the communication assessments. For group B only, the authors compared the amount of change that occurred during the first withdrawal (no treatment) phase to the change that occurred during the Speaking Out intervention phase. Changes on the ASHA-FACS were significantly greater following the intervention than during the no treatment phase only; there were no other significant differences noted.
Marshall et al. 1989 **USA** **RCT**	CA: ☒ Blinding: Patient ☒ Therapist ☒ Assessor ☑ ITT:☒	As per Wertz et al. 1986 (see below).	Patients were randomized to receive 1) a home therapy treatment provided by a volunteer (wife, friend or relative), 2) speech-language pathologist (SLP) or 3) deferred treatment provided by an SLP. This latter condition was deferred for a period of 12 weeks. ***(see further details provided in Wertz et al. 1986).*** **Duration of Study**: 24 weeks.	The primary outcome assessment was the PICA – used to determine "communicative performance over time" (p464). The CADL was used to evaluate functional communication. Other assessments included the Token Test, the Reading Comprehension Battery for Aphasia (RCBA), and Raven's Coloured Progressive Matrices (CPM). **Timing of Assessments**: Baseline, 6, 12 18 and 24 weeks.	*Note: This study was associated with a larger study reported by Wertz et al. 1986. The publication was intended to provide additional detail not provided in the original.* The authors reported a significant time ($p<0.01$) and groupXtime interaction ($p<0.01$). All 3 groups improved over the course of the first 12 weeks. At 12 weeks, the individuals receiving treatment provided by an SLP made significantly greater improvement than the no-treatment (deferred) group in terms of mean PICA scores. The improvement demonstrated by the home therapy group was not significant greater than in the deferred treatment group ($p>0.05$). However, the improvement demonstrated by the SLP group did not differ significantly from the improvement in PICA scores demonstrated by the home-treatment group over the

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
					first 12 weeks. Over the 2nd 12-week period, the only group receiving treatment was the deferred group. At the 24-week assessment, there were no longer any significant differences between groups in terms of performance on the PICA. *Note: Results on the remaining assessments were reported in terms of % of patients experiencing various levels of improvement only.* Patients in both groups tended to demonstrate improvement on all measures (except the CPM). Overall, on all measures except the CPM, a greater proportion of participants assigned to home treatment experienced greater (more marked) improvement than patients in the deferred condition (no comparison is provided to the SLP condition). 70% of home therapists, when asked, said that participants were highly cooperative or more cooperative than average. 76% felt that their patients made good or very good progress and 73% felt that this was due to the treatment administered during the home therapy sessions.
Wertz et al. 1986 **USA** **RCT**	CA: ☒ Blinding: Patient ☒ Therapist ☒ Assessor ☑ ITT:☒	121 males who were 2 to 12 weeks post onset from a single left hemisphere thrombosis infarct resulting in aphasia. Patients were less than 75 years of age and had had not more than 2 week of language therapy between the onset of aphasia and entry to the study. All participants lived in the community (outside of institutional facilities) and had a volunteer available to them who could fulfill the role of volunteer therapist within the study.	Patients were randomized to receive 1) a home therapy treatment provided by a volunteer (wife, friend or relative), 2) speech-language pathologist (SLP) or 3) deferred treatment provided by an SLP. This latter condition was deferred for a period of 12 weeks. Participants assigned to home treatment received 8-10 hours of therapy in his home each week for 12 weeks. Followed by a 12-week period of no treatment. The SLP	The primary study outcome was the PICA which was used to evaluate change in language over time in terms of auditory comprehension, reading, speaking and writing. A change of 15 percentile units on the overall PICA score was considered to be clinically significant change. **Timing of Assessments**: Baseline, 6, 12 18 and 24 weeks.	94 of 121 patients completed all 24 weeks of the study. The most common reasons for non-completion were onset of illness and second stroke. All patients made significant improvements in the first 12 weeks of the trial ($p<0.05$). Similar improvements were seen in all PICA modalities (gestural, verbal and graphic). Overall, individuals assigned to received treatment with an SLP improved significantly more on the PICA over the first 12 weeks than individuals assigned to no treatment ($p<0.05$). There was no significant between group difference noted for the comparison between SLP and home therapy. Although individuals assigned to home therapy appeared to have improved more than those assigned to deferred treatment, this comparison did not reach statistical significance.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			group, received 8-10 hours per week of treatment in a clinic by a speech pathologist for 12 weeks followed by a no-treatment period of 12 weeks. The deferred group received the same treatment as group 2 – in the opposite order. In the home treatment condition, the treatment provided was planned by an SLP, but administered by a volunteer home therapist who was willing and able to function in this capacity. These home therapists received 6-10 hours of training in various techniques of SL treatment. Volunteers met with the supervising SLP each week on an individual basis and were encouraged to communicate by telephone as well to receive updates re: treatment activities and report on patient performance. The content of the home treatment program and the SLP administered treatment program was the same and followed a general protocol that specified treatment in the following modalities: auditory comprehension, reading, oral-expressive language and writing.		In terms of the way in which the authors defined clinical significance, 40% of individuals assigned to treatment by an SLP achieved the minimum of a 15 percentile unit change set by the authors as the definition of clinically significant change. In the home therapy group, 34% of individuals achieved at least this level of change in overall PICA scores. At 24 weeks, all individuals assigned to the deferred group had received treatment and had demonstrated significant improvement in PICA scores.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			Patients and home therapists were videotaped every 2 weeks -- to check for problems, monitor and review (add or modify) treatment tasks. **Duration of Study**: 24 weeks.		
Meikle et al. 1979 **United Kingdom** **RCT**	CA: ☒ Blinding: Patient ☒ Therapist ☒ Assessor ☒ ITT:☒	31 patients who had suffered a stroke 3 weeks prior and passed through the acute phase being left with "disabling dysphasia".	Following baseline assessments, patients were randomly assigned to 1 of 2 groups. One group received conventional speech therapy from a quality speech therapist while the other group received therapy from a non-professional volunteer. Participants assigned to conventional therapy received 3-5, 45-minute sessions with a speech therapist in a hospital setting per week including, where possible a group session. Those in the volunteer-based group received four home visits a week from a team of volunteer helpers and could also participate in a group session at a rehabilitation centre, operated by volunteers. Volunteers were provided with a "short, introductory course" and some further time (approx 1 hour) to explain prospective treatments.	Primary assessment appears to be the PICA. Serial assessment of each patient was performed at approximately 6-weekly intervals. The Wolfson Rehabilitation test was also administered at baseline and 3 months. **Timing of Assessment**: Baseline, every 6 weeks thereafter.	Time in the trial ranged from 2 weeks to 84 weeks. No significant differences were observed between the two groups on Porch Index of Communicative Ability (PICA) scores. There were significant improvements over time noted in both treatment conditions.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			Duration of Intervention: Participants remained in the trial until 2 successive assessments on the PICA demonstrated no improvement or until they requested removal or until trial end.		

