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Upfront

This double issue of *Augmentative Communication News* focuses on Auditory Scanning (AS), a communication technique designed to address the needs of individuals with severe speech, motor and visual impairments. Although the number of augmented communicators who use auditory scanning techniques is relatively small, the need for research, clinical strategies and information about the use of AS techniques is significant.

The **Clinical News** section gives an overview of AS techniques and strategies and identifies issues that warrant careful consideration when planning and implementing them. **Equipment** considers features of high-tech AAC devices that offer AS options. Tables I and II list available AAC devices with auditory scanning options. **For Consumers** summarizes the results of a survey conducted during 1998 among professionals who work with individuals who use AS devices. Respondents shared information about the diagnoses, skills and uses of no-tech, light-tech and high-tech strategies and devices among 28 auditory scanners.

This issue also introduces three new sections of *ACN.* **On the Web** features two new information resources about auditory scanning. The AS Website has information about auditory scanning with links to other sites that focus on augmentative communication. The AS listserv seeks to facilitate discussions about clinical and research issues. These valuable resources were developed by David McNaughton in collaboration with Tracy Kovach and others. The **Case Examples** section highlights two auditory scanners who were included in the survey. This section allows for a more in-depth view of how some individuals are using AS techniques. **AAC-RERC** introduces *ACN's* ongoing coverage of the new Rehabilitation Engineering Research Center on AAC. Subscribers to *Augmentative Communication News* will be kept

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Clinical News

Auditory Scanning

Auditory scanning (AS) is an AAC access technique. In AS a communication partner or a device with a synthetic voice announces vocabulary items, one at a time, until the AAC user hears what he or she wants to say and selects the item. Is this approach to communication slow and tedious? Most definitely. However, AAC users who cannot use a visual-based system have clearly demonstrated the value of AS techniques.

Auditory scanning can be done using no technology, light technology (non-electronic equipment) or high technology (electronic equipment).

No-tech

A partner presents language in a linear scan. *"Which shirt do you want to wear? The red one? The blue one? The striped one?"* The augmented communicator waits and indicates his choice by vocalizing, blinking, smiling or moving some body part. This technique is known as partner-assisted auditory scanning.

Another form of partner-assisted auditory scanning, which is only slightly different, is asking "yes/no" questions. For example, the partner says, "*Do you want to wear the red one?"* and waits for a response

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before asking about the *"blue one"* or the *"striped one."*

No-tech strategies require no equipment, which is an advantage. In addition, they can be very efficient with familiar partners. A disadvantage is that augmented communicators must rely on their partners to access language and, therefore, they remain in a position of dependency.

Light-tech

A partner presents language to the augmented communicator by reading from a card, communication board or a book in which the vocabulary is written down. Augmented communicators select their messages, as described above. Some may hit a switch to indicate their choice (the switch is not connected to a device or appliance at the time.)

Vocabulary can be arranged in a linear fashion as described earlier, or may be presented using branching, as described below.

Partner: The partner asks a question (*e.g.*, What would you like to do?) Then, the partner reads a list of categories from a card or book. The categories are organized in a way that is meaningful to the AAC user. For example: "Does it have something to do with . . . "

Math? Free time? Reading? Gym? (Activity based)

School? Home? Community? Babysitter's house? Supermarket? (Location based)

Food? Clothing? Household items? (Taxonomic based)

Mom? Dad? Teacher? Brother? (People based).

Augmented communicator (AC): The individual selects a category, *e.g.,* "Food."

Partner: Additional items are presented. For example, the partner might then read . . . "Hamburger? Drink? Dessert?" *etc*.

AC: The user selects what he wants, *e.g.*, "Hamburger."

Partner: The partner expresses the selection, *e.g.,* "You want to eat a hamburger." The partner then asks about toppings or a drink, and so on.

Light-tech systems have several advantages. They enable augmented communicators to: (1) become familiar with the language in their system, (2) be less dependent upon a specific partner's knowledge of their needs and preferences, (3) participate in more activities, (4) develop more independence, and (5) establish personal relationships with more people. In addition, light-tech approaches allow for more flexible communication. Human partners adapt more quickly to the shifting needs and circumstances of AAC users than machines. A major disadvantage of light-tech systems, however, is that users are dependent upon partners to communicate.

High-tech

Instead of a human partner, AAC users listen to a speech synthesizer (either digitized or synthesized) that announces the vocabulary items and speaks the message that is selected. AAC users generally activate the scan by hitting a switch, and the auditory cues begin. The user listens to the cues and selects the desired

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abreast of the research and outcomes of the Center over the next five years.

In the **Governmental** section, we share with our readers a strategic approach that is designed to challenge (and change) Medicare funding policy in the U.S. Currently, individuals eligible for Medicare are most often excluded from reimbursement for AAC devices. This section provides an AAC assessment protocol for speech-language pathologists that will increase the likelihood of successful reimbursement for Medicare funding of AAC devices. The protocol was developed by master clinicians and policy makers. Some may find it a useful guideline for developing funding requests throughout the world.

I would like to thank all who contributed to this issue. The are listed in **Resources and References** section on page 15. I am particularly grateful to Tracy Kovach who encouraged me to write about this topic and inspired the survey.

A "heads up." We will be developing an *Augmentative Communication News/Alternatively Speaking* Website over the next six months. I welcome your suggestions with respect to both form and content.

Finally, as we approach the 21st century, and electronic mail and resources permeate our lives ever more deeply, I would like to clarify our protocol. All electronic addresses listed in *ACN* will be underlined and colored (blue).

Sarah W. Blackstone, Ph.D.

message (or the category label where the message is located) by hitting the switch again, and so on. Augmented communicators listen to the auditory cues either through an earphone, a speaker placed close to the head, or the speaker in their AAC device. Ideally, two different voices are used. One presents the cues; the second speaks the selected message (the user's "voice"). It is better if auditory cues are not audible to the communication partners because they can be very distracting. However, during training sessions, the scan should be audible to both partners.

The Denver Symposium

Since 1995, four symposia on auditory scanning have been hosted by The Children's Hospital in Denver, Colorado. Individuals interested in AS have gathered each year to consider a wide range of issues and to share concerns about auditory scanning.

The AS experience

What is auditory scanning like for the people who use it? Of course, we don't really know because no AAC user has described it. However, we do know that when participants at the 1998 Denver Symposium were blindfolded and asked to play the role of an augmented communicator using a high-tech AS device, they provided some insightful comments:

> "I was overwhelmed. It was too noisy and hard to concentrate."
>
> "I felt left out. *I qui*t was my favorite message."
>
> "I just wanted everyone to ask me *yes/no* questions."
>
> "I became disengaged. After a while everything blended together and became background noise."
>
> "The volume was too low."
>
> "Most of the time I couldn't answer the questions people asked."
>
> "I had trouble remembering where things were in the device."

