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Abstract

Communicating confidently is the cornerstone of a positive self-image, and we recognize that *severe communication disorder* is an example of a phrase that will be interpreted differently in different contexts. Our intent in this chapter is not to diminish the impact of less debilitating communication disorders, but our focus will be on the small but significant minority of children who have such severe difficulties that they either cannot communicate via speech or are at risk to have significant limitations in this area. This area of practice is known as augmentative and alternative communication (AAC). For children with severe communication difficulties, AAC is a powerful outlet for celebrating the fundamental human connection that all children need to thrive. Healthcare providers are in a unique position to help identify and support children with severe communication disorders, and this begins with helping caregivers access AAC services for these children. Research has consistently shown that the use of AAC strategies does not interfere with the development of speech. Further, when the child's caregivers use AAC strategies to support language development, the outcomes improve.

Abbreviations

AAC	Augmentative and Alternative Communication
AJSLP	American Journal of Speech-Language Pathology
ASHA	American Speech-Language Hearing Association
IDEA	Individuals with Disabilities Education Act
JSLHR	Journal of Speech, Language, and Hearing Research

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PL Public Law

SLP Speech-Language Pathologist

2.1 Introduction

The traditional articulation therapy may be the first image that comes to mind when the field of speech-language pathology is mentioned, and this role is important. While misarticulation of “r” or “s” sounds might not seem to represent a serious problem, this can negatively affect a child’s self-esteem and thereby limit his potential in life. Communicating confidently is a cornerstone of a positive self-image, and we recognize that *severe communication disorder* is an example of a phrase that will be interpreted differently in different contexts. In the field of speech-language pathology, severity ratings are based upon clinical judgment rather than an absolute numeric standard or severity rating scale such as those used in ranking the level of intellectual disability. Our intent in this chapter is not to diminish the impact of less debilitating communication disorders, but our focus will be on the small but significant minority of children who have such severe difficulties that they either cannot communicate via speech or are at risk to have significant limitations in this area. This area of practice is known as augmentative and alternative communication (AAC).

Severe communication disorders may result from acquired injuries and illness or from developmental conditions. Whether acquired or congenital, the language, phonology/articulation, and voice disorders can each or in combination limit communication to such a degree that AAC is needed. For example, a child might have such severe dysarthria (oral muscle weakness) resulting from a head injury or treatment for cancer that both articulation and voice are profoundly impaired. AAC may be needed for this child throughout his or her life span. In contrast, the child who has apraxia (oral motor planning problems) associated with autism, may be unintelligible and require AAC for several years. Both of these children will have traditional articulation therapy as a component of their intervention plan, and they must also be supported by strategies that address the broader picture of communication.

Except in cases involving a short-term medical intervention (as in a tracheostomy tube), the exact course of speech development and AAC intervention will be unique to the child. Some children will use AAC for a relatively short time, and for others AAC will be the primary mode of communication into adulthood. While the course is uncertain, the consequences of inadequate communication skill intervention are more predictable. Children who are not supported in communication development may misbehave, become depressed and/or socially isolated (Light et al. 2003).

The foundation of AAC rests upon the conviction that all individuals can and do communicate (National Joint Commission for the Communication Needs of Persons with Severe Disabilities 1992). Further, successful communication interventions for children are the responsibility of every communication partner, not just the speech-language pathologist (SLP). The reader of this chapter will gain an understanding of:

- The definition and scope of AAC
- The population of children who benefits from AAC
- The difference between AAC and other learning, symbol, and picture tasks
- The components of successful AAC assessments
- The components of successful AAC interventions

2.1.1 What is AAC?

The American Speech-Language-Hearing Association (ASHA) has defined AAC as follows: “AAC involves attempts to study and when necessary compensate for, temporarily or permanently, the impairments, activity limitations, and participation restrictions of individuals with severe disorders of speech-language production and/or comprehension. These may include spoken and written modes of communication” (ASHA 2005).

Whether through speech, behaviors, gestures, writing, etc., the human communication is a uniquely complex and dynamic activity. The crucial link is a shared symbol system that allows both partners to construct messages and jointly interpret meaning (Fig. 2.1).

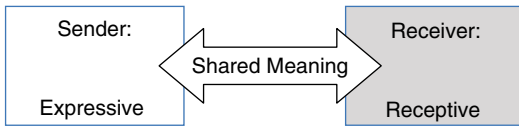


Fig. 2.1 Essential elements for human communication. This figure illustrates the three basic components of human communication

Typical or “normal” communicators have a large repertoire of communication options (e.g., facial expressions, body posture, gestures, eye gaze, vocalizations, speech, writing, computers, telephones, etc). Individuals who have severe communication difficulties will also require combinations of communication modalities to promote functional and effective communication in all environments. Therefore, best practice in AAC includes developing a multimodal communication system. A child could be taught to use signs, picture symbols and a voice output device to communicate in various contexts. AAC devices are more available now than ever before. Mainstream technology has streamlined the process of acquiring touch screen tablets and handheld devices with AAC software or apps. This is an exciting development, but these are not for everyone with a severe communication disorder (Gosnell et al. 2011).

Sometimes family members question the need for AAC because they feel that they know what their loved ones need even with minimal communicative interaction. For example, children who have supportive caregivers may be able to communicate adequately using basic strategies such as reaching and utilizing facial expressions because family members often report that they know what their loved ones need even with minimal communicative interaction. Individuals outside the family typically have much more trouble interpreting idiosyncratic signals. When unfamiliar communication partners encounter a child who cannot communicate using traditional symbol systems, they may not understand the message. AAC is the bridge that enables children with severe communication difficulties to learn higher-level language skills and to interact with individuals outside the family. AAC should be viewed as an essential component of intervention programs that provide a foundation to support the learning, communica-

tion, social and emotional development of children, and strengthen their relationships with family members and others in the community.

2.1.2 Language Development

Spoken language is the natural course of development for most children. In those who do not develop speech, a brain difference or disorder usually exists. Paul (2007, p. 11) summarized the research on brain structure and function related to developmental language impairments: “It is important to realize that no one pattern of brain architecture has been consistently shown in all individuals with language impairment. Instead, these structural differences appear to act as risk factors for language difficulty.” Conversely, a child with an acquired speech and language impairment will have the area of damage identified by various imaging tests.

Communication intervention takes a somewhat different form when children are not speaking, but the typical course of spoken language development provides the starting point as AAC planning begins. There are a number of language development models. Some focus more on the child’s innate language capability. The fact that children around the world follow a similar sequence of cooing, to babbling to speech supports these theories. Other theories focus more on the need for interaction with communication partners as the springboard for language development. An appreciation of the contributions of each of these models has gained wide acceptance (Nelson 2010). The following example (Table 2.1) shows the parallels between spoken language development and language development that are supported with AAC. This comparison illustrates that just as language development evolves rapidly when typical children are young, the AAC interventions evolve and change as children’s needs change.