Group Therapy

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Brady et al. (2012) **United Kingdom** **Systematic Review and Meta-Analysis (Cochrane Review)**	N/A	Included 39 RCTs evaluating the effectiveness of speech and language therapy (SLT). 3 trials examined group interventions compared to one-on-one provision of SLT therapy.	RCTs examining the effectiveness of speech and language therapy in the treatment of aphasia following stroke were identified (using electronic and hand-searching techniques (as per Cochrane method). Quasi-randomised trials were not included. Identified trials were rated for quality in order to assess risk of bias. Pooled analyses were conducted where possible using RevMan 5.1 software. Heterogeneity was assessed using the I^2 statistic. Where important heterogeneity was observed, random	Primary outcome measures chosen reflected "functional communication", although the authors acknowledged that this is difficult to define. Formal examples of assessments identified as functional communication measures included the CADL (Communicative Abilities of Daily Living) and the CETI (Communicative Effectiveness Index). Other outcomes included formal measures of receptive and expressive language or overall level of severity of aphasia (e.g. Western Aphasia Battery or the Porch Index of Communicative Ability).	In terms of functional communication (one trial), auditory comprehension (2 trials), spoken language (2 trials), and written language (1 trial), there was no significant difference in effect between group SLT and individual SLT. On assessments of severity (the PICA, the WAB, and AAT), there was also no significant difference in effect reported between the 2 conditions.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			effects models were employed, otherwise, analyses used fixed effects models. Pooled effects are reported as ORs or SMDs as appropriate.		
Wertz et al. (1981) **USA** **RCT**	CA: ☒ Blinding: Patient ☒ Therapist ☒ Assessor ☑ ITT: ☒	67 male veterans following their first stroke who scored between the 15th and 75th percentile on a language assessment (PICA). Patients with right hemispheric damage were excluded.	Participants were randomized within 4 weeks post-stroke to receive 8 hours per week of either individual speech therapy (n = 35; direct, stimulus-response manipulation of deficits) or group speech therapy (n = 32; language stimulated through social interaction with no direct manipulation of deficits). Study Period: 44 weeks.	Outcomes included a clinical neurologic examination, the Porch Index of Communicative Ability (PICA), the Token Test, the Word Fluency Measure, the Coloured Progressive Matrices, a rating of conversation ability, and an informant rating of functional language ability. Time points for assessment: Baseline and 11, 22, 33, and 44 weeks following initiation of the intervention.	Participants in the individual treatment condition obtained significantly higher scores on the total PICA at weeks 26 and 37, the verbal subsection of the PICA at weeks 15 and 26, and the graphics subsection of the PICA at all assessment points, as compared to participants in the group treatment condition (all at $p<0.05$). No other between group differences were found on the PICA or the other outcome measures at any assessment point. It should be noted that 51% of those randomized did not complete the study. Results were analysed with participants grouped in cohorts based on the last assessment period completed, with only 34 participants remaining in the final cohort.
Elman and Bernstein-Ellis (1999) **USA** **RCT**	CA: ☒ Blinding: Patient ☒ Therapist ☒ Assessor ☑ ITT:☒	28 stroke patients, under 80 years of age, with aphasia (for more than 6 months) who had completed their SLT treatment. Had to be literate in English prior to stroke.	Participants were assigned at random to either immediate (IT) or deferred treatment (DT) groups. Once allocated, participants were assigned to either mild-moderate or moderate-severe groups within conditions based on baseline testing (SPICA). Participants in the IT groups received immediate assessment and immediate communication treatment. Those in the deferred (ST) conditions, received immediate assessment,	Authors used a "multimethod battery of outcome measures" (p413) to assess study outcomes that includes batteries for aphasia (SPICA, WAB) as well as the CADL. **Timing of Assessment**: Baseline, 2 and 4 months, and at follow-up (4-6 weeks post study completion).	24 patients completed the 4-month trial. Patients in the treatment group demonstrated significantly higher scores on the WAB AQ ($p<0.05$) and CADL ($p<0.05$). There was no significant difference between groups reported on the SPICA. Significant increases in performance were evident at 2 and 4 months. No significant decline in performance occurred at time of follow-up (4-6 weeks post-intervention).

