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 of AAC intervention in ALS. They included a detailed description of the staging of AAC intervention, based on stages of speech and physical functioning typically observed during the progression of the disease.

An AAC treatment staging strategy that encompasses the range of disorders associated with acquired dysarthria requires a multidimensional perspective. This approach addresses speech, language, cognitive, physical, and visual functioning as well as progression (static or progressive), and prognosis for regaining functional speech with treatment. At the end of this paper is a list of the stages of functioning in speech, language (literacy), cognitive, visual, and physical domains relevant for AAC intervention planning, in disorders associated with acquired dysarthria ("Functional Staging for AAC Intervention").

Speech Staging

The planning and implementation of AAC intervention differs based on the etiology of the dysarthria. In degenerative diseases, for example, speech decline into stage 2 and beyond may be a presenting or early symptom, such as with bulbar onset ALS and HD (Klasner & Yorkston, 2000; Mathy et al., 2000; Yorkston, Miller, & Strand, 1995). In contrast, dysarthria may not appear until late in the course of the disease in PD and MS (Armstrong, Jans, & MacDonald, 2000; Klasner & Yorkston, 2000; Porter, 1989; Yorkston et al., 1995). As well as evidencing persistent changes over time, speech performance in people with degenerative dysarthria may show fluctuation during the course of a day due to the effects of fatigue or medication. In some cases (e.g., MS), speech also may oscillate between functional stages due to exacerbations and remissions of the disease. These factors may influence AAC use and must be taken into consideration in intervention planning.

In all of the studies reviewed for this paper, the authors stressed that an essential component of successful intervention was the provision of regular follow up to assess speech functioning and assist individuals with degenerative diseases and their families to plan for the future. (Armstrong et al., 2000; Ball, Willis, Beukelman, & Pattee, 2001; Doyle & Phillips, 2001; Klasner & Yorkston, 2000, 2001; Porter, 1989). For example, Ball and colleagues (2001) stressed the importance of monitoring speech functioning over time, using objective measures of speech intelligibility, speaking rate, voice, and resonance. Their longitudinal monitoring of speech in persons with ALS showed that rapid (within 2 to 4 months) decline in speech functioning into Stage 3 and below consistently followed a reduction in speaking rate to half of that predicted for non-impaired speakers. The implications of these results are that once speaking rate has declined to this point, the decision to begin the assessment for a high technology AAC device should occur immediately, to allow time for the funding process and for the individual to learn to use the AAC device before needing to rely on it.

In contrast to degenerative dysarthria, people with TBI may show a recovering pattern of speech functioning. Based on their review of speech recovery in TBI, Doyle, Kennedy, Jasualaitis, and Phillips (2000) concluded that the majority of persons with TBI recover speech functioning to the point where they do not need to rely on AAC or require it only in challenging speaking situations (e.g., noise, unfamiliar communication partners). Doyle and colleagues also found a relationship between speech and cognitive recovery in adults with TBI. When speech recovered, it typically occurred by the middle stage of cognitive recovery. This corresponds to Stages V and VI in the Levels of Cognitive Functioning (LOCF; Hagen, 1984). Those who did not recover speech by this stage were likely to have permanent speech impairment. The rate of recovery of speech in the studies reviewed by Doyle and colleagues (2000) ranged from 3 to 48 months post-injury. An example of a protracted period of recovery was given by Light, Beesley, and Collier (1988), who documented improvement of speech in an adolescent girl across a 44-month period. During that time, she began augmenting her communication using low technology AAC strategies and then moved to microcomputer-based devices. Finally, she regained the ability to rely primarily on natural speech to meet her communication needs.

Cognitive Staging

Concurrent cognitive processing deficits are seen in both degenerative and acquired motor speech disorders (Armstrong et al., 2000; Doyle et al., 2000; Klasner & Yorkston, 2000, 2001; Mathy et al., 2000; Yorkston et al., 1995). Therefore, the intervention team should be prepared to examine functional cognitive skills as part of AAC intervention. This includes use of information from formal cognitive assessments and scales (e.g., LOCF; Hagen, 1984) and observation of the person's ability to learn to communicate with targeted AAC strategies and devices. In addition, AAC interventions for persons with both degenerative and acquired disorders must accommodate changing (i.e., declining or improving) cognitive status over time.

