
Intensive Comprehensive Aphasia Programs: An International Survey of Practice

Miranda L. Rose, PhD,^{1,2} Leora R. Cherney, PhD,^{3,4} and Linda E. Worrall, PhD^{2,5}

¹Department of Human Communication Sciences, La Trobe University, Melbourne, Australia; ²Centre for Clinical Research Excellence in Aphasia Rehabilitation, Brisbane, Australia; ³Center for Aphasia Research and Treatment, Rehabilitation Institute of Chicago, Chicago, Illinois; ⁴Department of Physical Medicine and Rehabilitation, Northwestern University Feinberg School of Medicine, Chicago, Illinois; ⁵School of Health and Rehabilitation Sciences, The University of Queensland, Brisbane, Australia

Background: In response to the need to simultaneously address multiple domains of the International Classification of Functioning, Disability and Health (ICF) in aphasia therapy and to incorporate intensive treatment doses consistent with principles of neuroplasticity, a potentially potent treatment option termed intensive comprehensive aphasia programs (ICAPs) has been developed. **Objective:** To conduct an international survey of ICAPs to determine the extent of their use and to explore current ICAP practices. **Methods:** A 32-item online survey was distributed internationally through Survey Monkey between May and August 2012. The survey addressed ICAP staffing, philosophy, values, funding, admission criteria, activities, family involvement, outcome measures, and factors considered important to success. **Results:** Twelve ICAPs responded: 8 from the United States, 2 from Canada, and 1 each from Australia and the United Kingdom. The majority of ICAPs are affiliated with university programs and are funded through participant self-pay. ICAPs emphasize individualized treatment goals and evidence-based practices, with a focus on applying the principles of neuroplasticity related to repetition and intensity of treatment. On average, 6 people with aphasia attend each ICAP, for 4 days per week for 4 weeks, receiving about 100 hours of individual, group, and computer-based treatment. Speech-language pathologists, students, and volunteers staff the majority of ICAPs. **Conclusions:** ICAPs are increasing in number but remain a rare service delivery option. They address the needs of individuals who want access to intensive treatment and are interested in making significant changes to their communication skills and psychosocial well-being in a short period of time. Their efficacy and cost-effectiveness require future investigation. **Key words:** *aphasia, function, group, intensive, participation, psychosocial outcomes, treatment*

Aphasia is a common and significant communication disability; an estimated 28% to 35% of individuals have aphasia after a first stroke.¹⁻³ Effective treatments for aphasia are important to address the language impairment and participation and quality of life issues in those affected. Meta-analyses of single-subject and controlled trial studies⁴⁻⁶ and qualitative reviews of single-subject designs⁷ have provided evidence that, in general, aphasia therapy works. Although the chronicity of aphasia impacts the extent of outcome,⁴ there are demonstrated significant treatment effects in the chronic phase. There is a need to address issues associated with living with a chronic communication disability to minimize health care burdens to society associated with the effects of aphasia on independence, social relationships, mental health, and well-being.⁸⁻¹¹

There is considerable variability in the approaches that speech-language pathologists

utilize in aphasia rehabilitation.¹² Aphasia rehabilitation can directly target any of the domains of the International Classification of Functioning, Disability and Health (ICF).¹³ These targets include language impairment (eg, word retrieval, syntax), communication activity (eg, ordering food in a restaurant), communication participation (eg, social conversation), personal factors (eg, client self-identity post stroke and aphasia), and environmental factors (eg, conversation partner skills, accessibility of written information). It has been common for aphasia rehabilitation to focus on just one of these targets.¹⁴ Researchers have begun to explore the possibility that targeting multiple domains simultaneously is more effective.

Top Stroke Rehabil 2013;20(5):379-387
© 2013 Thomas Land Publishers, Inc.
www.strokejournal.com

doi: 10.1310/tsr2005-379

For example, Hinckley and Carr¹⁵ targeted word retrieval inside a functional catalogue-ordering task therapy.

