Supplementary Table S1. Summary of interventions

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Author | Design | Intervention | Timing of intervention | Duration and Frequency of intervention | Home practice | Person delivering intervention | Results |
| Wenke et al. (22) | A-B-A-A | Group 1: LSVT LOUD; Group 2: TRAD\* (control) – individualized behavioural intervention targeting breakdown in the areas of respiration, phonation, articulation, resonance, prosody and everyday communication. | M = 3.4 years post onset (range = 0.5-21 years) | 4x 1 hour sessions/week for 4 weeks (total time: 16 hours) | Yes | SLP | Short and long term significant increases in vowel space area after LSVT. Significant increase in intelligibility at FU after LSVT. No significant differences between the groups on any additional variables. |
| Wenke et al. (23) | A-B-A-A | Group 1: LSVT LOUD; Group 2: TRAD\* (control) - individualized behavioural intervention targeting breakdown in the areas of respiration, phonation, articulation, resonance, prosody and everyday communication.  | M = 5.9 years post onset(range = 9-252 months)  | 4x 1 hour sessions/week for 4 weeks (total time: 16 hours) | Yes | SLP | Three participants demonstrated reductions in perceived hypernasality immediately following LSVT. Maintained at FU for 1 participant. 2 participants had a corresponding reduction in mean nasalance. Limited changes in mean nasalance scores and perceived hypernasality following traditional therapy, with only one participant exhibiting reduced nasalance at FU.  |
| Wenke et al. (24) | A-B-A-A | Group 1: LSVT LOUD; Group 2: TRAD\* (control) – individualized behavioural intervention targeting breakdown in the areas of respiration, phonation, articulation, resonance, prosody and everyday communication. | M = 3.4 years post onset (range = 0.5-21 years) | 4x 1 hour sessions/week for 4 weeks (total time: 16 hours) | Yes | SLP | Slower words per minute and increased conversation initiation at FU after LSVT compared to traditional therapy. Reduced slurring of speech at FU by traditional group. Pattern of long-term improvements in ratings of participation and well-being were comparable between groups. |
| Mackenzie et al. (21) | A-A-B-A-A | Group 1: Speech practice (words and sentences) + conversation practice; Group 2: Speech practice (words and sentences) + conversation practice + non-speech oral motor exercises (tongue and lip movements) | M = 10.05 months post onset (range = 3 – 32 months) | 1x 40 minute session/week for 8 weeks (total time: 5.33 hours) | Yes | SLP | Both groups displayed improvements in communication effectiveness. Nil improvements in intelligibility or ratings of lip or tongue function across both groups. No differences between the two treatment groups at any of the assessment points, therefore no added benefit of including NSOMEs. |
| Kwon et al. (20) | A-B-A | rTMS group: received low frequency (1Hz) 1,500 stimulations/day plus speech therapy. The exact nature of the therapy was not specified.Sham group: angle of the rTMS coil was perpendicular to the participant’s skull so that magnetic field could not penetrate the skull, plus dysarthria therapy. | rTMS group M = 26.4+15.0 days; Sham group M = 26.5+9.8 days | 30 mins, 5 days per week for 2 weeks (total time: 5 hours) | No | rTMS – physiatrist;Speech therapy - SLP | Significant improvements across all outcome measures after rTMS and conventional speech therapy. Sham stimulation group showed statistically significant improvements across AMR and MPT scores. rTMS group had significantly greater improvement in SMR than sham group. |
| Mackenzie et al. (27) | A-B-A | Living with Dysarthria Program: Education with specific emphasis on speech, dysarthria and methods of maximizing communication; peer and professional support specifically relating to the impact and negative consequences of chronic dysarthria; communication practice targeting speech comprehensibility and confidence in communication. | M = 34.4. months post onset ( range = 3-72 months) | 1x 2 hour session/week for 8 weeks (total time: 16 hours) | Yes | SLP | Significant improvements post-program in intelligibility and knowledge of stroke and dysarthria. Participants’ self-ratings of goal achievement post-program ranged from some change to a lot of change |