The five stages of cognitive functioning described in "Functional Staging for AAC Intervention" highlight important skills related to the selection and use of AAC strategies and devices. For example, with individuals who have cognitive impairments affecting attention, memory and learning (Stage 3 or below), published reports have documented greater success with AAC devices and strategies that capitalize on well-learned skills (Armstrong et al., 2000; Doyle et al., 2000; Klasner & Yorkston, 2000, 2001; Mathy et al., 2000). For example, Doyle and colleagues (2000) found that persons unfamiliar with the QWERTY layout did better with an alphabetic letter arrangement on a low technology or high technology AAC device.

Language (Literacy) Staging

As part of the AAC assessment process, it is important to determine the person's ability to construct messages using spelling. Most adults with the neurogenic disorders discussed in this paper retain the ability to spell, but cognitive processing deficits may impede their ability to use spelling independently to communicate (Doyle et al., 2000). To construct messages through spelling, the communicator must formulate the message and keep it in mind long enough to deliver it through a process of searching for and selecting each letter to spell the message. Motor impairments and language impairments, such as word retrieval deficits, also may increase the cognitive load of message construction (Doyle et al., 2000).

Visual Staging

Many individuals with acquired dysarthria have concomitant visual processing deficits that affect their ability to use and benefit from features available on AAC devices. Although formal assessment of visual processing may be helpful, as was suggested in relation to cognitive functioning, determination of the effects of visual functioning may best be determined by observing performance with target AAC technologies during the assessment process. For example, word prediction, a common feature on high technology devices, requires the user to look away from the keyboard to the screen to determine if the program has predicted the target word. Individuals with visual tracking deficits (functioning in Stage 2 or below) may have difficulty using word prediction or other features that require rapid shifts of gaze.

Upper and Lower Extremity Staging

The staging of upper and lower extremity physical functioning also influences the selection of high technology and low technology AAC aids. For example, an individual who is at Stage 1 in upper extremity physical functioning, but at Stage 5 in speech functioning, may benefit from a high tech device with a full-sized keyboard to allow for a typing rate (communication rate) that is as rapid as possible. Before an individual enters the final phase of AAC device selection, however, he and his caregivers and service providers should consider the stage of lower extremity physical functioning. Individuals functioning at Stage 3 or above in ambulation usually want a device that is small enough to be carried by hand or in a purse or "fanny pack," whereas those using a wheelchair may require a wheelchair mounting system to transport the device. A team evaluation that includes an occupational and physical therapist is recommended for the assessment of upper and lower extremity functioning and to determine the best options for the person to access and transport AAC devices.

Intervention Strategies

The next section is a review of AAC intervention strategies ranging from those designed to supplement natural speech to interventions for individuals whose speech is no longer functional. In each section, results from published studies of the use of AAC interventions by people with acquired dysarthria will be presented when available.

Speech Supplementation

Even when their speech is moderately to severely unintelligible, most individuals with dysarthria continue to rely on it as their primary mode of communication. In such instances, speech supplementation strategies, also referred to as signal-independent strategies (Yorkston, Beukelmen, Strand, & Bell, 1999), should be evaluated. These strategies are designed to provide listeners with contextual information external to the speech signal, to increase the comprehensibility of the message. Such strategies include gestures, alphabet supplementation, topic supplementation, and managing the environment (e.g., reducing background noise).

When using alphabet supplementation, the speaker points to the first letter of each word on an alphabet display as the word is spoken, thereby providing the listener with the orthographic-phonetic context to support speech production and increasing the listener's ability to understand the message (Yorkston et al., 1999). For topic supplementation, the user indicates the topic of the message prior to speaking it, to provide the listener with a frame of reference in hopes of increasing the accuracy of understanding (Yorkston et al., 1999). Each of these methods can be used alone or in combination with low technology or high technology communication displays. The user can point manually, if possible, or use a head stick or head-mounted optical pointer.

