Investigating the role of intensity in a comprehensive, aphasia therapy program: A non-intensive trial of Aphasia LIFT.

BACKGROUND

Intensive, comprehensive aphasia programs (ICAPs) are an emerging service delivery in aphasia rehabilitation (Rose, Cherney, & Worrall, 2013). Positive therapeutic outcomes for the ICAP *Aphasia LIFT (Language Impairment and Functioning Therapy)* have been demonstrated across World Health Organisation *International Classification of Functioning and Disability (ICF)* domains (Rodriguez et al., 2013). Within aphasia rehabilitation, there is evidence favouring intensive treatment models (Cherney, Patterson, & Raymer, 2011; Robey, 1998); however, the optimal treatment intensity for even one type of aphasia therapy is yet to be established (Cherney, 2012). Evidence from the neurosciences literature, based predominantly on animal studies of stroke rehabilitation, suggests that optimal learning outcomes are achieved when training is provided intensively (i.e., many hours per day) (Kleim & Jones, 2008). In contrast, studies of learning in healthy humans suggest that optimal long-term learning is achieved when training is distributed over time (Cepeda, Pashler, Vul, Wixted, & Rohrer, 2006). This study evaluated the therapeutic effect of non-intensive Aphasia LIFT (NiLIFT) on impairment and functional communication outcomes in adults with chronic aphasia.

METHOD

Study design

A multiple baseline, pre/post-test design was utilised to evaluate the acquisition and maintenance of treatment gains. Three therapy trials were conducted (NiLIFT1, NiLIFT2, NiLIFT3).

Participants

Nine adults (1 F, 8 M) aged 47–76 years (mean = 60 years) with chronic aphasia following a left cerebral stroke were recruited to participate in the study (Table 1). All participants were >4 months post stroke at the commencement of the study (mean TPO = 41.4 months, range 9–225 months) and spoke fluent English prior to their stroke. Individuals with comorbid neurological impairments and/or severe apraxia of speech or dysarthria were not eligible to participate.

Study Procedures

Assessment. A comprehensive cognitive and communication assessment battery was conducted prior to therapy for all participants. Measures of participants' language impairment and functional communication were collected immediately post-treatment and at 4 weeks follow-up.

Goal Setting. A collaborative goal-setting session was conducted prior to commencing therapy in order to identify participants' communication goals. Individual language profiles were used to assist goal setting and to develop individualised treatment plans.

Therapy. Individuals with aphasia and their significant communication partners (when available) participated in an 8 week trial of NiLIFT. A total of 51 hours of treatment was provided, which equated to approximately 7 hours of therapy per week (see Figure 1). Therapy tasks were individually tailored for participants and consisted of a combination of treatment approaches (i.e., impairment-based treatment, functional treatment, computer-based training and group sessions), as per previous Aphasia LIFT trials (Rodriguez et al., 2013).

RESULTS

Individual and group-level analyses were conducted using Wilcoxon signed ranks test. Effect sizes (ES) were calculated to determine the magnitude of treatment effects (See Table 2).

Eight participants completed the NiLIFT therapy trial (6 participants completed 99-100% therapy hours; 2 participants completed 94-96% therapy hours). One participant (N3P3) withdrew from the study in week two due to medical reasons. A second participant (N1P2) was unavailable for follow-up testing.

Language Impairment

Analysis of group data revealed a significant increase in word retrieval for treatment items ($z = 2.52$, $p = .012$, ES = 2.67) and control items ($z = 2.32$, $p = .021$, ES = 1.17), immediately post-treatment (Table 3). These effects were maintained for treatment ($z = 2.37$, $p = .018$, ES = 1.75) and control items ($z = 2.03$, $p = .043$, ES = 0.90) at follow-up. Analysis of individual participant data revealed six participants made significant improvements in word retrieval for treated items immediately post-treatment and this was maintained for four participants at follow-up (Table 4, Figure 2). Two participants made significant improvements in naming accuracy for control items immediately post-treatment and these improvements were maintained at follow-up.

There was no significant increase in confrontation naming as measured by the Boston Naming Test (Kaplan, Goodglass, & Weintraub, 2001) immediately post-treatment, however, a small but significant treatment effect was found at follow-up ($z = 2.207$, $p = .027$, ES = 0.17).

Functional Communication

An increase of 35.4% and 34.8% on the Communication Effectiveness Index (Lomas et al., 1989) indicate that NiLIFT had a positive therapeutic effect on participants' functional

communication immediately post-treatment ($z = 2.21$, $p = .027$, ES = 1.82) and at follow-up ($z = 2.20$, $p = .028$, ES = 1.73), respectively.