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			but communication treatment was deferred until the IT groups completed the 4-month treatment trial. The focus of communication treatment included increasing initiation of conversation and exchanging information using whatever communicative means possible. Group treatment was provided by an SLP with the assistance of a volunteer or student intern for 2.5 hours X days per week. A 30-minute social break was provided in the middle of each session. The deferred group engaged in activities such as support, performance or movement groups to control for effects of social contacts, while awaiting commencement of treatment. **Duration of Intervention: 4 months.**		

Training Communication Partners/Significant Others

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Hilton et al. (2014) **United Kingdom** **Review**	N/A	17 articles of relatives' views about their own intervention needs in relation to acquired aphasia. Studies were included where aphasia patient relatives describe the impact of aphasia or aphasia-related needs, and made recommendations for meeting needs Studies where professionals or people with aphasia were suggesting how relatives' needs should be met, were excluded.	Each study was reviewed by 2 researchers who abstracted descriptive information. Data was collected retrospectively and was most often qualitative in nature (questionnaires, interviews and focus groups).	Key information from relevant papers was summarized: the aims of the study, participants, details about aphasia (e.g., time post onset, severity), and methodology. Timing of intervention was classified into three stages: acute, rehabilitation, longer-term. Recommendations classified into three intervention types: factual information, emotional and psychological support, and training	A total of 126 recommendations spanning 8 countries and 3 continents were compiled. <u>Acute</u> Need for factual information, provided proactively in a flexible and supportive manner. Need for professionals to acknowledge the impact of aphasia on their lives and the need for ongoing psychosocial support. <u>Rehabilitation</u> More information would reduce anxiety, particularly at the point of discharge home <u>Longer-term</u> Clinicians can forewarn relatives about periods of predictable difficulties, such as transitions from hospital to home, and provide coping strategies to manage these periods, benefiting the relative as well as the person with aphasia <u>Key Points</u> Service delivery to families of people with aphasia can be helped by enhancing awareness and anticipation of relatives' needs and by validating best use of resources.
Simmons-Mackie et al. (2010) **USA** **Systematic Review**	N/A	31 articles describing studies of communication partner training as an intervention for aphasia. Communication skills training involved "training the partner to use strategies or resources to support and facilitate the communication of the person with aphasia" (p.1815). Studies involving counselling	Each study was reviewed by 2 researchers who abstracted descriptive information. Data was collated and analysed to create a descriptive review of the included treatment studies. A 5-member review panel reviewed included studies to assign (by consensus) AAN classification of evidence (where class I is considered the highest	Descriptive review of participant and intervention characteristics, outcome assessments used and results, AAN classifications of evidence and applications of recommendations where possible. A summary of results is provided in terms of clinical questions addressing assessment in individuals with acute and chronic	Overall, there were 352 communication partner participants identified; most (241) participated in studies of group design. Most (234) were described as either caregivers or family members. Family member partners tended to be older than partners who were less familiar with the person with aphasia. The authors identified 319 participants with aphasia in the 31 included studies; 256 were represented in studies of group design. Mean age ranged from 49.5 to 70 years. 25 studies provided information regarding sex; in these, 62.4% of participants with aphasia were male. Etiology of aphasia was reported in 22 studies, and in 210/221 participants, the cause was stroke. Time post-onset ranged from

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		programs or volunteer-facilitated conventional therapies were excluded. All empirical studies were included regardless of study design.	level of evidence and IV the lowest). These results were used to form levels of recommendation (A, B, C or U) according to the AAN manual, where possible.	aphasia and with regard to activity/participation, psychosocial well-being and quality of life of communication partners.	1.25 to 178 months. Chronic aphasia was defined as at least 6 months. Of the 31 studies, more than 50% involved training both the communication partner and the individual with aphasia. Slightly less than 50% trained only the partner. 18 studies provided group training, 10 involved dyad training. Content: Most studies were multi-faceted though the content of all facets were not necessarily clear. Education about aphasia was common as was training of communication strategies. Timing/intensity: Duration of intervention ranged from 4 – 35 hours in total, in sessions 1-2 hours in length provided as frequently as 4 times/week. The longest intervention lasted 20 weeks. With regard to the clinical questions posed, the authors note that, based on the data reported, it was not possible to address the questions regarding acute aphasia. For the questions regarding chronic aphasia, the authors note, that positive outcomes were reported in 19/21 studies and 9/10 studies reported positive outcome regarding psychosocial improvement. No studies reported quality of life outcomes for individuals with chronic aphasia. In terms of assessments of outcome for communication partners, the authors identified 22 studies reporting activity/participation assessments (21 positive – 6 noting gains that were sustained). 10 studies reported psychosocial outcomes – 8 reported improvements. Only 1 study reported QOL measure for partners, but there was no significant change. The majority of studies were classified as AAN level IV. Only 2 studies were rated as AAN Level I. The authors note that there is insufficient evidence to offer any recommendations for acute aphasia (during the first 4 months post onset) (Level U). The authors also note insufficient evidence to provide recommendations regarding the impact of partner training interventions on language impairment, psychosocial outcomes or QoL of individuals with chronic aphasia (Level U). They do