2.1.3 The Impact of AAC on Speech Production

The use of AAC is not new to the twentyfirst century. Helen Keller was one of the first and most

Table 2.1 Spoken language development versus supporting language development using AAC

Language Learning Attribute	Spoken Language (Typical Development)	AAC Correlate
Timing	From birth, vocalizations are interpreted as communication	From birth, vocalizations are interpreted as communication. Whenever the child is at risk for significant communication difficulties, AAC is considered
Earliest interactions	Presymbolic communication is valued and supported Example: Parents respond to babbling as if the child is saying words. This focused reinforcement of word-like utterances gives rise to true words	Presymbolic communication is valued and supported Example: Looking toward an object by chance is interpreted as communication. This focused reinforcement teaches the child how to use eye gaze as communication of a word
Utterance length	Language evolves from single words to phrases and then sentences	Symbols are sequenced to produce phrases and sentences. Adults model the use of AAC strategies
Scope of communication possibilities	Children cry, point, vocalize, use words, etc. to communicate. As they get older, they phone, write, type, text, and email	Children are encouraged to use a variety of modalities so that they can communicate in many contexts. (Speech, gestures, objects, writing, etc.)
Social-emotional maturation	Children learn about emotions as their parents teach them these words (happy, bored, etc.). They develop emotional regulation and empathy through observations of others and through conversations	Children learn about emotions as their parents teach them these words (happy, bored, etc.). They develop emotional regulation and empathy through observations of others and through conversations. Adults continue to model AAC strategies
Behavioral presentation	As children learn to speak, they are expected to use words rather than whining, tantrums, etc. to communicate	As children learn to use AAC, they are expected to use symbols/signals rather than whining, tantrums, etc. to communicate
Rate of message exchange	Younger children process and produce messages more slowly and develop skill in more rapid communication exchanges over time	Specific rate-enhancing strategies are taught and these may be different for different situations. Residual speech is encouraged because this is always more efficient than AAC
Rate of progress	In young children, speech and language skills advance rapidly in the preschool years and more subtle refinements evolve naturally even into adulthood	AAC progress can be slower especially when children have cognitive impairments. Systems are modeled, taught, and refined into adulthood to support communication with new partners and in new contexts

famous AAC users. She expressed herself by signing letters of the alphabet against the palm of her communication partner's hand to begin her entrance as an interacting and contributing member of society. The success story of Helen Keller is often perceived as an isolated incident. In reality, the world of AAC has exploded both theoretically and technologically since then with most of the growth occurring over the past few decades.

Along with most things that develop quickly, many misconceptions exist. A common misconception among SLPs, parents, and even some physicians is that giving a child an AAC system

will lead to a disruption or impairment in natural speech production. The research studies have looked at the impact of AAC upon children of different ages and diagnoses. A meta-analysis of these studies by Millar et al. (2006) revealed that AAC does not impede natural speech production. A growing body of research is continuing to provide compelling evidence to share with families when such concerns arise. AAC looks different, but it does *not* decrease the likelihood of speech production (Table 2.2).

Another misconception is that AAC is only for children who have failed to make progress in

Table 2.2 The impact of AAC interventions on language acquisition

Study	Participants	Outcome
The impact of augmentative and alternative communication on the speech production of individuals with developmental disabilities: A research review (Millar et al. 2006; JSLHR)	Meta-analysis of six studies involving 27 individuals, most of whom had intellectual disabilities and/or autism	None of the subjects had decreased speech production, 11% showed no change and 89% showed increased speech production
Effects of augmentative and alternative communication intervention on speech production in children with autism: A systematic review (Schlosser and Wendt 2008; AJSLP)	Nine single-subject designs and two group studies with 98 total participants	AAC interventions did not impede speech production. Subjects made modest gains in speech

traditional speech-language therapy. Parents and clinicians do not need to choose between teaching speech production and teaching AAC strategies. If deemed appropriate, traditional speech therapy may be pursued while a child uses an AAC system. In fact, AAC can stimulate verbal expression for many children. AAC is best viewed as a bridge to optimal communication and thereby an avenue for promoting cognitive, emotional, and social development.

2.2 Early Intervention

A child’s preschool years provide an unparalleled opportunity to nurture all aspects of development during this critical period of rapid learning. The results of a study by Binger and Light (2006) revealed that 12% of 8,742 preschoolers who were receiving special education required AAC. Children who had developmental delays, autism spectrum disorders, speech-language impairments, and multiple disabilities were the most likely to need AAC. Clearly, significant numbers of preschoolers around the United States will need this type of communication intervention.

Many parents wonder about the old advice that toddlers will *grow out of speech and language delays*. In fact, there are anecdotal reports of individuals who did not begin talking until they were three years old or older, and then matured into adults with typical speech. Children who seem to have specific language impairment and then respond quickly to intervention are the very ones who lend credibility to the notion that speech

will eventually develop. Yet even when speech develops, many late talkers will continue to have subtle language problems (Rescorla 2009). The biggest concern is that it is not possible to predict with absolute certainty which young children will talk and which will not. This is true both for children who seem typical except for the absence of speech and those who have other developmental issues such as autism.

A brief period of watchful waiting would be appropriate when the child is developing normally in all other areas. When there are other developmental concerns or the communication delay appears to be severe, the risks of limiting acceptable communication options to only natural speech are significant and could impact the child’s development in many areas. For example, children who cannot communicate in other ways may tantrum, become withdrawn, fail to establish friendships, and become academic underachievers when they enter school. Children who speak increasingly use words as they mature and children who need AAC may use vocalizations, gestures, and symbols for regulating behavior and to support social-emotional maturation (Table 2.1). The urgency of optimizing the child’s learning potential and social/emotional development requires exploration of AAC options whenever (a) communication delays are evident or (b) the child’s history suggests that he may be at risk for severe speech-language impairment. Caregivers need to understand that the choice is NOT between speech *and* AAC. Rather the choice is whether to work only on speech without knowing how quickly (or even if) this will be a viable expressive option for the child who is at risk of severe communication

difficulties or to support language development using every means possible.

Table 2.1 outlines the difference between spoken language development and language development in children who use AAC. The primary difference is that in children at risk for severe communication difficulties, there is a greater therapeutic focus on reinforcing all vocalizations, watching for subtle signals such as small gestures, modeling the use of AAC systems, and providing many opportunities to practice multiple communication modalities such as signs and picture symbols. The child will progress from single symbols to combinations and will move from a less developed communication system (e.g., crying) to a more symbolic level. The rate of progress varies for both spoken language development and language development of an AAC user; however, progress may be slower for those with cognitive impairments.

Given that predictions about speech development are not completely reliable, the most helpful approach healthcare providers can take when discussing a child's communication difficulties is to guide parents toward an appreciation that intervention programs that combine augmentative communication strategies along with a focus on improved articulation will be the most successful. The child who does begin to talk has not lost anything, and the child with persistent, severe speech production problems has the tremendous advantage of being able to interact with others to access the knowledge that will promote greater academic and social success.

2.3 Diagnoses Associated with Severe Communication Disorders

2.3.1 Medical

A number of medical conditions have comorbid severe communication disorders and may lead SLPs toward consideration of an augmentative communication system. While some children have a single risk factor, others will have multiple risk factors that can combine to have a

more profound impact on speech production. An example is a child who has an intellectual disability, hypotonia, and a behavioral presentation that affects learning. This youngster is at greater risk for lasting communication difficulties than the child who has a single risk factor. However, a single risk factor can have a devastating effect such as with the child in our practice who contracted meningitis in infancy. When he was six years old, he had average scores on nonverbal cognitive measures. This child had received several years of speech-language intervention and was able to produce just one speech sound: "uh." A shift in his therapy goals to include a focus on AAC was urgently needed.

In contrast to children such as the one with meningitis who had a definitive medical diagnosis, there are other children with severe speech impairments who present with a normal neurodevelopmental course and without a specific medical etiology to explain the communication disorder. Both groups of children needed high quality, evidence-based interventions including implementation of AAC strategies.

2.3.2 Medical Necessity

The potential outcome is the same for children with a medical diagnosis that explains their disability and those without a medical diagnosis: they are not able to participate optimally in their medical care or in any other aspect of the daily routine if they are not able to convey their thoughts, ask questions and answer questions. When speech is defined as the ability to communicate with others, it is clear that individuals who are unable to communicate adequately improve or regain the ability to "speak" when appropriate augmentative communication interventions are in place. This is true both when the etiology of the speech problem is evident and when it is not.

