

Introduction

When *Dysarthria Rehabilitation* (Tonkovich, Latham, & Rambow, 1982) was first published, it was designed for the improvement of clients' speech intelligibility for a geriatric population in acute hospital and nursing facility settings. The program helped clients improve intelligibility by exaggerating articulatory movements, by reducing rate through prolonging vowels within words, and by improving speech prosody. The original version was developed in a world in which microwave ovens, home video recorders, cellular telephones, and computers were not parts of daily life. Clinicians at the time were largely unconcerned about reimbursement issues, and treatment was delivered primarily in individual one-on-one situations with speech-language pathologists.

Based on the positive feedback about the program from clinicians over the years, we have updated and supplemented the material to better meet the needs of clients with dysarthric speech. In this revised *Dysarthria Rehabilitation*, we have retained features of the original work, included updated stimulus items, and reorganized some other items. The updated picture stimulus items now appear in the Picture Book, where they are divided into two sets. While still intended for use by speech-language pathologists and clients with dysarthric speech, the program is also intended for use by therapy extenders, including speech-language pathology assistants, family members, and other caregivers. For this latter audience, it is recommended that a speech-language pathologist help select appropriate activities for individual clients. It may be useful also for speech-language pathologists to monitor the administration of particular tasks and exercises to ensure that they are appropriate for the speaking needs and degree of

dysarthria severity of each client. The following guidelines and suggestions may be useful in assisting clinicians in implementing the materials in the revised edition.

Assessment

Clinicians should complete a thorough evaluation of each client's oral-peripheral mechanism and speech performance prior to the use of these materials. Cognitive, language, pragmatic, and hearing skills should also be addressed as necessary. Referrals for appropriate medical, dental, prosthetic, and assistive devices should be made prior to or in conjunction with use of the program.

Several dysarthria assessment measures are available commercially. These include *Assessment of Intelligibility of Dysarthric Speech* (Yorkston & Beukelman, 1981), *Frenchay Dysarthria Assessment* (Enderby, 1983), *Computerized Assessment of Intelligibility of Dysarthric Speech* (Yorkston, Beukelman, & Traynor, 1984), and *The Sentence Intelligibility Test* (Yorkston, Beukelman, & Tice, 1996).

Informal measures are also described in the literature. In a procedure described by Weiss (1978), the clinician obtains a tape-recorded speech sample of connected speech of 50 to 100 words, completes a word-by-word analysis, and computes a percentage of intelligibility. A rate assessment of words per minute (WPM) can be calculated with procedures and normative data applied for objective comparisons, as described by Glenn, Glenn, and Forman (1993). Hargrove and McGarr (1994) also describe a procedure for calculating rate in terms of syllables per minute (SPM), and these values can be compared to normative data.

Differential Diagnosis and Implementation of Treatment Tasks

Clinicians may find it useful to try to provide a differential diagnosis of the type of dysarthria exhibited by their clients. For information about differential diagnosis of dysarthria type, clinicians are referred to Darley, Aronson, and Brown (1975) and Duffy (1995). When clinicians are able to identify symptom clusters associated with the various types of dysarthria, they have a better understanding of the neurological basis of the aberrant speech, and can target specific clinical behaviors.

The clinician is expected to select items appropriately based on the individual needs of each client. In certain instances, such as in the mixed dysarthria associated with amyotrophic lateral sclerosis, the clinician may wish to abandon efforts at improving oral speech as a goal. In other cases, certain aspects of *Dysarthria Rehabilitation* may be useful entry points into intervention for those with particular dysarthria types. For instance, a client with the hypokinetic dysarthria associated with Parkinson's disease may benefit from practice in the rate section. Clients with hyperkinetic dysarthrias stemming from Huntington's chorea might also benefit from beginning with practice in rate. Those with cerebellar lesions and subsequent ataxic dysarthrias may begin with prosodic practice in order to promote speech precision. Individuals with flaccid dysarthrias stemming from traumatic brain injuries or brainstem lesions may benefit from postural adjustments and exaggeration of articulatory movements to reduce breathiness and hypernasality. Speakers with spastic and unilateral upper motor neuron dysarthrias may find the exaggeration section useful as well.