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
					suggest that partner training interventions may be effective for improving communication activities/participation for individuals with chronic aphasia (Level C). From the perspective of the partner, training may be an effective means of improving activity/participation (Level A) and improving/maintaining their skill in supporting communication (Level C).
Kagan et al. (2001) **USA** **RCT**	CA: ☒ Blinding: Patient ☒ Therapist ☒ Assessor ☑ ITT:☒	Study included 40 stroke patients with moderate-to-severe aphasia (based on the WAB AQ and clinical judgement of an SLP). Participants had to be at least one year post stroke onset and be able to participate in some form of conversation (verbal, gestural, written, pictured, drawn, etc.). In addition, 40 volunteers were recruited from a community-based aphasia centre.	Volunteers were randomly assigned to either receive a workshop training session designed to teach them how to acknowledge and reveal the competence of adults with aphasia through supported conversation (SCA) (n=20) or were assigned to be exposed to aphasia by watching a video that told stories of patients with aphasia and their families. (n=20) They were also given opportunity to interact with aphasia patients. Patients were randomly assigned to volunteers. Pre-and post-training videos were recorded of volunteers participating in conversational dyads with individuals with aphasia using a semi-structured interview format. Conversations were designed to offer opportunities for social interaction and information exchange. SCA training was provided in a one-day	A set of measures specific to supported conversation were developed and included: measure of skill in providing supported conversation for adults with aphasia, and a measure of participation in conversation for adults with aphasia.	SCA trained volunteers scored higher than controls on rating of acknowledging competence ($p<0.001$) and revealing competence of their aphasic partners ($p<0.001$). Patients assigned to trained volunteers scored higher on social ($p<0.023$) and message exchange skills ($p<0.001$) than did patients assigned to control volunteers. Effect sizes associated with the intervention over time were reported as 0.44, 0.88, 1.38 and 5.7 for interaction, transaction, acknowledging competence and reveal competence, respectively. It is noteworthy that a number of individuals assigned to the control group did not demonstrate improvement at the time of the second interview, but rather did worse. The authors suggest that an unsuccessful encounter may influence subsequent attempts at communication stressing the need to foster competence.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			workshop format followed by a "hands-on" session within 2 weeks of training allowing the trained individual to work with a group of individuals with aphasia (other than the specific individual they had interviewed).		

Computer-based Treatments in Aphasia

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Brady et al. (2012) **United Kingdom** **Systematic Review and Meta-Analysis (Cochrane Review)**	N/A	Included 39 RCTs evaluating the effectiveness of speech and language therapy (SLT). Four trials were identified as evaluating computer-mediated approaches to SLT. One RCT was identified as comparing therapy deliver via computer interface vs. professional SLP.	RCTs examining the effectiveness of speech and language therapy in the treatment of aphasia following stroke were identified (using electronic and hand-searching techniques (as per Cochrane method). Quasi-randomized trials were not included. Identified trials were rated for quality in order to assess risk of bias. Pooled analyses were conducted where possible using RevMan 5.1 software. Heterogeneity was assessed using the I^2 statistic. Where important heterogeneity was observed, random effects models were employed, otherwise,	Primary outcome measures chosen reflected "functional communication", although the authors acknowledged that this is difficult to define. Formal examples of assessments identified as functional communication measures included the CADL (Communicative Abilities of Daily Living) and the CETI (Communicative Effectiveness Index). Other outcomes included formal measures of receptive and expressive language or overall level of severity of aphasia (e.g. Western Aphasia Battery or the Porch Index of Communicative Ability).	Although there were four trials identified in total (some had multiple publications associated with the same trial), only 1 randomized controlled trial was included in the statistical analysis. This RCT is described in the table below (Cherney 2010). Overall, the authors conclude that there is not enough evidence to recommend one type of therapy over another. There is little indication, at the present time, that there is a significant difference in computer-based SLT vs therapy delivered by a therapist.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			analyses used fixed effects models. Pooled effects are reported as ORs or SMDs as appropriate.		
Doesborgh et al. (2004) **The Netherlands** **RCT**	CA: ☑ Blinding: Patient ☒ Therapist ☒ Assessor ☒ ITT:☒	18 people with aphasia post stroke and who had completed an intensive course of either semantic or phonological therapy for aphasia previously. All participants had experienced stroke at least 11 months prior to study entry, and had a moderate to severe deficit in naming. Mean age was 62 (±9) years in the intervention group and 65 (±12) years in the control group.	Participants were randomly assigned to receive either 10 – 11 hours therapy with Multicue (n=8) or no treatment. Multicue is a computer program for the improvement of word finding based on cueing therapy. Sessions lasted 30 – 45 minutes and were conducted 2-3 times per week for approximately 2 months. While patients were treated via the Multicue program, apart from assigned language therapy and group psychosocial therapy, no other interventions were given. The SLT participated in the first 4 sessions with the participants assigned to treatment following a structured protocol to help familiarize the participant with the computer program. After the 4th session, the therapist just checked-in on participants occasionally. Participation in the "no treatment" control condition continued for 6 – 8 weeks (n-10).	Primary study outcomes were naming and verbal communication. The primary outcome was assessed using the Boston Naming Test (BNT), using 60 pictures. The Amsterdam Nijmegen Everyday Language Test, scale-A (ANELT-A) was also administered to assess verbal communication. **Timing of Assessment**: Baseline and at the end of therapy.	Mean improvement on the Boston Naming Test (BNT) and the Amsterdam-Nijmegan Everyday Language Test (ANELT-A) did not differ between groups. However, within groups analysis demonstrated that individuals who received treatment with the Multicue program improved their scores on the BNT significantly (t=3.0, p=0.02), whereas scores on the BNT did not improve significantly for participants allocated to the control condition (t=0.31m p=0.76). Improvement on the BNT did not generalise to improvement in everyday verbal communication as assessed by the ANELT-A. Individuals assigned to the Multicue condition did not experience significant improvement in ANELT-A scores over time (t=0.27, p=0.80).