2.3.3 Behavior

From an early age, children use behavior to communicate. The infant who cries when he is

hungry gets reinforced for this behavior: parents provide sustenance. As children get a little older, parents learn to differentiate their cries and more reliably predict whether the child needs a bottle, a diaper change, or to be held. The expectation for typically developing children is that they will advance from crying to more sophisticated communication strategies. They will learn to reach for objects or vocalize to get their needs met. When their efforts to vocalize receive a lot of attention, they begin to practice this more and then begin to produce word approximations.

Children who are not able to progress from crying to words may persist in crying and add other undesirable behaviors to get what they want. For example, the child who screams and hits may learn that this behavior is a way of asking to be removed from situations he does not like. Research has documented that communication disorders and behavior disorders coexist between 33 and 67% of the time (Gidan 1991; Prizant et al. 1990). While the cause-effect relationship is not well established, the treatment for behavior disorders must incorporate communication intervention as a component of a broader intervention plan that may also include counseling, behavior modification techniques, and medication management.

2.3.3.1 Autism and Intellectual Disabilities

The behavioral difficulties that can be associated with autism and intellectual disabilities deserve special consideration. Both of these diagnoses encompass a broad spectrum of developmental issues which may or may not include limited speech production. Children with milder forms of these disabilities may have excellent speech intelligibility and functional language skills. However, there are many who will have significant articulation and language impairments. When limited speech capability coexists with a tendency to be easily upset, the result can be severe behavioral problems that are difficult to treat. Children may resort to aggression, tantrums, self-stimulatory behavior, or excessive whining when they do not have other methods for getting what they want (Mirenda 2005). These behaviors are not unique to children with autism and intellectual disabilities, but when

children have multiple diagnoses it can be more difficult to determine what triggers the maladaptive behavior and equally challenging to plan successful interventions. The research on interventions for children who have autism spectrum disorders, intellectual disabilities, or both shows that using AAC to support language development and social communication in these children has the potential to have a positive effect on both behavior and communication (Ronski and Sevcik 2003).

2.3.4 Identification and Assessment

A child's ability to succeed in the classroom, to develop friendships, and ultimately to obtain meaningful employment is directly linked to communication skills. For children with severe communication disorders, reaching these goals begins with a thorough communication skills assessment. This process can be set in motion by the primary healthcare provider who monitors health and development and guides families toward resources and services in the community.

2.3.5 Healthcare Providers' Roles and Responsibilities

Children who have health issues that impact development often have accompanying speech and language disorders. Physicians and other pediatric healthcare providers play a significant role in monitoring a child's speech and language skills and making recommendations for screenings and, if indicated, full communication assessments.

Knowledge of developmental norms and guidelines for making referrals to SLPs is vital. Language development begins within the first few months of life. A newborn baby is exposed to the rhythm or prosody of the speech of others and begins to orient to sounds and then voices in the environment. As early as four to six months, the children attempt to babble, an important precursor to speech. Children speak their first words around 10–12 months of age and begin putting novel two-word phrases together at 18–24 months. Even young infants who are not bab-

bling when expected and show little interest in social interaction may need speech and language services. Those who have more severe delays are potential candidates for AAC.

National and some state programs such as BabyNet, which serves newborns and children up to three years old, may provide speech-language therapy services at no charge. Child Find is the federally mandated public school program that focuses on identifying children three- to six-year old with disabilities. Public schools provide speech and language therapy services for children who qualify in first grade up to the age of 21 (IDEA P.L. 108–446 2004). Private speech-language therapy services are also available in many communities.

Healthcare providers need to be aware of SLPs in their area who are trained to use AAC intervention and strategies to support communication development. In addition, it is helpful to prepare parents for the array of interventions, including AAC, which the SLP may suggest. This focuses the caregivers on the idea of supporting communication development rather than focusing solely on speech production. Further, this alerts the SLP that the expectations for this child include the possibility of AAC interventions so that this is explored early in the relationship with the family.

Physicians are sometimes asked to play a unique role when children need AAC to support the idea of communication as interaction: third party payers sometimes require a prescription from the child's primary care provider when purchase of a voice output device is being considered. The cost of these devices ranges from US\$ 100 to as much as US\$ 16,000. Therefore, the physician who is writing the prescription needs to have confidence that the SLP who is recommending the voice output device has made an appropriate selection that will meet the child's needs for several years.

2.3.6 SLPs' Assessment Roles and Responsibilities

When a communication disorder is either suspected or present, a referral to an SLP is indicat-

ed. While SLPs are not the only source of communication stimulation for a child, these professionals have the training to help support both the child and those who interact with the child. This support targets not just how the child sounds and what words he says but also how well he uses his knowledge in the everyday routine.

Communication assessment of children who have some speech: Many children who have AAC needs will have at least some residual speech that can and must be nurtured. These children may be able to participate in aspects of a test protocol that includes standardized testing. The testing will encompass the following areas:

2.3.6.1 Language

Language assessments typically include components that measure five areas: morphology (grammar), phonology (speech sounds), syntax (word order/sentence length), semantics (vocabulary/meaning), and pragmatics (social language use). Children with autism spectrum disorders (ASD) have the most difficulty with the communication-social component of language (Mirenda and Iacono 2009). Children with very severe communication impairments may have difficulty in all of these areas of language.

Pragmatics deserves special attention because the ultimate goal is for children to become independent, socially appropriate, and appealing communicators. This area is the interface of speech and language skills with daily routines and familiar and unfamiliar communication partners. Pragmatics is a key consideration in the development of AAC systems that are effective and contribute to improved quality of life. Even though there are standardized tests for pragmatic skills, these are not normed for children with severe communication disorders. Therefore the SLP will assess pragmatic language through informal observations and caregiver interviews.

2.3.6.2 Articulation

This is often the most obvious area of communication impairment. Standardized testing includes administration of tests designed to elicit production of all the speech sounds of English. Children who have a very limited speech sound repertoire

may be asked to imitate very simple words or single consonant or vowel sounds. An interesting phenomenon that has a profound effect on speech intelligibility is the inconsistency that is evident with apraxia of speech which is a disorder of motor speech programming. Children with this disorder often cannot imitate the sounds that they produce regularly in their spontaneous speech attempts. Those who have motor weakness (*dysarthria*) will consistently have difficulty producing sounds clearly. Children may also have a resonance disorder (*hyponasality* or *hypernasality*). Oral structure and function impairments may result in constant or profuse drooling, which may be remediated with positioning techniques, lip-strengthening exercises, heightening increased attention to maintaining a closed-mouth posture, or prescription drugs such as Robinul. Severe oral structural impairments can drastically affect articulation skills and may need to be addressed with surgery. Like many other aspects of communication, children may have combinations of developmental speech sound errors and apraxia, dysarthria, and/or oral structural impairments.

2.3.6.3 Fluency

A fluency disorder is characterized by deviations in continuity, smoothness, rhythm, and/or effort with which phonologic, lexical, morphologic, and/or syntactic language units are spoken (ASHA 1999). When children with Down syndrome, Fragile X, Moya Moya disease, and traumatic brain injury have severe communication disorders, stuttering may be a concomitant feature (Van Borsel et al. 2006; Van Borsel and Vanryckeghem 2000).

