Therapeutic effect of an intensive, comprehensive aphasia program: Aphasia LIFT

Background

The development of intensive, comprehensive aphasia programs (ICAPs) is increasing due to evidence in favour of greater treatment intensity (Cherney, Patterson, Raymer, Frymark, & Schooling, 2008), the adoption of a broad, holistic, biopsychosocial approach in aphasia rehabilitation (Byng & Duchan, 2005; Kagan et al., 2008; Martin, Thompson, & Worrall, 2008; Simmons-Mackie & Kagan, 2007), and the desire to meet the needs of people with aphasia and their family members in therapy (Howe et al., 2012; Worrall et al., 2012). ICAPs comprise a range of therapy approaches (individual therapy, group therapy, patient/family education, technology), delivered at high intensity (minimum of three hours per day over at least two weeks), to a defined group of participants within a specified amount of time (Cherney, Worrall, & Rose, 2012). Aphasia LIFT (Language Impairment and Functioning Therapy) is a research-based ICAP that uses evidence-based therapy approaches to target language and functioning across the World Health Organization's International Classification of Functioning, Disability and Health (ICF) domains (WHO, 2001). The aim of this study was to determine the therapeutic effect of Aphasia LIFT on language impairment, functional communication, and communication-related quality of life (QOL).

Method

Design

This Phase I/II study utilized a pre-post group design to assess acquisition and maintenance of treatment gains. A series of three Aphasia LIFT trials were conducted (LIFT 1, LIFT 2, and LIFT 3).

Participants

Individuals with aphasia secondary to a left hemisphere stroke at least four months prior were eligible to take part in Aphasia LIFT. Care was taken to ensure that they had no additional neurological disorders or uncorrected sensory deficits that could potentially interfere with participation in the program. Participants were 17 individuals (13 M, 4 F), aged 18-79 years (mean= 59.8 years), who were between 8-66 months post onset (mean= 27.8 months). See Table 1 for demographic information.

Study Procedures

Assessment. A range of standardized assessments and procedures were utilized as outcome measures for Aphasia LIFT. In the domain of language impairment, the Comprehensive Aphasia Test Naming subtest (CAT; Swinburn, Porter, & Howard, 2004) and the Boston Naming Test (BNT; Kaplan, Goodglass, & Weintraub, 2001) were used to assess confrontation naming. Content information unit (CIU) analyses (Nicholas & Brookshire, 1993) were conducted on connected speech samples to determine discourse informativeness and efficiency. In the domain of functional communication, the Communicative Effectiveness Index (CETI; Lomas et al., 1989) was used to assess family members' perception of the individual with aphasia's ability to communicate basic needs, social needs, everyday living, and physical well-being. In the domain of communication-related QOL, the Assessment for Living with Aphasia (ALA; Kagan et al., 2011) was used to measure the impact of aphasia on the participants' everyday lives across: language and related impairments, participation in life situations, communication and language environment, and personal, identity, attitudes, and

feelings. All outcome measures were administered at baseline, post-treatment, and 6-8 weeks after treatment termination.

Goal Setting. The individuals with aphasia and their family members (if available) participated in collaborative goal-setting prior to the start of LIFT. The goal-setting interviews provided an opportunity to identify participants' interests, needs, and expectations in order to establish relevant treatment goals and develop salient treatment stimuli. A communication-related challenge task, to be presented on the final day of the program (i.e.,"Challenge Day"), was also identified.

Treatment. Aphasia LIFT trials comprised impairment-based treatment, functional treatment, computer-based treatment, and group sessions. Participants' goals were integrated and addressed across sessions. Impairment-based sessions aimed to restore the skills necessary to help the participants meet their goals and in most cases focused on word retrieval (i.e., through semantic feature analysis or phonological component analysis). The functional treatment sessions aimed to identify the skills and actions necessary to achieve goals and mainly focused on rehearsal of those skills and actions in personally relevant contexts (i.e., through conversation and role playing). Computer-based treatment sessions aimed to increase intensity of practice and focused on word-level practice and/or rehearsal of scripts (i.e., AphasiaScripts™). Group sessions were held to educate participants and family members, promote discussion and information exchange, and promote social interaction. Participants also engaged in regular practice for their communication-based challenge task. Participants received between 40-100 hours of treatment, depending on the trial in which they participated (see Figure 1).

Results

Data from all three LIFT trials were pooled for analysis. Difference scores were calculated from baseline to immediate post-treatment and follow-up. To establish whether treatment yielded a significant therapeutic effect, Wilcoxon signed ranks tests were conducted on group data at both time points. See Table 2 for the range, mean and standard deviation for each outcome measure.