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			Duration of Intervention: Approximately 2 months.		
Cherney (2010) **USA** **RCT**	CA:☒ Blinding: Patient ☒ Therapist ☒ Assessor ☒ ITT:☑	25 individuals with chronic, non-fluent aphasia following a single left-hemisphere stroke. WAB-AQ scores ranged from 9.7 – 81.5 at baseline. Time since stroke ranged from 12.2-253.2 months. There were no significant between group differences noted in terms of age, time since stroke or severity of aphasia (defined as WAB-AQ) at study entry.	Participants were randomized to receive Oral Reading for Language in Aphasia (ORLA) therapy delivered either computer (n=11), or by a speech language pathologist (SLP) (n=13). A delayed treatment designed was employed meaning that all participants received their assigned treatment following a no-treatment period of 7-12 weeks. Each participant received 24, one hour sessions of ORLA at a rate of 2-3 times per week. No other language treatments were provided during this time.	Participants were assessed using the Western Aphasia Battery (WAB) and measures of discourse measures based on descriptions of 2 composite pictures and 2 narratives. Samples of discourse were analyzed to determine speech rate (words per min) and correct information content units (CIU/min). **Timing of Assessment**: Baseline, following the no-treatment period, and at the end of the intervention.	24 sessions of therapy were delivered to all 25 participants enrolled in the study over an average of 12.62 weeks. Computer delivered ORLA therapy resulted in improvements on the WAB-AQ from pre- to post treatment (mean change in test score = 3.29. SD=6.16). Over the no-treatment phase from baseline to pre-treatment, there almost no change in WAB-AQ scores (-0.4, SD=3.44). The author calculated effect sizes in order to compare change in test scores during the initial no-treatment phase with change in test scores during the computer-provided ORLA treatment phase. In terms of the WAB-AQ, a Cohen's d of 0.74 is reported (95%CI -0.15, 1.57). Effect sizes for discourse measures were reported to be 0.81 (words/min) and 0.47 (CIUs/minute). As the reported effect sizes are both positive, the author instructs the reader to interpret this as evidence that change was larger in the treatment than in the no-treatment phase of the study. Between group comparisons examining the change in language outcomes in the computer delivered ORLA condition vs. the SLP-delivered ORLA group revealed no significant differences for any of the outcomes assessed.
Palmer et al. (2012) **United Kingdom** **RCT** ***(pilot study)***	CA: ☑ Blinding: Patient ☒ Therapist ☒ Assessor ☑ ITT:☒	34 participants with aphasia (with word-finding difficulties) post stroke and no longer engaged in active SLT. Individuals assigned to the control group had a mean age of 66.2 (±12.3) years while those assigned to the control condition were slightly (though not significantly)	Participants were randomized to receive either a computer-based therapy (20 minutes, 3x per week) (n=17) or usual care (n=17) over a 5 month intervention period. The intervention consisted of speech and language therapy delivered through independent use of a	Primary outcomes were associated with the feasibility of the study design and intervention, as this was a pilot study. However, clinical effectiveness was evaluated using the words selected from the Object and Action Naming Battery in order to evaluate word retrieval ability.	10 of the 15 participants (66.7%) randomized to the computer therapy arm were able to complete the therapy with the recommended frequency. The change in naming ability between groups from baseline to 5 month follow up was 19.8% (95% CI, 4.4 - 35.2; P=0.014), with the treatment group demonstrating a greater improvement in naming ability over the course of the intervention. The mean difference in change in naming ability was no longer significantly greater among individuals who had participated in the intervention vs. the control condition at 8 months (p=0.08). When the authors

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		older (mean = 69.5 years, ±12.2). Time post onset of aphasia ranged from 1.8 to 29 years.	computer therapy program (Step-by-Step) configured by an SLP and supported by a volunteer. Volunteers were provided with 3 hours of training on the use of the computer program and their role in supporting the use of the program through assistance with hardware and software, encouragement to practice and activities to facilitate the use of new words. During treatment, participants in the intervention practiced 48 words from the Object and Action Naming Battery in addition to 48 words that were the individual participant considered relevant. **Duration of Intervention**: 5 months.	**Timing of Assessment**: Clinical effectiveness was evaluated at 5 months and 8 months after study entry.	excluded individuals who were able to name <10% of words correctly at study entry from the analysis, they reported that participation in the intervention was associated with a 23.1% improvement in the percentage of words named correctly at the 5-month assessment. Over 75% of participants were offered the therapy using a trained volunteer as a support; however, volunteer support was unavailable for the remaining treatment group participants. Of those who received volunteer support, 66.7% completed the study intervention with the recommended frequency, while 25% of individuals with no volunteer support were able to do so. A mean of 75% of computer therapy time completed was reported to be independent practice.

Constraint-Induced Language Therapy

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Brady et al. (2012) **United Kingdom** **Systematic**	N/A	Included 39 RCTs evaluating the effectiveness of speech and language therapy (SLT). Two trials evaluating CILT are	RCTs examining the effectiveness of speech and language therapy in the treatment of aphasia following stroke were identified (using	Primary outcome measures chosen reflected "functional communication", although the authors acknowledged that this is difficult to define. Formal examples of assessments	Only one of the two identified trials are included in the analysis. This RCT (and its result) is described in the table below (Meinzer et al. 2007). Note: Overall, the authors conclude that there is

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Review and Meta-Analysis (Cochrane Review)		identified; however only one is included in an analysis comparing CILT with conventional SLT.	electronic and hand-searching techniques (as per Cochrane method). Quasi-randomised trials were not included. Identified trials were rated for quality in order to assess risk of bias. Pooled analyses were conducted where possible using RevMan 5.1 software. Heterogeneity was assessed using the I^2 statistic. Where important heterogeneity was observed, random effects models were employed, otherwise, analyses used fixed effects models. Pooled effects are reported as ORs or SMDs as appropriate.	identified as functional communication measures included the CADL (Communicative Abilities of Daily Living) and the CETI (Communicative Effectiveness Index). Other outcomes included formal measures of receptive and expressive language or overall level of severity of aphasia (e.g. Western Aphasia Battery or the Porch Index of Communicative Ability).	not enough evidence to recommend one type of therapy over another.
Balardin and Miotto (2009) **Brazil** **Systematic Review**	N/A	The authors searched the MEDLINE database for all studies up to the year 2001 examining the adaptation of constraint-induced therapy for the treatment of aphasia. 16 studies were identified initially – 5 primary studies were included in the review.	Studies were evaluated for level of evidence – Studies are assigned a level from I – IV where Class I studies represent well-designed, RCTs. Studies described as Class IV are uncontrolled, case series or reports or represent expert opinion. Following classification of levels of evidence, the authors assigned recommendations for practice based on the levels of evidence.	Recommendations classified as practice standards, guidelines or options based on the levels of evidence available.	5 primary studies were identified. Two of these were classified as Level 1a evidence, 2 were Level II (prospective non-randomized cohort or case-controlled studies) and 1 was a level IV study (a case series report). All studies took place during the chronic phase post stroke (6-12 months post onset). Overall, participants in both treatment and control conditions tended to improve over time. One study did demonstrate significant improvements in both language tests and in daily communication when compared to a control condition. Based on the available evidence, the authors did not make any specific recommendations with regard to practice. Although there have been some promising results, they suggest that

