Augmentative and Alternative Communication for Children with Speech, Language and Communication Needs

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Abstract

Augmentative and alternative communication (AAC) is the collective term for a broad range of techniques, strategies and devices which can support children with communication difficulties who may have little or no intelligible speech. This may include manual signs or systems of symbols, words or letters that can be used to construct messages and convey meaning. This review discusses the ways in which AAC systems are categorised and outlines some key principles of assessment and intervention, using the World Health Organisation's *International Classification of Functioning, Disability and Health for Children and Young People* as a proposed framework to guide decision-making. The review highlights that

children who may make use of AAC are a heterogeneous group and it is considered best practice for interventions to be highly individualised, taking into account the motor, sensory, learning and communication needs of each child, as well as their environment, personal preferences and support structures.

Introduction

Children with physical, social and intellectual disabilities can face significant barriers when communicating with others. In particular, children with little or no functional speech may be more reliant on other methods of communication such as vocalisation, facial expression or manual gesture. These communication methods may be limited in scope or may be highly dependent on context and the familiarity of the communication partner with the child's wants, needs and preferences. As such, they provide very little opportunity for self-expression or for being an active participant in interactions. In such cases, the use of one or more augmentative and alternative communication (AAC) systems is often considered. AAC describes a broad range of techniques, strategies and devices which can support children with communication difficulties. This article gives a broad overview of the types and categories of AAC system available to children and discusses some of the key points relating to the assessment and support of these children.

In its broadest sense, AAC includes both expressive and receptive communication systems: those that support a user's transmission and their understanding of messages. The American Speech and Hearing Association (ASHA) defines AAC as "a variety of techniques and tools, including picture communication boards, line drawings, speech-generating devices (SGDs), tangible objects, manual signs, gestures, and finger spelling, to help the individual express thoughts, wants and needs, feelings, and ideas" [1]. However, the term is most commonly used in the UK to refer to formal systems that are explicitly introduced and taught, and which support face-to-face interaction with children for whom speech is not a useful communication modality [2]. It is this definition on which this paper will primarily focus.

Classification of AAC Systems

Several taxonomies for describing the features of an AAC system are used by clinicians and researchers. The first distinction is that made between *manual signs* and *symbols*. The former may refer to sign languages with their own complex grammars (British Sign Language, American Sign Language), which are primarily used to support children in the d/Deaf community, or to manually coded languages such as Sign Supported English or the Paget Gorman Sign System, which follow the grammatical structure of their parent oral

language. For children with communication difficulties in the UK, the use of manual signs to support expressive and receptive language is common, with signing systems such as the Makaton language programme used widely in schools and colleges. The use of manual signs provides an additional channel through which children can take in information, as communication partners are encouraged to accompany their spoken language with corresponding manual signs. Sign languages and systems are also termed "unaided" AAC – in that their use does not require any additional equipment or materials.

Children with motor disorders such as cerebral palsy may be precluded from the use of manual signs by the complexity of the fine motor movements required, although they may still make use of gesture and a reduced range of consistent, approximated signs. These children may be considered candidates for an aided form of AAC. The use of a system of symbols is often the preferred intervention, with the term "symbols" referring to any pictorial or physical object representation of language. This can include, for example, real objects, photos, line drawings or written letters which represent an item or concept, and which children can indicate or select to convey meaning to a partner. In some cases, this may mean selecting a single symbol to make a request or give an instruction, although children may be provided with full systems of symbols which will allow the generation of more complex, novel utterances through combinations of symbols. Decisions on the content and complexity symbol systems used with a child should be the result of careful assessment of a child's language and cognition, with the symbol vocabulary needing to be matched to the individual's needs and abilities [3].

Another way in which AAC systems are commonly classified is by their level of technological complexity. It is common to hear the communication systems that an individual uses referred to as "low-tech" or "high-tech", with the former referring to paper-based resources such as books and letter boards, and the latter to more complex systems which are usually based on a computer, phone or tablet device. It is important to highlight that this classification refers to the complexity of the technology, not to the complexity of the user's communication: a grid with a handful of symbols for use in one specific activity can be displayed on a touchscreen tablet (high-tech) or printed onto paper (low-tech) and such this delineation should not imply a hierarchy in which one is seen as superior to the other.