Hustad and Beukelman (2000) reviewed the results of published experimental studies examining the effects of speech supplementation strategies, including alphabetic cues and topic cues, on sentence and discourse intelligibility. They found that listeners' ability to transcribe sentences and discourse produced by dysarthric speakers was better with alphabetic and topic cues when compared to no cues. Results varied based on the type of cue. Alphabetic cues were more beneficial than topic cues, and combined cues (alphabetic and topic) had the greatest effect on improving intelligibility. In addition, the severity of dysarthric speech also affected results. In general, speech supplementation produced the greatest improvement in intelligibility for individuals with moderate and severe dysarthria compared to those with profound dysarthria.

Although a number of studies have examined the potential of speech supplementation to improve speech intelligibility of dysarthric speakers, Hustad and Beukelman (2000) found few studies that examined its use in daily communication. Other areas for future research include examination of patterns of use of speech supplementation strategies by individuals who have access to them, partner attitudes and acceptance of speech supplementation, and cognitive/linguistic skills required to use speech supplementation strategies successfully. Research on listener attitudes toward speech supplementation is a current focus of the Research Engineering Research Center (RERC) on AAC (http://www.aac-rerc.com). As part of this project, Hustad (2001) examined listener attitudes toward three speech supplementation strategies: topic cues, alphabet cues, and combined cues. Listeners indicated a higher degree of communicative effectiveness and willingness to interact with the dysarthric speaker when combined cues (topic and alphabet) were used.

When Speech Is Not Functional

When speech is no longer functional, intervention becomes focused on AAC methods that will maintain the person's communicative functioning in activities of daily living. Research examining the outcomes of AAC intervention for people with ALS (Doyle & Phillips, 2001; Mathy et al., 2000) indicates that these individuals use different AAC methods, depending on factors such as their communication goal and their communication partner. For example, Mathy and colleagues (2000) found low technology methods were preferred to communicate a simple request such as for something to drink, whereas high technology methods were used to communicate detailed directives, talk on the phone, and tell stories. These results emphasize the importance of providing a continuum of AAC methods that can be employed, depending on the user needs and communicative circumstances.

Unaided AAC Methods

Unaided AAC methods are those that do not require any external device or chart, such as facial expressions, responses to yes-or-no questions, gestures, and partner-assisted auditory scanning. With partner-assisted auditory scanning, the communication partner verbally lists the alphabet or a predetermined list of options until the user indicates that the desired element has been reached, and then the process is repeated until the message is complete. When this method is used to spell messages, the alphabet may be segmented in half or into quarters to speed up the message construction process (e.g., A-M, M-Z). The user can indicate a letter through any means established by the user and the listener (e.g., gesture, vocalization, buzzer switch). For example, the author worked with a patient with ALS who used a buzzer switch (e.g., one buzz for "yes," two buzzes for "no") with partner-assisted-auditory scanning. At a clinic visit, he and his wife shared how they used this method to communicate in bed at night. When she helped him into bed, his wife clipped his buzzer switch to his pillow. When he needed something, he moved his head to access the buzzer to wake his wife. Once awake, his wife began the process of assisting him to construct his message using partner-dependent auditory scanning.

As unaided AAC methods require minimal physical movement, they are appropriate for individuals functioning across the range of physical stages described in "Functional Staging for AAC Intervention." They can also be used in situations where the partner cannot look at or see the listener (e.g., in the dark, riding in a car) or when the AAC user has reduced visual acuity and/or visual processing deficits. In addition, partner-assisted auditory scanning can be adjusted to accommodate for a range of cognitive and language (literacy) functioning. For example, individuals who have a good attention span and unimpaired spelling ability can use partner-dependent auditory scanning to spell messages. Those with reduced attention span and spelling skills may benefit from a hierarchy of yes and no questions, asked in a consistent order to narrow down the message as illustrated in "Example of a Yes/No Question Heirarchy" at the end of this article.

