Nonspeech Oral Motor Treatment Approaches for Dysarthria: Perspectives on a Controversial Clinical Practice

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This article addresses nonspeech oral motor treatments and reports the results of a search for evidence of their effectiveness in improving the speech of persons with dysarthria. The term *oral motor treatment* refers to a range of nonspeech and speech-like activities used to achieve a variety of goals that involve actions of the lips, jaw, and tongue. Interested readers should refer to the comprehensive review by Chapman Bahr (2001) for further information on this topic. Typically, these treatments are limited to behavioral techniques applied by professionals (e.g., oromyofunctional therapists, occupational therapists, speech-language pathologists) who are members of health service delivery teams, but they may be conducted in conjunction with surgical, orthodontic or pharmacological treatments in an attempt to maximize the functional benefits of these medical procedures (ASHA, 1993; Dworkin, 1991).

Nonspeech oral motor treatment activities described in the literature fall under three broad categories. These include: (a) isotonic and isometric strengthening exercises, (b) relaxation exercises, and (c) neurophysiological or neurotherapeutic approaches (Gordon, 1987). The goal of strengthening exercises is to promote appropriate lip, jaw, and tongue postures at rest and to increase the stability, strength, range, speed, and control of lip, jaw, and tongue movements (Duffy, 1995; Hanson & Barrett, 1988). In strengthening exercises, a person voluntarily activates target muscle groups to perform isometric or isotonic exercises, with or without resistance. These exercises are based on general principles of muscle conditioning. Increases in strength occur when muscle mass (number and/or size of muscle fibers) or recruitment and rate of firing of motor units increases (Duffy, 1995). If available, instrumentation can be used with these exercises to provide feedback to the person about strength or forces achieved.

The goal of relaxation exercises is to reduce abnormally high muscle tone in the lip, jaw, and tongue muscles. The goals of neurophysiological or neurotherapeutic approaches are to reduce muscle tone, inhibit abnormal oral reflexes and postures at rest and during functional tasks like talking and eating, and promote sensorimotor integration for learning skilled actions of the lips, tongue, and jaw for speech and the oral phase of eating (Chapman Bahr, 2001; Dworkin, 1991; Mysak, 1983; Robertson & Thompson, 1986). These approaches, which include the application of sensory stimuli to facilitate muscle activity, are based on techniques of Rood (1956) and proprioceptive neuromuscular facilitation (Knott & Voss, 1968), as well as techniques that focus on normalizing abnormal muscle tone and postural control and inhibiting reflexes and abnormal movement patterns. The latter techniques are based, in turn, on neurodevelopmental treatment (NDT; e.g., Bobath & Bobath, 1984).

Neurotherapeutic approaches are based on reflex or hierarchical models of motor control and traditional motor developmental and learning theories. They use a neurophysiological rationale to explain normal motor behavior and share the same assumptions about how the central nervous system (CNS) is organized and what happens when CNS damage occurs (Gordon, 1987; Mathiowetz & Haugen, 1994).

Some authors (e.g., Boshart, 1998; Chapman Bahr, 2001) include techniques that are components of traditional articulation therapy in "oral motor" treatment. These techniques use sensory stimulation in the form of physical prompts, spoken instructions, and visual, auditory, and tactile cues to help children and adults learn or relearn how to position and move the lips, jaw, and tongue to produce target consonant and vowel sounds. They resemble Duffy's (1995) description of traditional methods of articulation therapy for dysarthric speakers, which include integral stimulation (watch and listen imitation tasks); phonetic placement (hands-on assistance in attaining targets and movements, with picture or other cues for articulatory place and manner); and phonetic derivation (using an intact nonspeech gesture to establish a sound target such as blowing to facilitate production of /u/). The use of traditional articulation therapy placement techniques will not be reviewed here. Instead, the paper focuses on nonspeech oral motor treatment techniques.

Perspectives on Nonspeech Oral Motor Treatment

Nonspeech oral motor techniques are mentioned under behavioral treatments for the articulatory subsystem in many publications on intervention for persons with congenital and acquired dysarthria (e.g., Chapman Bahr, 2001; Duffy, 1995; Dworkin, 1991; Hodge & Wellman, 1999; Love, 2000; Theodoros & Thompson-Ward, 1998; Mysak, 1983; Solomon & Stierwalt, 1995; Tonkovich, Boettcher, & Rambow, 2001; Yorkston, Beukelman, Strand & Bell,

1999). The authors vary, however, in their views on the appropriateness and effectiveness of these techniques.