2.3.6.4 Voice

Voice disorders involve complications in one or more aspects of vocal quality (hoarseness, stridency, breathiness), pitch (frequency), loudness, and/or duration (length of time speaking on a single breath), given an individual's age and/or gender (ASHA 1993). Generalized neuromuscular impairments can have an impact on breath support for residual speech in children with severe communication disorders. Maximizing postural integrity through improved seating systems may

increase breath support for longer utterances. Amplification of residual speech in children who speak softly may decrease breathiness that arises from the child's efforts to "shout" to be heard.

2.3.6.5 Vision and Hearing

Determining if there are sensory deficits that could impact the use of an AAC system is essential. Referrals for vision and hearing assessment may be suggested before determining the best AAC device for the child.

2.3.6.6 Motor Skills

Optimal positioning is paramount to gesture and sign language or accessing a communication device and an SLP may refer the child for a seating and positioning assessment prior to beginning AAC device trials to ensure a child's optimal access to an AAC device.

2.4 AAC Assessment

In contrast to the relative objectivity of standardized testing, AAC assessment has many more informal, subjective components. A number of resources have excellent information on planning and conducting this type of assessment (Beukelman and Mirenda 2005; Hegde and Pomaville 2008). Unlike standardized testing which may be completed more quickly, a comprehensive AAC assessment may not be completed within the first appointment.

Assessing the communication skills of children who have limited language is frequently a challenge. These children use little or no speech, and they are often described as prelinguistic. Some of them may show little interest in playful interactions and others may have physical disabilities or sensory deficits that have limited their access to the world around them. With children who are functioning at this level, the merits of standardized testing are debatable when all the test items are too hard for the child. Obviously, there are agencies that require test scores even when standardized testing seems counterproductive.

Another concern about standardized testing with children who are prelinguistic is that we are

often left knowing more about what they cannot do than what they can do. Without some idea of what the child is communicating in less conventional ways, we do not have an appropriate starting point for intervention. Further, the energy expended in charting the absence of skills reinforces the sadness and pessimism that caregivers may already be feeling. Every skill the child demonstrates is a valuable skill, and beginning with a functional assessment of all the ways a child communicates is the most effective way to help caregivers fully appreciate their child's potential. Donnellan (1984, p. 141) introduced the "Criterion of the Least Dangerous Assumption," which suggests that it is best to assume all individuals have something to communicate, but have severe difficulty doing so. To err on the side of assuming competence is to set the stage for creating positive outcomes. Notice the difference between focusing on what a child cannot do and what a child can do:

- "The child is nonverbal, only answers limited yes/no questions with head movement, and cannot access (point to) pictures of objects indicating wants and needs," compared to,
- "The child can nod/shake his head yes/no to concrete questions about objects to meet wants and needs, uses eye gaze for direct selection of a photo indicating a want/need from a field of eight photos positioned approximately 18 inches away from him."

2.4.1 History

Collaboration with teachers, occupational therapists, physical therapists, teachers of the visually impaired, and input from the parents and the child with the communication disorder are critical for the decision-making process (Angelo 2000; Parette et al. 2001; Kintsch and DePaula 2002; Beukelman and Mirenda 2005). Reports of what has been tried in the past and insights regarding what strategies and equipment did or did not meet the communication needs are valuable. As with any speech–language assessment, the results of medical, educational, vision, and hearing

assessments will be important elements of the assessment plan for these children.

2.4.2 Ecological Inventory

When a standardized test must be administered to satisfy an agency's eligibility requirements, the SLP can still support the development of appropriate goals by supplementing the test results with what is variously called an ecological inventory, a routine-based assessment or a functional assessment. Using an ecological inventory for obtaining subjective, pragmatic information can provide far more information than structured standardized tests for children with severe communication disabilities. The interview component of an ecological inventory often infuses caregivers and interventionists with greater optimism about the child's potential and that alone is reason enough to focus on this to obtain baseline data for intervention planning.

A typical ecological inventory (Nalty and Quattlebaum 1998) will include the following questions:

- How does the individual communicate now (gestures, signs, eye gaze, vocalizations, limited verbalizations, object symbols, picture symbols)?
- What are the child's favorite activities, objects, places, people, and foods?
- When does the child try to interact with others the most?
- Where does the child communicate now?
- What environmental barriers exist? Does one communication device or system work better in one environment than another?
- Does the child fatigue quickly? Under what conditions, if any, can the fatigue be minimized?
- Who does the child interact with (e.g., friends, siblings, teachers, medical personnel, etc.)?
- What communication partner barriers exist? Is one communication partner reluctant to a new way of communicating or to learn new technology? Will one partner need more training than another?

Table 2.3 Example of an ecological inventory for a morning routine

Daily Routine	
Ms. Smith was interviewed about the typical daily routine to better learn about the types of communication symbols Jarrod is using at home. She described a typical school morning as follows:	
7:00 a.m.	Ms. Smith walks into Jarrod’s room to wake him up. He will sit up and look around briefly. Then he will <i>look at his mother, make eye contact and smile</i> . Ms. Smith helps him get off of his bed. Then <i>he takes her hand to lead her</i> to the bathroom. Ms. Smith puts him on the toilet. Jarrod wears pull-ups. He does not indicate that he wants a clean pull-up. He takes his pull-up off later in the day, but he does not usually do this first thing in the morning. Ms. Smith washes Jarrod’s face and brushes his teeth. Jarrod can provide some assistance with this
7:15 a.m.	Ms. Smith gets Jarrod dressed. His father selects his clothes for him. Jarrod can assist with parts of the dressing routine
7:20 a.m.	Jarrod goes downstairs on his own accord. He will get a banana or some grapes for himself. When Ms. Smith comes into the room, she will offer him something to eat. <i>If he does not want what she has offered, he will begin pointing to things</i> . He will <i>push items away until he gets what he wants</i> . If Jarrod wants more, he repeats the same routine of <i>pointing toward the cabinet that has what he wants</i> . Jarrod walks away when he is finished
7:40 a.m.	When Jarrod sees everyone going to the door, he gets his jacket and goes to the door. After they arrive at school, he will <i>occasionally wave goodbye</i>
Jarrod’s parents provided the following list of activities and objects he likes: bathing/water play, swinging, sliding on the slide, walking around holding objects, fruit, chicken nuggets, and running	

- How does the child learn best? Is the child a visual or auditory learner?
- What aspects of the child’s current communication system work well?

The basic goals of an in-depth interview about the daily routine are to determine what the child is doing to participate in routines and what the child likes to do (Table 2.3). This ecological inventory of the morning routine showed that Jarrod uses eye contact and smiling to interact with family members. He can point to show that he knows where his favorite foods are kept, and he makes selections by pushing away objects/foods that he does not want. The interview also revealed that there are some additional opportunities for increasing Jarrod’s communication skills. For example, pauses could be used to encourage him to signal that he knows what is coming next in a routine, and he could be taught to do more choice making when objects are presented to him.

An analysis of Jarrod’s interactions revealed numerous deliberate attempts to communicate. Some children will not show as much evidence of interest in communicating. Ideas for interventions for children who are not yet showing much intentional communication are available in the book by Korsten et al. (2007). The authors outline strat-

egies for objectively identifying a child’s sensory preferences and then using these preferences to develop higher-level communication skills.

2.4.3 Feature Matching

Feature matching describes the process of determining what communication system would be best to explore. The major aspects to consider when beginning a feature match are the child’s current level of skills, daily needs, current communication system, and future communication needs. It eliminates the chance of selecting a device based on its popularity or an ambiguous determination of being “the best one.” The website created by AbleData (<http://www.abledata.com/abledata.cfm?pageid=19337>) lists many assistive technology products including AAC products and their features. The best communication device or system will always be the one that has the features that meet the needs arising from the child’s disabilities. Determining the optimal feature matches begins with looking at the individual assessment objectives and their associated features. The child’s assessment team uses selection criteria to match the features to the child’s needs based on their abilities (Table 2.4).