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
					more research needs to be done and the "active ingredients" of the therapeutic interventions better defined before such recommendations are made.
Meinzer et al. 2007 **Germany** **RCT**	CA: ☒ Blinding: Patient ☒ Therapist ☒ Assessor ☑ ITT:☑	20 individuals with chronic aphasia (mean age = 56.1 years, 4 women 16 men) following single left hemisphere stroke where chronic is defined as symptom duration of at least 6 months. Patients with different syndromes were included – sample included individuals with Broca's, Wernicke's, global, amnestic and unclassified aphasias of a range of severity. **Duration of aphasia**: 6 – 79 months.	Participants were placed in groups according to severity of aphasia (mild, moderate or severe). Groups also included relatives of individuals who agreed to participate in the study. Groups (2-3 patients + 2-3 relatives) were then randomly assigned to receive either constraint-induced aphasia therapy (CIAT) delivered by a psychologist or by a trained volunteer (the participating family member). Relatives (lay person trainers) received 2-hour introductory sessions that included materials, procedures, approaches and information regarding adjustment of task difficulty. Additional training sessions for the layperson volunteers at the end of each CIAT session. Note: In this constraint-induced intervention, gesture was not prevented; however, verbal communication was "enforced". Gestures were allowed if they were not the primary mode of communication	Language functions were assessed using the Aachen Aphasia Test (AAT), which includes 5 subtests (token test, repetition, written language, naming and comprehension). **Timing of Assessment**: 1 day in advance of and 1 day following the end of the intervention.	Participants assigned to volunteer-facilitated CIAT were significantly older than those who were assigned to treatment by a psychologist ($p<0.012$); however, since age had not been associated with treatment in a previous study, the authors did not include in as a covariate in the current analysis. No other significant between group differences were noted. All patients were able to complete the intervention and all received the same number of CIAT sessions. Both groups demonstrated a significant improvement over the 2-week training period based on the AAT profile score obtained before and after completion of the intervention ($F=7.05$, $p<0.0001$ and $F=5.65$, $p<0.002$ for group A and B, respectively]. There was no significant group x time interaction for either the total profile score or any of the individual subtest scores of the AAT. The authors note that gains over time were, therefore, similar for participants in each group.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			and they facilitated verbal exchanges. **Duration/Intensity of Intervention**: All groups received CIAT sessions (facilitated by lay persons or a trained psychologist) for 3 hours per day for 10 consecutive working days.		
Pulvermuller et al. (2001) **United Kingdom** **RCT**	CA: ☒ Blinding: Patient ☒ Therapist ☒ Assessor ☑ ITT:☒	17 individuals with language impairment due to a single stroke affecting the left middle cerebral artery with no severe perceptual or cognitive deficits were recruited. Age ranged from 42-62 years in the control condition and from 39-72 in the treatment condition. Time from onset of aphasia ranged from 2 to 233 months.	Participants were randomized to either constraint-induced language therapy (CILT) treatment (n=10) or control groups (n=7). Patients in the treatment group received CI therapy for 3 hours/day for two weeks. The control group received conventional therapy for 3 hours/day for 4 weeks. Treatment was provided as massed-practice exercise. CILT was based on the use of therapeutic language games in which game materials, rules (verbal instruction and shaping techniques) and reinforcement contingencies were used to introduce and manipulate constraints.	Language functions were assessed using 4 subtests of the Aachen Aphasia Test (token test, comprehension test, repetition test and naming test). A communication activity log (CAL) was also used to record use of verbal communication/language in daily life. **Timing of Assessment**: Language function was assessed one day before commencement of therapy and again, 1 day following completion of therapy.	On the overall score from the AAT, there was a significant group x time interaction reported such that the group assigned to receive CILT demonstrated significantly greater improvement over the course of the intervention than participants in the control condition ($f[1,15]=17.3$, $p<0.0008$). Patients in the CILT group demonstrated significant improvement on 3 of the 4 components of Aachen Aphasia Test scores (Token Test $p<0.04$, naming $p<0.02$ and language comprehension $p<0.02$). Improvements on individual subtests were significant for only one test (naming) for participants assigned to receive conventional therapy. Patients in the CI group had significantly higher Communicative Activity Log scores of communication of everyday life compared to patients in the control group ($F[1,7]=25.0$, $p<0.001$) on group X time analysis. Participants in the CILT group reported a 30% increase in the amount of communication in their daily lives.