Similarly, a low-tech letter board could allow a person to generate novel utterances in a range of contexts, whereas a small array of symbols on a touchscreen may offer limited communication possibilities. Because of this, the terms "powered" and "non-powered" are sometimes preferred as implying less of a hierarchy. Children who make use of AAC to convey more complex messages may well make use of both powered and non-powered systems and it is considered best-practice for even the most proficient powered AAC users to be provided with a non-powered backup.

Who Benefits from AAC?

As with many assistive technologies, the question of who benefits is not one that can be answered with a list of diagnoses or descriptions. Clinicians working in the field of AAC are encouraged to look beyond diagnostic categories and to assess the needs of each individual, looking to "match" their strengths, needs and abilities to an appropriate AAC system.

AAC is most typically considered when children present with a "gap" between their receptive and expressive language. Von Tetzchner and Martinsen [4] propose a broad classification of children who may make use of AAC. These authors propose three groups: the **expressive** language group (children who understand the spoken language of their communication partners but lack the means to express themselves), the **supportive** language group (including two sub-groups of children who may use AAC temporarily to facilitate their understanding or to express themselves; and children who speak but have difficulty making themselves understood) and the **alternative** language group (who use AAC as a permanent means of both receiving and conveying messages). These groups are likely to have different needs from an AAC system and different needs for support, which again underlines the need for an individualised approach to the selection and support of an AAC system.

Due to the wide range of people needing AAC and the lack of any consistent recording and review of provision, an estimate of need is difficult to generate with any precision. In 2013 the UK charity Communication Matters, which represents people who use AAC, as well as those supporting them, produced a report into provision of AAC services across the UK [5]. This report included estimates of the number of people who could benefit from AAC, based

on the prevalence of different conditions and the numbers of people with those conditions who would likely have a need for AAC. The report estimated that 0.5% of the total UK population (536 people per 100,000) could benefit from provision of an AAC system, with 0.05% (52.9 people per 100,000) likely to need powered AAC. Whilst this figure represents a total population estimate, review of the different conditions and the general population age breakdown suggests that children account for roughly one third of the estimated need.

Assessment and Decision-Making for AAC

The provision of an AAC system should be the result of careful assessment and observation, owing to the need for each child to have their individual skills and needs fully understood and matched to an appropriate system. It is widely recognised that AAC-focused assessment necessitates a multi-disciplinary viewpoint and that the selection of an appropriate system should involve multiple stakeholders including the child themselves, their family and skilled professionals, each bringing their skills and perspectives to the task of understanding the child's complex health, motor, sensory, learning and communication needs [2], [6], [7].

Owing to the heterogeneous population of children who will require AAC provision, there is no universally agreed assessment approach. It is however often proposed that the World Health Organisation's *International Classification of Function, Disability and Health for Children and Youth* (ICF-CY) [8] can serve as a framework to guide decision-making. The ICF-CY offers an holistic approach to the description of functioning and disability in childhood through to adolescence, which is represented through a framework of inter-related domains: body structures and functions (e.g., intellectual functions, speech functions, and structures such as the nervous system), environmental factors (e.g., attitudinal and policy environment, provision of assistive technology) and activity / participation (e.g., learning and applying knowledge, communication, interpersonal interactions and relationships) and personal factors (information about the life and lifestyle of the child including factors such as age and gender). The following sections highlight some key areas of assessment for AAC, mapped onto the domains of the ICF-CY.

Body structure and function

Oro-motor Examination

Assessment of body structure and function is likely to include examination of the range, speed, consistency, accuracy, strength and steadiness (rhythmic, arrhythmic, tremor) of oro-motor function. This involves observation of voluntary movements of the articulators (lips, tongue, and mandible); examination of the oral cavity, and neurological assessment of oral reflexes. Assessment will also consider respiration, phonation (ability to produce voice), resonance (e.g. hypo / hyper nasality), and prosody. For children with more complex motor disorders, assessment of these is best carried out when the child is supported to achieve best possible physical positioning, which may include the provision of supportive seating systems which can improve respiratory function and reduce discomfort and abnormal muscle tone [9]. Understanding children's oro-motor abilities and the likely prognosis for speech is important since evidence suggests children may be less likely to adopt AAC if they have some functional speech.