Table 2.4 Feature matching

Objective	Feature	Selection Criteria
Shared symbol system	Unaided: Signs and gestures	Choose one or more types of symbols that are consistent with the child's cognitive and literacy capabilities to nurture multimodal communication
	Aided: Objects, photographs, graphics, and/or text	
Development of a language system	Single-meaning pictures: One symbol has one meaning representing one word or an entire thought	Choose one or more language system(s) that are consistent with the child's cognitive and literacy capabilities
	Semantic compaction: Symbols combined to generate vocabulary	
	Spelling: Letters combined to create words	
Construction of messages to interact with others	Vocabulary: Core vocabulary of common, frequently used words combined with personal vocabulary	Choose meaningful vocabulary to motivate the child to communicate. A resource is http://aac.unl.edu/vocabulary.html
Access to communication symbols	Direct selection:	Choose selection method that child can reliably use to efficiently access communication symbols
	Message activated by pushing against the device surface or using eye gaze	
	Keyguard to prevent accidental activation of letter and picture symbols	Abbreviation expansion, word prediction, and phrase prediction can minimize fatigue
	Indirect selection/switch scanning:	
	Step, linear, row/column, block	Choose one- or two-switch scanning method that maximizes the child's reliable movements and is consistent with the child's cognitive capabilities
	Minimizing visual impairments:	
	High contrast settings	Choose background and foreground color, text and symbol size that allow the child to see and discriminate between symbols
	Zoom and magnifying options	
	Large display communication devices	Choose auditory options so child can choose communication symbols based on using hearing
	Auditory scanning	
Access to communication device	Minimizing hearing impairments:	Choose amplification level so the child can hear the voice output
	Amplification	
	Visual activation cues	Choose visual activation cues so the child can see what communication messages are selected
	Carrying case/shoulder strap: For children who are ambulatory	
	Mounting systems: Fasten device to a stand or to a wheelchair or bed for children who are non-ambulatory	Choose a mounting system that provides access to the communication device while the child is seated or lying in bed

A final major consideration for a feature match is the child's future communication needs. While meeting the child's present communication needs is paramount, addressing the communication needs of the future plays a critical role in determining intervention goals and objectives and in selecting communication devices. For example, a child with a degenerative condition may need to practice eye gaze access to a dy-

namic display communication device if other forms of access are expected to deteriorate.

2.5 AAC Devices

Although there is great diversity within specific diagnoses, a specific diagnosis does not indicate the need for a specific device. Device tri-

als are an integral part of the feature matching process. Determining the best communication system includes a trial period for the child to use the device during daily routines and collecting data to support the recommendation for a specific device. Communication devices can be borrowed from most vendors or from State Tech Act programs (<http://www.resna.org/content/index.php?pid=132>). Many of these programs offer free AAC device loans and have a device demonstration center. AAC device vendors can often make arrangements such as rent-to-own, rent, or a free loan to an AAC professional. In addition, most vendors will assist the SLP through programming demonstrations or providing information about training webinars or teleconferences.

Communication equipment is often referred to by its level of technology using three primary categories: low, mid, and high. The words “low,” or “mid” may appear to indicate that these communication devices lack effectiveness, are easy for all AAC users to learn or require less knowledge on the part of the team working with the child, but this is not the case. Again, the most appropriate device is the one that has the features the child needs. As progress is made, documenting the AAC user’s skill with low- or mid-tech devices supports funding requests for more advanced systems. Regardless of the level of technology, it is important that communication devices are recommended based on the results of a thorough assessment and feature match.

“Low-tech” includes communication boards and booklets. Low-tech devices are relatively inexpensive to purchase, or can be quick and easy to construct and are typically easy to modify. Many consider it prudent to introduce low-tech communication devices during the assessment process to kickstart the intervention process, obtain useful information about issues related to feature matching and as a backup for mid- to high-tech devices.

“Mid-tech” communication devices require battery power for operation, cost more than low-tech devices and require communication partners to have at least a cursory knowledge of how to program, operate, and maintain the communication device. Human voices are digitally recorded on mid-tech devices.

“High-tech” communication devices typically provide a larger vocabulary than low- and mid-tech devices. Many high-tech devices include digitized and/or computer-generated synthesized speech. The training required and the programming and maintenance of the devices can be more involved than low- and mid-tech devices. However, when feature matching shows a need for a high-tech communication device, the impact of these devices in meeting the communication needs of severely multiply-disabled children cannot be overemphasized.

Readily available mainstream handheld devices with Apple, Android, or Windows operating systems are increasing in popularity and have AAC software or apps. However the software or apps may not be robust enough to meet all the child’s communication needs. Vendor support and training, device warranties and device durability must be taken into consideration. As with all AAC devices, trial use and careful documentation of effectiveness continues to be important components of an AAC assessment.

2.6 Standardized Tests, Observation, and Reports from Significant Others

Standard scores, percentile ranks, and age equivalents are valuable objective data to be reported in a summary. Descriptive data from standardized tests are reported if the child is very young or severely delayed in the area of expressive or receptive communication skills.

The importance of subjective information cannot be overstated for children with severe communication disabilities. Informal observations are made before, during, and after the standardized testing process. These descriptions should include comments about the child’s response to new people and objects in their environment, to structured versus nonstructured tasks, and to motivating and nonmotivating items or activities. Spontaneous communication in the form of gestures, facial expressions, body posture, and vocalizations should be documented. Parents, school staff, and significant others can be given

questionnaires to fill out prior to the assessment. These questionnaires will include space for the child's medical history, descriptions of the child's current communication and participation in the daily routine, information about motor skills and reports of behavioral issues that may exist. The feedback from the questionnaires provides great insight regarding the child's communication skills during a typical week. Parents and other team members will be interviewed further on the day the child is assessed.

2.6.1 Summary of Findings

The summary of all the information gathered through formal and informal testing is compiled into a report. This report provides the physician, parents, therapists, school staff, early interventionists, and others with detailed information about the child's communication skills, communication goals and objectives, strategies that facilitate communication and any recommended AAC devices. Sometimes *ongoing therapeutic trials of AAC strategies and equipment* are recommended.

2.6.2 Prognosis for Success

Successful outcomes in AAC are specific to each user, and the traditional language development paradigm is not always the best model for measuring success. For some children, success might mean increased participation in an activity or in interactions with familiar partners. The prognosis for success is based on many factors, and the child's health status, motivation and support from others are the foundations for this determination. Strengths in all three areas are not always needed for successful outcomes, but a pattern of strengths leads to more reliable predictions about future outcomes.

2.6.2.1 Extrinsic Indicators

Children with severe communication disorders need considerable support from family, school staff, and therapists to learn new communica-

tion skills. Using a team approach to intervention maximizes the benefits to the child, and team members learn from each other. The parents play a powerful role in the team. All the other team members must remember that parents have developed the interaction style they use with their child in response to the child's communication efforts, and the parent-child interaction style may have been profoundly affected by the child's health issues. It is not uncommon for family members and other communication partners to reduce the communication demands on a child with severe or multiple disabilities as they focus on the complex process of meeting the child's basic needs. The communication partners may have developed a pattern of speaking for the child and making decisions for him. The parents' ability to shift their focus as the child's health stabilizes so that they can incorporate therapy objectives during everyday routines is an indicator for a positive outcome. Likewise, when teachers, early interventionists, shadows, or aides think creatively about how best to facilitate the child's communication skills throughout the school day, the prognosis is more positive. If it is possible for the child's SLP to cotreat with other team members, this has the benefits of modeling communication-stimulation techniques for the other interventionists while reducing any confusion the child may experience when seeing multiple therapists in separate appointments. This empowers all adults who interact regularly with the child to model language using the AAC system.

