**Clinical Practice Guideline:** **Augmentative and Alternative Communication (AAC) and Speech Generating Devices (SGD)**

**Date of Implementation:** **June 22, 2017**

**Product:** **Specialty**

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Related Policies:
CPG 165: Autism Spectrum Disorders
CPG 166: Speech-Language Pathology/Speech Therapy Guidelines
CPG 257: Developmental Delay Screening and Testing

## GUIDELINES

### Medically Necessary

American Specialty Health– Specialty (ASH) considers augmentative and alternative communication (AAC) devices and speech generating devices (SGDs) as medically necessary durable medical equipment (DME) upon meeting **all of** the following criteria:

- A formal speech evaluation has been performed by a speech-language pathologist with documented permanent and severe speech disability in their primary language which must include at least **all of** the following items:
  - A description of the communication goals expected to be achieved and treatment options (past and current);
  - Treatment plan with a training schedule for the selected device;
  - Daily communication assessment indicating natural modes of communication;
  - Rationale for the selected device and accessories and medical justification for the device, and if a high tech* device is requested, it is demonstrated that a low tech* communication device or system is inadequate to meet the individual's functional communication needs;
  - Demonstration that individual is capable of using the device and any accessories successfully;
  - Evaluation of the current communication impairment, including type, severity, language skills, cognitive ability, and prognosis;
  - If an upgrade to another device is necessary, information as to why functionally necessary;
  - A copy of the Speech Language Pathologist’s (SLP's) written evaluation and recommendation have been forwarded to the individual's treating physician prior to ordering the device.
- The individual has a permanent and severe expressive speech impairment such as but not limited to dysarthria, anarthria, aphasia, apraxia, aphonia, or severe speech


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impairment associated with an autism spectrum disorder, pervasive developmental disorders, or cerebral palsy.
- Other forms of treatment have failed, are contraindicated or not appropriate.
- Speaking needs cannot be met using natural communication methods.
- The individual's speech disability will benefit from use of the device.
- The SGD is available in the individual's primary language and is being used primarily for speech but may also include the following capabilities:
    - Email, text, or phone message generation which allows the individual to communicate remotely;
    - Download of updates to the covered device features from the manufacturer or supplier of the device.
- The SLP performing the evaluation is not an employee nor has a financial relationship with the supplier of the SGD.

  * See description/background for more information

For purposes of this guideline, SLPs are licensed health professionals trained in the diagnosis and treatment of speech and language disorders. The SLP should hold a Certificate of Clinical Competence from the American Speech and Hearing Association.

Accessories for speech generating devices may be medically necessary for an individual to use a device if criteria for the base device are met and the medical necessity for each accessory is clearly indicated as part of the speech-language pathologist's formal evaluation. The selection of accessories is determined by the speech-language pathologist and as necessary by an occupational therapist and is based on the user's physical capabilities, including motor skills and visual abilities. The accessories should be critical to the proper functioning and maintenance of the device and should not be for the comfort or convenience of the individual. Many of the accessories are used by individuals with neurological conditions to enable them to use the device. Accessories for speech generating devices include, but are not limited to:

- Access devices (HCPCS code E2599) that enable direct or indirect selection of letters, words, or symbols via direct or indirect selection techniques:
    - Non-electronic devices include: pointers (head and foot), splints, mouth stick, and keyguards which enables the user to make a direct selection when an individual has difficulty using a standard keyboard.
    - Electronic (direct) devices include: infrared pointers, light pointers, eye-gaze systems, joysticks, optical head pointers, head controlled mice.
    - Electronic (indirect) devices include: pneumatic switch, rocking lever switch, tread switch.
- Ocular tracking device, any type, describes an SGD accessory used with an SGD and SGD software to allow a speech-impaired person to use his or her eyes to communicate. Ocular tracking devices allow for the person's eye movements to be calibrated allowing eye movements to target icons on screen.