These comments suggest that the experience of being visually impaired and an AS device user can be quite disorienting and frustrating. Participants also reported that auditory scanning techniques required enormous concentration and focus. As a result of their experiences, they recommended several strategies:

> Consider using an in-the-ear speaker so it is easier for the user to listen to the scan.
>
> Conduct training sessions in quiet environments.
>
> Involve augmented communicators in planning and organizing vocabulary. Unless they are involved, they don't know what vocabulary is available, how it is organized or where to find it.
>
> Train communication partners who are natural speakers to use AS techniques effectively.

Who benefits?

Auditory scanning techniques originally were developed to accommodate the needs of people with severe communication and motor impairments who were unable to see visual symbols. According to Kovach and Kenyon,[1] however, a few augmented communicators who are not visually impaired may also use auditory scanning techniques because auditory feedback can help them:

> Learn the names or locations of visual symbols.
>
> Focus their attention on the message.
>
> Use their vision to interact with partners and scan the environment, rather than operate their AAC devices.
>
> Be more accurate in their motor responses. Some people have difficulty "looking" and "hitting a switch" because of abnormal reflexes.

Vision and communication

Visually impaired infants miss interpersonal cues in communication, have difficulty developing person-person-object associations, and have a delayed knowledge of their body, limited mobility and fewer opportunities for incidental learning.[2] In addition, linguistic input to individuals with visual impairment is likely to be less effective. Language development and use are at risk because the development of spatial awareness and relationships, interpersonal interaction skills, object permanence, concept development and symbolic representation is affected.

> "The development of communication and particularly the development of spoken language have traditionally been connected with the auditory sense, not with vision. But observations of early patterns of communication between the blind infants and their parents show that absence of visual information about the world; and therefore, the dependency on auditory and haptic stimulation, diminishes the blind infant's opportunities to learn and to understand interpersonal rules in communication . . . Therefore, blind infants must be considered to be more dependent on skillful caregivers than the deaf and sighted infants."[3]

Most individuals who use AS systems are visually impaired, but not blind. Many have cortical visual impairments (CVI). CVI occurs when there is damage to the visual cortex, to the posterior visual pathways or to both. Six basic guidelines for clinicians who work with individuals who use AS are:[4]

> 1. Visual performance can be variable. Look at the individual's functional use of vision and try to make it better. Be careful how you position visual information. Also be aware that movement cues, especially in the peripheral fields, can often stimulate a visual response. Remember that vision also affects motor responses.

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2. Reduce extraneous visual information. Visual crowding may occur and make it difficult to focus on one object of interest. Be especially aware of the fatigue that can occur in trying to decipher visual, auditory and tactile information. Build in breaks.

3. Work hard to develop imagery skills. This is crucial to concept and language development. Remember imagery is multi-sensory (*e.g.,* feel the sand, see the blue water, feel the warm sun, taste the salty air, remember the fun you had at the beach). Emotional associations are integral to developing effective imagery.

4. Pair visual with auditory scanning whenever possible. Red and yellow may be more easily perceived and can enhance a visual target.

5. Use touch as a primary means of introducing information. Be aware that intonation and language use are also very important.

6. Repetition is important. Practice is critical. Allow the person extra time to respond.

Arranging vocabulary for efficient access

The process of arranging language for someone who uses auditory scanning is different than for someone who uses visual scanning. As the person's vocabulary needs increase, so do the navigational problems. In visual scanning, AAC users can see their target during the scan. Thus, they can prepare to make their selections. In auditory scanning, however, AAC users may not know where their message is located and can easily get "lost" in the system. Several important decisions must be made:

1. What auditory cues should be provided? Should the cue be part of the message?

2. Is it easier for individuals who are visually impaired and use AS techniques to learn cues that are labels for categories (branching approach) or cues that are icons (Minspeak approach)? How can we determine this?

3. What strategies can we use to teach individuals to associate auditory cues with the messages they wish to convey? How can we help people learn to navigate through their vocabulary?

4. What kind of message options should we provide (*i.e.*, sentences, phrases, words, letters)? When should we expand someone's options? Should we always begin by using sentences/phrases? Will individuals learn to generate language if everything is "canned?"

5. At what point (and in what manner) should individuals be encouraged to use words to generate their own phrases and sentences? How can language be arranged to encourage the use of novel utterances?

6. As vocabulary increases, what strategies can we teach that positively affect communication rate?

Summary

Individuals who benefit from the use of AS techniques have access to a range of options. However, many questions remain. Perhaps the most difficult factors relate to how language is stored and retrieved when someone can't see. The AAC community is working to find answers to these and other challenges that confront individuals who use auditory scanning techniques.

On the Web

AS Website & listserv

Address: http://espse.ed.psu.edu/SPLED/McN/auditoryscanning/home.html

A new Website devoted to auditory scanning is available at the address noted above. This site has wonderful resources: a list of articles, abstracts, a glossary, papers on AS by knowledgeable manufacturer representatives, a partial list of AS devices through a link to AbleData and a protocol for training partner-assisted auditory/visual scanning. In addition, the AS Website links to other AAC sites. According to Drs. David McNaughton and Tracy Kovach, who collaborated on developing these resources, the goal of the Website is to stimulate dialogue and information exchange.

An AS listserv has also been set up. It will provide a forum for discussions, instructional activities for AS, vocabulary selection and technology information. The listserv is intended as a tool for anyone interested in auditory scanning (AAC clinicians, AAC users and family members, developers and researchers, manufacturers, product representatives and special education teachers.) Send an Email to audscan@espse2.ed.psu. edu to join. On the Subject line, write: **Subscribe.** You will receive a reply with additional information about posting messages, signing off, *etc*.

For more information on the technical operation of the AS listserv and to provide suggestions/comments about the AS Website, contact David McNaughton at dbm2@psu.edu
For information about AS listserv content and goals, contact, Tracy Kovach at Kovach.Tracy@tchden.org

Equipment

AS devices

A number of commercially available AAC devices offer auditory scanning options. While many have similar features, *e.g.*, speech output, visual displays, auditory cueing and navigational strategies that enable users to find and send their messages, differences do exist. For example, one group of AAC devices uses static displays (*e.g.,* paper overlays with symbols); the other group uses dynamic displays (*i.e.*, computer screens that display pictures, symbols, alphabet, *etc.*).