2.6.2.2 Intrinsic Indicators

When a child realizes the power of communication and is motivated to be an active participant in learning language and engage with communication partners, the prognosis for improvement is good. Some children experience the frustration of attempting to communicate through limited vocalizations, unnoticed or misunderstood gestures or body postures or misinterpreted attempts to localize with eyes or head position. This can lead to learned helplessness and being a passive observer rather than active participant. Some of these children focus on pleasing others rather than actively learning a symbol system or how to

use language to meet some of their needs. Unless the child can be engaged regularly and experience the power of being an active participant in the communication exchange, the prognosis remains guarded.

2.6.3 Stable Versus Progressive Medical Condition

The child's diagnosis of a stable medical condition plus positive extrinsic and intrinsic indicators suggests a successful outcome in improving communication skills. However, children who have medical diagnoses that will lead to developmental regression also need AAC interventions. In these circumstances, the child's ability to learn or maintain communication skills may be impacted by increased fatigue, impaired access to the communication device and pain or sickness associated with a declining medical condition. A multimodality communication system can be implemented to prepare the children for a mode of communication they will need to rely on more heavily in the future. For example, a child may be a proficient communicator with eye gaze, facial expressions, gestures, signs and a communication device today, but it is anticipated that eye gaze, facial expressions, and a communication device will be the best modes of communication as the disease process progresses. The SLP will monitor the child's changing needs and make changes to his communication system to increase the likelihood of ongoing communication success during the disease progression.

2.7 AAC Intervention

Intervention for AAC use is the next critical step after the assessment. This is the culmination of the information collected during the assessment put into practical application. Intervention begins with writing functional communication goals. AAC intervention must be based on evidence that has been established by research and clinical and educational practice (ASHA 2005). Although basic therapeutic concepts have been described

in the literature, the features of each communication system remain specific to the individual user. Communication goals should be culturally and linguistically appropriate and should include a strong commitment from family members. Research shows that when the users of electronic communication devices have the opportunity to practice frequently with caregivers who show that they value this type of communication, the intervention is much more successful (Dada and Alant 2009; Ronski and Sevcik 2003). Modeling the use of the AAC system is known as Aided Language Stimulation or Augmented Input Strategies.

In some respects, AAC interventions for severe communication disorders mirror medical models of intervention for chronic medical conditions such as diabetes, high blood pressure, and sickle cell anemia. The patients with these conditions and their health care providers share the goal of optimal management of the symptoms. Plans for treatment are made with the understanding that while the disease cannot be cured, appropriate treatment can (a) help patients live the most normal lives possible and (b) decrease complications and costs in the future. Intervention for severe communication disorders can be viewed within a similar framework. SLPs carefully evaluate the communication abilities and potential of each child, consider the child's support network and prescribe appropriate interventions. Following this, SLPs work with the child and all of the child's caregivers to maximize the child's success with the AAC interventions that are suggested.

As the intervention begins, it is crucial to help the team distinguish between AAC and other learning, symbol, and picture tasks. As parents, teachers, and other interventionists work with children who have severe speech impairments, they ask these children to do what all children are expected to do: demonstrate what they know so that adults can measure their knowledge. The child's responses can take many forms depending upon any motor difficulties or cognitive delays that may be present. Some children will look at the object as it is named to signal that they recognize it. Others may be asked to point to pictures

or to use an adapted keyboard to type the answer to a question.

The difference between AAC and other types of learning activities must be clarified from the outset because this confusion can create significant problems for both the AAC user and those who interact with him. A common misconception is that any activity done with “pictures” is the same thing as AAC. In fact, pictures are used for many different purposes in the classroom and at home to meet cognitive/academic goals such as:

- Learning family members’ names
- Learning new vocabulary
- Reading comprehension
- Matching
- Sorting
- Understanding the daily schedule
- Learning the written form of the child’s name from seeing this matched with the photo

The key difference in AAC is that accessing the pictures is NOT the goal; real, meaningful interaction in a natural, spontaneous conversational context is the goal. An analogy is that a car is a tool that takes you to the beach, but the car is not the same thing as the vacation. In the same way, AAC is a tool that takes you into social interactions. The focus is on using pictures to engage another human being rather than on using pictures to demonstrate knowledge.

In our experience, this confusion between how picture symbols are used in AAC and how pictures can facilitate other types of learning is quite persistent. For example, *picture identification* is a skill that children are taught from a young age. Parents want their children to recognize pictures of family members and to identify pictures in storybooks. Increased adeptness in this skill is associated with increases in cognitive skills, and so picture identification is a way that parents can celebrate their children’s achievements. When families are asked to use pictures to nurture communication, they often need a lot of support and training as they shift from a focus on eliciting responses in a teaching format to using objects, pictures, etc. to nurture improved social communication skills.

Using pictures and other symbols to communicate is a skill that has to be taught, and we

suspect that it is the teaching component of AAC that so quickly gets interventionists off track. The natural tendency is to go back to using pictures to demonstrate receptive skills and knowledge. Using pictures for expressive communication requires creativity and an unwavering focus on the goal: achieving social communication that is meaningful by broadening the scope of interactions beyond simplistic demonstration of knowledge and allowing the AAC user to develop the unique personhood that stems from the ability to express his thoughts. Failure to understand how to use symbols to support communication has major consequences; children who have had to point to pictures over and over again in learning tasks need an *entirely different* type of experience in order to recognize the value of using pictures to develop connections with the people around them. The focus shifts from demonstration of knowledge to demonstration of a desire to engage other people both in the ideas that are interesting to the AAC user and in discussions of the ideas that interests others.

2.7.1 Vocabulary Selection for an AAC System

The goal for vocabulary selection is to provide a means for the child to interact with others to participate fully in home, school, and community environments (ASHA 1993). Selection of motivating vocabulary is crucial if the child is expected to improve his communication skills. This means that the child’s interests are considered first, and the vocabulary should include a variety of word types. While nouns provide the child opportunities to meet basic wants and needs, the vocabulary is not varied enough to allow the child to learn or experience the benefits of using a rich communication system to meet social and emotional needs.

Vocabulary development is as closely linked to social and emotional development as it is to language development. As they mature, children are expected to talk about their unhappiness rather than engage in misbehavior. Parents of typically developing children spend a great deal of

time and energy supporting this aspect of development at least until their children are old enough to live independently. A number of reports indicate that children with delayed language skills show an increased prevalence of problem behaviors. (Chamberlain et al. 1993; Pinborough-Zimmerman et al. 2007; Prizant et al. 1990; Sigafoos 2000). Therefore it is not surprising that even when early intervention has taken place, children with severe communication disorders may have behavior problems that must be addressed. Concerns may include ADHD, frustration, tantrums, aggression, withdrawal, or combinations of these. Careful vocabulary selection can provide acceptable communication to replace these problem or challenging behaviors. The research is compelling, and it shows that improved communication skills can dramatically improve behavior (Sigafoos et al. 2009; Wacker et al. 2002).