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- Head control mouse, any type, describes an SGD accessory that monitors head movement and translates those movements into actions by the pointer on the SGD screen.
- Alternative input device, any type, describes any accessory other than an ocular tracking device or head control mouse, not integrated into the SGD hardware, used to control the actions of an SGD. Examples of alternative input devices include (not all-inclusive): specialty keyboards, joysticks, trackballs, trackpads, buddy buttons, jellybeans, beamers, roller balls, round pads, pal pads.
- Protective key guard, any type describes an overlay for a keyboard, alternative input device or SGD screen that assists the beneficiary in preventing inadvertent selection of a button, icon, or other input.
- Electronic components that allow the SGD to be operated by the drive control interface of a power wheelchair.
- Mounting systems (HCPCS code E2512) are necessary to place SGD, switches, and other access peripherals in a stable position relative to the user. Mounting systems may be used to attach to a wheelchair, desk or be a floor-based device.
- Computers and tablets in general are not considered DME because they are useful in the absence of an illness or injury.

For any subsequent upgrade of equipment or software, or accessories to a previously issued device, information regarding the functional benefit to the individual of the upgrade compared to the initially provided device must be submitted to demonstrate medical necessity. Software that enables a laptop computer, desktop computer, or PDA to function as a SGD is considered an SGD; however, installation of the program or technical support is not separately reimbursable. Only one device or software application at a time is considered medically necessary per individual.

## Not Medically Necessary

ASH considers the following not medically necessary:

- If the above criteria are not met.
- Multi-purpose, general consumer electronic devices such as personal digital assistants (PDAs), computers, tablet devices (e.g., iPads), smart phones, electronic mail devices and pagers, because they are not primarily medical in nature and do not meet the definition of DME.
- Devices that are not dedicated speech devices but are devices that are capable of running software for purposes other than for speech generation, (e.g., devices that can also run a word processing package, an accounting program, or perform other non-medical functions).

- Features of a speech generating device that are not used to meet functional speaking or communication needs, including but not limited to:
  - Computing hardware or software not necessary to allow for generation of audible/verbal speech, email, text, or phone messages, including:
    - Hardware or software used to create documents and spreadsheets, play games or music.
    - Video communications or video conferencing.
- Internet or phone services or any modification to a patient's home to allow use of the speech generating device are not medically necessary because such services or modifications could be used for non-medical equipment such as standard phones or personal computers.
- A device that is useful to someone without severe speech impairment is not considered a speech generating device for ASH medical necessity purposes.
- Multi-lingual modules for SGDs.
- SGDs using pre-recorded messages (per benefit description only).

Speech may gradually improve after head trauma or stroke. For these acquired disorders, SGDs are used as a last option. Therefore, use of an SGD is not usually initiated less than 4 to 6 months after trauma or stroke unless patient is ready for an assessment and SGD at an earlier time with modifications expected later.

This guideline does not apply to electronic speech aids that are used by laryngectomized persons and persons with a permanently inoperative larynx. These are considered prosthetics. There are several types of electronic speech aids. One of the most common operates by placing a vibrating head against the side of the throat or cheek. Another is an intraoral method which produces sound by inserting a tube in the mouth that amplifies sound waves. The intraoral method is more effective for a person who has had radical neck surgery and/or extensive radiation to the anterior part of the neck resulting in scarring.

## HCPCS Codes and Descriptions

| HCPCS Code | HCPCS Code Description |
|---|---|
| E1902 | Communication board, non-electronic augmentative or alternative communication device |
| E2500 | Speech generating device, digitized speech, using pre-recorded messages, less than or equal to 8 minutes recording time |
| E2502 | Speech generating device, digitized speech, using pre-recorded messages, greater than 8 minutes but less than or equal to 20 minutes recording time |

| HCPCS Code | HCPCS Code Description |
|---|---|
| E2504 | Speech generating device, digitized speech, using pre-recorded messages, greater than 20 minutes but less than or equal to 40 minutes recording time |
| E2506 | Speech generating device, digitized speech, using pre-recorded messages, greater than 40 minutes recording time |
| E2508 | Speech generating device, synthesized speech, requiring message formulation by spelling and access by physical contact with the device |
| E2510 | Speech generating device, synthesized speech, permitting multiple methods of message formulation and multiple methods of device access |
| E2511 | Speech generating software program, for personal computer or personal digital assistant |
| E2599 | Accessory for speech generating device, not otherwise classified |
| V5336 | Repair/modification of augmentative communicative system or device (excludes adaptive hearing aid) |