Advocates state that nonspeech techniques reduce neuromuscular impairments such as weakness, muscle tone abnormalities (abnormally increased or reduced), and reduced control in the lips, jaw, and tongue. The underlying hypothesis is that if the neuromuscular impairment in these muscle groups is reduced, the articulatory movements of the person with dysarthria will "normalize," resulting in improved speech function such as increased articulatory accuracy and speech intelligibility. Proponents claim that these techniques improve muscle function and motor control for speech by one or more of the following:

1. Increasing muscle strength and endurance,
2. Normalizing abnormal muscle tone,
3. Increasing sensory awareness and sensorimotor integration, and
4. Eliminating abnormal reflex behaviors that interfere with voluntary speech movements.

The predicted results are increased stability, speed, range, strength, and accuracy of movement of oral muscle groups (lips, jaw, tongue) in speech articulation.

Several authors who promote the inclusion of nonspeech oral motor techniques in treatment of dysarthria (e.g., Chapman Bahr, 2001; Dworkin, 1991; Mysak, 1983) provide step-by-step, sequentially ordered behavioral exercises for treating various speech subsystem disturbances, including deficits in articulation. These include exercises to treat lip, tongue, and jaw weakness or hypertonia and typically precede activities that involve phonetic stimulation of speech sounds. For example, Chapman Bahr (2001) described a typical 45-minute oral motor treatment session as having four segments, in the following order:

1. Gross motor activity to improve postural tone and stability necessary for improved eating, drinking, and speaking;
2. Oral massage that may improve precision of oral movements needed to improve drinking and eating skills as well as speech production;
3. Specific nonspeech oral motor activites and exercises to improve oral strength, mobility, and coordination for eating, drinking or speaking; and
4. Specific speech and language activities.

The gross motor, oral massage, and oral exercises occur in the first 15 to 20 minutes, leaving 20 to 25 minutes for more traditional speech and language treatment.

In contrast, several authors who are considered experts in the assessment and management of dysarthria (Duffy, 1995; Love, 2000; Theodoros & Thompson-Ward, 1998; Yorkston, Beukelman, Strand & Bell, 1999) expressed guarded opinions about the effectiveness of nonspeech oral motor techniques in improving speech performance and noted that the use of these techniques is controversial. For example, Duffy stated that patients who require a focus on articulation typically receive traditional articulation treatments, while other techniques like strength training, relaxation, stretching, and biofeedback are less universally appropriate. He advised that, in general, strengthening exercises should be used only after establishing that weakness of the oral articulators is clearly related to the dysarthria. He commented that patients whose physiologic support for speech is severely compromised might benefit from efforts to increase strength. Duffy also observed that if increasing the strength of a muscle group (in this case the lips, jaw, or tongue) is a treatment goal, then procedures need to adhere rigorously to principles for standard muscle strengthening exercises. For example, one would have to do five sets of 10 repetitions each, three to five times per session, with 5 to 10 exercise periods per day. The exercises should overload the muscle in some way, such as with high repetition-low resistance exercises or low repetition-high resistance exercises.

Theodoros and Thompson-Ward (1998) observed that the effectiveness of nonspeech techniques to alter muscle tone and strengthen oral muscles is difficult to quantify and has yet to be determined for the population of persons with dysarthria. Yorkston and colleagues (1999) stated that there is little evidence to support any generalization of nonspeech oral motor interventions to improved speech function in persons with spastic, hyperkinetic, hypokinetic, or ataxic dysarthria and advocated that intervention focus on speech or speech-like movements. Specific to children, Yorkston and colleagues were of the opinion that some nonspeech activities may be useful on occasion for children with dysarthria, who may benefit from improving strength or range of motion. They also stated that oral motor techniques they have found helpful are those that lead directly to phonetic placement and derivation. They concluded by stating that, "although nonspeech activities may be used during the first few minutes of a session to increase attention to the face, increase awareness of movement and so on, spending much of the session on nonspeech movement is probably not the best use of treatment time" (Yorkston et al., 1999, p. 563).

