

**Critical Review:
Intervention in Chronic Dysarthria- Evidence for a Second Plateau of Recovery**

Jason Pineo
M.Cl.Sc SLP Candidate
University of Western Ontario: School of Communication Sciences and Disorders

Dysarthria is a common communication disorder with a potentially severe reduction in speech intelligibility and quality of life. Following a period of spontaneous recovery, individuals with dysarthria are often discharged by Speech Language pathologists, reducing the therapeutic resources available to these individuals with a chronic condition. The following critical review examines evidence for treatment efficacy for individuals with chronic dysarthria. A literature search was conducted and four studies were critically reviewed and discussed in terms of their clinical importance. Overall, these studies demonstrated that the resumption of speech therapy resulted in an improvement in speech intelligibility for individuals with chronic dysarthria, but failed to demonstrate a true 'second plateau' to justify the use of clinical resources in this population.

Introduction

Dysarthria is a series of neuromuscular communication disorders that can severely reduce speech intelligibility, resulting in a profound impact on overall quality of life for the individual with dysarthria (Mackenzie & Lowit, 2007). Dysarthria is also one of the most common communication disorders, comprising 46.3% of the referrals to the Mayo Clinic's Speech Pathology department between 1987 and 1990 (Palmer & Enderby, 2007).

There are numerous acquired, developmental and progressive disorders that result in dysarthria, creating a group of 'dysarthrias' defined by the cluster of symptoms observed (Palmer & Enderby, 2007). The complexity of varying etiologies may explain why dysarthria research has historically been sparse, regardless of the relatively large prevalence (Palmer & Enderby, 2007). A further complication of these multiple etiologies is that clinicians are often unclear when rapid therapeutic gains can be expected (Keatley & Wirz, 1994).

Individuals could be said to have 'chronic' dysarthria when their condition is both stable and longstanding (Palmer & Enderby, 2007). 'Stable' dysarthria refers to a condition that is non-progressive, such as stroke, traumatic brain injury or developmental disorders such as cerebral palsy (Palmer & Enderby, 2007). 'Longstanding' dysarthria refers to a point in the client's recovery where spontaneous recovery is complete and significant improvements in speech are no longer expected (Keatley & Wirz, 1994; Palmer & Enderby, 2007). Given that a clinician's resources are limited, adding a client with chronic dysarthria to a given caseload may be difficult to justify without evidence for a significant improvement in speech intelligibility.

Resource management is an important issue in any clinician's practice as many Speech Language Pathologists carry an ambitious caseload. Discharge decisions are often based on a client's predicted therapeutic benefit (Palmer, Enderby, & Hawley, 2007). A client may reach a point of diminishing returns called a 'plateau', which may be an appropriate time to discharge the client. Recently, a focus group of UK Speech Language Therapists indicated that once spontaneous recovery reaches a plateau, it is common to discharge a client with dysarthria (Palmer, Enderby, & Hawley, 2007).

A small number of case studies have suggested that in individuals with chronic dysarthria, there may be evidence of significant beneficial effects following the resumption of speech therapy (Enderby & Crow, 1990; Keatley & Wirz, 1994) akin to a 'second plateau', albeit less dramatic than is seen in spontaneous recovery (Palmer, Enderby, & Cunningham, 2004; Workinger & Netsell, 1992). In terms of resource management, a period of 'second plateau' several years after discharge may be a justifiable timeframe to dedicate precious therapy resources.

Objectives

The primary objective of this paper is to critically evaluate existing literature regarding treatment efficacy in individuals with chronic dysarthria.

Methods

Search Strategy

Computerized databases including SCOPUS, MEDLINE and PubMed were accessed using the

following search strategy: [(dysarthria) AND (longstanding) OR (stable) OR (chronic)].

The search was limited to articles written in English, with no other limitations on results. Relevant sources were also discovered by examining reference lists in journal articles obtained through initial searches.

Selection Criteria

Studies selected for inclusion in this review were required to examine the effect of treatment for individuals with a diagnosis of dysarthria, at least 2 years post-onset of injury or developmental disorder, with a non-progressive condition.

Data Collection

Results of the literature search using the above criteria yielded 2 single-subject case studies and 2 multiple-subject case studies of varying experimental design.

Results

Workinger and Netsell (1992)

This study examined the effect of a speech therapy program for a 28-year old male with severe mixed dysarthria. The subject had not received speech therapy for a period of 13 years and was reliant on a communication board, with limited vocalizations.