A second difference is that some devices have synthesized speech while others have digitized speech. (A few offer both). Because some digitized devices have significant memory constraints, the auditory cue and target messages may be limited. This is less often a problem with devices that use synthesized speech.

Differences are also found in how devices present auditory cues. In some cases, the cue must be the first word in the message. In most devices, however, the auditory cue can be customized. For example, cues may be set up to represent pictures (*e.g.*, icons) or categories (*e.g.*, people, places, activities). Another available option in some AS devices is an external speaker. This enables the auditory cue to be presented to the AAC user without the partner hearing the auditory scan. Volume control features relate to both the auditory cue and the message.

Feedback (particularly auditory) is an important feature on all AAC devices. Most AS devices provide both visual and auditory feedback.

In an effort to consolidate information about available AS devices, Tracy Kovach, Jill Tullman and Kristen Johnson put together information, which is included in Tables I and II. Many thanks! Please note that although we have attempted to be comprehensive, we may have left out some devices that enable individuals to use auditory scanning techniques. If so, please let us know about our errors or omissions and we'll see the information gets included on the AS Website.

Digitized AS devices

Table I features devices with digitized speech. All have static displays, which means that any symbol set (pictures, words, icons) can be placed on the device and modified by a clinician in ways that benefit the user. The number of levels and available locations available on each device varies.

Feedback options for digitized devices typically include the activa-

Table I. Digitized AAC devices with auditory scanning (with Tracy Kovach, Jill Tullman & Kristen Johnson)[5]

Devices	Levels Coding	Locations	Feedback otpions	Scanning options	Rate enhance-ment	Auditory cue	Second Speaker?	Visual Rep	Manu-facturers
Action Voice 2A	1 or 2 levels	10 -18 locattions	Light spoken message	Linear	Locations skipped if not programmed	Can be customized	Yes	Any symbols 1" x 1" locations	Ability Research, Inc.
AlphaTalker	Coding (Minspeak)	32 locations	Light spoken cue	Linear, row-column; column-row circular	Icon prediction	Can be customized	Yes	Any symbols Icons (Minspeak)	Prentke Romich Co.
CheapTalk 4 Inline Scan CheapTalk 8 with Scan	1 level	4 -8 locations	Light spoken message	Linear	No	1st word of message only	No	Any symbols	Enabling Devices
Digivox 2	48 levels (6 user groups)	48 locations	Light spoken cue	Linear, row-column; column-row	No	Can be customized	Yes (required)	Any symbols	DynaVox Systems, Inc.
Macaws (9 models)	8 to 32 levels (40 person-alities)	Up to 128 locations	Light spoken cue	Linear, row-column block	No	Can be customized (new model)	Yes	Any symbols	Zygo Industries, Inc.
Message Mates (20,40, multilevel)	up to 4 levels	20-40 locations	Light spoken cue	Linear row-column	No	1st word of message	No	Any symbols	Words+, Inc.
Vocal Assistants 90S; 270/28; 270/48	1 - 4 levels	15 - 48 locations	Light spoken cue	Linear	No	Same as message	No	Any symbols	Adaptivation
Voice Pal Max	3 levels	2-4 locations	Light spoken cue	Linear	No	Can be customized	Yes (required)	Any symbols	Adaptivation
SuperHawk	72 levels	variable	Beep or spoken cue	Linear row-column	No	Can be customized	Yes	Any symbols	ADAMLAB

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tion of a red light (LED) and a spoken cue when the user makes a selection. While all AS devices provide linear scanning, only some offer other scanning options (*i.e.,* row-column, circular or block scanning). Digitized AS devices that offer rate enhancement options are the AlphaTalker, which has an icon prediction feature, and the Action Voice 2A, which skips locations that are not programmed.

Volume control options on digitized devices do not necessarily affect the volume of the message or the auditory cues. Some devices do not have volume controls. However, when there is a second speaker option, (earphone, pillow switch), the volume may be modified through the speaker.

Simple digitized devices are often a good place to start when considering the feasibility of auditory scanning as an AAC technique.

Synthesized AS devices

Table II highlights devices with synthesized speech. Some synthesized devices have static displays with features similar to those discussed above. Other synthesized speech devices have dynamic displays. This means that the display is produced electronically (like a computer screen). Dynamic display devices allow for variability in the number of locations available to AAC users, as well as the number of different pages (levels) users can access. These devices also allow clinicians to modify visual displays to capitalize on any residual vision that the user might have.

Volume controls in these devices are often adjustable and auditory cues can be customized. As with digitized devices, rate enhancement features are limited in AS devices to icon prediction or having the scan skip locations that are not programmed.

These AS devices allow users to have two voices (one for the cue and one for the spoken message). Most provide access to large vocabularies and multiple symbol sets since it is relatively easy to import symbols.

A few computer software programs are designed for auditory scanning (*e.g.*, AudioScan II [Words+]. These programs are not used with any visual display. Also, there are several computer programs that are transparent to other programs, yet offer forms of auditory scanning as an option (*e.g.*, Discover [Don Johnston] and Click It! [IntelliTools].

Table II. Synthesized AAC devices with auditory scanning (with Tracy Kovach, Jill Tullman & Kristen Johnson)[5]

Device	Static/ Dynamic	Locations	Feedback otpions	Scanning options	Rate Enhancement	Auditory cue	Second Speaker?	Visual Rep	Manufacturers
DeltaTalker	Static display	128 locations	Light, spoken cue	Linear; row-column; column-row, block	Icon prediction	Customized Different voice	Yes	Any symbols (imported) Minspeak	Prentke Romich Co.
Liberator	Static display	128 locations	Light, spoken cue	Linear, row-column; column-row; block	Icon prediction	Customized Different voice	Yes	Any symbols (imported) Minspeak	Prentke Romich Co.
Vanguard	Dynamic display	Variable	Picture highlighted spoken cue	Linear, row-column; column-row	Icon prediction	Customized Different voice	Yes	Any symbols (imported) Minspeak	Prentke Romich Co.
Whisper Wolf	Static display	up to 36	Light, spoken cue	Linear; row-column	No	Part of message	Required	Any symbols	ADAMLAB
Dynavox 2C (also digitized speech)	Dynamic display	Variable	Picture/color highlighted spoken cue	Customizable for each page	Scans only what's programmed	Customized Different voice	Yes	Any symbols (imported) DynaSyms	DynaVox Systems, Inc.
Speaking Dynamically Pro (also digitized speech)	Dynamic display	Variable	Picture/color highlighted spoken cue	Customizable	Yes	Customized	Yes	PCS (imported)	Mayer Johnson, Inc
Freestyle (Companion)	Dynamic display	Variable	Picture highlighted spoken cue	Linear; row-column, block	No	Customized	Yes	Any symbols (imported)	Assistive Technology
Talking Screen (Freedom2000 or PegasusLITE)	Dynamic display	Variable	Picture highlighted spoken cue	Linear; row-column	No	Customized	Yes	Any symbols (imported) PCS	Words +, Inc.