Starting Point

An appropriate starting place in therapy for any given task would be where the client can perform with 60% to 70% accuracy (Duffy, 1995). Tasks on which clients perform at less than 50% accuracy will be too difficult for most clients. Clinicians may choose to transfer skills when a client demonstrates 80% accuracy or better on any given task for two to three sessions. A skill demonstrated at the 90% to 100% accuracy level can be considered a met target or an expected outcome.

Pragmatically speaking, an expected outcome would be determined by an individual's ability and prognosis. For example, a client who can produce numerous single words with precision at the 95% level may have met his expected outcome if he is unable to progress to short phrases beyond the 75% level. This is where the role of professional judgment plays an important part in the therapy process.

Spontaneous Usage

To promote generalization of skills as soon as possible, spontaneous production at each level has been introduced in the *Dysarthria Rehabilitation* procedures. While the previous edition targeted spontaneous usage at later tasks in each section, this edition provides for procedures to elicit spontaneous usage at each level. Current trends support providing efficient therapy in an expedient time frame. In order to provide quality, cost-effective services, providers must set reasonable, achievable goals. Encouraging spontaneous production at the word level from the beginning of therapy sets the stage for the expected outcome for the client, that is, that he or she spontaneously produces intelligible speech at the highest level possible to the best of his or her ability. When picture stimuli are used to elicit spontaneous, expository speech, clinicians might find it useful to place a barrier between themselves and the pictures. When clients describe pictures that are concealed from the view of their conversational partners, more natural communication and communication repairs occur.

Repair Strategies

Given that communication is a two-way venture between speaker and listener, it is the responsibility of both participants to ensure that the message is sent and received successfully. Practically speaking, each party contributes to the process. This communication exchange typically continues when an impairment exists; however, there may not be an equal shift in bearing the burdens of the communication exchange. Some treatment strategies target speaker behaviors while others focus on completing the total communication process (Duffy, 1995). For

example, a client could gesture by pointing to the TV that he wanted it turned on, and his wife could comply with a head nod. Complete communication would have taken place without a word being spoken.

The role of the speaker is to convey a message as naturally as possible. The listener receives the message and responds accordingly. The response may take place through answering verbally in a conversational turn or completing a request. Both parties have the opportunity to employ a variety of techniques when there is a breakdown in the exchange. While it may not be a reasonable expectation for a dysarthric speaker to have clear speech fully restored, it may be reasonable to expect listeners in his or her environment to assist with the back-and-forth aspects of communicating. The dysarthric speaker and his or her listener may both need guidance in implementing some of the following suggestions to repair a breakdown in the message. As clients progress through activities in this book, clinicians can select from the following techniques to teach repair strategies in case of a gap in the completion of the process:

- restate with a slowed rate (I want orange juice.)
- restate with an increased volume (I want **ORANGE** juice.)
- repeat exactly
- rephrase (not apple, orange juice)
- gain eye contact
- move closer to the listener and watch his or her face
- ask for a repetition (a listener's strategy)
- state a key word (orange)
- gain attention by calling the listener's name to prepare him or her to listen

Self-Monitoring

Clients are encouraged to be active participants in their therapy and to share the responsibility for the outcome. It is important to discuss this from the outset of therapy. Clients need to know what is expected of them, and clinicians need to state what their own role in therapy will be.

Often, clinicians provide frequent feedback to clients regarding their responses. While this can be needed in the establishment phase of a skill, it can be detrimental to continue it for too long. Helping clients make the transition to being independent with their skills is part of our role. Fading feedback promotes generalization, and weaning the client from reinforcement as soon as a skill is acquired promotes self-assessment (Schmidt & Bjork, 1992). Self-monitoring increases the efficiency of time spent in dysarthria therapy.

Outside listeners' judgments of communication effectiveness can be valuable (Thomas & Keith, 1989) by creating client awareness of how well they are getting their message across.

Strategies to help clients self-monitor include the following:

1. Help clients collect their own data when possible.
2. Provide home practice instructions and help clients learn how to implement; daily practice calendars can be helpful.
3. Teach clients how to self-assess their productions and how to give you feedback on their speech.
4. Encourage clients to help set their own realistic goals.