## BACKGROUND

Augmentative and alternative communication (AAC) devices and SGD are speech aids to provide individuals with severe speech impairment or absent speech, the ability to meet their functional communication needs. Etiologies of speech impairment in children may include cerebral palsy, intellectual/developmental disorder, autism-like disorders and other genetic or speech disorders. Etiologies in adults may include stroke, traumatic brain injury, amyotrophic lateral sclerosis (ALS), Parkinson's disease and head and neck cancers among others. There may be associated functional disabilities that also limit the individual's ability to use alternative natural methods of communication such as writing notes, using sign language, or even to manipulate a low-tech augmentative communication system.

There are numerous communication devices currently available from multiple manufacturers. Low technology, non-electronic AAC devices include boards that use letters, words, phrases, pictures and/or symbols (communication boards), mini boards, schedule boards, and conversation books. They may be purchased, homemade, or developed by the speech therapist. High technology devices are electronic, generally SGDs, and usually computer based. Speech generating devices (SGDs) are durable medical equipment utilized for communication to help individuals who have severe speech impairments/communication disorders to be able to meet their functional speaking needs. The individuals may also have impairments that interfere with writing or sign language. A SGD may also be considered an electronic augmentative and alternative communication device that generates speech output. Augmentation and alternative communication involve the attempt to compensate for the impairments of individual with severe impairment. Speech is the articulation and phonation of language sounds. Language refers to symbolic communication and is the ability to converse, comprehend, repeat, read, and write. Severe speech impairments/communication disorders may include (Bradley et al., 2008; National Institute on Deafness and Other Communication Disorders [NIDCD], 2009):

- Dysarthria: Dysarthria is a speech disorder that may involve paralysis, weakness, or incoordination of muscles/or nerves which impact one's ability to articulate sounds and words. It frequently involves inability to control voice. Dysarthria may be the result of a developmental disability or acquired neuromuscular involvement.
- Apraxia: The impairment stems from a deficit in the planning and programming of the sequence of movements for speech and occurs despite the fact that the same oral muscles may move normally when speech is not involved. The most common cause is stroke; however, apraxia may also occur with tumor or traumatic brain injury.
- Aphasia: This is the impairment of an individual's ability to understand and formulate language. Aphasia results from brain damage, typically involving the language-dominant (i.e., left) cerebral hemisphere. This disorder is a total or partial loss of the ability to use or understand language; usually caused by stroke, brain disease, or injury.
- Anarthria: This disorder is a total loss of ability to articulate (known words co-existing with inability to move oral structures).

Speech generating devices provide multiple methods of message formulation and are used therapeutically to establish, develop, or maintain the ability to communicate functional needs. These devices or aids are electronic, and computer based and can generate synthesized (computer-generated) and/or digitized (natural human) speech output. SGDs may utilize either digitized or synthesized speech. Digitized SGDs are those that deliver "whole message" speech output. These devices deliver words or phrases that have been pre-recorded by an individual other than the user of the speech generating device, who can play it back on demand. Synthesized SGDs are those that translate the user's input into device-generated speech using algorithms representing linguistic rules. Users are not limited to pre-recorded messages but can create messages independently according to their communication needs. These devices may also be called text to speech systems.