Research on the use of unaided AAC methods is lacking. There are, however, a few published reports on their use by individuals with acquired neurogenic communication disorders. Mathy and colleagues (2000) reported on AAC use patterns by people with ALS. A total of 24 subjects were included, 12 with spinal onset and 12 with bulbar onset of the disease. At the time of the study, all subjects functioned at Stage 5 on the speech scale. All subjects reported using facial expression and responses to yes-or-no questions. Five of the 12 patients with spinal onset ALS reported using partner-dependent auditory scanning, but none of the patients with bulbar onset ALS used this method. The latter group functioned at Stage 1 or 2 in upper extremity functioning and at Stage 3 or above in lower extremity functioning and, therefore, had less need to rely on partner-dependent communication methods than did the patients with spinal presentation, who all functioned at Stage 5 in both upper and lower extremity staging at the time of the study.

In their long-term case studies of AAC intervention for four people with ALS, Doyle and Phillips (2001) found that although the participants had access to high technology AAC devices, they primarily relied on unaided approaches during the late stage of the disease. This stage corresponded with reduced motor abilities and a narrowing of communication partners and topics. During the final stage of the disease, subjects spent most of their time in bed cared for by family members and communicated primarily to indicate basic needs. In a similar vein, Porter (1989) presented a case study of AAC intervention for a man during late stage MS. Due to motor and visual deficits, he relied primarily on auditory scanning (both partner-assisted and automatic scanning). Finally, Soderholm, Meinander, and Alaranta (2001) reported on the use of AAC by 17 patients with locked-in syndrome. The initial communication methods used by all of these individuals included eye movements to indicate responses to yes-or-no questions and respond when the alphabet was "read-out" by the communication partner.

Teaching unaided AAC strategies, particularly establishing a means to answer yes-or-no questions, is often the first step in the AAC intervention process. Moreover, research examining the use of these strategies with individuals with acquired dysarthria indicates that the strategies continue to be used as part of the individual's communication repertoire, even when the user has access to high technology AAC devices. This is particularly true for individuals with reduced upper extremity functioning.

Low Technology AAC

Low technology AAC methods include alphabet boards or picture symbol communication displays, accessed using either manual direct selection, optical direct selection, or partner-assisted manual scanning. Partner-assisted manual scanning requires the communication partner to point sequentially to letters on the alphabet board, written message lists, or picture symbol displays until the user indicates that the desired element has been reached. The process is repeated until the message is completed. It is useful for the partner to write down the elements of a message during the message construction process so that both partners can keep track of the message as it is created.

As with unaided AAC methods, an advantage of low technology AAC methods is their cost and the flexibility to be adjusted by the communication partner to meet the physical, cognitive, and linguistic abilities of the AAC user. Low technology AAC strategies also allow for immediate improvement of communicative functioning and provide a means to practice skills necessary to be successful with high technology AAC methods. For example, individuals in Stage 5 in upper extremity functioning may need practice to become proficient in accessing a switch for a high technology AAC device that uses row-column scanning. Practice can be accomplished with partner-assisted manual scanning by having the user access a bell or buzzer placed in the most physically accessible location to indicate when the partner has reached the desired message element on the manual scanning display. Partner demands for timing and accuracy can gradually be increased to simulate the demands of scanning on a high technology AAC device.

A few recent studies have examined low technology AAC use by individuals with acquired dysarthria, including those with ALS (Doyle & Phillips 2001; Mathy et al., 2000), HD (Klasner & Yorkston 2001), and PD (Armstrong et al., 2000). In their report of AAC usage patterns in ALS, Mathy and colleagues (2000) found that the majority of the subjects with spinal onset (9/12) and all of the subjects with bulbar onset (12/12) used low technology AAC techniques; however, the techniques differed based on physical abilities. All of the bulbar onset subjects had adequate upper extremity functioning at the time of the study and therefore used handwriting as their primary low technology method. The spinal onset group relied on alphabet boards accessed with partner-dependent visual scanning or optical pointing. The four subjects with ALS studied by Doyle & Phillips (2001) included two with bulbar onset and two with spinal onset ALS. Both of the subjects with bulbar onset used handwriting in the early and middle stages of the disease when it was still physically possible. One of the subjects with spinal onset used an Eye-Gaze board, and no low technology strategies were described for the other subject with spinal onset ALS.