Home Programming

For *Dysarthria Rehabilitation* to be implemented effectively, clients should meet a number of parameters. Clients must have the potential for using speech as a communication mode and sufficient comprehension to understand task and strategy directions. Clients must be aware of their speech production deficits, and have the desire to participate in interventions. They should have sufficient motivation to practice using strategies outside of regularly scheduled speech-language treatment sessions. As much as possible, relevant others in the lives of these clients must agree willingly to engage in intervention efforts and they too must be sufficiently motivated to follow through with treatment recommendations.

Speech-language pathologists should develop home programs that delineate what clients must do outside of regularly scheduled speech-language sessions. Yorkston, Beukelman, Strand, and Bell

(1999) outlined strategies that might be useful for improving intelligibility for both speakers with dysarthria and for the communication partners of dysarthric speakers. These strategies are displayed in Tables 1 and 2.

Oral Motor Exercises

Though widely used by speech–language pathologists, repetitive non-speech oral motor exercises may be of little use in the clinical management of dysarthric speech. These exercises have been implemented presumably to strengthen oral musculature. Such exercises

Table 1
Strategies for Improving Intelligibility for Dysarthric Speakers

Provide your communication partner context for what you are saying.
Do not shift topics abruptly.
Use turn-taking signals.
Get your listener's attention.
Use complete sentences.
Use predictable types of sentences.
Use predictable wording.
Watch the tone of your voice.
Rephrase your message.
Accompany speech with simple gestures when appropriate.
Take advantage of situational cues.
Make the environment as "friendly" as possible.
Avoid communication over long distances.
Use alphabet board supplementation.
Communicate emotional messages.
Have a handy backup system.

Note. From *Management of Motor Speech Disorders* (pp. 534–536), by K. M. Yorkston, D. R. Beukelman, E. A. Strand, & K. R. Bell, 1999, Austin, TX: PRO-ED. Copyright 1999 by PRO-ED, Inc. Reprinted with permission.

have been used in conjunction with biofeedback in the treatment of cranial nerve damage in a few anecdotal reports (Ziegler, Hoole, Hartmann, & Von Cramon, 1988; Daniel & Guitar, 1978). There is little support, however, in the clinical literature for the use of repetitive oral motor exercise without biofeedback. Also, clinicians who use these

Table 2
Strategies for the Communication Partners of Dysarthric Speakers

Make sure you know the general topic of the conversation.
Watch for turn-taking signals.
Give your undivided attention.
Choose the time and place for communication.
Watch the speaker.
Piece together the cues.
Make the environment work for you.
Avoid communication over long distances.
Make sure your hearing is as good as possible.
Decide on and incorporate strategies for resolving communication breakdowns.

- Signal as soon as you do not understand.
- Let the speaker know the parts of the message that you did understand.
- Let the speaker repeat the misunderstood words one at a time.
- If you still don't understand, ask the speaker with dysarthria to go to a predetermined "backup" plan that involves perhaps rephrasing, verbal spelling or writing.

Establish some rules.
Facilitate communication with others.

These strategies may be incorporated into practical home programs for clients and relevant others in their lives to use outside the speech–language therapy sessions. Clients and their communication partners should be provided with tasks for practicing use of these strategies.

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exercises without instrumentation are unable to determine the magnitude of the effectiveness by visual inspection of the muscles. Yorkston et al. (1999) state that there is little evidence to support any generalization of nonspeech interventions on persons with spastic, hyperkinetic, hypokinetic, or ataxic dysarthrias, and advocate that interventions for these individuals focus on speech or speechlike movements.

Many of the exercises prescribed by clinicians employ nonspeech movements and do not use speech musculature in the same way it is used for speech production. For instance, there may be no relationship between pointing the tongue lip alternately toward the nose and the chin, when no speech movements in English or other languages require such movements. Clients likely obtain better practice by actually producing speech. Relative to speech production, precision of movement and coordination of speech musculature are more important to intelligibility than muscle strength (Yorkston et al., 1999). There is evidence in the literature to suggest that even with little strength of the articulatory musculature, clients are capable of producing intelligible speech. Barlow and Abbs (1983) demonstrated that intelligible speech production requires only 10% to 20% of the maximum force of lip movement. Repetitive exercise is actually contraindicated in some dysarthrias, such as those stemming from myasthenia gravis and those from amyotrophic lateral sclerosis. Clinicians should not underestimate the influences of spontaneous recovery of flaccid dysarthrias resulting from cerebrovascular accidents. Some individuals who present with mild flaccid dysarthrias immediately postonset have improved function within the first few months postonset, even without direct intervention.