An increase of 11.2% immediately post-treatment ($z = 2.1$, $p = .036$, ES = 0.74) and 18.6% at follow-up ($z = 2.20$, $p = .028$, ES = 1.04) on the Communication Confidence Rating Scale for Aphasia (Babbitt & Cherney, 2010) indicate that NiLIFT had a positive therapeutic effect on individuals' confidence participating in daily communication interactions.

CONCLUSIONS

The results of this study provide support for a non-intensive model of Aphasia LIFT. Overall, NiLIFT was found to have a positive effect on participants' language impairment and functional communication. At the individual level, all participants were found to improve on at least one communication measure across ICF domains. Furthermore, for many participants these treatment gains were enduring at follow-up. Further analysis of the data, with consideration of participants' language and cognitive profiles, will contribute to our knowledge of the factors that influence therapy outcomes. Comparisons of this study with the high-intensity Aphasia LIFT study will help to establish our understanding of optimal treatment intensity for aphasia intervention.

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Table 1

Demographic Information

Participant	Gender	Age	MPO	Speech/Language Deficits
N1P1	M	76	13	Severe anomia; severe comprehension deficits
N1P2	M	47	9	Moderate anomia; moderate AOS
N1P3	F	62	38	Severe anomia; severe comprehension deficits
N2P1	M	71	17	Moderate-severe anomia; moderate comprehension deficits
N2P2	M	64	225	Moderate anomia; mild-moderate AOS
N2P3	M	55	23	Moderate anomia
N3P1	M	58	16	Mild receptive deficits; moderate anomia; mild AOS
N3P2	M	53	11	Mild anomia
N3P3	M	54	21	Mild-moderate receptive deficits; mild anomia

N1= NiLIFT 1; N2= NiLIFT 2; N3= NiLIFT 3; MPO = Months post-onset; AOS= apraxia of speech

Table 2

Benchmarks for Effect sizes (ES).

	Individual Data*	Group Data**
Small	4.0	0.2
Medium	7.0	0.5
Large	10.1	0.8

*Busk & Serlin d_1 statistic (Beeson & Robey, 2006); ** Cohen's *d* (Cohen, 1988)

Table 3

Group-level Data

	Baseline	Post-Treatment	Follow-Up
30 Treatment Items			
	n=8	n=8	n=7
Mean (*SD*)	9.0 (3.14)	23.75 (7.15)	20.43 (9.01)
Range	5.0 – 15.0	12.0 – 30.0	7.0 - 29.0
30 Control Items			
	n=8	n=8	n=7
Mean (*SD*)	8.83 (3.27)	16.13 (8.18)	14.43 (8.44)
Range	5.3 – 16	3 – 27	3 - 29
BNT			
	n=8	n=8	n=7
Mean (*SD*)	27.88 (20.20)	30.50 (19.68)	31.43 (21.66)
Range	2.0 – 59.0	2.0 – 58.0	3.0 – 60.0
CETI			
	n=6	n=6	n=6
Mean (*SD*)	55.7 (12.72)	75.43 (8.59)	75.08 (9.44)
Range	40.40- 70.0	65.0- 88.90	2.61- 8.19
CCRSA			
	n=8	n=8	n=7
Mean (*SD*)	68.4 (9.65)	76.0 (10.85)	79.2 (11.26)
Range	51.0 - 79.5	61.0 – 91.5	65.0 - 92.0

BNT= Boston Naming Test; CETI= Communicative Effectiveness Index; CCRSA= Communication Confidence Rating Scale for Aphasia

Table 4

Individual effect sizes for naming accuracy of 30 treatment items and 30 control items.