Another variation in aphasia therapy concerns the intensity of the treatment. The cumulative intensity of treatment has been defined as the product of the session frequency, session duration, total intervention duration, and dose, that is, the number of times a teaching episode containing a unique combination of active ingredients occurs in the session.¹⁶ It may also involve the actual effort expended in each session (how difficult or how varied the task). Currently, no standard reporting of aphasia therapy intensity exists.¹⁷ For example, in Robey's⁴ meta-analysis of the effects of aphasia therapy, he classified the amount of treatment in the metric of hours per week: low, < 1.5 hours; moderate, 2 to 3 hours; high, >5 hours. Other analyses consider the overall amount and duration of therapy,¹⁸⁻²¹ reporting larger gains from higher numbers of sessions. These findings are consistent with principles of neural plasticity that suggest that repetition and high-intensity practice are necessary for learning and for relearning after brain damage.²² These principles have been defined as they relate to poststroke aphasia rehabilitation.²³

However, current clinical speech-language pathology practice does not favor intensive service delivery. For example, in 5 English-speaking countries, therapists provided on average 1 hour of aphasia treatment per week.^{24,25} In an Australian study, 70 Australian speech and language pathologists working in outpatient rehabilitation settings reported providing 2 to 3 sessions per week totaling on average 2.1 hours per week. Weekly therapy was the most common frequency in community-based services, totaling on average less than 2 hours per week.²⁶

In response to the need to simultaneously address multiple domains of the ICF in aphasia therapy and to incorporate intensive treatment doses consistent with principles of neural plasticity, several facilities have developed a potentially potent treatment option termed intensive comprehensive aphasia programs (ICAPs).²⁷ An ICAP is a service delivery model that:

1. Provides a minimum of 3 hours of daily treatment over a period of at least 2 weeks;

2. Uses a variety of different treatment approaches and formats including individual and group therapy;
3. Targets directly both the impairment and the activity/participation levels of language and communication functioning;
4. Includes patient and/or family education; and
5. Has a definable start and end date, with a cohort of participants entering and leaving the program at the same time.

An ICAP differs from a program in which a single treatment is administered intensively such as constraint-induced language therapy,²⁸ because the ICAP targets multiple areas via different treatment approaches and formats. It also differs from an aphasia center that addresses multiple ICF domains,²⁹ because aphasia centers do not have a circumscribed time frame with cohorts of participants entering and leaving the program at the same time.

Aims

The demand for ICAPs is growing internationally, and new programs are being established every year.³⁰ As this is a relatively new service delivery option, there are limited published details concerning the nature of ICAPs being offered to the public. To determine the extent of their use around the world and to explore current ICAP practices and core features, we conducted an international survey of ICAPs. Such information may be useful for groups considering starting an ICAP, and it provides a baseline description of this service delivery option. Future research can address questions of ICAP efficacy, effectiveness, and best practices implementation.

Method

We piloted a 40-item survey on 5 ICAPs in North America and Australia during October 2011. Following feedback and revision to the pilot version, we loaded the final 32-item digital survey to an online commercial survey distribution and collection site (Survey Monkey). The survey link opened in May 2012 and closed in August 2012. The survey questions were primarily multiple choice questions with free-text options. They covered the basic characteristics of the

Table 1. Summary of recruitment methods

Methods	Groups	Countries ^a
Newsletters	Speech Pathology Australia	Australia
	Canadian Association of Speech Language Pathology	Canada
E-mail lists	British Aphasiology attendees	United Kingdom
	Clinical linguists and SLPs	Denmark
	Aphasia Society of Germany	Germany
	Academy of Aphasia	International
	Clinical Aphasiology Conference	United States and others
	ASHA Special Interest Division 2	
	ANCDS	
	CCRE Aphasia Rehabilitation Community of Practice	Australia, New Zealand, and others
Personal communications to high-profile aphasiologists and clinicians likely to know about ICAPs in their country; asked to pass on the letter of invitation to relevant centers and individuals		South Africa
		Denmark
		Belgium
		Finland
		Italy
		France
		Slovenia
		Austria
		The Netherlands

Note: ANCDS = Academy of Neurological Communication Disorders and Sciences; ASHA = American Speech-Language-Hearing Association; ICAPs = intensive comprehensive aphasia programs; SLP = speech-language pathologist.