Klasner and Yorkston (2001) described the use of low technology AAC strategies termed "cognitive and linguistic supplementation" for WD, a 44-year-old man diagnosed with HD in 1993. They used an in-depth, guided interview process with WD and his wife to identify the communicative activities that were most important to him and that he wished to have assistance to maintain. These included involvement in running the household and family decision-making and talking to his wife and friends about his daily life. Intervention for conversation with his wife involved the use of linguistic-cognitive supplementation with scripts. For example, WD wanted to be able to talk to his wife about what he did at home during the day while she was at work. To support this activity, a notebook with short descriptions of the activities in which WD typically engaged during the day was developed. During therapy, WD learned to trigger his scripts of various activities using key words and his wife learned strategies to facilitate effective conversation with WD, such as beginning with similar questions each day.

Armstrong and colleagues (2000) surveyed speech language pathologists in Scotland regarding their experiences implementing AAC with individuals diagnosed with PD. Of the 32 therapists initially contacted, 23 responded. When queried about their application of low technology AAC devices, respondents indicated most frequent use of amplifiers, alphabet boards, picture charts, and pacing boards. Nearly half of those surveyed indicated a low rating of success with low technology with PD clients. Among the primary reasons given for this rating included cognitive/memory problems, preference for speech, and lack of motivation.

As is the case with unaided strategies, low technology AAC strategies are inexpensive and highly adaptable to needs of the user. Continued research on low technology AAC strategies is needed to support evidence-based AAC practice with individuals who have acquired dysarthria.

High Technology AAC

Traditionally, high technology AAC devices are placed in two categories: dedicated devices and integrated/multipurpose devices. Dedicated devices are designed and manufactured specifically for the purpose of augmentative communication. They provide a means to select message elements on the device (e.g., a keyboard, switch scanning, or combinations of input methods), a means to formulate messages (e.g., iconic codes, orthography, or combinations of message construction elements), and a mode of output (e.g., synthesized speech or digitized speech). Multipurpose/integrated AAC devices consist of standard microcomputer platforms and special software and hardware. The special software instructs the operating system (e.g., Windows, Windows CE, Macintosh OS) to work with a speech synthesizer, and provides access to the computer through a variety of methods including a modified keyboard, joystick, or mouse, and optical or switch scanning.

As indicated above, the means to access the AAC device is an essential component. Access technologies are designed to accommodate the user's physical abilities to make selections. These technologies range from simple micro-switches to brain-computer interface technologies in which the user moves the cursor on the computer screen by learning to control the amplitude of mu and beta rhythms in electroencephalographic recordings from the sensorimotor cortex (Wolpaw, Birbaumer, Heetderks, McFarland, Peckham, Schalk, Donchin, Quatrano, Robinson, & Vaughan 2000).

In their studies of AAC technology usage patterns with people with ALS, Doyle and Phillips (2001) and Mathy and colleagues (2000) reported that all subjects used high technology devices. People with bulbar onset were more likely to use small, keyboard-based devices such as the Link™ and the LightWRITER™. These devices were accessed using manual direct selection in the early to middle stages of the disease process (Doyle & Phillips, 2001), and adapted to be used with a keyguard (Link™) and scanning (LightWRITER™) as upper extremity functioning declined in the late stage of the disease process. These results underscore the need to plan for upper and lower extremity functioning decline, when selecting high technology devices for people with degenerative diseases.

All of the individuals with spinal-onset ALS studied by Doyle and Phillips (2001) and Mathy and colleagues (2000) used multipurpose devices, such as EZ Keys™, accessed using single-switch scanning or two-switch Morse Code. This multipurpose AAC device includes the EZ Keys™ software implemented on a notebook computer (the package is sold as the Freedom 2000™). In addition to providing a means for speech communication, this program also allows the user to apply his or her physical access method (e.g., single switch scanning, Morse Code, Joystick) for full computer access. Mathy and colleagues found that subjects with spinal onset ALS used their high technology AAC devices extensively for computer activities, such as written communication and email, as well as for speech augmentation.