Love (2000) noted that there are conflicting research findings concerning the effects of muscle weakness and other types of oral motor impairment on speech performance. He suggested that careful analysis of muscle strength and movement

rates in a given child with dysarthria is probably the only reliable guide for recommending oral exercises to increase strength or movement. He observed that current management programs for childhood dysarthria are likely to use a broad spectrum of techniques and that oral exercises are generally given limited prominence in current intervention approaches. Tonkovich and colleagues (2001) stated that while many clinicians advocate the use of nonspeech repetitive exercises in the clinical management of dysarthric speech, there is little if any evidence to support the efficacy of such exercises. These authors stated that they did not include repetitive nonspeech movement exercises in their clinical program manual, *Dysarthria Rehabilitation*, because they believe that repetitive nonspeech movements do not generalize to speech intelligibility. They stated that clients might be misled by implicit or explicit claims that the practice of nonspeech movements will result in restored speech performance.

There appear to be many reasons for opposing views about the effectiveness of nonspeech oral treatment techniques for dysarthria. As descriptions of the specifics of these treatments vary from source to source, they are not delivered in a standardized manner. Also, dysarthria is a low incidence disorder and persons with dysarthria are a heterogeneous population. Children with dysarthria are undergoing growth and maturation, and are changing over time. They also differ in how they respond to the constraints imposed by their nervous system impairment as they attempt to function in their environments. It would appear, however, that the major reason for continued controversy is that there is not sufficient or compelling information available to resolve it. The arguments put forward by those who advocate nonspeech oral treatment techniques are not convincing those who oppose these techniques to change their views. Arguments put forward by those who oppose these techniques are not convincing those who do support their use to change their practice.

Data-Based Studies of the Effectiveness

Electronic health databases, books, and newsletters addressing treatment for dysarthria written by authorities in the field and two recent therapy manuals that include nonspeech oral motor techniques were reviewed. The purpose was to obtain data-based information addressing the effectiveness of nonspeech oral motor treatment techniques for adults and children with dysarthria.

Literature searches of health research databases. Medline, PsychInfo, and CINHAL were searched for citations from January 1960 to July 2002 that included the combined terms "oral motor" or "oromotor" and "dysarthria." Only one article was identified that reported the results of behavioral oral motor intervention. Harris and Murry (1984) reported the case of a 44-year-old man with flaccid dysarthria and aphagia resulting from a gunshot wound. Seven years after his injury, he received speech therapy. Initially, therapy focused on glottic closure, velopharyngeal closure, and tongue strength and mobility. After 9 weeks of intensive practice, gains were noted in strength and movement of the tongue, velum, and larynx, and in speech and swallowing function. The literature search did not identify any published, controlled, experimental studies (either group or single subject design) of the application of nonspeech oral motor behavioral techniques to children or adults with dysarthria.

Together, Duffy (1995) and Theodoros and Thompson-Ward (1998) identified 12 published studies of cases with dysarthria that reported results of the application of EMG biofeedback therapy to alter muscle tone and strength by decreasing and increasing muscle activity in the lips and jaw. In a few of these (e.g., Nemec & Cohen, 1984; Netsell & Daniel, 1979), improvements noted in jaw closure and/or lip strength were reported to result in an increase in speech intelligibility, which was maintained following discontinuation of the biofeedback.

Published anecdotal reports. Chapman Bahr (2001) and Dworkin (1991) were judged to be most comprehensive in their descriptions of the specific application of nonspeech oral motor techniques. Dworkin described the case of a 52-year-old woman with flaccid dysarthria resulting from a unilateral left acoustic neuroma. Strengthening exercises for the tongue, then lips, and then jaw were followed by training to improve the fine force control of each of these muscle groups. This was followed in turn by phonetic stimulation for consonants. Performance on these exercises was reported for each session. Ratings of the woman's speech improved from a pre-treatment articulation subsystem baseline rating of 3.5 on a 7-point scale, indicating mild to moderate articulatory imprecision, to a post-treatment score of 2.0. The effect of this change in rating on speech intelligibility was not reported. Chapman Bahr presented case descriptions to consider for practice in treatment planning, but did not report any data from individuals with dysarthria.