| Wenke et al. (36) | A-B-A-A | LSVT LOUD | M = 28 months post onset (range = 6-144 months) | 4x 1 hour sessions/week for 4 weeks (total time: 16 hours) | Yes | SLP | Clinically and statistically significant increase in vocal loudness (acoustic and perceptual) in sustained phonation, conversation, and reading. Significant improvements in perceptual articulatory precision immediately post with improvements in articulation maintained at FU. Significant improvement in speech intelligibility at FU. Clinically significant change in vocal frequency range and improved word and sentence intelligibility. Improved initiation of communication, participation and well-being, with communication partners reporting rating overall communication as improved post LSVT. |
| Lee & McCann (39) | A-A-B-A-A | Therapy used non-words. Diaphragmatic breathing, diaphragmatic breathing + phonation (VL phoneme to CV combinations), extension of pitch range by facilitated movement from one pitch level to another. | 3 and 12 months post onset | 9x 1 hour sessions over 3 weeks (total time: 9 hours) | No | SLP | Mandarin intelligibility improved significantly at both single word and sentence level, compared with smaller increases in English intelligibility. Phonation therapy was more effective for Mandarin-English bilinguals when speaking Mandarin than English. Phonation therapy was effective in enhancing accurate tone production for all four tones of Mandarin. |
| Mahler & Jones (28) | A-B-A | LSVT LOUD | Condition present at birth | 4x 1 hour sessions/week for 4 weeks (total time: 16 hours) | Yes | SLP | Statistically significant improvement in vocal dB SPL and phonatory stability post-intervention. Improved speech intelligibility scores in 1 patient. |
| Mahler & Ramig (40) | A-B-A | LSVT LOUD | M= 1.7 years post onset(range = 0.75 to 2 years) | 4x 1 hour sessions/week for 4 weeks (total time: 16 hours) | Yes | SLP | Statistically significant improvements in vocal dB SPL and phonatory stability as well as larger vowel space area for all participants. Listener ratings suggested improved voice quality and more natural speech post LSVT. Speech intelligibility scores improved for 1 participant. |
| Palmer et al. (29) | A-B-A-C or A-C-A-B | Traditional treatment versus computer treatment (Ortho-Logo-Paedia [OLP] computer program) – During both treatment types the therapy objectives remained the same. Participants completed individualized intervention targeting 2-5 areas of breakdown identified during assessment. Treatment objectives included respiration, larynx, palate, tongue and intelligibility. No specific information regarding techniques was provided. | M = 30.4 years(range = 2-50 years post onset) | 2 treatment blocks, with each block consisting of 1x 40-60 minute session/week for 6 weeks | Yes | SLP | Computerized therapy was as effective as traditional therapy. Participants’ total practice time was 37% higher in the OLP group when compared to traditional practice. |
| Tamplin (32) | A-B-A-B-A | Music therapy sessions: Vocal exercises (including physical preparation, oral motor respiratory exercises, rhythmic and melodic articulation exercises, rhythmic speech curing and vocal intonation therapy) + therapeutic singing of 3 familiar songs. | M = 6.5 months(range = 2.5-9.5 months) | 3x 30 minute sessions/week for 8 weeks (total time: 12 hours) | No | Music therapist | Statistically significant improvements in functional speech intelligibility post, but not in speech rate. Improved speech naturalness and decreased number and length of pauses post-intervention. |
| Stocks et al. (34) | A-B-C-A | La Trobe University Smooth Speech Programme = 5-day intensive: monologue reading and conversational activities using smooth speech at progressively increasing speech rates + beyond-clinic speaking situations; Follow-up: review of Smooth Speech technique, review of home practice, discussion of transfer strategies. | 24 years post onset | 9 hours/day for 5 days + follow-up therapy of 1x 2 hour session/week for 7 weeks (total time: 59 hours) | Yes | SLP | No significant change in speech intelligibility following intervention. Clinically significant improvements in speech naturalness and overall communicative competence. Reduced activity limitation and participation restriction which was maintained at 4-weeks post FU. |
| McGhee et al. (31) | A-B-A | Individualized modified behavioural intervention aimed at improving intelligibility, efficiency and naturalness of speech focusing on basic motor skills required for respiration, phonation, and lip and tongue movements. | 54 and 95 days post onset | 2x 15 minute sessions daily (Patient 1 total time: 2.25 hours; Patient 2 total time: 11.15 hours) | No | SLP | Physiological improvements in respiratory, laryngeal and articulation function. Variable functional speech outcomes.  |