For Consumers

Survey of 28 AS users

Just after the 1998 conference on Auditory Scanning in Denver, Tracy Kovach, Janice Light and I developed a survey in an effort to contribute to the growing information base on auditory scanning. This section summarizes the results of that survey. Sixteen AAC professionals (mostly speech-language pathologists) completed the surveys, sharing information about 28 individuals who use high-tech auditory scanning systems to communicate (AS group). The AS group was comprised of nineteen females and nine males, ranging in age from three to 42 years, with a mean of approximately 12 years. All but three individuals attended school. The three who did not were:

1. A forty-two-year-old man, who had sustained a head injury in a motor vehicle accident. He attended a day program connected to his nursing home. He was quadriplegic, visually impaired, anarthric and had short-term memory problems. He reportedly used a beeper (yes/no), partner-assisted scanning (to spell) and the Dynavox 2 to communicate phrases and sentences. He was the only "speller" in the AS group.

2. A twenty-year-old man with severe cerebral palsy who was medically fragile and reportedly had mild cognitive impairment. His communication system included a variety of auditory scanning formats:

a. No-tech "yes/no" strategy (clicks for "no"; vocalizes for "yes") that he used in all environments.

b. Twenty-questions that he used at home.

c. Light-tech system (partner-assisted scanning using a communication book with Mayer Johnson Picture Communication Symbols) that he used in his day program and the community.

d. High-tech system (IBM compatible computer with Talk4Me software) that he operated with his knee and used primarily in therapy sessions.

3. A three-year-old, nearsighted girl with severe cerebral palsy who received therapy services at home. Her communication system included some speech, vocalizations, gestures, facial and body movements, partner-assisted scanning and the Liberator with Unity software. She accessed her device using a quadrant, row/column auditory scanning technique.

Three of the 25 children in school went to a "special" school. Twenty-two children were enrolled in regular schools. Of these, ten were full-time students in regular education classrooms. Six split their time between a special day class/resource room and regular classroom. Six attended a special day class. The survey did not ask about the nature of the support these children received or the progress they were making academically or socially in their educational programs.

Diagnostic information

The survey asked for information about the diagnosis and skills (vision, hearing, cognition, speech, language and motor) of the AS group. Respondents reported that no one had a hearing impairment and everyone had severe speech and severe motor impairments. Twenty-five individuals (89%) had congenital disabilities and three had acquired disabilities (TBI and encephalitis). Most (24) of the group with congenital disabilities were diagnosed with cerebral palsy. One child had a diagnosis of gluturic aciduria (GA-1), a metabolic disorder.

In response to questions about the functional skills of the AS group, respondents rated the individuals' skills using the following scale:

1 = no disability: is able to perform in this area without difficulty and as expected for age level

2= slight disability: is able to perform in this area with minimal prompting, facilitation, environmental supports or instruction at a level expected for age

3= moderate disability: is able to perform in this area with moderate prompting, facilitation, environmental supports or instruction at a level expected for age

4= significant disability: can perform only minimally, even with maximum prompting, facilitation, environmental supports or instruction at a level expected for age

5= severe disability: is unable to perform and has no functional skills in this area.

Motor Skills: The mean rating for motor skills in the AS group was a 4.4. The range was four to five. This is indicative of severe impairment in functional motor skills. Respondents based their ratings on personal observation (100%), reports from others (93%) and formal testing (25%).

Respondents were not as clear in reporting diagnostic information about vision, cognition and language. This is not surprising since severe motor and speech impairments make it very difficult to assess these areas. However, all auditory scanners were enrolled in programs where periodic assessments were required, and all used high-tech devices, so they must have undergone an evaluation prior to receiving their devices. Thus, the limited diagnostic information reported about the visual, cognitive and language status of some individuals was unexpected.

Vision: Respondents reported that two individuals had no visual disability. Information about the cause of visual impairment was not specified for 13 members of the AS group. Of these, eight were said to have visual impairments, but no etiology was

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given. Of the 13 individuals with a reported diagnosis, ten had cortical visual impairment (CVI), two were near sighted and one had abraded corneas.

In ranking the severity of the group's visual skills using the five-point scale described above, respondents gave the group a mean ranking of 3.3. Individual rankings ranged from one (no disability) to five (severe disability). Most individuals in the AS group had some useable vision; only four individuals were ranked as having no functional vision. Respondents said they used personal observation (93%), reports from others (96%) and formal tests (18%) when ranking each individual's visual skills.

Cognition: Respondents did not provide information about cognition for nearly half (12) of the AS group. In three cases, they said they "did not know." Of the 16 for whom a diagnosis was given, six were noted to have severe cognitive impairment, five were moderately impaired, four had mild cognitive impairment and one person was diagnosed as profoundly cognitively impaired. When asked to rate the cognitive skills of the AS group on the five-point scale, the mean score was a 2.9 with a range from one to four. This suggests that, as a group, individuals using AS systems had some degree of cognitive impairment, even if the extent or nature of the cognitive disability it was not clear. Respondents said their judgements were based on personal observation (96%); reports from others (89%) and formal tests (25%).

Language: Respondents listed the following language diagnoses: nonverbal, no expressive language, language delay, dysarthria, no speech, non-vocal and oral-motor dysfunction. The mean rating for the AS group's understanding of language was 2.7, indicating moderate difficulties. The range was from one (no disability) to four (significant disabilities). These ratings were similar to the cognitive ratings. Respondents said they estimated receptive language skills using personal observation and the reports of others, rather than formal/informal test results (32%), even though most were speech-language pathologists.

Communication modes: Respondents reported that individuals in the AS group relied on facial and body expressions (28), vocalizations (22), gestures (8) and speech (3) as natural communication modes. On the five-point scale, the group's communication skills were rated at a mean of 3.8 with a range from two (mildly disabled) to five (severely disabled). Twenty of the individuals' communication skills were rated as a four (significant disability) or five (severe disability). Respondents based their ratings of communication skills on personal observation (100%), reports from others (93%), and formal tests (25%).