^aMain targets, but people from other countries may access this information.

program, staffing, philosophy and values, funding, admission criteria, structure and activities, family involvement, outcome measures, and factors considered important to success. The international recruitment strategies were multifaceted (Table 1). A letter of invitation was sent through all electronic sources to the individuals listed in Table 1. A follow-up letter was sent approximately 6 weeks after the first invitation. Letters of invitation were printed in newsletters, as listed in Table 1. With such an open recruitment strategy, it is impossible to estimate the overall target population. We attempted to reach as many individuals around the world working in the field of aphasia as we could.

Results

There were 13 responses on the survey. Of these, 1 was removed from further analysis, as the program did not meet the provided definitions of intensity and comprehensive programming.

Location, affiliation, funding, and growth

Of the 12 programs meeting the provided definitions of ICAPs, 8 were from the United

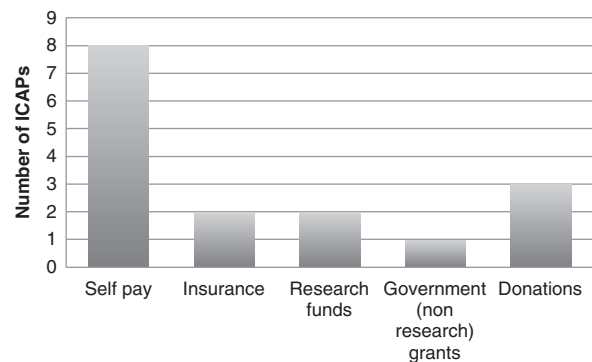


Figure 1. Sources of funding for intensive comprehensive aphasia programs (ICAPs). Some ICAPs listed multiple sources.

States, 2 were from Canada, and 1 each were from Australia and the United Kingdom. Eight were affiliated with university programs, 3 with health care facilities, and 1 was independent. Funding sources are displayed in Figure 1. The majority of ICAPs were funded through participant self-pay. Two ICAPs were funded through research grant funds and 1 through Veteran's Administration health care funds. Three ICAPs listed donations as a source of funding, and 1 ICAP was funded solely

by this method. Growth in ICAPs appears to be a reasonably recent phenomenon, with 7 ICAPs commencing in the last 3 years. Four programs began operations between 5 and 12 years ago, and 1 has been in existence for more than 20 years.

Philosophy, values, and principles

Four programs reported having a mission statement. Common themes derived from the free-text responses included excellent and evidence-based assessment and intervention practices, innovation, and education for health care providers, family, and communities. Nine programs reported core values and principles as summarized in **Table 2**. There was a heavy emphasis on individualized treatment goals and evidence-based practices, with a focus on applying principles of neuroplasticity to programming. Further, positive outlook and respect and compassion were reported to be important contextual elements to these ICAPs.

Number, duration, and size

The ICAPs reported that they have been running from 1 to 20 years (mean, 4.6 years; mode, 2 years) and offer from 1 to 12 ICAPs annually (mean, 3.13; mode, 1). They reported providing an ICAP to between 3 to 60 people with aphasia per year ($M [SD] = 17.3 [15.5]$ people). On average, 6 people with aphasia attend each ICAP session (range, 3-10; $SD = 2.5$; mode = 6). The ICAPs operate from 3 to 6 days per week ($M = 4.5$; mode = 5) and last from 12 to 33 days in total ($M [SD] = 21$

Table 2. Core values and principles reported by survey respondents

Core values and principles	No. of ICAPs reporting
Individualized treatment goals	6
Neural plasticity: intensity, saliency	5
Compassion, respect, positive outlook	4
Evidence-based interventions	4
Aim to enhance life participation	3
Focus on family and friends	3
Involving peer volunteers	1
Daily feedback	1
Education about stroke and aphasia	1

Note: ICAPs = intensive comprehensive aphasia programs.

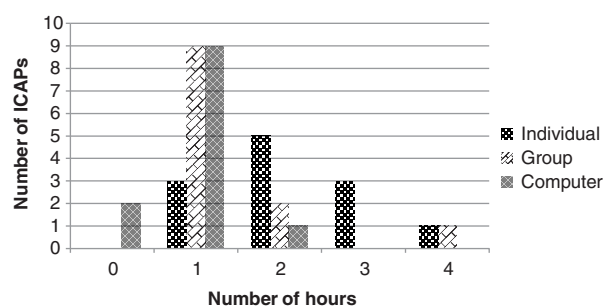


Figure 2. Number of intensive comprehensive aphasia programs (ICAPs) where clients spend 1, 2, 3, or 4 hours in individual, group, and computer-based sessions.