| Mahler et al. (37) | A-B-A-A | LSVT LOUD | 3 and 4.5 years post onset | 4x 1 hour sessions/week for 4 weeks (total time: 16 hours) | Yes | SLP | Listeners preferred post speech sample for P1 but not P2 which was rated as similar or worse post-treatment. Participants and family members reported positive outcomes of treatment on functional communication scales and in post treatment interviews.  |
| Kumar et al. (30) | A-B-A | Individualized therapy: Visual biofeedback to develop maintenance of jaw elevation and pitch and loudness; Traditional methods of articulation therapy encompassing integral stimulation, phonetic placement, phonetic derivation, prosody and naturalness [contrastive stress drills], rate modification [tapping]; Non-speech oral motor exercises; Voice therapy including circumlaryngeal massage, humming and chewing. | Not specified | 5x 45 minute sessions/week for 4 weeks (total time: 15 hours) | No | SLP | Nil statistically significant outcomes for verbal communication reported. |
| Mackenzie & Lowit (33) | A-A-B-A-A | Individualized behavioral intervention\*. Treatment strategies included rate reduction [finger tapping, self-monitoring], exaggerated articulation, decreased phrase length, optimal breath groups, contrastive stress drills, and articulation drills. Goal was to maximize comprehensibility and effectiveness in conversational speech.  | M= 19.7 months(range = 3-80 months) | 16x 45 minute sessions over 8 weeks (total time: 12 hours) | Yes | SLP | No evidence of group change between assessment points for word intelligibility, reading intelligibility or communication effectiveness. Significant group change on one section of the DIP (Accepting my dysarthria) post. One patient had improved word intelligibility, four patients had improved reading intelligibility, and four patients had improved conversation effectiveness immediately post.  |
| Mackenzie & Lowit (38) | A-A-B-A-A | Individualized behavioural intervention\*. Treatment strategies included rate reduction [finger tapping], exaggerated articulation, decreased phrase length and articulation drills.  | 5 months post onset | 16x 45 minute sessions over 8 weeks (total time: 12 hours) | Yes | SLP | Statistically significant improvements in reading intelligibility and conversation effectiveness post and at FU. Marginal increase in % phonemes misarticulated post. Reduced articulation rate in conversation found post, but this was not maintained at FU. There was little change in acoustic phonetic and phonological data except for an increase in MLU and F0 excursion. |
| Kim & Jo (26) | A-B-A | Accent-based music speech protocol: (1) Introduction – upper body stretching with music; (2) Breathing exercise with a hand drum; (3) Phonatory exercise – MDSP on /f/, /a/ with descending glissando, /a/e/i/o/u/ with singing, /a ‘a:/ /I ‘i:/ /u ‘u:/ vocalization, /a ‘a’a’a:/ /I ‘I’I’I:/ /u ‘u’u’u:/ vocalization, /a ‘a’a’a’a’a:/ /I ‘I’I’I’I’I:/ /u ‘u’u’u’u’u:/ vocalization; (4) Transfer – melodic chanting with accents  | <1 year post onset. Date of stroke onset provided but not date of study participation | 5x 30 minute sessions/week for 2 weeks (total time: 5 hours) | No | SLP | Statistically significant increases in maximum phonation time, fundamental frequency, intensity, & SMR. Statistically significant decrease pre-post test in shimmer and AMR(Kə). |
| Park et al. (35) | A-B-A-A | Be Clear Program: Structured speech drills (functional phrases and service requests) + Functional speech tasks (reading, picture description, and conversation) | M = 26 months(range = 10-78 months) | 1 hour pre-practice session + 4x 1 hour sessions/week for 4 weeks (total time: 17 hours) | Yes | SLP | Speech intelligibility as perceived by naïve listeners improved substantially. Improvements in word intelligibility on the ASSIDS were clinically significant and sentence intelligibility were statistically significant post-treatment. Statistically significant improvements in communication partner ratings of speech intelligibility and overall communicative function post-treatment. |
| Jones et al. (25) | A-B-A-A | Expiratory muscle strength training using an expiratory pressure threshold device | 4 years post onset | 1x 30-60 minute session/week + 25x EMST trials/day at home 5 days a weeks over 6 months | Yes | SLP | Increased maximum phonation time at post and 3 month FU. Improved sentence intelligibility post but not maintained at FU. Improved Communicative Effectiveness Survey scores post and at 3 month FU. |

Note: A = assessment phase, B = treatment phase 1, C = treatment phase 2, \*more information regarding specific tasks is reported in the original article; rTMS = Repetitive Transcranial Magnetic Stimulation; SMR = Sequential Motion Rate; FU = Follow-up; NSOMEs = Non=Speech Oromotor Exercises; ASSIDS = Assessment of Intelligibility in Dysarthric Speech