Vocabulary selection should rely heavily on what is known as *core vocabulary*. Core vocabulary consists of a few hundred words that make up about 80% of what typical speakers say (Baker et al. 2000). Most of the core vocabulary words are not easy to represent with pictures or objects so the symbols for them may have to be taught. These words include pronouns, verbs, articles, adjectives, and demonstratives. If a child's beginning AAC system offers a limited amount of messages on the communication device, core vocabulary can maximize available message space by providing a small vocabulary set that generalizes across communication environments. Further, core vocabulary facilitates generative language skills (Cannon and Edmond 2009). Generative language provides opportunities to express fuller meaning as a result of putting words together. For example: a child using a voice-output communication device can send one prerecorded message "Let's go to McDonald's," or send two prerecorded messages "go" and "eat." The sentence indicates only one meaning, whereas combining words allows the child to begin an interaction with their communication partner who will then ask, "Where do you want to go to eat?" This allows the child to experience new things by asking for different dining places over time. An additional ben-

efit is that the child learns the rules of syntax by combining words to create different meanings. Careful consideration should be given to storing sentences that address more urgent or frequent needs as single messages. These may include "I need help," "Please ask yes/no questions," or "It's not on my communication board/device." For other messages, access to the core vocabulary should be the priority.

2.7.2 Routine-Based Interventions

Routine-based interventions begin with the information obtained from the ecological inventory. This information is used for introducing many opportunities for the child to communicate throughout the day during typical activities. The vocabulary may be available in one or more types of symbols or devices and is conducive to communication exchanges throughout the day.

2.7.3 Writing Individualized Education Plans (IEPs) for AAC Use in the Classroom

The Individuals with Disabilities Education Act (IDEA 2004) states that the need for assistive technology must be considered for every child with a disability. Assistive Technology devices are defined in IDEA 2004 (§ 300.5) as "any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of children with disabilities." One type of assistive technology is AAC devices. IDEA 2004 (§ 300.6) defines an assistive technology service as "any service that directly assists an individual with a disability in the selection, acquisition, or use of an assistive technology device." The service includes a functional evaluation in the child's natural environment; providing acquisition to an assistive technology device; customization, maintenance, and repair of the device; coordinating therapies, interventions, and services with current education and rehabilitation plans; and training the

child who uses the device and the child's communication partners. IDEA 2004 (§ 300.105) also describes each school's responsibility to provide assistive technology devices or services if these are required as a part of the child's special education, related services, or supplementary aids and services.

If the IEP team determines that AAC is needed, then the components of this intervention must be described in the child's IEP. To ensure the use of AAC in the classroom, the team documents the child's communication, academic and functional needs along with the child's strengths. A statement is included in the IEP about the child's academic achievement and functional performance, including how the child's disability affects participation and progress in the general education curriculum.

Based on this information, measurable annual educational and functional goals and objectives are written in the child's IEP (Downey et al. 2004). An academic goal should be written to include the area of need; the direction of change; the level of attainment (Wright and Laffin 2001); and how the AAC device relates to a functional task. For example, the present level of academic achievement and functional performance may show that the child uses varying vocalizations to get attention, greet others, to protest and to answer simple yes and no questions. The child also uses eye gaze to indicate a desire for things in the immediate environment. With a new focus on AAC, the child has begun to demonstrate some success using eye gaze to select one of four choices for activities and can push a single-message voice output device with the left hand. An example of a short-term objective is: During group singing time, the child will use a single-message, voice-output device to participate with peers in the repeated chorus 90% of the time as observed during 10 random trials. Another example could be: Using a portable eye gaze frame, the child will indicate a preference between four choices 80% of the time in five random trials. Notice that the focus of these objectives is on relating the use of the technology to a functional outcome. The equipment should not be viewed as an end in itself, but rather a means to an end.

2.7.4 SLPs' Intervention Roles and Responsibilities

The American Speech-Language Hearing Association has prepared a position statement on the roles and responsibilities of SLPs with respect to AAC. It states that providing AAC services is within an SLP's scope of practice. SLPs should acquire training and resources to serve those who may benefit from AAC; assess and provide functional treatment with a multi-disciplinary team approach; use a multimodality approach; document outcomes; and recognize and support the way an AAC user prefers to communicate to maintain and promote quality of life (ASHA 2005). SLPs should have knowledge of typical developmental stages and skills, conduct comprehensive assessments, identify strategies and implement a comprehensive intervention plan, and assess effectiveness of the AAC system (ASHA 2002). If the SLP has not had adequate training in AAC practice, he or she must refer to another professional who can provide quality services.

2.7.4.1 Creating/Providing Communication Systems

Because AAC is consumer driven, the type of symbols, layout of symbols, language system, and level of technology are determined individually for each child and are components of the communication system. More than one low-tech communication system can be created to meet the communication needs across different environments. Typically, the child's SLP is responsible for the construction of low-tech communication systems or securing equipment loans for mid- or high-tech system trials. Low-tech communication devices can be constructed and provided immediately so that higher-level communication skills are nurtured in advance of a more sophisticated communication system that may be needed.

Sometimes AAC devices are purchased just before students transition into new programs and at other times the parents may purchase devices without the type of assessment or device trial described as best practice. This has occurred with increasing frequency as mainstream devices have become more popular as less expensive alterna-

tives to dedicated AAC devices. As a result, there may be different opinions about what device best meets the child's needs. At these times, utmost diplomacy and regard for each team member's contribution is important in determining how existing devices fit into the child's multimodal communication system.

2.7.4.2 Educating Communication Partners

The success of a child's communication system increases when SLPs teach parents, teachers, teaching assistants, other therapists and aids how to encourage the child's functional use of the communication system throughout the day. The SLP should also teach these partners to model the use of the communication system and learn programming basics for mid- and high-tech devices. Team participation and feedback are essential as changes and updates to the available vocabulary and symbol layout are necessary as the child learns a new communication system.

2.7.4.3 Therapeutic AAC Device Trials

Upon using the AAC device consistently for several days, the child may begin to interact with the device less and less or refuse to use the device. Some children may not be able to express themselves well enough to give an adequate explanation for this rejection. There are many reasons that the device may be neglected or refused. The device may be too heavy, or the symbols may be too small, too complex, too abstract or unmotivating. Perhaps the communication partners are not modeling and encouraging the use of the device during the naturally occurring activities. The SLP will want to contact the team members to discuss their impressions of why the child is resistant to using the communication device and implement changes based on observation and feedback from them.

Documenting the level of success the child has using the device provides data to share with funding sources. Providing data on several different AAC device trials informs funding sources that the device is recommended based on evidence of being the optimal fit for a particular child's communication needs and not because it is the only one tried or the one deemed best in the market.

2.7.4.4 Funding and Letters of Medical Necessity (LMN)

Professionals who support children with communication disorders can reach consensus on the premises that (a) communication is a fundamental element of human existence, (b) without communication, interactions that nurture basic health are not possible, and (c) electronic communication devices are a reasonable response whenever all lower-tech options have been considered and proven inadequate. Usually vigorous efforts are needed to secure funding for these more costly devices. Assisting with funding requests requires dedication and a significant time commitment of the SLP.

In addition to the traditional speech and language evaluation and report, Medicaid and other third party payers also require the SLP to write a letter of medical necessity (LMN). The LMN incorporates specific information about the child's communication skills and how AAC equipment is able to meet those needs and is sent to the physician to request a physician's order for a particular AAC device. The LMN and the physician's order are used for applying for funding and justifying the request through a variety of payer sources. If the initial funding request is denied, an appeal letter is written with additional justification.

School districts are required to provide communication devices for a child if they are deemed necessary for the child to receive a Free and Appropriate Public Education (FAPE). Schools may purchase an AAC device through their budget or through available federal or state grants. It is not unusual for schools to be reluctant to send electronic AAC devices home with children. If the AAC device is written in the IEP as required tool for the child to complete homework, then the device must be sent home with the child to ensure a FAPE. A limited number of federal or state grants may be available to schools to purchase AAC devices.