[5.4] days; mode = 20). Over an entire ICAP program, a person with aphasia receives from 48 to 150 hours of service ($M [SD] = 101 [32.3]$ hours; mode = 100).

Number and distribution of hours

Programs were asked to indicate how many hours their clients spend in individual sessions, group sessions, and computer lab sessions per day of ICAP. **Figure 2** displays the results. On a typical day, each person with aphasia receives on average 4.75 hours of ICAP service (range, 3-7; $SD = 1.2$; mode = 3). This was constituted by, on average, 2.17 individual session hours (mode = 2), 1.4 group session hours (mode = 1), and 0.92 computer lab hours (mode = 1). Some ICAPs indicated additional program hours in a range of activities including structured and facilitated social discourse during refreshment breaks, constraint-induced aphasia therapy, functional communication challenge tasks, working in pairs with a student speech-language pathologist, caregiver training and support, and nightly computer-based or paper-and-pencil home practice tasks.

Staffing

Programs were asked to list the staff utilized across their ICAPS and approximate time fractions. The number of programs that employed staff at each of the displayed fractions (equivalent full-time role [FTE] = 1.0; 0.1 = 1/2 day per

Table 3. Number of ICAPs employing staff at particular full-time equivalent (FTE) fractions

Staff	FTE position												Total no. of programs employing staff
	0.1	0.2	0.5	1.0	1.5	2.0	3.0	4.0	4.5	5.0	6.0	7.0	
Speech-language pathologist				3		1	2	1	1	2		1	11
Student						2				1	2		5
Administrative assistant			2				1	1					4
Volunteer				1		1		1					3
Recreation coordinator			1		1								2
Physical therapist		2											2
Music therapist	1												1

Note: ICAPs did not report employing any social workers, psychologists, occupational therapists, exercise coordinators, or physicians. 0.1 FTE = ½ day per week; 0.2 FTE = 1 day per week; 1.0 FTE = full-time position, etc. ICAPs = intensive comprehensive aphasia programs.

week) is listed in **Table 3**. Speech and language pathologists, students, administrative assistants, volunteers, recreational coordinators, physical therapists, and music therapists were reported. The vast majority of ICAPs utilize speech-language pathologists as primary staff for their programs. However, volunteers were also listed by 3 ICAPs. In addition, 5 ICAPs routinely utilized student speech-language pathologists in service delivery under certified supervision. Two ICAPs utilized a recreational therapist for a small fraction per week, and another ICAP reported bringing in occupational therapy, physical therapy, and dietetics staff on a casual basis to deliver small components of the overall ICAP.

Family involvement

All programs reported requiring or encouraging family involvement. **Figure 3** displays the extent to which programs involve family in various ways in ICAP sessions, including observation of the person with aphasia during treatment sessions, family meetings with the clinician, participation in individual or group treatment sessions with the person with aphasia, and family education and support sessions.

Admission criteria

Eleven of the 12 programs reported having admission criteria (**Table 4**). The majority of

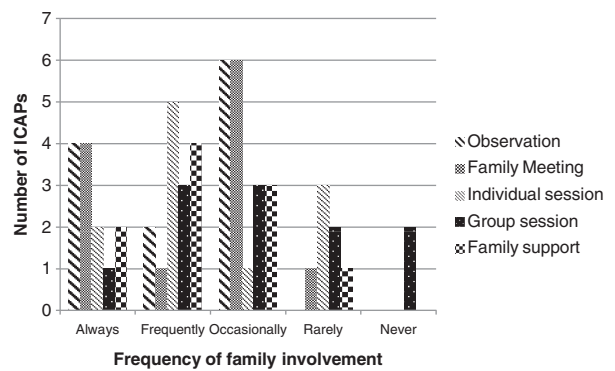


Figure 3. Number of intensive comprehensive aphasia programs (ICAPs) that always, frequently, occasionally, rarely, or never involve family members in various ICAP sessions.