To summarize, although many clinicians advocate 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. Repetitive nonspeech oral motor movements do not generalize to speech intelligibility. In fact, clinicians who state explicitly or implicitly that practice of nonspeech movements will result in restored speech production performance may mislead clients. Such claims may be subject to litigation or ethical sanctions imposed by governmental regulatory boards and professional associations. For these reasons, *Dysarthria Rehabilitation* does not contain such exercises nor do we advocate their use.

Data Collection

For the clinician's convenience, forms for data collection are included in Appendixes C and D. Appendix C is a form for tracking successful, approximated, and unsuccessful responses. Appendix D is a data collection form to aid in identifying clients' movement through the program. These forms might also benefit paraprofessionals and caregivers using the materials.

Augmenting Speech Production

Some individuals with severely dysarthric speech might benefit from the use of devices to augment speech production. *Dysarthria Rehabilitation* activities may be adapted for use for those requiring augmentative communication devices. A practical, low-tech approach that facilitates rate control and intelligibility enhancement in dysarthric speakers is the alphabet board supplementation approach described by Buekelman and Yorkston (1977) and Crow and Enderby (1989). In this approach, speakers must locate and point to the initial letters or words on an alphabet board, forcing them to reduce rate of speech production and affording their listeners additional cues. When the alphabet board is sufficient in slowing the rate of speech production, it may be small and need not be viewed by a listener. When viewing the first letter of a word is essential to a listener's comprehension of that word, a larger alphabet board is required. *Dysarthria Rehabilitation* contains both a small and a large alphabet board that can be used by dysarthric speakers to augment speech production (see Appendix A).

Hustad (1999) reported that intelligibility for dysarthric speakers could be enhanced when both an alphabet board and a topic board were used in conjunction with each other. The topic board is included in Appendix B. The client, after producing an utterance, identifies both the topic of the utterance on a topic board and the first letter of the first word on an alphabet board. In severe cases, clients may require more sophisticated electronic communication devices, especially when intelligible speech is an unattainable goal.

Garcia, Cannito, and Dagenais (2000) suggested that some dysarthric speakers might benefit from training in the use of hand gestures

(gesticulations) as an adjunct to the use of speech. Severely dysarthric speakers might benefit from training in the use of iconic gestures that depict some aspect of what is being described (e.g., showing an “okay” sign when saying “okay”). Speakers with mildly dysarthric speech might benefit from training in use of beat gestures (e.g., tapping a finger during speech production) that emphasize or accentuate speech in efforts to improve speech naturalness. Clinicians may find that some dysarthric clients will benefit from concurrent training in gesticulations and *Dysarthria Rehabilitation* activities.

Clinicians may also find *Dysarthria Rehabilitation* useful for other clinical populations such as those with regional dialects and foreign accents, those learning English as a second language, those with voice and prosody disorders, individuals with nonneurological articulation and phonological disorders, individuals with fluency and rate disorders, and individuals seeking to improve their general speech intelligibility.

How To Use This Book

Section 1: Exaggerating Articulatory Movements

Speech intelligibility is largely influenced by articulation. Since most dysarthric clients tend to slight or slur speech sounds, teaching exaggerated articulatory movements is helpful for increasing the client's speech intelligibility (Darley, Aronson and Brown, 1975).

Section 1 deals with teaching exaggerated articulatory movements to the dysarthric client. These tasks begin with exaggerated oral movements of single vowels and consonants and progress to exaggerated words, phrases, and sentences, and finally to conversational speech. Initially, the word tasks are divided into three consonant groupings on the basis of place of articulation (labial, alveolar, and lingual sounds). These consonant groupings allow the client to work on various sounds with similar articulatory movements and afford the clinician the opportunity to differentiate the more difficult movements for each client. Words containing consonant sounds with similar articulatory movements are also provided, with the target sounds occurring in all three positions of words: initial, medial, and final.