Sensory Functions

Using AAC systems typically demands a degree of visual ability. Therefore, examination of visual functions such as visual acuity (clarity of vision) and accommodation (ability of the eyes to adjust focus at different distances) are central to the assessment process. Information gathered from such assessments can provide insight into, for example, the type of graphic symbols and the layout and crowding of the array of symbols from which a child makes selections.

In addition, effective AAC use is supported by good functional gaze control – the ability to use ones vision to accomplish a task. Finding target vocabulary demands of the child the ability to fix gaze, to disengage and transfer gaze in order to search, and to selectively attend to specific items. Such functional gaze control abilities may not be present in all children for whom AAC is considered and they require assessment; tools such as the eye-pointing classification scale (www.ucl.ac.uk/gaze) can be used to support clinicians in making systematic observation of children's looking behaviours and inform decision-making on AAC support. For children who are not expected to use vision for learning and communication, techniques such as "auditory scanning" may be used. This involves the vocabulary items available for selection being spoken aloud by a communication partner or by the communication device, and the child using a consistent signal or activation method

to indicate when the desired item is voiced. Understanding the child's hearing abilities is an important component when considering this approach.

Motor ability

A full understanding of children's gross and fine motor abilities is key in the selection and provision of AAC, particularly with regard to the selection of a method by which the child will access and control the system. The skills of an Occupational Therapist alongside, in some cases, a Paediatrician or Physiotherapist with an understanding of movement disorders will offer a clear picture of the child's the range of movement, the functioning of muscles and joints and any factors such as tremor that might impact on accuracy. Understanding, for example, the seating and positioning requirements of a child with a physical disability is an important precursor to AAC assessment, since poor posture can impact negatively on upper limb function, which in turn impacts on accurate control of a computer [9], [10]. From here, assessment of motor ability focuses on the identification of one or more points of control – parts of the body where an individual can execute independent, purposeful, accurate, graded and repeatable movements [10] that can be used to make a selection.

A child's motor ability will inform the selection of an access method – the means by which a child will control the technology or make selections from their AAC system. Selection, provision and training for access systems is crucial to the success of an AAC intervention and the choices available to clinicians are many and varied, including "mainstream" methods of access such as a mouse, touchscreen or keyboard, adapted versions of these devices, mechanical or electrical switches or remote gaze or gesture-based control methods. As with other areas of AAC, the selection of an access method should be the result of careful assessment and observation, followed by matching the child's individual profile of strengths and needs to one of the available options. Many access methods have configurable elements, such as the ability to introduce a delay on a touchscreen to prevent accidental selections. For an in-depth discussion on the selection of access methods, the reader is directed to papers included in the recommended reading list at the conclusion of this paper.

Language understanding and cognitive ability

with understanding of a child's language and cognitive skills can assist clinicians both to develop a general picture of a child's skills and to inform decisions related to AAC provision. Concerns are sometimes raised that low cognitive and language ability in children may preclude the provision of AAC. However, understanding of a child's learning ability should not be used as a form of "gatekeeping", but as highly valuable information for determining the right kind of system for the child and to appropriately designing and delivering intervention and support.

Many assessments of language understanding and cognitive ability require children to point to their chosen response from an array, following the assessor's request ("show me the hat"), however children with complex motor disorders may struggle to point independently. For these children, alternative purposeful and repeatable forms of access to standardised assessment are required. This may include the use of eye-pointing (e.g. shifting gaze between the chosen item and the observer and back to the item) or "partner assisted scanning", a strategy in which the assessor points to individual response items one at a time and the child indicates when their chosen option is highlighted. Partner assisted scanning requires shared knowledge of the child's means of communicating 'yes' and 'no', which may be achieved through distinctive individual ways (e.g., glancing up for 'yes' and protruding the tongue for 'no').