Cognitive-Linguistic and Communicative Treatments

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Brady et al. (2012) **United Kingdom** **Systematic Review and Meta-Analysis (Cochrane Review)**	N/A	Included 39 RCTs evaluating the effectiveness of speech and language therapy (SLT). A single RCT was identified as evaluating cognitive linguistic and communicative treatments.	RCTs examining the effectiveness of speech and language therapy in the treatment of aphasia following stroke were identified (using electronic and hand-searching techniques (as per Cochrane method). Quasi-randomised trials were not included. Identified trials were rated for quality in order to assess risk of bias. Pooled analyses were conducted where possible using RevMan 5.1 software. Heterogeneity was assessed using the I^2 statistic. Where important heterogeneity was observed, random effects models were employed, otherwise, analyses used fixed effects models. Pooled effects are reported as ORs or SMDs as appropriate.	Primary outcome measures chosen reflected "functional communication", although the authors acknowledged that this is difficult to define. Formal examples of assessments identified as functional communication measures included the CADL (Communicative Abilities of Daily Living) and the CETI (Communicative Effectiveness Index). Other outcomes included formal measures of receptive and expressive language or overall level of severity of aphasia (e.g. Western Aphasia Battery or the Porch Index of Communicative Ability).	The RCT included in the Cochrane review is described in the table below (de-Jong-Hagelstein et al. 2011). Note: Overall, the authors conclude that there is not enough evidence to recommend one type of therapy over another.
van der Meulen et al. 2014 **Netherlands** **RCT**	CA: ☑ Blinding: Patient ☒ Therapist ☒ Assessor ☒ ITT: ☑	27 stroke patients with aphasia. <u>Inclusion criteria:</u> aphasic after left hemisphere stroke, time post-stroke 2 to 3 months, premorbidly right-handed, age 18 to 80 years, native language Dutch and	Study participants randomly assigned to experimental group (MIT) or control group. MIT is a language production treatment for severe non-fluent aphasia that involves repetitive singing of short sentences, while hand tapping the rhythm.	<u>Primary Outcomes:</u> Sabadel: story retelling task measuring information content in connected speech ANELT: Amsterdam Nijmegen Everyday Language Test AAT: Aachen Aphasia Test	<u>Efficacy of MIT</u> There was no significant difference in treatment intensity between the 2 groups (MIT: mean = 6.52 h/wk [SD = 3.55]; control: mean 5.67 h/wk [SD = 1.41]; $t = -.71$, $p = .49$). <u>Linear Regression Analysis</u> Significant difference in improvement at T2 between the 2 groups for the MIT repetition test (trained items) and on the AAT subtest repetition. Trend was

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		Melodic Intonation Therapy (MIT) candidate Experimental group (MIT) n=16: Mean age: 53.1 ± 12, 25% male Control group n=11: Mean age: 52 ± 6.6, 63.6% male	In both groups, therapy started at 2 to 3 months post-stroke and was given intensively (5 h/wk) during 6 weeks. In a second therapy period, the control group received 6 weeks of intensive MIT. The experimental group resumed their regular treatment. Assessment was done at baseline (T1), after the first intervention period (T2), and after the second intervention period (T3). Efficacy was evaluated at T2. The impact of delaying MIT on therapy outcome was also examined	subtests of repetition and naming, MIT repetition task Timing of Assessment: Baseline (T1: 2-3 months post-stroke) Time point 2 (T2: 6 weeks after T1) Time point 3 (T3: 6 weeks after T2)	observed for one functional task: the ANELT. Difference over time Effect of time on all outcome measures: Sabadel: $F = 5.49$, $p = .011$; ANELT: $F = 7.82$, $p = .003$; AAT naming: $F = 11.37$, $p = .001$; AAT repetition: $F = 16.33$, $p < .001$; MIT repetition trained items: $F = 26.62$, $p < .001$; MIT repetition untrained items: $F = 17.19$, $p < .001$. Determinants for therapy outcomes Treatment intensity and time post onset had an impact on one or more outcome variables. Treatment intensity predicted outcome on the repetition of trained items, MIT task ($\beta = .04$, $p = .02$). Time post-stroke at the start of MIT predicted outcome on untrained items, MIT task ($\beta = -.68$, $p = .01$), on AAT repetition ($\beta = -1.54$, $p = .02$), and on the ANELT ($\beta = -.46$, $p = .04$) Key Points Significant effect in favor of MIT on language repetition was observed for trained items, after MIT there was a significant improvement in verbal communication but not after the control intervention. Delaying MIT was related to less improvement in the repetition of trained material
Blake et al. (2013) **USA** **Review**	N/A	5 studies of stroke patients with right hemisphere communication disorders. Inclusion criteria: Right hemisphere communication disorder (RHBD) due to acquired brain injury (CVA, AVM, TBI), 18 years of age or older. Patients: n=25, age range 25-81,	Data collection and analysis procedures were completed by two independent reviewers. Both reviewers separately screened the full text of studies for further evaluation.	Primary Outcomes: Four clinical questions about the effect of sentence- or discourse-level communication on: 1) prosodic outcomes 2) receptive language outcomes 3) expressive language outcomes 4) pragmatic language outcomes	Prosody: The two treatments (motoric–imitative and cognitive–affective) have both been shown to be effective in creating immediate changes in prosody and maintenance of those gains. Receptive/Expressive/Pragmatic: The majority of reported and recommended treatments for communication deficits associated with RHBD and TBI rely on metalinguistic judgments and understanding decontextualized phrases, such as matching phrases to pictures or defining idioms and metaphors. Key Points.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		72% of patients exhibited right hemisphere communication disorders as a result of a CVA.		for patients with right hemisphere communication deficits	Emphasis on contextual cues to (a) determine appropriate meanings of ambiguous words and sentences; (b) activate and access distant meanings or features of words that are contextually important; (c) determine meanings of nonliteral language such as idioms and metaphors; and (d) determine speakers, intents, such as interpreting sarcasm, white lies, and meanings.
Nykanen et al. (2013) **Finland** **Observational**	N/A	34 stroke patients with aphasia and their significant others Exclusion criteria: Patient could name more than five objects of the WAB subtest Object naming, did not attempt to communicate independently after the guidance of the speech therapist, and/or if the partner was unwilling to use communication methods other than speech Mean aphasia age: 63.3 ± 8.2, 88% male Mean partner age: 61.2 ± 7.5, 12% male	Severe aphasia patients, with no speech or insufficient speech to maintain communication, and their significant others, were recruited. The APPUTE model consists of three different types of communication tasks arranged according to the level of difficulty. The evaluation period and the rehabilitation periods took place at the rehab center the follow-up took place at the couples' homes. During the two rehabilitation periods, 1 hour long APPUTE session took place every working day, 20 times in all.	Primary Outcome: To describe a new intervention (Communication Therapy for People with Aphasia and their Partners: APPUTE Method) where both the aphasia patient and the partner receive therapy equally and practice finding functional communication strategies to convey everyday messages or more complicated ones Timing of Assessment: Baseline, 2 rehabilitation periods (6 & 12 months, respectively), follow-up (18 months)	Changes in communication skills of aphasia patients: Statistical improvement in the Western Aphasia-Battery Aphasia Quotient between the evaluation period and end of the second rehabilitation period (MD = –3.471, SE = .708, p<.001, 95% CI [–4.911, –2.030]). Communication efficiency improved significantly between the evaluation period and the end of the second rehabilitation period (MD = –1.053, SE = .352, p = .016, 95% CI [–1.940, –.167]) Changes in communication skills of partners: Partners communication skills improved significantly between the evaluation period and the end of the first rehabilitation period (MD = –1.667, SE = .165, p < .001, 95% CI [–2.128, –1.206]),and between the end of the first and second rehabilitation periods (MD = –3.951, SE = .245, p < .001, 95% CI [–4.635, –3.266]). Key Points: Communication skills of people with severe non-fluent aphasia and their partners improve during the APPUTE intervention
Rose et al. 2013 **Australia** **Review**	N/A	23 studies of stroke patients with aphasia Inclusion criteria: Post-stroke aphasia in adults; used gesture-based methods, including symbolic gestures and/or	Data collection and analysis procedures were completed by two independent reviewers. Both reviewers separately screened the full text of studies for further evaluation	Primary Outcome: To evaluate the effects of gesture treatment for measures of verbal (e.g., auditory comprehension, word retrieval, repetition and connected speech outcomes) and nonverbal	Combined symbolic gesture + verbal training has a positive impact on trained items for spoken language measures (picture naming for nouns/verbs) Generalized language improvements on standardized tests such as the BNT (9/30 individuals) and WAB (18/35 individuals for the AQ)