As a result of funding constraints that agencies face, some may feel compelled to divide communication into components that relate to home, school, medical settings, etc. or to develop specific guidelines that place constraints on funding based on variables such as age and type of

disability. However, it is not possible for SLPs to ethically restrict communication opportunities to a specific environment.

If it is appropriate for the child to use a mid- to high-tech AAC device beyond the school setting (e.g., the home and the community), insurance or Medicaid funding may be investigated. Insurance options must be explored prior to seeking Medicaid funding as Medicaid is the payer of last resort. To receive Medicaid funding, the child must be eligible for Medicaid and the AAC device must be deemed medically necessary. Private avenues of funding include church groups, service clubs such as Lion's Club, Sertoma Club, and Shriner's, local charities and private pay.

While the value of communication cannot be overstated as it relates to the potential for participation in the daily routine and communicating health concerns, fiscal responsibility is an equally important consideration. The purchase of an electronic AAC device is appropriate only when there is compelling documentation of the other strategies and techniques that have been tried and have proven inadequate. It is reasonable to assume that more expensive communication devices would require extensive documentation that explains why less expensive alternatives are inadequate and that these requests would be scrutinized very carefully.

2.8 Parents' Roles and Responsibilities

Parents whose children have severe communication disorders are thrust into systems and services that can be confusing and overwhelming. For some parents to be successful participants in AAC implementation, they may need an initial period for mourning and acceptance (Seligman-Wine 2007). Team members have to respect this journey and support both parents and children as they move through the grief process.

It is not possible to predict how quickly parents will move toward acceptance of AAC systems, and research shows that parent involvement varies greatly during AAC assessment and implementation (Bailey et al. 2006). Some basic respon-

sibilities that parents face when their child first receives an AAC device include programming, participating in vocabulary selection, facilitating device use across settings, modeling device use, troubleshooting device problems, and the daily upkeep and cleaning of the device. Parents must also allocate the time and effort required for these activities as they continue to support their child's development in other areas. They will benefit from referral to support groups or possibly individual counseling as they balance all the demands of raising a child with special needs.

2.8.1 Parent Participation in AAC Training

Training is often available from the child's SLP and device vendors and through workshops, conferences, seminars, and webinars held by specialists in the field. The parents' goal will be learning how to maximize naturally occurring communication interactions through modeling the use of the device in motivating activities. They also need to learn to program and maintain electronic communication devices, make decisions about appropriate vocabulary, and recognize possible signs of need for small or large changes to a communication system. Acquiring this amount of information and skill may seem overwhelming at first, but it can be learned over time.

2.8.2 Creating Opportunities for AAC Use Across Environments

Training the child to use AAC strategies in the home and community requires that parents become familiar with the AAC objectives and how to apply them during naturally occurring activities. Parents also need to educate other family members and significant others in the community about how best to communicate with their child. Including a message on the child's communication device stating how the child communicates and how others may best communicate with the child may be beneficial. Children always require many opportunities to practice communication

skills to facilitate communication in and across environments. For example, a child may learn to use his communication system at home to talk with his parents about his experiences in school (Bailey et al. 2006).

2.8.3 Advocating for the Child

A parent's ability to advocate for their child's right to communicate, obtain an AAC assessment and AAC intervention requires knowledge of federal and state laws and policies and procedures. The onus is often on the parent to become self-educated about their children's rights and available services and resources. Schools, state tech act programs, early intervention agencies, and support groups can be valuable resources for this information. A parent may need to remind professionals to include them as part of their child's assessment team, as participants in device selection, and as participants in vocabulary selection on the communication device.

Transition planning Specific transitions during the child's development may trigger consideration of an AAC reassessment. Examples are moving to a new school or home or when the developmental picture changes significantly. Parents will need to meet with the child's school team before and after changes take place to ensure that the AAC system travels with the child and continues to meet the communication needs of the child. An excellent resource for supporting older students is *Transition Strategies for Adolescents & Young Adults Who Use AAC* (McNaughton and Beukelman 2010).

2.8.4 Updating

An AAC system should provide a means for allowing a child to meet his communication needs now and in the future. Ongoing monitoring is needed to determine if the AAC system is providing a means for the child to engage meaningfully in social relationships and participate in activities with success (Beukelman and Mirenda 2005). The monitoring

and updating of an AAC system is dynamic in nature and therefore never ends. The AAC systems used by children typically need updating each time a significant school transition occurs or when there is a significant change in development. As the child's communication and literacy skills improve, the AAC system will again need updating. A successful AAC system is based on the needs identified during the assessment and provides a means to expand and thereby enhance the quality of social interactions and activities commensurate with the child's typically developing peers.

2.9 Literacy, Language, and AAC

It has been suggested that "children with developmental speech/language impairments are at a higher risk for reading disabilities than typical peers with no history of speech/language impairment" (Schuele 2004, p. 176). Factors that may positively influence a child's literacy skills are plenty of opportunities to practice reading and writing, exposure to topics of interest to the child, regular exposure to peers who read and write, and many experiences of success while reading and writing (Special Education Technology–British Columbia 2008).

A child with a severe communication disability may begin communicating with AAC using single word messages only which should be drawn from core vocabulary lists. Often, initial communication focuses on the use of single nouns or verbs. If single-word messages are selected to nurture symbol sequencing, the child has the opportunity to combine single symbols to demonstrate an understanding of semantics, combine symbols to communicate phrases, or sentences that may increase the specificity of meaning, promote generative language and develop knowledge of syntax. Syntax refers to how words are combined and is important for both communication and literacy skills. For example, the child may initially use the communication system to express "juice." With practice, the child may combine single words to convey specific information about the juice such as "want juice," "no juice," or "more juice." This skill can

be extended to literacy as the child learns to read and perhaps write or type “juice” and other words that can be combined with “juice.”

The increased number of opportunities for communication using high-tech communication devices also facilitates literacy skills through interfaces with other technology. Operating systems in high-tech communication devices often include word processing, phone, and internet with e-mail and instant messaging capabilities. The child can write and communicate with others while using his specific access method to practice literacy skills in these motivating activities using a combination of video, photographs, graphics, whole words, and individual letters for spelling.

2.10 Discharge from Intervention

SLPs are prepared to nurture the child’s language skills, both through direct services and through training teachers and families. Planning for discharge from formal intervention should be part of the initial assessment. The IEP team determines the criteria for discharging the child from speech-language pathology intervention through analysis of (a) the communication skills acquired by the child, (b) the level of independence the child has achieved, (c) the adequacy of training and followthrough of teachers, parents, and child for maintaining and updating the communication system as needed, (d) the ability of teachers, parents, and/or the child to determine and request a reassessment if the need is present. Discharge should be a natural evolution of a carefully planned intervention program. In most instances, when children have severe communication disorders, the parents should be prepared for the possibility that the child may need additional services in the future.

2.11 Summary

For children with severe communication difficulties, AAC is a powerful outlet for celebrating the fundamental human connection that all children need to thrive. Healthcare providers are in a

unique position to help identify and support children with severe communication disorders, and this begins with helping the caregivers to access AAC services for these children. Research has consistently shown that the use of AAC strategies does not interfere with the development of speech. Further, when the child’s caregivers use AAC strategies to support language development, the outcomes improve. All children who have significant developmental delays and those who may be at risk of severe communication difficulties should have high quality interventions that are proven to enhance communication skills, and AAC strategies are in this category.

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