



CRITICAL REVIEW

Solutions for the Speechless

NEW DIRECTIONS IN POST-STROKE APHASIA TREATMENT

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ABSTRACT An increasing number of Canadians will be affected by aphasia and other post-stroke communication disorders as the nation's population continues to age. Recent studies have expressed concern in the face of this reality; the rehabilitative services being provided to post-stroke aphasia patients are often based on correlative evidence, and important quantitative benefits evoked from this form of therapy remain unclear. A new body of research is emerging, and is giving greater consideration to alternative forms of treatment for post-stroke aphasia—including novel therapy techniques and pharmacological interventions. Perhaps the findings of these studies will have an impact on the way Canada administers care to those suffering from this disorder.

Aphasia, alternatively referred to as dysphasia, is an acquired neurological disorder affecting an individual's linguistic performance and overall communication abilities.¹ It is highly prevalent among individuals who have suffered an ischemic stroke affecting various language centres in the brain. When blockage to the middle cerebral artery occurs in the brain's left hemisphere, the extent and location of the resulting tissue damage can have a wide array of detrimental effects on one's ability to read, write or verbally externalize thoughts.²

The two most common forms of aphasia are Broca's and Wernicke's aphasia.² While no two manifestations of the disorder are exactly alike, the symptoms of each form of aphasia generally correspond with damage to the cortical regions after which they are named. Broca's aphasia, for example, involves a functional deficit of Broca's area. This region is located at the left inferior frontal gyrus, and is responsible for the motor movements necessary to initiate speech. A defining characteristic of Broca's aphasia is that while speech is slow and effortful, receptive audio comprehension is still intact; this classifies the disorder as a "non-fluent" aphasia.² It is also common for individuals with this disorder to speak in a manner that is described as "telegraphic," often omitting smaller inflectional affixes and "function words" between key nouns and verbs.^{1,3} There is speculation that these traits are related to peripheral damage in the temporal and parietal regions posterior to the central sulcus.^{1,4}

Wernicke's aphasia, by contrast, is a "fluent" aphasia. Individuals with this form of the disorder have no trouble with the utterance of words, but experience difficulty with comprehension and word perception.² Their speech, while spoken with ease, tends to be nonsensical—often riddled with jumbled or misused words. As the name

suggests, this disorder typically involves damage to Wernicke's area, located in the posterior region of the superior temporal gyrus.⁵

Broca's and Wernicke's aphasia are the two most common forms of the disorder, but there are many more—some of which are easier to treat than others. At present, the standard practice for post-stroke aphasia rehabilitation is one-on-one speech-language therapy (SLT) administered by a

qualified speech-language pathologist.⁶ Patients typically undergo a battery of neurological tests to assess their baseline skills in verbal reasoning, their capability to utter speech sounds (i.e., "phonetic range"), and their perception of sentence structure and interpretation—referred to by linguists as syntactic and semantic comprehension (Figure 1).^{1,6} The primary intent of this communication therapy is to augment the patient's communication skills through repetitive "impairment reduction" exercises.⁷ The end goal is to maximize the patient's ability to participate in social activities, be it by means of skill restoration or developing compensation techniques for skills that cannot be recovered.^{1,6,8}

A recent study published by the U.K.'s National Institute for Health Research (the "ACT NoW" study) performed a thorough evaluation of the clinical effectiveness of the U.K.'s National Health Services' post-stroke communication therapy services.¹⁰ These researchers were unable to find evidence that early communication therapy from a speech-language pathologist provided additional benefit above natural recovery and "attention control" trials.¹⁰ This expressed concern is not an isolated finding, either; an emergence of randomized control studies have further demonstrated that the reported benefits associated with communication therapy remain largely correlative.^{11,12,13} The specific elements of cognitive rehabilitation resulting from SLT remain unidentified at this time.

This emerging body of scepticism may carry some interesting implications for the Canadian population in the years to come. Statistics Canada reports that Canadians above the age of 65 are indeed the fastest growing demographic.¹⁴ This is

SAMPLE SENTENCE

"Yesterday was very sunny and the sky was blue."

BROCA'S APHASIA

"Yesterday...sunny...blue"

WERNICKE'S APHASIA

"Yesterday was very sunsily and the sky was green"

FIGURE 1: An example of typical speech tendencies that may occur in individuals with Broca's and Wernicke's aphasia. Broca's aphasia is characterized by very sparse speech that omits 'function words' in between principle nouns and verbs. Meanwhile, Wernicke's aphasia does not affect utterance of speech, but instead causes words to be scrambled or incorrectly substituted for one that is functionally similar.²

CORE COMPONENTS OF THE INTERVENTION

1. ASSESSMENT – Initial and ongoing, standardised, functional, case history, goal setting

2. INFORMATION PROVISION – Communication problem, strategies or equipment to assist communication, intervention plan, therapist opinion of progress, available information resources and support networks

3. PROVISION OF COMMUNICATION MATERIALS – Communication book for recording activities, an “alternative and augmentative communication device” if required

4. CARER CONTACT – Discussion and provision of information, observation and participation in therapy, conversation training for patient’s partner, preparation for the end of the research intervention

5. INDIRECT CONTACT – Written descriptions of needs, abilities, and strengths; discussions with clinical teams; goal planning with multidisciplinary team

6. DIRECT CONTACT – Therapy to improve language skills at all levels of the World Health Organisation ICF model: Impairment (improving language skills), Activity (compensatory strategies), Participation (developing confidence, accessible information)

FIGURE 2: Current post-stroke aphasia treatment. A typical sequence of intervention measures applied in the provision of speech-language therapy (SLT).⁹

also the age bracket with which the onset of post-stroke aphasia is most positively correlated.¹⁵ With 50,000 Canadians experiencing a stroke each year, and thirty-five percent of those affected developing some form of aphasia, post-stroke communication disorders are likely to become a rising concern among older Canadian adults.^{15,16}

In an effort to meet the needs of this burgeoning vulnerable demographic, post-stroke therapy research has been expanding, over the past few years, to explore the viability of alternatives to SLT. Not only are different methods of one-on-one therapies being developed, but there is also a growing consideration for pharmacological supplements.