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		non-symbolic intentional gesture movements; and group and single-case experimental designs		communication (e.g., gesture use for pictures or conversational interactions)	Positive changes in verb (7/10 individuals) and noun production (4/8 individuals) Gesture training is effective for improving gesture production for trained pictures (24/31 individuals) with some success for untrained pictures as well (10/31 individuals) <u>Key Points</u> Combined gesture + verbal training showed positive effects for verbal production of nouns and verbs for over 50% of participants, with a mixed pattern of generalization to untrained words and contexts. Gesture + verbal training paradigms had limited advantage over those with verbal training alone. Significant gains in gesture production were reported for trained gestures only following gesture training protocols.
De Jong-Hagelstein et al. (2011) **The Netherlands** **RCT**	CA: ☒ Blinding: Patient ☒ Therapist ☒ Assessor ☑ ITT:☒	75 stroke patients with aphasia. Participants had to be experiencing a semantic and/or phonological disorder to be included. Participants assigned to the CLT condition had a mean age of 68 years ± 13 years and were a mean of 22 days post stroke onset at the time of study entry. Individuals assigned to the control condition had a mean age of 67 ±15 years and were a mean of 23 days post stroke. More than 80% of participants in both conditions were experiencing both semantic and phonological disorders at	Study participants were randomly assigned to receive either cognitive-linguistic treatment (CLT), consisting of a semantic treatment program (BOX) and a phonological treatment program (FIKS), or the control treatment (a communicative treatment using verbal and non-verbal strategies such as PACE, role playing and conversational coaching). Participants were assessed as soon as possible following stroke and treatment started approximately 3 weeks post stroke onset. Therapy was provided for	The primary study outcome was the score on ANELT scale A at 6 months. Assessments included the Semantic Association Test (SAT), Semantic Association with low image-ability words (PALPA), Semantic Word Fluency, Nonword repetition Task (PALPA), Auditory Lexical Decision (PALPA), Letter Fluency, Amsterdam-Nijmegen Everyday Language Test (ANELT), the Aachen Aphasia Test (AAT) , and the Modified Rankin Scale. **<u>Timing of Assessment</u>**: Baseline, 3 months, and 6 months post stroke.	There was no significant difference in mean ANELT-A scores between groups at either the 3 month or 6 month assessment points (p=0.48, p=0.42, respectively). Participants assigned to both groups experienced improvement over time on all of the secondary tasks assessed. However, there were significant between group differences in favour of the CILT at 3 months in terms of Semantic Word Fluency and at 6 months in Letter Fluency ($p<0.05$). There were no other significant difference between groups on any other measures at 3 or 6 months post stroke. There were no significant between group differences in terms of intensity of therapy delivery. Mean number of therapy hours provided per week were 2.1. Over the course of the intervention, the mean number of therapy hours provided per person was 45.4, 33.8 of which were spent in face-to-face therapy time with an SLT.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		baseline.	a minimum of 2 and a maximum of 5 hours per week. Therapy was provided partly in individual sessions and partly provided in homework to be completed. Treatment was provided in formal treatment settings and in the participant's home. **Duration of Intervention**: Therapy was provided for a total of 6 months. This time could be shorter if the participant demonstrated full recovery.		

Glossary
RCT= Randomized Controlled Trial
N/A = Not Applicable
CA = Concealed Allocation
ITT = Intention to treat
SLT = Speech Language Therapy
OR = Odds Ratio
IQR = Interquartile Range
SMD = Standardized Mean Difference
CI = Confidence Interval

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