In their survey of AAC use by individuals with PD, Armstrong and colleagues (2000) found that the LightWRITER™ was the most frequently used device with this group. The respondents in the study reported a generally higher level of success with high technology AAC than with low technology strategies. In their conclusions from this preliminary study, the authors stressed the need to provide early and regular speech/language intervention for people with PD to enable timely introduction of AAC intervention as needed. They also stressed the need for controlled research examining the efficacy of AAC intervention in PD.

Medicare groups all dedicated AAC devices under four codes based on the following characteristics: type of speech output (synthesized or digitized), message type (pre-recorded messages or formulated "spelled" messages), recording time (for digitized devices only—shorter than 8 minutes or longer than 8 minutes), and access method options available (direct physical contact only or multiple access methods). AAC software programs for integrated devices have a separate Medicare code. There are additional codes for device accessories and wheelchair mounting systems. Further information regarding Medicare guidelines for AAC assessment and funding can be found on the Medicare information Web site (AAC/RERC Web site).

Future Research Needs

As indicated in the beginning of this article, the documentation of positive outcomes of AAC intervention for individuals with severe expressive communication disorders was essential to bring about the change in Medicare reimbursement policy for AAC intervention. For continued optimal intervention for individuals with AAC needs, the field must continue to provide evidence. As illustrated by the publications reviewed in this paper, most of the information currently available to support evidence-based practice in AAC for people with acquired dysarthria comes from clinical experience and case studies. Although this information is useful to illustrate the effects of AAC intervention with individuals with various disorders, there is also a need for controlled studies examining the efficacy of AAC interventions for individuals with acquired dysarthria across the etiological groups. A suggested list of questions for future research includes the following:

- What are the most effective service delivery models for assuring the timely provision of AAC intervention across the etiological groups?
- What features of AAC devices and accessories do individuals prefer across the etiological groups?
- Which AAC devices are the most effective for individuals from different etiological groups with differences in cognitive, literacy, visual, and physical functioning?
- Which cognitive skills and deficits have the greatest impact on the success of AAC intervention?
- Which features of AAC devices and accessories do family members and friends of AAC users prefer?

The field of AAC is diverse and challenging, but there are numerous resources (e.g., books, workshops, World Wide Web sites) available for speech language pathologists and other professionals to assist them in assessment, funding, and treatment planning in AAC intervention. In addition to the AAC-RERC Web site, which contains information on Medicare and descriptions of research in AAC currently in process, the site hosted by The Hattie B. Munroe and the Barkely Memorial Augmentative Communication Centers is another valuable resource (http://aac.unl.edu/). The materials provided on this site include links to all of the vendors and manufacturers of AAC devices, AAC device tutorials, treatment resources, and more. Moreover, with the lifting of barriers to funding AAC devices and services by Medicare and private insurance carriers, there has never been a more rewarding time to provide AAC intervention for individuals with acquired neurogenic disorders.

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Speech Staging

1. No reduction in speech functioning.
2. Detectable speech disorder but speech remains intelligible.
3. Speech intelligibility reduced especially in challenging speaking situations (e.g., noise groups).
4. Natural speech requires supplementation by augmentative communication aids and strategies in most situations.
5. No functional speech. Augmentative communication aids or strategies needed to maintain functional communication.

Cognitive Staging

1. Cognitive functioning not affected.
2. Cognitive functioning mildly affected in the areas of attention, memory and new learning but aware of deficits and able to compensate independently.
3. Cognitive functioning moderately affected in the area of attention, memory, new learning, self monitoring. Performs best with previously learned tools
4. Cognitive functioning severely affected in all areas. Needs context (e.g., scripts) and partner support to engage in communication.
5. Cognitive functioning profoundly affected may not be aware of communication partner.

Literacy Skills Staging

1. Spelling communicator. Has functional literacy skills for written communication and has no difficulty using spelling to communicate on an AAC device.
2. Supported spelling communicator. Reading is functional for reading the newspaper but relies on spelling supports such as word prediction to maintain independent communication.
3. Graphic symbol/sight word communicator. Recognizes basic sight word vocabulary, is not able to use spelling to maintain independent communication even with support, however, may be able to identify first letters of words.
4. Graphic symbol communicator. Not able to read or spell. Relies on graphic symbols to construct/represent messages.
5. Non-symbolic communicator.