No-Tech AAC approaches

Twenty-three of the individuals in the AS group were reported to use no-tech approaches. These techniques were often developed by family members (*i.e.,* 20 questions and yes/no) or by speech-language pathologists (partner-assisted scanning). Seventeen individuals in the AS group used partner-assisted scanning (*e.g.*, presenting two or three choices, on-the-fly choices); five used "twenty questions" and five used "yes/no" questions. Some used more than one of these approaches. Those responding to the question said that individuals used no-tech approaches with their family members (18), teachers (13), therapists (7), peers (5), aides (2) and siblings (1). No-tech auditory scanning was being used successfully at home (18), at school (13) and in therapy settings (4).

Light-Tech AAC approaches

According to the respondents, 13 of the 28 individuals in the AS group also used light-tech strategies. Typically, a speech-language pathologist introduced light-tech approaches when the children were between four and nine years of age. Two in the AS group had used light-tech approaches for 10 years or more; three for between three and five years; and four for a year. The LT approaches described were:

Yes/No systems. Individual uses switches, symbols or locations to indicate "yes/no."

Partner-assisted auditory scanning. Partners use cards, books, paper displays or picture boards with vocabulary on them to present language to the person. Examples given were: (1) situation-specific cards with 4 choices; (2) a book that was the same as the individual's high-tech display; (3) a paper divided into sections, (4) a paper overlay similar to the overlay on a device and (5) a spelling board.

Object choice systems. Partner holds two objects in view and asks the individual to indicate a preference.

The number of vocabulary items provided on these systems ranged from two (yes/no) to 300 items. Light-tech strategies were used in classrooms and at home. Several respondents also mentioned their use on the playground and in therapy sessions. Respondents reported that individuals in the AS group used light-tech AAC systems with therapists (12), teachers (10), families (7) and peers (4).

High-Tech AAC approaches

Everyone (N=28) in the AS group used high-tech auditory scanning devices. Many were using a Dynavox 2c (14) or a Dynavox (4). Five individuals used a Liberator (with Unity software); one was using a Macaw; two had a PowerBook (with Speaking Dynamically or an AS training program); one used an IBM clone and Talk4 Me software; one child used a loop tape recorder with a switch; and one child used both the Apple 2e with AudScan (Don Johnston, Inc.) and a Whisper Wolf (AdamLab). Several individuals used more than one device.

High-tech devices were reportedly introduced as young as three years of age. Twelve individuals had begun using a high-tech device by the age of six years. Six were using high-tech devices before they were nine years of age, and four individuals began to use a device in their teens. One adult became a user after sustaining a severe head injury. The age at which five individuals began using high-tech devices was not reported.

As with light-tech systems, the speech-language pathologist typically introduced the AAC device, sometimes with the assistance of school assistive technology personnel or AAC evaluation teams. Respondents reported that individuals used high-tech AAC devices successfully in school (17), therapy (8), home (9) and community (2) settings. They used them with speech-language pathologists (18), teachers (14), families (13), peers (10), educational assistants (4) and a nurse (1).

Most of these individuals (21) used AS devices primarily with familiar partners. Seven also were using them with unfamiliar partners. Only one person used a device primarily with unfamiliar partners.

All used their devices to respond. Approximately half also used high-tech devices to initiate interaction (14) and to ask questions (13). Only eight individuals used their devices to accomplish all three of these discourse tasks. A majority expressed their wants/needs (20), made requests (19) and commented (18). Fewer than half, however, used high-tech devices to communicate novel information (11), express greetings/partings (11), protest (8) or write (9).

In response to a question about the type of auditory cueing being used with these individuals, respondents indicated that most (18) were using word cues. Two were using icon labels and four used sentence cues. We received no information about four individuals.

By report, the availability of vocabulary in these high-tech devices ranged from four to 4000 items. The median number was 72 items; the mean (average) was 444. This discrepancy reflects the fact that only a few individuals had large vocabularies available. Vocabulary items included words, phrases and sentences.

Respondents indicated that the alphabet was a useful tool for only one individual, the 42 year-old person who had spelling skills prior to using an auditory scanning system. Seven individuals had access to the alphabet but did not use it functionally. Thus, Morse code was not an option for this group.

Next Steps

When asked about "next steps" respondents indicated a number of different goals for individuals in the AS group. Their responses clustered within four general categories:

Strategic competence: Develop more "true communication." Expand use of system within classroom. Expand use of AS techniques across activities.

Linguistic competence: Continue to develop vocabulary. Use single words to generate novel utterances.

Operational competence: Teach mechanics of scanning. Increase ability to scan for longer periods of time. Work on access issues. Use freestyle. Refine navigational techniques/strategies.

System changes: Move to Speaking Dynamically Pro. Introduce Unity and gain proficiency.

Summary

According to the results of this survey, all individuals in the AS group could hear. All had severe motor impairments affecting functional movement, including their speech production. As a result, all had severe communication impairments. These individuals relied on nonverbal modes (facial/body expressions, vocalizations), as well as on a range of low-tech and high-tech AAC techniques to express themselves.

By report, most were visually impaired. However, more than half of the respondents did not specify a diagnosis for visual problems. Ten reportedly had cortical visual impairments. Because auditory scanning is a way to access communication when the visual channel is unreliable or unavailable, it would seem advisable, if not essential, for information about vision to be readily accessible to those making decisions about the use of augmentative communication. It is unclear from the survey results what role, if any, opthamologists, optometrists and visual specialists play in the development of AAC systems. Only 18 percent of the respondents said they had access to information about visual "testing."

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Limited diagnostic information also was reported for cognition and receptive language. Respondents based their ratings on personal observations and reports from others. While testing (formal or informal) was a source of information in some cases, it was not a factor in the judgements made by nearly seven out of ten respondents. Cognitive and language skills have an impact on a person's educational/rehabilitation programming, as well as their use of AAC techniques. Because all 28 individuals had access to high-tech devices and many also used light-tech and no-tech communication techniques, it was surprising that information about cognition and receptive language was limited.

The survey results raise some interesting questions about AAC intervention with individuals who use auditory scanning. Some issues that need to be considered are:

1. When AAC professionals (*e.g.*, speech-language pathologists) rely on their own observations to make judgements about an individual's vision, language, cognitive skills and motor capabilities, how valid and reliable are these observations?

2. When observing someone who uses AS, what protocols should we use? What questions should we be asking? What behaviors should we be observing? How, when, and where should we document these behaviors?

3. What role should vision specialists play in the development of AAC systems? What risks do AAC professionals take when this kind of expertise is not readily available?