Each client will articulate some sounds more intelligibly than others. Thus it is important that the clinician recognize the client's abilities and set realistic criteria according to these abilities. When a client plateaus on a given task or reaches the predetermined criterion level, the clinician should proceed to the next, more difficult, task. Because each client will vary according to articulation skills, it is important that he or she begin the program with a task that is appropriate to his or her abilities. A client may begin exaggerated articulatory training with any task on the hierarchy and proceed toward the conversational speech level.

Section 2: Reducing Speech Rate Via Vowel Prolongation

Addressing the rate of speech can be beneficial to the overall intelligibility of speech. Rate can refer to the words per minute or the syllables per minute that a speaker reads or speaks. Duration can refer to the length of the phoneme itself. Since this section focuses on the lengthening of the actual vowel/diphthong in the nucleus of the word, it may be helpful for the clinician to think in terms of the duration of that phoneme as well as to the overall rate.

Since rapid rate frequently characterizes the speech of some dysarthric speakers, and since slowed speech facilitates the achievement of articulatory targets in others, vowel prolongation can be a useful procedure for rate or duration control. Telling a client to “slow down” may not be effective. Instructing a client to extend the length of time the vowel is produced increases the amount of time necessary to produce the entire word. Such efforts may lead to a more intelligible word production.

The stimulus items in Section 2 are arranged in order to provide the client with a progression of practice items from single syllable words to conversational speech. If your client needs an introductory step to distinguish between rapid production and vowel prolongation, please use one. It may be helpful to have clients discriminate between fast and slow productions at the word and phrase level in the speech of others as well as in their own speech. This step may be helpful for clients using self-monitoring strategies in future tasks; however, the primary purpose of this program is to provide opportunities for verbal productions. If

needed, the clinician may choose examples from the lists and present examples contrasting fast and slow (e.g., go home and go home).

Other suggestions the clinician may find useful in establishing vowel prolongation include the following:

1. A flattened palm held facing the client could be a nonverbal reminder to reduce rate.
2. A pencil/pen can assist clients in prolonging vowels in words. Slide the pencil across the table while verbally producing the word. The client continues prolonging the vowel until the clinician stands the pencil upright. The client completes the production of the word at this point.
3. Stretching a rubber band can signal a client to stretch the vowel.
4. Drawing arrows across vowels can remind the speaker to lengthen the sound.
5. Sliding a finger across the table can signal the speaker to "slide or glide" a vowel.
6. Written, visual cues to *s t r e t c h* a given word or phrase can be written in **bold**, in UPPERCASE LETTERS, in *italics*, or underlined.
7. Highlighting phonemes with colors can draw attention to the specific aspect.
8. Drawing circles or squares around vowels can serve as reminders to clients.
9. Using a pacing board can assist. Have the client imitate one sentence at a time by moving his or her hand across the board, saying one word per space: I am ready.

10. Index cards with numbers written on them can remind clients of the correct number of syllables to produce in a given word, with emphasis on the vowel.

General reminders to pause at needed junctures may be used. Low technology tools such as the Pocket Talker, Language Master, or the Facilitator may provide immediate auditory feedback for the client working on speech intelligibility via rate reduction by vowel prolongation.

Section 3: Improving Speech Prosody

Prosodic aspects of speech are often altered in clients with dysarthria. The stimulus items in this component are designed to provide the client with practice in stress, intonation, and speech phrasing.

Speakers with ataxic dysarthrias and hyperkinetic dysarthrias typically evidence overt disturbances of syllable and word stress. Other dysarthric speakers have difficulty with stress characteristics of speech. The exercises in this section for improving stress move in graded difficulty from appropriate stress placement in bisyllabic words to the appropriate stress placement of word stress to signal new information in sentences (Clark and Clark, 1977).

Intonation drills are designed to increase the client's ability to distinguish between declarative and interrogative sentences. The client may also benefit from differentiating polite imperatives (with rising intonation contours) and direct imperatives (with falling intonation contours).

Finally, speech phrasing drills are included to enable the client to determine how to utilize breath support efficiently for speech production. Sentences are printed with generous margins to allow the clinician to circle word clusters suitable for each client's physiological ability for phrasing. The client, by the end of the phrasing drills, becomes able to self-monitor the coordination of breathing with speech phrasing.