In a previous ASHA Division 2 newsletter, Solomon and Stierwalt (1995) described two patients with dysarthria who underwent tongue-strengthening training. The first was a 17-year-old woman who had sustained a traumatic brain injury as a result of a motor vehicle accident 30 months prior to the authors' evaluation. A program to increase tongue strength was implemented. After 18 months, tongue strength increased from 9 kPa to high 40s to low 50s kPa and the woman was able to produce 10 to 15 functional phrases. Speech

progress was confounded by velopharyngeal incompetence. The progress with speech indicated that a palatal lift was an option to further enhance speech intelligibility.

The second case involved a 72-year-old man with Parkinson's disease who demonstrated reduced and variable measures of tongue strength following a unilateral pallidotomy. Use of tongue strengthening exercises was one of several approaches used to increase his speech intelligibility. While his overall tongue strength improved, his performance remained variable and conversational speech remained largely unintelligible. Tongue strength training was terminated and treatment approaches with more promise were identified. Solomon and Stierwalt commented that strengthening exercises might not have been the best approach to remediating this patient's speech, even though he had reduced tongue strength. These authors suggested that tasks addressing the underlying motor problems of control and consistency of productions probably would have greater impact on speech.

In summary, the use of strengthening exercises for treatment of acquired dysarthria in adults was described in a few case studies. No studies of children were located. Reports of improvement in speech were limited to individuals with flaccid dysarthria and/or severely compromised function of the lips, jaw, and tongue for speech. There also are a few single case studies in which adults with dysarthria were reported to successfully alter muscle tone using biofeedback, with positive effects observed on speech. It would appear that there is insufficient empirical evidence to evaluate the effectiveness of these approaches for persons with dysarthria.

Occupational and Physical Therapy

In the occupational and physical therapy literature, several authors (e.g., Gordon, 1987; Mathiowetz & Haugen, 1994) have contrasted traditional neurophysiological approaches with more contemporary task-based approaches. As noted earlier, the former approaches are based on older reflex and hierarchical theories of motor development and motor responses to CNS damage. The latter approaches are based on systems models of motor development and control and are influenced by contemporary developmental and motor learning theories. Treatment approaches based on a task-oriented model of therapy focus on accomplishing functional goals rather than normalizing movement patterns. They involve more problem-solving by the client and less "hands-on" facilitating by the clinician. The emphasis is on specific skill acquisition versus enhancing quality of movement. Task-based approaches have emerged because of the limitations of neurophysiological approaches. As Gordon (1987) stated, "essentially the facilitating [neurophysiological] approaches promised more than they could deliver. The hope was that we could reinstate normal movement patterns. The reality was that even when we succeed in accomplishing this, we find that patients use movements different from the ones we teach them when confronted with functional tasks in meaningful environments" (p. 11). Gordon's chapter is relevant across the rehabilitation disciplines. It is recommended for clinicians looking for a very interesting, thoughtful, and reader-friendly discussion of the relationship between changes in scientific attitudes and new scientific knowledge and the development of new therapeutic models.

Another relevant contribution from the physical therapy literature is the American Academy for Cerebral Palsy and Developmental Medicine (AACPDM) evidence report on the effects of NDT (Butler & Darrah, 2000). In the report summary, the authors stated that the preponderance of results presented in the evidence table did not confer any advantage to NDT over the alternatives to which it was compared, other than immediate improvement in dynamic range of motion. There was no consistent evidence that NDT changed abnormal motor responses or facilitated more normal motor development or more functional motor activities. Based on the evidence reported, the authors noted the need for concerted efforts to investigate other therapy approaches that may prove more clearly beneficial. They suggested that these new approaches might grow out of more contemporary theories of motor development and motor learning and skill acquisition and may include task-oriented approaches based on dynamic systems concepts.

Treatment principles that are derived from contemporary motor learning theories have also been proposed to guide speech therapy practice. Sample principles based on Schmidt and Bjork (1996) and Strand (1995) include the following:

1. Training tasks are goal-directed and build on previously learned behaviors;
2. Learning is context-specific, and training activities should simulate real-world tasks (in this case, speech); and
3. The learner has the necessary prerequisite behaviors (motivation, attention, effort/focus, trust), is *actively* involved as a problem solver, has multiple opportunities to practice attaining the goal, and has knowledge of the results.