4. What tests (formal or informal) can be used (or modified) to gather useful data/information about receptive language?

5. When we modify tests and provide auditory rather than visual choices, what is the impact on the results?

6. If we were to conduct a survey on other groups of individuals receiving AAC services (*e.g.*, individuals using visual scanning techniques), would the results be similar?

Case Examples

A closer look

Two individuals were selected from among the 28 auditory scanners, to expand upon the survey data and offer a more in-depth picture of children who use AS techniques.

Example #1. MH is a 7-year-old girl with cerebral palsy, moderate cognitive impairment and profound speech and motor impairments. She attends a regular classroom. Information about her visual skills was not reported. Motor skills were rated as 5 (severe disability), while receptive language, cognition and communication skills were rated as 3 (moderate disability). Ratings were based upon personal observation and reports from others.

MH uses vocalizations, several single words and facial expressions to communicate. She also uses partner-assisted scanning with a switch and/or vocalization. Her speech-language pathologist developed this approach. MH uses it with her family, teachers and therapists. A DynaVox 2c was introduced two years ago when she was 5 years old. She uses the device successfully at home with her family and at school with her teachers and speech-language pathologist. The clinician said she "loves to use the DynaVox and gets in trouble for talking at school."

MH uses words as auditory cues to select target sentences. She has approximately 160 vocabulary items in her system, including words, phrases, and sentences. She can initiate, respond and ask questions of familiar and unfamiliar people. She makes requests, comments, indicates wants and needs, gives novel information and writes. She has an emerging knowledge of the alphabet. The next step is to teach MH to use single words to generate novel utterances.

Example #2. AP is a 17-year-old girl with cortical visual impairment, cerebral palsy and severe speech, cognitive and motor impairments. She is enrolled in a special day class in a regular school. Her visual and receptive language skills were rated as 3 (moderate disability). Motor skills were rated as 5 and cognitive and communication skills were significantly impaired (rated as 4). Ratings were based upon personal observation and information from others.

AP was reported to rely on vocalizations and facial/body expressions. A partner-assisted light-tech AS approach was introduced at 16 years of age when she entered a new school district. Unfortunately, records of previous AAC approaches were not available. AP now uses a no-tech approach at home and in school with teachers, family and therapists. A "dynamic display system" is being considered. She currently uses 20 vocabulary items to indicate wants and needs with familiar people. Reportedly, the next step her clinician will take is to develop more appropriate vocabulary for AP.

The AAC-RERC

AAC-RERC goes "virtual"

The National Institute on Disability and Rehabilitation Research, part of the U.S. Department of Education, has awarded the Rehabilitation Engineering Research Center (RERC) in Communication Enhancement to Duke University Medical Center. This five-year, $4.5 million grant will support one of 13 RERCs in the U.S. that are funded to seek solutions to disability-related problems through the use of technology. Called the **AAC-RERC,** the Center takes a multi-site, collaborative approach, and has the distinction of being the first "virtual" RERC to be funded. Some of the leading experts in AAC from several areas in the United States will collaborate to improve technologies that further the development of communication, language, natural speech, discourse skills and literacy in children and adults with congenital or acquired speech impairments, under the leadership of Frank DeRuyter. According to Dr. DeRuyter:

> The ability, through the Internet, to bring all these state-of-the-art locations together to advance AAC is truly revolutionary. To take advantage of the country's greatest resources in a multi-site collaboration, rather than maintain an extensive effort in a traditional single location, enables us to bring together far greater expertise and provides the necessary resources to bring AAC into the next millennium. A lot of AAC technology already exists; this center will facilitate our ability to work together to make better use of what we have, as well as come up with new solutions and creative strategies.[6]

The AAC-RERC will connect researchers from clinical centers and academia with their counterparts in business and industry, with computer and mechanical engineers and, most importantly, with the people who ultimately will use what is developed by the center, *i.e.,* AAC users and their families, clinicians and teachers. The guiding principle of the AAC-RERC is that all stakeholders must be partners in the design, implementation and dissemination of the center's activities.

Partners

In addition to Duke, five other academic institutions are involved: the University of Nebraska, Pennsylvania State University, University of North Carolina at Chapel Hill, University of New York at Buffalo and Temple University. *Augmentative Communication News*, *Alternatively Speaking* and ACOLUG are also part of the team.

Projects

Projects fall into four areas: research, development, training and dissemination. While they are discussed separately below, each project is actually being carried out by multiple investigators and involves multiple sites.[7]

Research Projects

1. Attitudes of AAC users, peers, and intervention professionals toward AAC technology and toward technology use by elderly persons. This project will identify various attitudinal barriers toward the acceptance of AAC technology and its use by AAC users with aphasia, ALS and Parkinson's disease. Principal investigator (PI): *David R. Beukelman, University of Nebraska.*

2. The study of organizational strategies for adult AAC users. This project will seek to determine the AAC organizational capabilities and preferences of four groups of AAC users (amyotrophic lateral sclerosis, aphasia, Parkinson's disease and traumatic brain injury) and one group of adults without disabilities. Similarities and differences in organizational preferences among the groups will be compared and an effort made to facilitate the development of systematic conceptual message grouping structures within AAC technologies. PI: *David R. Beukelman, University of Nebraska.*

3. Improving AAC technologies for young children with significant communication disorders. This project will evaluate the learning demands and functional performance of various approaches to representation, presentation, organization and/or selection of language in AAC technologies with young children. The goals are to: (a) determine developmentally-sound design specifications for improved AAC technologies for young children and (b) develop, implement, evaluate and disseminate effective and efficient instructional protocols to teach these innovative approaches to young children. PI: *Janice Light, Pennsylvania State University.*

4. Evaluating and enhancing communication rate, efficiency and effectiveness. This project will develop a comprehensive, empirically based model that addresses issues of communication efficiency, rate and performance in the use of AAC technology. The project will: (a) develop procedures and software to simulate and measure performance of AAC devices; (b) establish methodologies to investigate communication rate in social interaction contexts; (c) evaluate the efficiency and communication rate of existing and experimental AAC

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University & Research, Continued from page 11

technologies; and (d) develop a computerized model that can predict user-device performance. PI: *Jeff Higginbotham, University of New York at Buffalo*.

5. Improving employment outcomes for individuals who require AAC. This project will identify barriers to employment and document strategies used by AAC users to obtain and maintain employment, including innovative uses and adaptations of assistive technology. The project will document empirically-based AAC design specifications for the workplace, and describe action plans to achieve successful employment outcomes for key stakeholders (*i.e.,* augmented communicators, families, employers, vocational rehabilitation and education professionals). PI: *David McNaughton, Pennylvania State University*.