This single-subject study followed 18-months of treatment using a clinician-developed 7-point scale with respiratory, laryngeal, velopharyngeal and oral motor components. Subjective measures of voice quality and intelligibility were mixed with objective measures of maximum phonation time (MPT) and nasal manometry using a U-tube monometer.

Treatment included the use of a palatal lift prosthesis at 6 months, a grab bar for 'push and pull' vocalization exercises, and drills designed to increase the syllables produced per breath group. The authors reported that after 9 months of treatment, the subject was able to abandon his communication board for functional vocalization and at 18-months was ready for discharge. The authors credited much of the improved intelligibility to the palatal lift.

While MPT and manometry details can provide objective information, the author's choice to use a non-standard scale weakens the strength of this study's reliability. Additionally, while the authors detailed therapeutic methods and targets, it was unclear how many hours total were spent in therapy.

While the results of this study may seem dramatic, the measures used were non-standard and subject to criticism regarding their reliability and validity. As a result, the study may be considered equivocal in terms of clinical practice.

Keatley and Wirz (1994)

A single-subject case study by Keatley and Wirz (1994) of a 62-year old male with idiopathic dystonia provided suggestive evidence of improved speech intelligibility 20 years after discharge. The subject suffered from a developmental condition that presented as mild dysarthria early in life and progressed into moderate dysarthria in adulthood before stabilizing. Therapy focused primarily on lip-rounding, and the authors clearly outlined the methods and targets used in therapy.

This study used an ABACA design, such that the subject received two 4-week blocks of therapy (16 sessions total), with a break between therapy blocks. Intelligibility was measured using 8 naïve listeners, whose inter-rater reliability was verified in a pilot test. Specific speech targets were broken down in terms of lip rounding, and intelligibility results were analyzed using a 3-way ANOVA.

The authors found significant results, which suggested an improvement in the subject's intelligibility at the word and sentence level. The authors suggested that after a period of 20 years, the resumption of speech therapy made measurable changes in speech intelligibility for this subject.

Overall, the authors took great care in outlining each detail of their therapy program and ensuring that their measures were valid. The implementation of this single-subject study was excellent; however, the applicability is questionable. The subject has a very specific disorder profile and a long history of speech therapy. Nevertheless, the results can be considered compelling.

Enderby and Crow (1990)

This 20-year old study of four adults with severe dysarthria and brainstem involvement sought to determine a common pattern of recovery in this dysarthria group over the course of four years.

The study was a retrospective case study design of multiple subjects. The authors used the Frenchay Dysarthria Assessment (FDA), which uses a 9-point grading scale of oral motor tasks, reflexes, and speech characteristics, as well as intelligibility ratings at the word, sentence and conversation level. Each subject was treated in hospital over a period of 18 months and were

then followed on an outpatient basis. Subjects were assessed every 6 months over a period of 54 months. Changes in FDA scores over time were plotted on bar charts for each individual, and overall trends were discussed.

Clients showed moderate gains in terms of their total FDA score during their first 18 months of therapy. Notably, subjects began to show a more rapid improvement at 24 months post-injury and reached a plateau in therapeutic gains between 42-48 months. The authors argued that a short-term view of dysarthria recovery (within the first 24 months) would lead a clinician to believe that recovery had levelled off, and that the subjects would remain severely dysarthric.

The authors noted an important limitation of their assessment tool- the FDA is a non-parametric test, such that the scale intervals are not equal, limiting the author's ability to compare subjects. There was also a great deal of variability in treatment goals among the subjects, limiting any between-subject comparisons. However, the authors did examine general trends in recovery and acknowledged the limitations of their study. Overall, the evidence of this study was suggestive.

Palmer, Enderby and Hawley (2007)

This study built on previous work that demonstrated the effectiveness of computerized practice conditions for individuals with chronic dysarthria (Palmer, Enderby, & Cunningham, 2004). The authors studied the effect of two treatment methods- traditional therapy and computerized speech tasks, on speech intelligibility.

Seven adults with chronic dysarthria were assigned to a therapy method using an ABAC/ACAB therapy block design, receiving therapy once per week for 6 weeks with breaks between therapy blocks. Speech samples were taken using the intelligibility rating scale of the FDA and were rated by naïve listeners. The authors appropriately used a within-subject ANOVA to compare therapy conditions.