ICAPs utilized endurance and time post onset as admission criteria.

Outcome measures

All the ICAPs reported measuring client outcomes. The types of outcomes measured and the number of ICAPs measuring each is shown in **Table 5**.

Factors that contribute to ICAP success

Participants were asked to use free-text to list the 3 most important factors that they thought contributed to successful ICAPs. **Table 6** lists the responses and their frequency.

Table 4. Admission criteria reported for ICAPs

Criteria	No. of ICAPs	Specific comments by some ICAPs
Endurance	9	Able to tolerate a full day Able to tolerate 3 hours treatment Able to tolerate 7 hours treatment
Time post onset	8	At least 6 months At least 12 months
Age	6	18 years or older
Severity of aphasia	4	Not provided
Motivation	4	High
Toileting	3	Independent or caregiver attend
Medically stable	3	
No history of dementia or cognitive impairment	3	
Ambulate/transfer	2	Independent
Auditory comprehension	1	Sufficient for conversation
Must attend with communication partner	1	
English	1	Functional prior to stroke

Note: ICAPs = intensive comprehensive aphasia programs.

Table 6. Factors identified by participants as contributing to a successful ICAP

Factor	No. of ICAPs reporting factor
Quality, expertise, enthusiasm, knowledge, commitment, and dedication of staff/students who go above and beyond	9
Individualized goal setting and personal, functional practice targets	4
Treating all modalities comprehensively and intensively	3
Caring for and involving family and friends	3
Appropriate facilities and space	3
Interprofessional collaboration	2
Using evidence base to draw on all relevant frameworks, theories, and approaches	2
Variety and interest of activities	2
Excellent leadership and organization	2
Low cost	2
Partnership with voluntary/government services	1
Support of academic faculty	1
Participant motivation and endurance	1

Note: ICAPs = intensive comprehensive aphasia programs.

Table 5. Number of outcome areas measured by ICAPs and the measurements used

Outcome area	No. of ICAPs measuring	Outcome measure
Linguistic and cognitive tests	12	Language samples Western Aphasia Battery Comprehensive Aphasia Test Verb Naming Test Test of Adolescent Word Finding Boston Naming Test PALPA Pyramids and Palm Trees Apraxia Battery for Adults Cognitive Linguistic Quick Test
Ratings of communication	12	Assessment for Living with Aphasia Communicative Effectiveness Index MiniCAL Communication Confidence Rating Scale ASHA FACS Aphasia Communication Outcome Measure
Quality of life, well-being	9	Stroke Impact Scale Burden of Stroke Scale
Mood	1	VASES
Client satisfaction with ICAP	9	
Family satisfaction with ICAP	7	
Goal attainment scaling	1	

Note: ASHA FACS = American Speech-Language-Hearing Association Functional Assessment of Communication Skills; ICAPs = intensive comprehensive aphasia programs; MiniCAL = Mini Communication Activity Log; PALPA = Psycholinguistic Assessments of Language Processing in Aphasia; VASES = Visual Analogue Self-Esteem Scale.

Discussion

There is a move within aphasia rehabilitation to apply principles of neural plasticity, such as repetition and intensity, to treatment development.²³ Similarly, when considering the person with aphasia in his or her entirety, there is recognition that aphasia treatments can span all the ICF domains. The move to combine multifaceted treatments that address all ICF domains into an intensively delivered format has led to the development of ICAPs for people with aphasia. In this international survey, there was considerable overlap in the structure and philosophical backgrounds reported by the 12 participating ICAPs, suggesting that this service delivery phenomenon is indeed definable.

The majority of ICAPs are in North America (10 out of 12). With the exception of 1 long-running program (>12 years), ICAPs are a recent phenomenon. Most ICAPs are affiliated with a university program and are generally funded through user-pay systems rather than supported by government health care programs or private insurance. The programs share a focus on life participation and individualized and functional communication goals, and they emphasize a positive and respectful culture. Most ICAPs run with a group size of about 6 people with aphasia, but they vary in the number of days they operate per week and the overall program length. The most common number of program hours was 100 (mean, 101 hours) per ICAP. All ICAPs included individual, group, and computer-based treatment sessions and were heavily reliant on speech-language pathologists and students to staff them. Involvement of family was a key feature in all ICAPs surveyed. This family involvement spanned observation of treatment sessions, specific family meetings, participation in both individual and group therapy sessions, and dedicated family support and education sessions.