6. Advanced ACES. This project will develop and implement ACES (Augmentative Communication and Employment Supports), which will focus exclusively on AAC users becoming job-ready for employment in the world of computer-based telecommunication. The project will develop employment-related vocabulary and symbol sets, collaborate with private business in designing and implementing a job internship for graduates of Advanced ACES, replicate Advanced ACES with high school students and measure the outcomes of the ACES programs for AAC users. PI: *Diane Nelson Bryen, Temple University*.

Development Projects

1. Communication Enhancement Technology Watch. This project will collect, seek out and monitor emerging technology developments in commercial form and pre-release stages that can impact the engineering and clinical aspects of the AAC field. PIs: *Frank DeRuyter & Kevin Caves, Duke University.*

2. The Development of a "Menu-Based" AAC Interface for the Elderly and other Persons with Recall Memory Limitations. This project will develop a menu-based interface minimizing the demands on recall memory common with fixed screen and dynamic screen interfaces. The interface, which will rely extensively on recognition memory, will operate in standard computer environments and manage orthographic and graphic symbols. PI: *David R. Beukelman, University of Nebraska.*

3. Improving Literacy Technologies for School-Age Children with Severe Physical Disabilities. This project will address the need for children with physical disabilities to have access to literacy activities. Goals are to: (a) develop design specifications for a literacy tool that can support children who use AAC in regular educational settings and (b) develop and validate a standardized reading assessment instrument that will provide valid, reliable information about the literacy capabilities of individuals with severe physical disabilities. PIs: *Janet Sturm & David Yoder, University of North Carolina—Chapel Hill.*

4. End-User AAC Technology Consumer's Report. This project will facilitate a collaborative effort among consumers and manufacturers to establish useful measures for assessing the effectiveness of augmentative communication devices and technologies. A consumer-driven and consumer-managed review of dedicated AAC technology and software will be established. The AAC-RERC will promote and underwrite development of an *AAC Technology Consumer's Report,* managed by AAC end-users and manufacturers of AAC technology. PIs: *Kevin Caves & Frank DeRuyter, Duke University.*

Training and Dissemination

Training activities will include opportunities for graduate education and student research training at participating institutions, as well as continuing education through traditional and Internet applications. Dissemination will be ongoing through an Internet/Web Site and ACOLUG.

Augmentative Communication News and *Alternatively Speaking* will publish up-to-date information about AAC-RERC projects. *Alternatively Speaking* will offer the unique insights of Michael B. Williams and other AAC consumers about the work underway. *Augmentative Communication News* will regularly report on various new developments among the various projects; and, once a year, will conduct a "critical friend" review of progress by interviewing various stakeholders (researchers, manufacturers, government officials, clinicians, family members and consumers) regarding their perceptions of the center's activities and outcomes for the field of AAC.

In 2001, a state-of-the-science conference will gather AAC stakeholders to discuss the latest developments in the field.

For additional information, contact **AAC-RERC**, Box 3888, Duke University Medical Center, Durham, NC 27710. Phone: (919) 681-9983; FAX: (919) 681-9984; Web page: www.aac-rerc.com; Email: aac-rerc@mc.duke.edu

Medicare and AAC devices (with Lew Golinker)

Medicare, the largest federal health-care program in the United States, continues to impose two barriers to AAC device funding. Medicare says it does not recognize AAC devices as prosthetic devices because they "do not replace a body part or function." Say what? Isn't the ability to produce speech a body function? Come on!

The second (equally baseless) barrier is that Medicare says that AAC devices are not durable medical equipment because they are "convenience items." Speech a convenience? Medicare does cover speech-language pathology services, and pays for the artificial larynx. This just doesn't make any sense.

Despite these obviously erroneous positions, further investigation reveals that Medicare will ultimately pay for AAC devices. According to Lewis Golinker, Esq., of the Assistive Technology Law Center, approvals have been issued when claims are appealed since 1987.[7]

A Call to Action

The time has come for the AAC community in the U.S. to open the doors to Medicare funding of AAC devices, so that eligible Americans can obtain them. Here's what we need to do.

1. **Submit claims**. If you work with people who are Medicare eligible and could benefit from an AAC device, take the time to submit a claim.

2. **Distribute information**. Even if you don't work with people who are Medicare eligible, share this information with your colleagues and encourage them to submit claims.

3. **Get political**. Contact the representatives and senators from your state. You can get a sample letter through USSAAC, the Assistive Technology Law Center or Augmentative Communication, Inc.[8]

AAC assessments

To submit a viable Medicare claim for an AAC device, a speech-language pathologist (SLP) must complete an AAC assessment and prepare a complete report. While there are no "official" Medicare AAC assessment criteria, the following are guidelines for the component parts of the assessment and report. [Please feel free to copy the protocol on pages 13-15 and distribute.]

1. SLP information. Describe the SLP's education, licensure and experience, including experience, training and expertise related to AAC intervention. Attach a copy of the SLP's *curriculum vitae* to the Assessment Report.

2. Beneficiary information. Provide identifying information, including:

(a) Date of the assessment.

(b) Medical diagnosis.

(c) Identification and description of the beneficiary's communication impairment diagnosis (*e.g.*, dysarthria, apraxia, aphasia, anarthria). Describe how the recommended AAC device is "necessary," *i.e.*, the device "is expected to make a meaningful contribution to the treatment of the patient's communication impairment." It is essential to provide references from the professional literature that show AAC devices constitute treatment for the patient's specific communication impairment diagnosis.

Note: SLPs needing assistance identifying such references can contact either the Assistive Technology Law Center lgolinker@aol.com or the USSAAC national office ussaac@northshore.net

(d) Description of the adverse impacts of the communication impairment on all activities and interactions: personal, social and familial, as well as a description of how the AAC device will address the adverse effects and what benefits it will convey.

It is essential that the SLP report describe how interactions have been adversely affected by the communication impairment. Of course, the effects are severe for all persons needing AAC devices, but they are particularly pronounced for persons with acquired communication impairments. The impact has been described as "not a loss of life, but a loss of access to life." Losses do not have to focus on communication with health care providers or health issues. They can be described in terms of:

Personal issues: mood, personality change, depression.

Changes in activities: activities that have been reduced in frequency, level of competence, enjoyment or sharing with others (*e.g.,* activities with friends); or activities that are completely abandoned.

Change in roles among family or household members: shopping; running the household; managing finances; caring for family members; being left alone; making appointments; communication with children, grandchildren and other family members.

In addition, compensatory techniques should be discussed. When writing is not a functional alternative, explain why not.