Visual staging:

1. Visual processing not affected.
2. Visual processing mildly affected. May have ocular motor deficits that affect tracking, and/or field cuts that cause visual neglect, but is aware of deficits and able to use compensatory strategies effectively.
3. Visual processing moderately affected. Unable to independently compensate for deficits in tracking, neglect, etc. Performs best when materials are placed in optimal areas for viewing.
4. Visual processing severely affected. Requires auditory and/or tactile information to augment visual input for optimal performance.

Upper Extremity Staging

1. Accelerated rate AAC communicator. Has full use of both upper extremities, may already have developed good keyboarding skills or is capable of learning keyboarding. Handwriting not affected.
2. Moderate rate AAC communicator. Has adequate use of one or both upper extremities, but demonstrates some fine motor impairment that affects message construction rate. Able to handwrite but legibility may be affected.
3. Supported manual use communicator. Has sufficient use of one or both upper extremities for accessing AAC device but requires supports (e.g., key guard) to maintain accuracy. Unable to handwrite.
4. Alternate access direct selection communicator. Upper extremi-

ties not functional for access but has sufficient control head or other body part to use optical pointer (e.g., head mouse).

5. Alternate access switch user. Must use micro switch with scanning, etc. to access an AAC device.

Lower extremity staging:

1. Ambulation not affected.
2. Gait affected but independent ambulation.
3. Supported ambulation (must use crutches, cane or walker to prevent falling, may use wheelchair for long distance mobility).
4. Independent supported mobility (uses manual or power wheelchair to maintain independent mobility).
5. Dependent supported mobility (requires assistant to move wheelchair).

Example of a Yes/No Question Hierarchy

Directions

1. Determine the method that the individual uses to indicate "yes" and "no."
2. Ask the questions in the same order each time.
3. Continue through the series of questions until the message has been determined.

Questions to Narrow Down the Message Category

- Do you need to tell me something? [If "yes," ask the next question]
- Is it an emergency? [If "yes," go to *Emergency Questions* sub list]
- Are you in pain? [If "yes," go to the *Pain Questions* sub list]
- Do you want to do something? [If "yes" go to the Things to do Questions sub list]
- Do you want to ask about someone in your family? [If "yes," go to the *Family Questions* sub list]

Question Lists by Category

Emergency

Do you need the doctor?

Do you need your medication?

Do you need to lay down?

Pain

Where is the pain; is it your head, eyes, ears, nose, back, stomach?

Things to do

Watch T.V.

Listen to music.

Read

Book

Magazine

Family

Husband

Children

Daughter

Son

Continuing Education Questions

1. Prior to January, 2001, Medicare funding for AAC devices was

a. limited to adults over age 65.

b. limited to individuals with aphasia.

c. not available.

d. available to individuals in nursing homes only.

2. Provision of regular follow-up services to monitor speech functioning is essential in AAC intervention in degenerative diseases such as ALS for all of the following reasons *except*

a. it is required by Medicare.

b. it helps the individual plan for future intervention needs.

c. it helps predict when the individual may need an AAC device.

d. it allows time for an individual to learn to use an AAC device before needing it.

3. Assessment of cognitive functioning skills for successful use on an AAC device should

a. include the use of cognitive assessments and scales.

b. include observation of the individual's ability to learn to use target AAC devices during the assessment process.

c. accommodate changing cognitive status over time.

d. all of the above.

4. When implementing AAC intervention for individuals with Huntington disease, Klasner and Yorkston (2001) used

a. alphabet supplementation strategies.

b. cognitive support devices.

c. cognitive and linguistic supplementation strategies.

d. family support strategies.

5. According to the studies of patterns of AAC use in people with ALS (Doyle & Phillips, 2001; Mathy, Yorkston, & Gutmann, 2000), the type of high technology device most often used by people with spinal onset was a

a. small portable device.

b. device that could be accessed manually.

c. multipurpose or integrated device.

d. dedicated device