Thus, the speech is generated using one of the following methods:

- Digitized audible/verbal speech output, using pre-recorded messages;
- Synthesized audible/verbal speech output which requires message formulation by spelling and device access by physical contact with the device-direct selection techniques;

- Synthesized audible/verbal speech output which permits multiple methods of message formulation and multiple methods of device access; or
- Software that allows a computer or other electronic device to generate audible/verbal speech.

Other features of the device include the capability to generate email, text, or phone messages to allow the patient to "speak" or communicate remotely, as well as the capability to download updates to the covered features of the device from the manufacturer or supplier of the device.

Speech generating devices are characterized by:

- Being a device that generates speech, used solely by the individual who has a severe speech or language impairments;
- May have digitized speech output, using pre-recorded messages, less than or equal to 8 minutes recording time;
- May have digitized speech output, using pre-recorded messages, greater than 8 minutes recording time;
- May have synthesized speech output which requires message formulation by spelling and device access by physical contact with the device-direct selection techniques;
- May have synthesized speech output which permits multiple methods of message formulation and multiple methods of device access; or
- May be software that allows a laptop computer or personal digital assistant (PDA) to function as a speech generating device.

Synthesized speech, unlike pre-recorded messages of digitized speech, is a technology that translates a user's input into device-generated speech using algorithms representing linguistic rules. Users of synthesized speech SGDs are not limited to pre-recorded messages but rather can independently create messages as their communication needs dictate. Some SGDs require message formulation by spelling and access by physical contact with a keyboard, touch screen, or other display containing letters. Speech generating software programs enable a laptop computer, desktop computer or personal digital assistant (PDA) to function as an SGD. Within this guideline, the term SGD also describes speech generating software programs. Speech generating devices may permit multiple methods of message formulation and multiple methods of device access. For purposes of this guideline, a SGD with multiple methods of message formulation should include message selection by 2 or more of the following methods: letters, words, pictures, and symbols. A SGD with multiple methods of access should include the capability to access the device by 2 or more of the following: direct physical contact with a keyboard or touch screen, indirect selection techniques and a specialized access device such as a joystick, head mouse, optical head pointer, light pointer, infrared pointer, scanning device, or Morse code.

Upgrades of a SGD are subsequent versions of a SGD's software program or memory modules that may include enhanced features. Mounting switches are devices necessary to place the SGD, switches, and other access devices within the reach of the patient. Accessories for SGDs include, but are not limited to, access devices that enable selection of letters, words, or symbols via direct or indirect selection techniques. Examples of access devices include, but are not limited to, optical head pointers, joysticks, and SGD scanning devices.

## EVIDENCE REVIEW

Van der Meer and Rispoli (2010) completed a review of literature of communication interventions involving SGDs for children with autism. Twenty-three studies met inclusion criteria. Intervention, most commonly targeting requesting skills via operant/behavioral techniques or naturalistic teaching procedures, was provided to 51 children ages 3-16 years. Positive outcomes were reported for 86% of the studies and 78% of the studies were categorized as providing conclusive evidence. Authors concluded that the literature suggests that SGDs are viable communication options for children with autism. They also state that more research is needed in many related areas. Rispoli et al. (2010) did a similar review on the use of SGDs as a communication intervention for individuals with developmental disabilities. Thirty-five studies met inclusion criteria providing interventions to 86 individuals ages 1-42. Communication skills targeted included requesting, social or conversational skills, labelling items and receptive language. Intervention approaches were categorized as using Discrete Trial Training, Milieu teaching or a combined instructional approach. Positive outcomes were reported in 86% of the studies with 54% of studies categorized as providing conclusive evidence. Authors concluded that the base of literature may be promising however further research is needed. van der Meer et al. (2012) compared speed of acquisition and preference for using a SGD versus manual signing (MS) as augmentative and alternative communication (AAC) options. Only four children with developmental disabilities ages 5-10 years were taught to request preferred objects using an iPod®-based SGD and MS. A systematic choice-making paradigm was implemented to determine if the children showed a preference for using either the SGD or MS. Three participants exhibited a preference for the SGD while the remaining participant demonstrated a preference for using MS. Results support previous studies showing that individuals with DD often show a preference for different AAC options and extend previous data by suggesting that acquisition and maintenance was better for the preferred option.