CONSTRAINT-INDUCED APHASIA THERAPY

Constraint-induced aphasia therapy (CIAT) is a novel, intensive take on SLT. It requires patients to perform typical SLT exercises performed in longer sessions over a few consecutive days.¹⁷ CIAT is typically performed on individuals with chronic aphasia. The theory behind this method of practice

therefore challenges the conventional belief that significant restoration of communicative abilities is not possible past one year following a stroke.¹⁷ Remarkably, this intensive form of therapy has resulted in a variety of improvements for patients in a short timeframe, including expanded vocabulary and increased utterance of words (among many other linguistic measures of speech quality).^{17,18}

PHARMACOLOGICAL INTERVENTIONS

In the past, pharmacological supplements have been explored as a possible treatment method for aphasia, often to be administered in conjunction with traditional SLT. While viable improvements among patients have been reported, numerous drug trial methodologies have undergone criticism.⁶ Thus, no pharmacological agents are currently recommended for the purposes of language recovery.

One such drug is a cyclic derivative of γ -aminobutyric acid (GABA), known as “piracetam.” It was initially prescribed for vertigo and several cognitive disorders in the 1970s, and current research is investigating the nootropic effects of this drug on individuals who have experienced aphasia following ischemic stroke.^{19,20} Piracetam

has demonstrated positive effects in randomized placebo-controlled trials, particularly in the acute stages of recovery; the drug’s efficacy also increased when prescribed in conjunction with SLT.^{21,22} Localized increases in blood flow were also reported in key language regions of the brain, including the left transverse temporal gyrus, Broca’s area and Wernicke’s area.^{22,23} Despite this initial success, the specific mechanism of action of piracetam has not been investigated further, and therefore remains unclear.²⁴ It is known that piracetam facilitates excitatory neurotransmission in cholinergic and glutamatergic pathways.²⁶ However, other bodies of research suggest that its structural similarity to GABA indicates the involvement of GABAergic pathways, which are typically inhibitory in nature.²⁶

Ultimately, piracetam has never emerged as a mainstream treatment supplement for communication therapies. The results that piracetam has produced in research trials, while appearing promising, have also been subject to criticism due to flawed methodologies.^{27,28} The drug provided few definitive benefits for long-term recovery of communication skills.²⁶ The short-term therapeutic effects of piracetam described

previously, however, should not be overlooked. It has been acknowledged that, if fine-tuned control trials were pursued with greater vigour and detail, then it would not be unreasonable to revisit the consideration of piracetam as a pharmacological supplement to SLT.²⁷

A more recent pharmacological intervention that is being explored for the purpose of post-stroke communication treatment is an acetylcholinesterase inhibitor and vasodilator known as “donepezil.” Donepezil acts to ameliorate cerebral cholinergic connections to language processing centres, which are particularly susceptible to damage during ischemic stroke.²⁹ By inhibiting acetylcholinesterase in these regions, acetylcholine function is potentiated, thereby improving cholinergic projections important for language, learning and memory.²⁹ Donepezil has also demonstrated vasodilating properties in cerebral arterioles, increasing blood flow to these regions.^{17,30} Research relating donepezil to post-stroke aphasia treatment has identified significant benefits in both acute and chronic forms of the disorders. Notable improvements were observed in subjects’ ability to produce speech spontaneously, which could conceivably bring about improvements for individuals with nonfluent aphasia.³⁰

CURRENT AND FUTURE OPTIONS FOR ONTARIANS

There are many exciting evidence-based interventions that are currently offered in Ontario, with other innovations still on the horizon for future consideration. For a broader summary of current and future provincial aphasia rehabilitation strategies, interested readers are directed to the Evidence-Based Review of Stroke Rehabilitation website, www.ebrsr.com. This review website provides a “comprehensive review of [post-stroke] aphasia that includes both therapy-based and drug-based interventions.”³¹ It

includes a wide array of intervention styles, including “group programs, training conversation partners, computer-based instruction, as well as deficit-specific rehabilitation.”³¹

RESEARCH CONTEXT WITHIN CANADIAN GERIATRIC HEALTH ISSUES

A 2009 Senate special report entitled “Canada’s Aging Population: Seizing the Opportunity” highlights the benchmarks and upcoming goals of the Special Senate Committee on Aging. The committee’s primary aim is to provide a higher standard of living to Canada’s older adults. With regard to health care research, the committee identified a need to increase funding for longitudinal studies on aging processes in order to provide better-informed care to this demographic.³²

While longitudinal studies are valuable resources in assessing variable changes over long periods of time, they provide only correlational data that, in isolation, may not be enough to ensure the provision of thorough, evidence-based therapies. Greater consideration for research into alternative therapies and pharmacological supplements, may also be valuable avenues.

It will be intriguing to see whether Canadian research efforts shift in the coming years in response to these emerging therapeutic alternatives to traditional methods of SLT. The recent findings and sentiments expressed by the researchers of the ACT NoW study in the U.K. represent a more critical outlook on the treatments currently available for individuals suffering from post-stroke communication disorders. Dialogue of this nature may become more frequent as researchers and health care professionals seek cost-effective, evidence-based solutions for health concerns pertinent to Canada’s fastest-growing demographic.

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