Conclusions

The use of nonspeech oral motor treatment approaches for persons with dysarthria is controversial. Acknowledged experts in assessment and treatment of dysarthria are guarded in their opinions about the use of these techniques to improve function. There is very little published data on the use of

nonspeech oral motor treatments for treating speech function in persons with dysarthria. The information that does exist is limited to adults and primarily addresses the use of strengthening exercises. A few case studies reported beneficial effects of strengthening exercises for adults with acquired flaccid dysarthria and/or severely compromised physiologic support for speech. Similarly, a small number of adult case studies reported positive changes in speech when biofeedback was used to decrease or increase abnormal muscle tone. In regard to children with dysarthria, no empirical studies were located in any of three major health databases for either oral motor strengthening exercises or neurotherapeutic approaches. Although several current therapy manuals advocate such techniques for children, none include efficacy data or even anecdotal descriptions of treatment results. The search yielded no evidence to support the use of passive facilitative techniques (like brushing, icing, application of stretching or massage to inhibit reflexes, normalize increased muscle tone, or promote sensorimotor integration) to improve speech function in children or adults with dysarthria.

Contemporary reviews of the use of traditional neurophysiological treatment approaches by physical and occupational therapists suggest that these approaches are not effective in improving functional motor behaviors. A recent AACPDM evidence report on the effects of NDT, which has strongly influenced the development of nonspeech oral motor neurotherapeutic techniques, did not find consistent evidence that NDT changed abnormal motor responses or facilitated more normal motor development or functional motor activities in children with cerebral palsy. There is a shift in the occupational and physical therapy literature away from these more traditional neurophysiological therapy approaches to ones based on more task-oriented models.

The AACDPM reports list *levels of evidence* based on whether evidence is empirical or not and, if so, the rigor of the experimental design. The highest level of evidence is Level I, which is group or single subject randomized controlled trials. The lowest is Level V, which ranges from descriptive case studies, anecdotes, expert opinion, and theories based on physiology, to "common sense/first principles." The little "evidence" that was identified for the effects of nonspeech oral motor treatment for persons with dysarthria falls at this lowest level. Clearly, if these treatments are used with the expectation that they will improve speech function, their effects need to be documented and reported. Studies of the relative effects of these treatments compared to other approaches, such as those based on more recent theoretical models of motor development and control, are also required. There are alternative treatment approaches for dysarthria that have evidence to support their effectiveness, while evidence to support the effectiveness of nonspeech oral-motor treatment approaches for dysarthria is lacking. Until this information is available, the clinician may want to consider a set of guiding questions to assist in clinical decision-making. These are based on the literature and the author's "common sense" and may be helpful when considering the use of nonspeech treatment approaches for persons with dysarthria.

- What is the overarching goal of treatment?

  Is speech the highest priority for the individual's communication needs and goals?

  If speech is a priority, remember that in dysarthria, the impairment may extend to structures beyond the oral articulators. The articulatory disorder needs to be considered in relation to function of the respiratory, laryngeal, and velo-pharyngeal systems. Will effective treatment of articulatory disturbances need a broader treatment approach rather than a focus on just articulatory training?

- Will the selected exercises result in improved performance on the target behaviors?
- Is there a better technique available to accomplish the goal? As an ethical practitioner, one must always consider the principles of beneficence (do good) and non-maleficence (do no harm). Use of an ineffective or unnecessary technique has the potential to do harm because it is wasting client time and resources that could be spent on more efficient (better outcome in less time) treatment approaches to achieve functional speech goals.
- Are there contraindications to using therapeutic nonspeech oral motor exercises?
- Are there structural constraints (e.g., trismus, large tonsils, complete lip paralysis) on oral function?
- Is there a potential for harm (e.g., temporomandibular joint vulnerability)?
- Is the client motivated to participate in a therapeutic exercise program? Attention, motivation, and effort are needed for learning.
- If strengthening exercises are used, can the client, family, and clinician invest the time needed for the oral motor exercises to make a difference? The client must "overload" muscle to change its strength so multiple repetitions and sets are needed several times a day over several weeks.
- How will the individual know that he or she has accomplished the task successfully (i.e., achieved the goal)?
- How will you know when the goal of the exercises has been met?

- What will the individual have learned when the goal of the exercises has been met?
- How will you tell if treatment is working?
- How will you document and report the results of the treatment?

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Continuing Education Questions

1. Nonspeech oral motor treatment activities include all of the following *except*

a. speech intelligibility training based on minimal pair contrasts.

b. isotonic and isometric strengthening exercises.

c. relaxation exercises.

d. application of sensory stimuli.