Although the survey results illustrate the major features of the ICAP, questions were not specific enough to capture details of each program. For example, all ICAPs included individual, group, and computer-based sessions and all ICAPs targeted performance at both impairment and activity/participation levels, but precise descriptions of

the treatment approaches and interventions used within the sessions were not obtained. The type of treatment (or dose form) and the actual dose of treatment within each session (eg, the number of participant responses to a treatment task) affect overall cumulative intensity, and these factors may have differed across programs.^{16,17} These details would provide increased assistance to clinicians who are considering starting an ICAP. Furthermore, they would allow researchers, clinicians, and consumers to better compare programs, outcomes, and cost-effectiveness. Given the interest in intensive treatments in aphasia rehabilitation and other communication disorders (eg, stuttering), it is perhaps surprising that there are not more ICAPs. Despite our attempts to locate ICAPs throughout the world, we only identified 13 programs (1 declined to participate for proprietary reasons). We believe this is a true reflection of the current scope of ICAPs, but it is possible that we did not reach all existing ICAPs, particularly in countries such as China where our professional networks are limited.

There appear to be many structural barriers to implementing intensive service delivery models within current health care settings. Such barriers include inadequate space and facilities, inflexible funding models, and a lack of staffing resource to dedicate to such intense programming.¹² These barriers cause innovation to develop in environments with less structural restriction, for example, alongside university professional preparation programs. Future research could more specifically explore speech-language pathologists' attitudes and beliefs concerning ICAPs and the logistic requirements that would facilitate the ability to run ICAPs.

When asked what elements were associated with successful ICAPs, respondents emphasized the endurance capacity of the participants with aphasia to withstand a 3- to 7-hour treatment day for several days per week. They also emphasized the importance of high-quality and dedicated staff who are willing to go above and beyond the call of duty. Future research should address the overall efficacy of ICAPs and attempt to examine possible subgroups of people with aphasia who do or do not respond well to this kind of service delivery option.

Conclusion

ICAPs are beginning to increase in number but remain a rare service delivery option. This survey found that in ICAPs approximately 100 hours of intervention (individual, group, and computer-based) are provided by speech and language pathologists in a 4-week period to an average of 6 people with aphasia and their families. Individuals with aphasia may choose

to attend an ICAP in addition to government- or insurance-funded treatment. ICAPs may also address the needs of individuals who do not have access to other treatment options or are interested in making significant changes to their communication skills and psychosocial well-being in a short period of time. Efficacy and cost-effectiveness of ICAPs require future investigation.