Participant	Treatment Items		Control Items	
	Post-Treatment	Follow-Up	Post-Treatment	Follow-Up
N1P1	2.24	1.76	1.46	0.66
N1P2	16.74**	na.	4.54	na.
N1P3	5.77*	1.15	-1.75	-1.75
N2P1	14.0**	10.0**	2.89	4.62
N2P2	11.55**	9.81**	6.0	5.0
N2P3	7.18**	6.80**	14.0**	9.0**
N3P1	4.05**	3.66**	4.62**	2.31**
N3P2	1.34	1.20	2.09	2.75

Busk & Serlin d_1 statistic: 4.0 = small, 7.0 = medium, 10.1 = large (Beeson & Robey, 2006); *p < .05; **p < .01; na. = not available

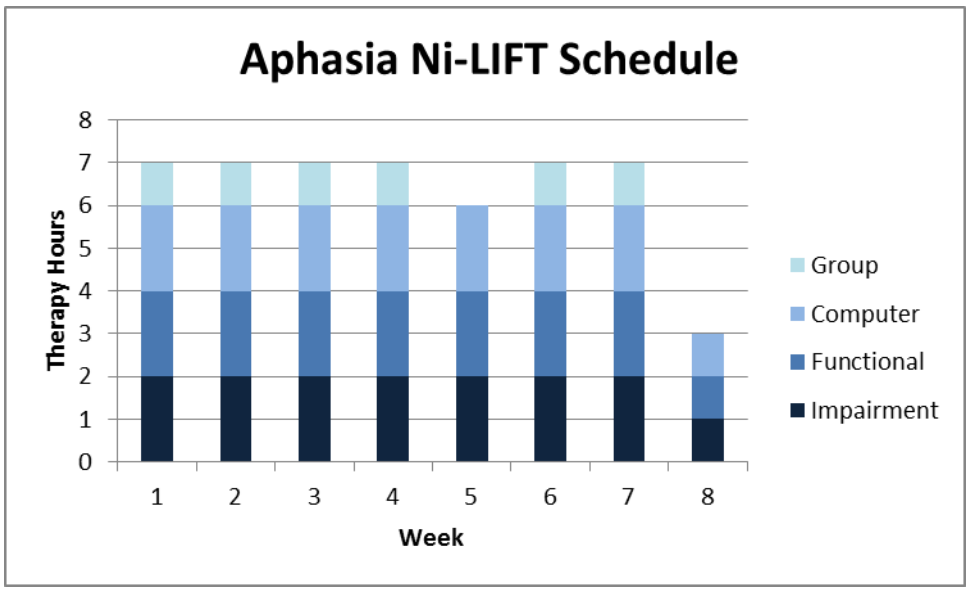

Figure 1. Therapy schedule for an 8 week distributed trial of Aphasia LIFT.

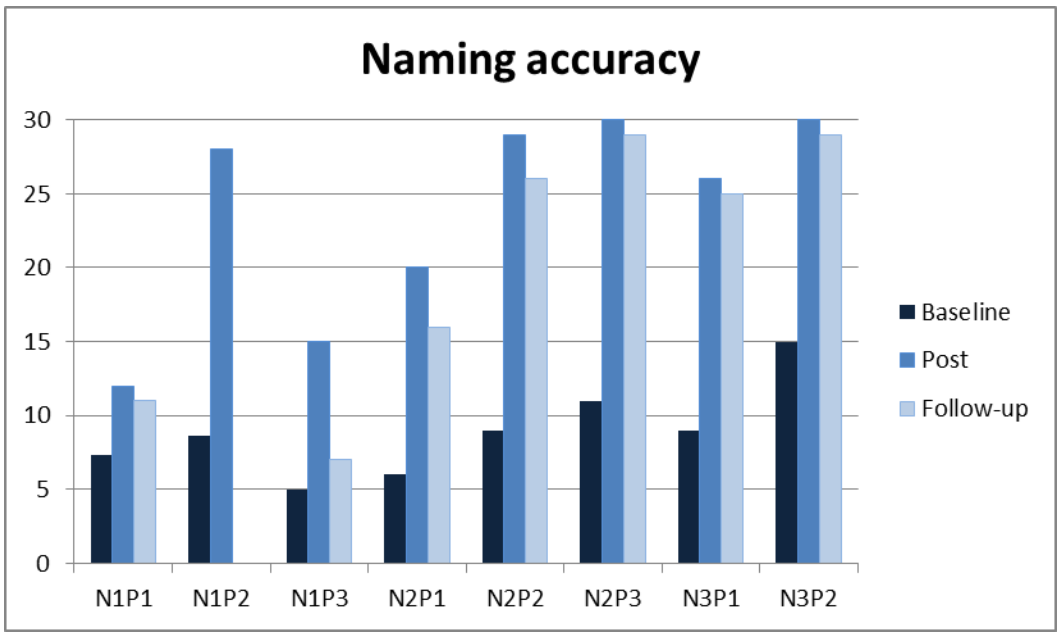

Figure 2. Individual naming performance on 30 treatment items at baseline (average), post-therapy and follow-up assessments.