Results of this study were two-fold: first, traditional therapy and computerized therapy was found to be equally effective in improving speech intelligibility. Second, all subjects were able to make significant improvements in their speech intelligibility that generalized after the final 6-week intervention period (Palmer, Enderby, & Hawley, 2007). This is significant in that all subjects had chronic dysarthria and were discharged from therapy.

The FDA measure used in this study was questionable, using a grading system to rate intelligibility with a non-parametric scale; as a result, any comparisons between individuals would not be valid. The authors also repeatedly state that therapy lasted 40-60 minutes, with no clear control for the amount of therapy minutes each client received for each therapy type. Finally, the authors note that with so few subjects, the ABAC design could be subject to changes in each subject's health over time.

A secondary goal of this study was to provide an intervention that is equally effective as traditional therapy, while consuming fewer resources. While more evidence for computerized treatment strategies needs to be demonstrated, it may be a good 'middle ground' between individual therapy and group therapy (Palmer, Enderby, & Hawley, 2007). Overall, the results of this study could be seen as suggestive.

Discussion

Several factors inherent in the study of dysarthria cloud the interpretation of these studies. The type, severity and time post-injury varied greatly, and each author chose different approaches to intervention and subject design. However, two overall trends became apparent.

First, several authors suggested that the 'standard' 18-month timeframe post-injury is an insufficient amount of time to establish a 'chronic' dysarthria diagnosis, an argument made nearly 20 years ago (Enderby & Crow, 1990) that appears to be in dispute to this day (Palmer & Enderby, 2007; Palmer, Enderby, & Cunningham, 2004). It may be that a true 'plateau' in recovery may occur as long as four years post-injury (Keatley & Wirz, 1994), a timeframe that many therapists would feel uncomfortable allocating resources for individual therapy (Palmer, Enderby, & Cunningham, 2004).

Second, these studies provided limited evidence for a true 'second plateau'. The most dramatic change in intelligibility was demonstrated by Workinger and Netsell (1990) a full 13 years after discharge; however, this was arguably due to the fitting on a palatal lift and grab bar, two interventions that could have been implemented far earlier in the recovery process. Other studies addressed in this paper were able to demonstrate a measureable improvement in speech intelligibility, but none of these improvements could be described as a true 'second plateau'.

Ultimately, it's difficult to justify a change in policy regarding the timeframe for therapy in chronic dysarthria, given the limited evidence. Should a client with chronic dysarthria wish to resume therapy several

years after discharge, it remains at the discretion of the clinician to allocate resources for therapy.

Finally, many authors cited the overall lack of research in dysarthria, despite its relatively large prevalence as a communication disorder (Mackenzie & Lowit, 2007; Palmer, Enderby, & Cunningham, 2004). Some of this may be due to the variability of presentation among the dysarthrias (Palmer, Enderby, & Cunningham, 2004), potentially limiting the generalization of therapy techniques. In order to justify the high-demand on a clinician's resources when implementing therapy in chronic dysarthria, more compelling evidence needs to be conducted, along with continued research into the nature of dysarthria.

References

- Enderby, P., & Crow, E. (1990). Long-term recovery patterns of severe dysarthria following head injury. *British Journal of Disorders of Communication*, 25 (3), 341-354.
- Keatley, A., & Wirz, S. (1994). Is 20 years too long?: improving intelligibility in long-standing dysarthria-- a single case treatment study. *European Journal of Disorders of Communication*, 29 (2), 183-201.
- Mackenzie, C., & Lowit, A. (2007). Behavioural intervention effects in dysarthria following stroke: communication effectiveness, intelligibility and dysarthria impact. *International Journal of Language and Communication Disorders*, 42 (2), 131-153.
- Palmer, E., & Enderby, P. (2007). Methods of speech therapy treatment for stable dysarthria: A review. *Advances in Speech-Language Pathology*, 9 (2), 140-153.
- Palmer, R., Enderby, P., & Cunningham, S. (2004). The Effect of Three Practice Conditions on the Consistency of Chronic Dysarthric Speech. *Journal of Medical Speech-Language Pathology*, 12 (4), 183-188.
- Palmer, R., Enderby, P., & Hawley, M. (2007). Addressing the needs of speakers with longstanding dysarthria: computerized and traditional therapy compared. *International Journal of Language and Communication Disorders*, 42 (S1), 61-79.
- Workinger, M. S., & Netsell, R. (1992). Restoration of intelligible speech 13 years post-head injury. *Brain Injury*, 6 (2), 183-187.