Ganz et al. (2012) meta-analyzed the single case research on the use of aided AAC with individuals with autism spectrum disorders (ASD). Twenty-four single-case studies including 58 subjects were analyzed via the Improvement Rate Difference (IRD). Results indicated that, overall, aided AAC interventions had large effects on targeted behavioral outcomes in individuals with ASD. AAC interventions had positive effects on all of the targeted behavioral outcome (social skills, challenging skills and academics); however, effects were greater for communication skills than other categories of skills. Effects of the Picture Exchange Communication System and speech-generating devices were larger than those for other picture-based systems, though picture-based systems did have small effects. Ganz et al. (2014) evaluated the moderating effects of intervention type of aided augmentative and alternative communication device (AAC) and setting on outcomes for students with ASD. Thirty-five single case design research studies were evaluated. Results indicated that the largest effects for aided AAC were observed in general education settings. With respect to communication outcomes, both speech generating devices (SGDs) and the Picture Exchange Communication System (PECS) were associated with larger effects than other picture-based systems. With respect to challenging behavior outcomes, SGDs produced larger effects than PECS. Authors summarized the importance of considering the setting and selection of AAC when designing interventions. Ganz et al. (2014) completed a meta-analysis investigating the impact of individual characteristics on the effectiveness of AAC device use. Three types of aided AAC were evaluated: the Picture Exchange Communication System (PECS), speech-generating devices (SGDs), and other picture-based AAC. Effectiveness was measured via the Improvement Rate Difference. Results indicated that AAC has small to moderate effects on speech outcomes, and that SGDs appear to be most effective when considering any outcome measure with individuals with ASD without comorbid intellectual/developmental disorders (IDD). PECS appears to be most effective when considering any outcome measure with individuals with ASD and IDD. SGDs and PECS were the most effective type of AAC for preschoolers, when aggregating across outcome measures. No difference was found between systems for elementary-aged and older individuals. The authors noted the limitations of the meta-analyses included the use of single-case research studies and small numbers of studies that investigated the specific comorbid disabilities and the impact on effectiveness of SGDs. The ongoing research of SGDs as a specific intervention for individuals with ASD was recommended.

Almirall et al. (2016) compared the growth in communications outcomes among three adaptive interventions in school-age children with autism spectrum disorder (ASD) who were minimally verbal. Sixty-one children, ages 5-8 years, participated in a sequential, multiple-assignment randomized trial (SMART). All children received a developmental behavioral communication intervention: joint attention, symbolic play, engagement, and regulation (JASP) with enhanced milieu teaching (EMT). The SMART included three 2-stage, 24-week adaptive interventions with different provisions of a speech-generating device (SGD) in the context of JASP+EMT. The first adaptive intervention, with no SGD, initially assigned JASP+EMT alone, then intensified JASP+EMT for slow responders. In the second adaptive intervention, slow responders to JASP+EMT were assigned JASP+EMT+SGD. The third adaptive intervention initially assigned JASP+EMT+SGD; then intensified JASP+EMT+SGD for slow responders. Analyses examined between-group differences in change in outcomes from baseline to Week 36. Verbal outcomes included spontaneous communicative utterances and novel words. Nonlinguistic communication outcomes included initiating joint attention and behavior regulation, and play. The adaptive intervention beginning with JASP+EMT+SGD was estimated as superior. Significant between-group differences were noted in change in spontaneous communicative utterances and initiating joint attention. Authors concluded that minimally verbal school-age children with ASD make significant gains in communication outcomes with an adaptive intervention beginning with JASP+EMT+SGD.