3. Sensory status and receptive language: Describe visual,

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hearing, tactile and receptive communication impairments and their impact on the beneficiary's expressive communication.

4. Postural, mobility & motor status: Describe motor status, optimal positioning, access methods and mounting options for the AAC device. Also, consider access options, if any, for integration of mobility with the AAC device.

5. Current speech, language and expressive communication status: Describe current communication abilities, behaviors and skills, and the limitations that interfere with meaningful participation in current and projected daily activities.

6. Communication needs inventory: Describe (a) current communication needs; (b) projected communication needs within the next two years; (c) communication partners and tasks, including any limitations in the communication abilities of partners that might have an impact on AAC device selection; and (d) communication environments and constraints that can affect AAC device selection (*e.g.*, need for verbal and/or visual output, feedback features, distance communication).

7. Any prior treatment for communication impairments. Describe any prior Medicare covered SLP treatment and explain why the person now has needs that only an AAC device can address.

8. Components of AAC device being recommended: Identify the requested AAC device components, accessories, peripheral devices, supplies, and the device vendor. Also describe:

1. Vocabulary requirements,
2. Representational system(s),
3. Display organization and features,
4. Rate enhancement techniques,
5. Message characteristics (speech synthesis, printed output, display characteristics, feedback, auditory and visual output),
6. Access techniques and strategies,
7. Portability and durability issues, if any,
8. Cost (of device and all accessories requested),
9. Any trial use period that demonstrated the beneficiary as able and willing to use the recommended device effectively.

9. Identification of other AAC devices considered for beneficiary: Identify the characteristics and features of alternate AAC devices considered, and describe why they were not recommended.

10. AAC Device Recommendation: Explain why the recommended AAC device (including accessories being requested) is better able to treat the beneficiary's communication impairment (*i.e.*, overcome or ameliorate the communication limitations that preclude or interfere with the beneficiary's meaningful participation in current and projected daily activities), as compared to the other AAC devices considered.

Be sure to address the Medicare standard of "reasonableness," which must be satisfied for funding to be approved. "Reasonableness" is established by showing: (1) that there is no less costly alternative way to achieve the same medical outcome; (2) that the recommended device does not duplicate a device or other means of communication currently available to the beneficiary; and (3) how the "therapeutic benefits" of the recommended device are not "clearly disproportionate" to the cost of the device.

Note: To address the third point, describe all the benefits the device will provide, including, the degree of functional improvement to the beneficiary's ability to communicate, as well as the benefits to the individual arising from the ability to communicate (personal, familial, economic, social, *etc*.) Then, in a sentence or two, compare these benefits to what would be possible if the person did not have an AAC device.

11. Treatment Plan: Prepare a treatment plan. Medicare requires SLPs to prepare a plan for treatment that includes: (a) the expected duration of need for the recommended device and (b) a statement of the "functional communication goals" that are reasonably achievable if the recommended AAC device is provided.

Note: To Medicare, "*functional goals*" may be a "small, but meaningful change that enables the patient to function more independently in a reasonable amount of time." Functional goals represent "the level of communicative independence the patient is expected to achieve outside the therapeutic environment."

Medicare SLP Services Guidance identifies examples of functional goals representing levels of communicative ability [*Medicare Hospital Manual*, § 446]. The SLP should select from among the following examples, or show how the goals set forth are comparable to those listed below:

- Communicate basic physical needs and emotional status.
- Communicate self-care needs.
- Engage in social communicative interaction with immediate family members.
- Carry out communicative interactions in the community.

The Medicare SLP Services Guidance also provides other examples of functional goals:

For some patients, it [the functional goal] may be the ability to give a consistent "yes" or "no" response; for others, it may be the ability to demonstrate a competency for naming objects using auditory/visual cues. Others may receptively and expressively use basic spoken vocabulary and/ or short phrases; and still others may regain conversational language skills.

In closing the SLP report, it is highly recommended that the SLP assert the following five points about the treatment plan:

1. Medicare covers SLP services.
2. Medicare SLP services coverage is

tied to identification of reasonably achievable functional goals.

3. The functional goals stated in the SLP services guidance and the functional goals that SLPs set as for AAC interventions are the same.

4. As shown in this treatment plan, the beneficiary is capable of achieving the specific functional goals identified in the Medicare SLP services guidance; and

5. The only form of SLP intervention that will allow the beneficiary to achieve these functional goals is the AAC device being recommended.

12. Conclusion: SLPs should conclude the report by stating that the AAC device being recommended represents their best judgment about (1) the appropriate type and degree of SLP treatment services needed to address this beneficiary's communication impairment diagnosis, and (2) that the AAC device will to enable the beneficiary to achieve the functional goals stated in the treatment plan. The report may also conclude that the AAC device recommended for funding is eligible under both the durable medical equipment and prosthetic device benefit categories.

How will the assessment report be used?

The assessment report must be sent to the Medicare beneficiary's treating doctor to serve as the basis for the doctor's prescription (certificate of medical necessity). The report, plus the prescription, must then be submitted to Medicare as part of the funding request documentation. The AAC device vendor, following purchase of the device, will submit the claim to Medicare on behalf of the beneficiary.

For additional information, contact Lewis Golinker, Assistive Technology Law Center, 202 East State Street, Suite 507, Ithaca, New York 14850. 607-277-7286 (phone); 607-277-5239 (fax); lgolinker@aol.com

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[5] Tracy M. Kovach, Coordinator, Augmentative Communication and Learning Enhancement Program, The Children's Hospital, B030, Denver, CO 80218. 303-861-6024 Kovach.Trach@TCHden.org

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[8] USSAAC. PO Box 5271, Evanston, IL 60204-5271. Phone: 847-869-2122; Fax 847-869-2161; ussaac@northshore.net

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Special thanks to Jillian King, The Bridge School, 545 Eucalyptus, Hillsboro, CA. 94010-6404. Note: Contact The Bridge School for a copy of their newsletter on auditory scanning in the classroom. 650-696-7295; fax 650-342-7598

ACN

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Manufacturers

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Adam Lab, 33500 Van Born Road, Wayne, MI 48184. Phone: 734-334-1433; Website: www.wcresa.k12.mi.us/adamlab

Adaptivation, Inc., 2225 W. 50th Street, Sioux Falls, SD 57105. 800-723-2783; Website: hometown.aol.com.adaptaac/index.html

Assistive Technology, Inc., 7 Wells Avenue, Newton, MA 02459. Phone: 617-641-9000/800-793-9227; Fax: 617-641-9191; E-mail: customercare@ assistivetech.com Web site: www.assistivetech. com

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