Language Impairment

An increase of 2.7% from baseline to immediate post-treatment and 21% from baseline to follow-up was obtained on the CAT Naming subtest, representing a significant improvement in confrontation naming of objects and actions immediately post-treatment (Z = 2.59, p = .009) and at follow-up (Z = 3.24, p = .001). An increase of 19.7% from baseline to post-treatment and 16.8% from baseline to follow-up was demonstrated on the BNT, representing a significant improvement in confrontation naming of objects immediately post-treatment (Z = 3.04, p = .002) and at follow-up (Z = 2.80, p = .005). Analysis of %CIUs revealed a 5.5% increase from baseline to post-treatment but less than 1% increase baseline to follow-up, indicating no significant differences in discourse informativeness at either time point. However, CIUs/min data revealed an increase of 20% from baseline to post-treatment and 16.6% from baseline to follow-up, representing a significant improvement in efficiency of discourse production immediately post-treatment (Z = 2.51, p = .012) but not at follow-up.

Functional Communication

An increase of 27.2% from baseline to post-treatment and 33.8% from baseline to follow-up was demonstrated on the CETI, representing a significant improvement in family-

rated perceptions of functional communication abilities immediately post-treatment (Z = 3.29, p = .001) and at follow-up (Z = 3.29, p = .001).

Communication-related QOL

An increase of 7.9% from baseline to post-treatment and 10.5% from baseline to follow-up was demonstrated on the ALA, representing a significant improvement in self-rated communication-related QOL immediately post-treatment (Z = 2.66, p = .008) and at follow-up (Z = 2.99, p = .003).

Analysis of individual data on all outcome measures is ongoing. At present, varying patterns of response to treatment have been noted. The most severely impaired participants have failed to demonstrate gains in word retrieval, but proxy- and self-rated measures of functional communication and communication-related QOL indicate improvements in these domains.

Discussion

Group-level data demonstrates that Aphasia LIFT yielded a therapeutic effect in the domains of language impairment, functional communication, and communication-related QOL. Moreover, with the exception of discourse efficiency, the treatment effects endured, suggesting that skills acquired during the program facilitated ongoing improvement across domains. Individual participant data analyses will contribute to discussion on patient characteristics, such as aphasia severity, that contribute to variability in response to treatment. Our results lend support for ICAPs as a service delivery model in aphasia rehabilitation.

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Table 1

Demographic Information

Participant	Gender	Age	MPO	Speech/Language Deficits
L1P1	F	67	49	Moderate anomia; mod-severe AOS
L1P2	M	18	46	Moderate anomia
L1P3	F	56	21	Severe anomia; moderate comprehension deficits
L1P4	M	68	8	Moderate anomia; moderate comprehension deficits
L2P1	M	40	12	Mod-severe anomia; mild-mod AOS
L2P2	M	70	23	Severe anomia; mod-severe AOS; mod-severe comprehension deficits
L2P3	M	56	56	Severe anomia; severe AOS; moderate comprehension deficits
L2P4	F	77	23	Severe anomia; mod-severe comprehension deficits
L2P5	F	79	11	Moderate anomia; mod-severe AOS
L2P6	M	68	14	Severe anomia; severe comprehension deficits
L2P7	M	66	21	Moderate anomia
L3P1	M	54	20	Mild-moderate anomia
L3P2	M	70	32	Moderate anomia
L3P3	M	51	9	Mod-severe anomia; mild-mod AOS; mild comprehension deficits
L3P4	M	57	66	Severe anomia; severe AOS; moderate comprehension deficits
L3P5	M	50	10	Mod-severe anomia; moderate comprehension deficits
L3P6	M	70	52	Moderate anomia

L1= LIFT 1; L2= LIFT 2; L3= LIFT 3; MPO = Months post-onset; AOS= apraxia of speech

Table 2

Group-level Data

	Baseline	Post-Treatment	Follow-Up
CAT-Naming Subtest			
	n= 17	n=17	n=17
Mean (*SD*)	26.9 (23.8)	29.6 (23.6)	32.5 (23.3)
Range	0- 64	0- 64	0- 70
BNT			
	n=17	n=17	n=17
Mean (*SD*)	18.9 (16.4)	22.6 (18.8)	22.1 (18.7)
Range	0- 43	0- 49	0- 47
%CIUs			
	n=12	n=12	n=11
Mean (*SD*)	54.0 (11.59)	57.0 (12.09)	54.5 (14.3)
Range	38.6- 74.2	37.7- 74.9	24.8- 74.9
CIUs/min			
	n=12	n=12	n=11
Mean (*SD*)	38.9 (26.4)	46.7 (25.7)	44.9 (33.9)
Range	14.7- 112.4	19.2- 119.4	15.3-137.67
CETI			
	n=14	n=14	n=14
Mean (*SD*)	4.19 (1.49)	5.33 (1.66)	5.46 (1.70)
Range	1.69- 7.00	2.28- 8.38	2.61- 8.19
ALA			
	n=13	n=13	n=16
Mean (*SD*)	101.8 (16.9)	109.8 (17.9)	115.6 (19.4)
Range	78.50- 132.0	83.50- 138.50	83.00- 142.00

CAT= Comprehensive Aphasia Test; BNT= Boston Naming Test; %CIUs= percent content information units; CIUs/min= content information units per minute; CETI= Communicative Effectiveness Index; ALA= Assessment for Living with Aphasia; Quality of Communication Life Scale

Figure 1. Intensity of Treatment Delivery