Gervarter et al. (2016) aimed to teach individuals with autism spectrum disorder (ASD) and limited vocal speech to emit target vocalizations while using a speech-generating device (SGD). Only 4 individuals participated and of the 4 participants, 3 began emitting vocal word approximations with SGD responses after vocal instructional methods (delays, differential reinforcement, prompting) were introduced. Two participants met mastery criterion with a reinforcer delay and differential reinforcement, and 1 met criterion after fading an echoic model and prompt delay. For these participants, vocalizations initiated before speech outputs were shown to increase, and vocalizations generalized to a context in which the SGD was absent. The 4th participant showed high vocalization rates only when prompted. The results suggest that adding vocal instruction to an SGD-based intervention can increase vocalizations emitted along with SGD responses for some individuals with ASD. However, given the methodologic concerns, further research is necessary to support results.

Lorah et al. (2015) reviewed the research on the use of portable, off-the-shelf handheld devices, such as tablet based computers (i.e., iPad®, Galaxy®) or portable multimedia players (i.e., iPod®) adapted to function as speech generating devices for individuals with autism spectrum disorders or related developmental disabilities. Authors conclude that in general, participants using these devices acquired verbal repertoires quickly. Studies comparing these devices to picture exchange or manual sign language found that acquisition was often quicker when using a tablet computer and that the vast majority of participants preferred using the device to picture exchange or manual sign language. Authors report that future research in interface design, user experience, and extended verbal repertoires is recommended.

Thiemann-Bourque et al. (2017) examined effects of a peer-mediated intervention that provided training on the use of a speech-generating device for preschoolers with severe autism spectrum disorder (ASD) and peer partners. Following peer training, intervention effects were replicated across 3 peers, who all demonstrated an increased level and upward trend in communication acts to their classmates with ASD. Outcomes also revealed moderate intervention effects and increased levels of peer-directed communication for 3 children with ASD in classroom centers. Additional analyses revealed higher rates of communication in the added context of preferred toys and snacks. The children with ASD also demonstrated improved communication reciprocity and peer engagement. Authors concluded that results provided preliminary evidence on the benefits of combining peer-mediated and speech-generating device interventions to improve children's communication. Furthermore, it appears that preferred contexts are likely to facilitate greater communication and social engagement with peers.

Thiemann-Bourque et al. (2018) examined the effects of incorporating a peer-mediated approach into a speech-generating device (SGD) intervention on communication of 45 nonverbal and minimally verbal preschoolers with autism spectrum disorder (ASD) and 95 peers without disabilities. The SGD was an iPad 2 (Apple) with voice output app. Children were randomly assigned to an experimental treatment that trained peers on use of the SGD or a business-as-usual comparison condition with untrained peers. Communication outcomes were measured for both children with ASD and peers. Children receiving the treatment demonstrated significant increases in rates of communication and more balanced responses and initiations (a measure of reciprocity) than children in the comparison group. They were able to generalize improvements and maintain communication gains. Treatment fidelity was high for school staff and peer implementation. Authors concluded that these results support positive effects on communication of teaching young children with ASD and peers without disabilities to use the same SGD system in typical preschool activities. SGD interventions that utilize peer-mediated approaches may improve core deficits in communication and reciprocity and allow for greater classroom social participation and interactions with peers.

Crowe et al. (2021) completed a mega-review of literature reviews, systematic reviews, and meta-analyses on interventions using aided augmentative and alternative communication (AAC) interventions for children with intellectual and developmental disabilities from 2000 to mid-2020 was conducted. This mega-review synthesizes information on aided AAC interventions for children with intellectual and developmental disabilities who have complex communication needs. Data from this overview of research literature indicate that review methodological quality is improving slightly over time. Most of the research used single-case research designs, utilized behavioral interventions, was conducted with participants using a speech-generating device, was conducted with children diagnosed with autism spectrum disorder ages 5–18 in general education settings, and is most frequently synthesized in systematic reviews of literature. This mega-review suggests that increasing generalization and maintenance programming before intervention begins, reporting out greater detail on participant demographics and skills, and ensuring that lasting, socially important behavior change takes place will improve quality of life for individuals who use AAC.