2. Advocates of nonspeech oral motor treatment for dysarthria believe that

a. the techniques reduce neuromuscular impairments in the lips, jaw, and tongue.

b. if neuromuscular impairment of the oral articulators is reduced, speech will improve.

c. the techniques increase sensory awareness.

d. all of the above.

3. Guarded opinions about the effectiveness of nonspeech oral motor approaches to dysarthria suggest that

a. effectiveness in altering muscle tone and strengthen-

ing oral muscles is difficult to quantify.

b. much evidence supports generalization to speech function in persons with dysarthria.

c. the techniques should always be used with patients with dysarthria.

d. the techniques result in restored speech performance.

4. Which of the following characterize a task-oriented model of therapy for persons with neuromotor disorders, as described in contemporary occupational and physical therapy literature?

a. The focus is on accomplishing functional goals versus normalizing movement patterns.

b. Tasks involve more problem-solving by the client and less "hands-on" facilitating by clinician.

c. The emphasis is on specific skill acquisition versus enhancing quality of movement.

d. All of the above.

5. Based on the information presented in this article, which statement about nonspeech oral motor techniques is true?

a. The inclusion of passive facilitative techniques to improve speech function in children with dysarthria is supported by published empirical research.

b. Beneficial effects of neurotherapeutic approaches on speech intelligibility are well established in adults with flaccid dysarthria

c. The use of nonspeech oral motor treatment approaches for persons with dysarthria is controversial.

d. Empirical research reports the effectiveness of oral motor strengthening exercises on speech intelligibility in children with cerebral palsy.

Augmentative and Alternative Communication Intervention in Neurogenic Disorders with Acquired Dysarthria

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A diverse group of individuals with acquired neurogenic disorders and severe dysarthria may benefit from augmentative and alternative communication (AAC). These include persons with traumatic brain injury (TBI), stroke, and those with degenerative neurological diseases such as amyotrophic lateral sclerosis (ALS), Parkinson's disease (PD), Huntington's disease (HD) and multiple sclerosis (MS; Doyle, Kennedy, Jausalaitis, & Phillips, 2000; Klasner & Yorkston, 2000; Mathy, Yorkston, & Gutmann, 2000; Yorkston, 1996). The etiology, incidence, and characteristics of these disorders are described elsewhere (e.g., Doyle et al., 2000; Klasner & Yorkston, 2000; Mathy, Yorkston, & Gutmann, 2000; Yorkston, Miller, & Strand, 1995).

January 1, 2001, the United States' national public health care system, Medicare, responded to the growing body of evidence documenting the efficacy of AAC interventions for individuals with dysarthria and other severe expressive communication disorders (aphasia, apraxia, aphonia) by reversing the longstanding policy of non-reimbursement of AAC devices (AAC/RERC Web site). This policy change was a major step in the journey to bring AAC intervention into standard speech/language pathology practice for persons whose speech functioning is so impaired that they are unable to meet their communicative needs in activities of daily living. For the first time, AAC intervention, including assessment, treatment and prescription of high tech AAC devices (referred to as Speech Generating Devices, SGD, by Medicare) has national Health Care Financing Administration Common Procedure Coding System (HCPCS) billing codes. Moreover, since the Medicare policy took effect, private insurance carriers have begun to modify their coverage policies for AAC devices and services (L. Golinker, 2002, personal communication). Therefore, the goal of this article is to provide an update on AAC intervention focusing on individuals with severe acquired dysarthria. The article includes a multidimensional clinical decision-making model for AAC intervention in dysarthria, an overview of the components of AAC intervention, and a summary of recent research in evidence-based practice in AAC with individuals who have dysarthria.

Clinical Decision-Making Model

The process of clinical decision-making involves determining the stage of functioning or progression of a disorder and providing evidence-based treatments at each level. This practice is well established in the medical profession and is becoming more common in speech language pathology. For example, Yorkston and Beukelman (1999, 2000) described a treatment staging strategy for individuals with progressive dysarthria. They described five stages, beginning with Stage 1—"no detectible speech disorders" and culminating with Stage 5—"no functional speech." Proposed treatments ranged from providing information for planning for the future loss of speech in Stage 1, to the use of low technology and high technology AAC strategies in Stage 5. An example of this model was provided by Mathy, Yorkston, and Guttman (2000) who presented an overview