REFERENCES

- Bersano A, Burgio F, Gattinoni M, Candelise L. Aphasia burden to hospitalised acute stroke patients: Need for an early rehabilitation programme. *Int J Stroke*. 2009;4(6):443-447.
- Dickey L, Kagan A, Lindsay P, Fang J, Rowland A, Black S. Incidence and profile of inpatient stroke-induced aphasia in Ontario, Canada. *Arch Phys Med Rehabil*. 2010;91:196-202.
- Engelter ST, Gostynski M, Papa S, et al. Epidemiology of aphasia attributable to first ischemic stroke: Incidence, severity, fluency, etiology, and thrombolysis. *Stroke*. 2006;37(6):1379-1384.
- Robey R. A meta-analysis of clinical outcomes in the treatment of aphasia. *J Speech Lang Hear Res*. 1998;41(1):172-187.
- Brady M, Kelly H, Godwin J, Enderby P. Speech and language therapy for aphasia following stroke. *Cochrane Database Syst Rev*. 2012;5:CD000425. doi: 10.1002/14651858.CD000425.pub3
- Wiseburn B, Mahoney K. A meta-analysis of word-finding treatments for aphasia. *Aphasiology*. 2009;23(11):1338-1352.
- Nickels L. Therapy for naming disorders: Revisiting, revising, and reviewing. *Aphasiology*. 2002;16:935-979.
- Astrom J, Adolfsson R, Asplund K. Major depression in stroke patients: A 3-year longitudinal study. *Stroke*. 1993;24(7):976-982.
- Davidson B, Howe T, Worrall L, Hickson L, Togher L. Social participation for older people with aphasia: The impact of communication disability on friendships. *Top Stroke Rehabil*. 2008;15(4):325-340.
- Hilari K, Byng S. Health related quality of life in people with severe aphasia. *Int J Lang Commun Disord*. 2009;44(2):193-205.
- Le Dorze G, Brassard C. A description of the consequences of aphasia on aphasic person and their relatives and friends, based on the WHO model of chronic diseases. *Aphasiology*. 1995;9(3):239-255.
- Rose M, Ferguson A, Power E, Togher L, Worrall L. Current aphasia rehabilitation practices in Australia: Challenges and solutions [published online ahead of print June 18, 2013]. *Int J Speech Lang Pathol*. 2013; doi: 10.3109/17549507.2013.794474.
- World Health Organization. *International Classification of Functioning, Disability and Health*. Geneva: Author; 2001.
- Cherney LR, Robey RR. Aphasia treatment: Recovery, prognosis and clinical effectiveness. In: Chapey R, eds. *Language Intervention Strategies in Aphasia and Related Neurogenic Communication Disorders*. 5th ed. Philadelphia: Lippincott Williams & Wilkins; 2008:186-202.
- Hinckley J, Carr T. Comparing the outcomes of intensive and non-intensive context-based aphasia treatment. *Aphasiology*. 2005;19(10/11):965-974.
- Baker E. Optimal intervention intensity. *Int J Speech Lang Pathol*. 2012;14:401-409.
- Cherney LR. Aphasia treatment: Intensity, dose parameters, and script training. *Int J Speech Lang Pathol*. 2012;14:424-431.
- Basso A, Caporali A. How intensive/prolonged should an intense/prolonged treatment be? *Aphasiology*. 2005;19:975-984.
- Bhogal S, Teasell R, Speechley M. Intensity of aphasia therapy, impact on recovery. *Stroke*. 2003;34(4):987-993.
- Cherney LR, Patterson JP, Raymer A, Frymark T, Schooling T. Evidence based systematic review: Effects of intensity of treatment and constraint-induced language therapy for individuals with stroke-induced aphasia. *J Speech Lang Hear Res*. 2008;51(5):1282-1299.
- Cherney LR, Patterson JP, Raymer AM. Intensity of aphasia therapy: Evidence and efficacy. *Curr Neurol Neurosci Rep*. 2011;11:560-569.
- Kleim JA, Jones TA. Principles of experience-dependent neural plasticity: Implications for rehabilitation after brain damage. *J Speech Lang Hear Res*. 2008;51(1):S225-239.
- Raymer S, Beeson P, Holland A, et al. Translational research in aphasia: From neuroscience to neuro-rehabilitation. *J Speech Lang Hear Res*. 2008;51:S259-275.
- Katz R, Hallowell B, Code C, et al. A multinational comparison of aphasia management practices. *Int J Lang Commun Disord*. 2000;35(2):303-314.
- Jordan L. A profile of aphasia services in three health districts. *Br J Disord Commun*. 1991;26(3):293-315.

26. Verna A, Davidson B, Rose T. Speech-language pathology services for people with aphasia: A survey of current practice in Australia. *Int J Speech Lang Pathol.* 2009;11(3):191-205.
27. Cherney LR, Doyle PJ, Hula WD, et al. Intensive comprehensive aphasia programs: Philosophy, procedures and outcomes. Presented at: Annual Convention of the American Speech-Language-Hearing Association; November 2011; San Diego, CA.
28. Pulvermuller F, Neininger B, Elbert T, et al. Constraint-induced therapy for chronic aphasia after stroke. *Stroke.* 2001;32:1621-1626.
29. Simmons-Mackie N, Holland AL. Aphasia centers in North America: A survey. *Sem Speech Language.* 2011;32(3):203-215.
30. Rodriguez A. Aphasia LIFT: The effects of an intensive comprehensive aphasia rehabilitation program across ICF domains. *Int J Stroke.* 2012;7(S1):1-69