White et al. (2021) evaluated the effects of augmentative and alternative communication (AAC) on speech development in children with autism spectrum disorders (ASD). Twenty-five single case design articles and three group design articles published between 1975 and May 2020 met inclusion criteria related to participant characteristics, intervention type, design, and visual analysis of dependent variable outcomes. Overall, AAC resulted in improved speech production; however, speech gains that did occur did not surpass AAC use.

Muttiah et al. (2021) summarized the current evidence base on communication-based interventions and partner training in LMICs (Low-and Middle-Income Countries) to explore and identify gaps in the AAC evidence base and guide future research. A total of 18 studies were identified. The results revealed many positive outcomes arising from AAC interventions, including increased communication, improved participation, increased knowledge about communication, and increased use of partner communication strategies, thus adding to the evidence base that AAC can be successfully implemented in LMICs. However, these studies did not broadly represent most LMICs and there were only a handful of indirect intervention studies training communication partners. To this end, there is an urgent need to expand the level of AAC intervention research conducted in LMICs in order to better serve individuals with complex communication needs living in these countries.

Leonet et al. (2021) evaluated the latest available evidence regarding augmentative and alternative communication (AAC) interventions in children from 0 to 6 years old diagnosed with various disabilities. Twenty-nine of 1,709 studies met the inclusion criteria for this review. This analysis revealed that children with different diagnoses show improvements in expressive and receptive communication, functional communication behaviors, communication participation skills, interaction strategies, and symbol and multi-symbol production and comprehension by using various AAC systems.

Langarika-Rocafort et al. (2021) completed a systematic review was to identify, appraise, and critically synthesize the latest available evidence on the effects of augmentative and alternative communication (AAC)-based interventions on communication skills in children aged between 6 and 10 years with mixed diagnoses. This review included 14 studies from a total of 1,204 found through an electronic search. The AAC interventions studied were effective at improving various outcomes in children with mixed diagnoses. Interventions that focused on narrative skills were the most common type. When considering the quality of the studies, the independence of assessors, data analysis, replication, and generalization of interventions were the weaker areas. Interventions analyzed in this review improve communication skills, including phonological awareness, vocabulary, requesting, and developing narrative skills in children aged between 6 and 10 years with mixed diagnoses. The results of one study also indicate that the acquisition of skills using an AAC method is superior when the child prefers the method.

Dada et al. (2021) mapped and synthesized research evidence of the effects that aided and unaided AAC interventions have on the receptive language of children with developmental disabilities. A total of 16 studies met the inclusion criteria. The review revealed positive associations between aided and unaided AAC, vocabulary acquisition and symbol comprehension. Authors concluded that AAC interventions may have merit for the development of receptive language skills in children with developmental disabilities.

Pak et al. (2022) state that optimal augmentative and alternative communication (AAC) systems for children with complex communication needs depend in part on child characteristics, child preferences, and features of the systems. Authors conducted a meta-analysis to describe and synthesize single case design studies comparing young children's acquisition of communication skills with speech-generating devices (SGDs) and other AAC modes. Nineteen single case experimental design studies with 66 participants (M age = 4.9 years) met inclusion criteria. All but one study featured 'requesting' as the primary dependent variable. Visual analysis and meta-analysis indicated no differences between use of SGDs and picture exchange for children learning to request. Children demonstrated preferences for and learned to request more successfully with SGDs than with manual sign. Children who preferred picture exchange also learned to request more easily with picture exchange than with SGDs. Young children with disabilities may be able to request equally well with SGDs and picture exchange systems in structured contexts. More research is needed comparing AAC modes with diverse participants, communication functions, linguistic complexity, and learning contexts.

Caron et al. (2023) evaluated the effectiveness of systematic literacy instruction with materials modified to teach letter-sound correspondences (LSC) to pre-adolescents and adolescents with autism spectrum disorder (ASD) with minimal or no speech who use AAC. Individuals who use augmentative and alternative communication (AAC) are often excluded from learning literacy skills that use phonological approaches due to challenges with verbal production of speech sounds. A single subject design across three letter-sound sets was used, with 3 individuals with ASD. A total of 12 LSC were targeted in the intervention. During the intervention, the participants were instructed using model, guided, and independent practice trials using low-tech letter tiles followed by two extension activities: letter sorting and initial letter-sound picture books. A functional relationship was established between the LSC intervention and the percent of correct responses on the LSC assessment probes. Very large and large effects sizes were calculated for all participants across the three LSC sets. The study adds to the very limited research base related to phonics instruction for older learners (ages 9 to 18) with ASD, demonstrating that LSC progress can still be made at an older age with systematic instruction.

Sterrett et al. (2023) described children's responsiveness to SGD input modeled by a social partner during adult-child play interactions over a 24-week intervention trial and explore the effect of that responsiveness on spoken language growth. A secondary analysis consisted of 31 children with less than 20 functional words at study entry who received a blended behavioral intervention (JASPER + EMT) as part of a randomized controlled trial. Significant improvements were seen in rate of responsiveness to both adult SGD models and adult natural speech models; only rate of responsiveness to SGD models at entry was a significant predictor of frequency of commenting and was a more robust predictor of number of different words post-intervention. Lastly, at entry, children with more joint attention and language responded to SGD models at significantly higher rates. Attention and responsiveness to SGD output may be important mechanisms of language growth and children who have more joint attention skills may particularly benefit from use of an SGD.

Gilroy et al. (2023) designed a delayed intervention start randomized controlled trial to compare improvements in functional communication following augmentative and alternative communication (AAC) interventions. The study compared outcomes from function-based applied behavior analytic (ABA) and eclectic non-ABA forms of classroom-based communication strategies (waitlist control) as well as from high- and low-tech forms of AAC. High-tech AAC consisted of tablet-based communication, and low-tech AAC used an exchange of picture cards. The community-based sample consisted of 29 autistic children with a co-occurring intellectual disability. Participants were randomized to groups (AAC, waitlist control), and each group received approximately 3 months of communication intervention. Multilevel modeling of learner outcomes indicated that the function-based approach produced greater improvements than the eclectic alternative, but significant differences were not observed between outcomes of high- and low-tech forms of function-based AAC. These results are consistent with earlier investigations and provide supporting evidence that both high- and low-tech forms of function-based intervention are effective for use with autistic children with accompanying intellectual disability. Additional discussion is provided regarding further research into how technology is applied and incorporated into behavior analytic programming.

## PRACTITIONER SCOPE AND TRAINING

Practitioners should practice only in the areas in which they are competent based on their education, training, and experience. Levels of education, experience, and proficiency may vary among individual practitioners. It is ethically and legally incumbent on a practitioner to determine where they have the knowledge and skills necessary to perform such services and whether the services are within their scope of practice.

It is best practice for the practitioner to appropriately render services to a member only if they are trained, equally skilled, and adequately competent to deliver a service compared to others trained to perform the same procedure. If the service would be most competently delivered by another health care practitioner who has more skill and training, it would be best practice to refer the member to the more expert practitioner.

Best practice can be defined as a clinical, scientific, or professional technique, method, or process that is typically evidence-based and consensus driven and is recognized by a majority of professionals in a particular field as more effective at delivering a particular outcome than any other practice (Joint Commission International Accreditation Standards for Hospitals, 2020).

Depending on the practitioner's scope of practice, training, and experience, a member's condition and/or symptoms during examination or the course of treatment may indicate the need for referral to another practitioner or even emergency care. In such cases it is prudent for the practitioner to refer the member for appropriate co-management (e.g., to their primary care physician) or if immediate emergency care is warranted, to contact 911 as appropriate. See the *Managing Medical Emergencies (CPG 159 – S)* clinical practice guideline for information.

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