Environmental factors

The ICF-CY documents a wide range of environmental factors that can potentially influence decision-making around AAC. Because they provide the primary contexts within which children learn language skills, factors relating to the family and school are of particular importance to consider. For example, heightened stress and periods of difficulty coping are recognised issues for parents of children with disabilities and will influence how clinicians work with families and the timing of any intervention. Parents' / carers' attitudes towards AAC will also guide the assessment process, decision-making and intervention planning. Clinicians will need to be sensitive to potential family concerns that the provision of AAC will "stop my child talking": this perfectly understandable and not uncommon concern is not supported by research and extensive clinical experience. The ICF-CY also recognises the influence of broader societal and political factors on child functioning. Of particular relevance are the wider implicit and explicit "ablelist" ideologies in the context of working

with children with significant disabilities. These often intersect with other prevailing mindsets and belief systems that make it difficult for children with disabilities, especially those from linguistic minorities, to access appropriate services and develop optimal language skills.

Personal Factors

The ICF-CY does not formally document personal factors, however the importance of addressing the views and preferences of children and their parents / carers cannot be underestimated in AAC provision and training. Seeking the views and perspectives of children with little or no functional speech, and who may have limited skills in communication via AAC systems, will draw on the knowledge and skills of Speech and Language Therapists, often working closely with family members who are most familiar with a child's preferences and response methods. Tools such as *Talking Mats™* (www.talkingmats.com) offer established methods to support children and clinicians in examining and prioritising children's preferences. By taking into account the lifestyle, habits and interests of children and their families, bespoke AAC systems may be designed to best support motivated engagement and learning. Recently, the advent of AAC systems based on mainstream technologies have brought a new dimension of personal preference to the field of AAC, with families increasingly concerned about the aesthetics of powered systems [3] and often preferring technology that does not look different from that used by a child's speaking peers.

Participation

The ICF-CY describes participation as "involvement in a life situation and AAC provision can be seen as having the ultimate aim of enhancing the participation of children with little or no functional speech in everyday life. Gaining an understanding of children's experience of their own participation will offer important insights for AAC adaptations and intervention planning. For young children, participation is likely to be closely associated with wider family participation and the views of parents and carers are again central to the clinical purpose. Assessment of participation may be informal and/or through participation measures such as *Picture My Participation* and the *Children's Assessment of Participation and Enjoyment*. In either case, identifying the range and types and range of activities in which a child wishes to

involve themselves will ensure that AAC interventions can be embedded in ways which are motivating to each individual.

Models of AAC Learning and Implementation

The field of AAC lacks a unifying theoretical model for how children using such systems develop language. It is recognised that the demands placed on AAC users will likely mean that these children will learn language differently from their speaking peers, or will develop their language use at different rates [3]. Whilst our understanding in this area is still developing, the language learning opportunities of these children may be different from their speaking peers and the need to provide responses from a limited array of symbols or choices may impact on their opportunities to develop language. Indeed, it is often suggested that children using AAC may experience a disconnect between the language input they receive (which is primarily in the form of spoken language) and their own output which is mediated through an AAC system. It is primarily for this reason that those implementing AAC with children stress the importance of "modelling" – using the child's communication system to demonstrate the generation of utterances so that the child may learn and copy.

One model which the AAC community has adopted and used for many years is the notion of users' developing "communicative competence" - the state of being functionally adequate in daily communication and of having sufficient knowledge, judgment, and skills to communicate effectively in daily life [11], [12]. This model, first proposed by Janice Light, proposes that functional mastery of an AAC system is the result of developing skills in four inter-related areas or competencies: linguistic (understanding of the language of their community and understanding of the symbols or text required by their AAC system), operational (proficiency in the technical skills required to operate their system and make selections), social (knowledge, judgement and skill in the social rules of communication) and strategic (developing an ability to use communication resources effectively to impart messages and understanding when to use each resource). In later iterations of this model, Light includes the additional dimension of psychosocial factors, such as motivation, attitude and confidence [12]. The relative importance of these competencies may vary between children and interactions, however they serve to highlight the additional complexity of learning to use an AAC system compared to developing speech.

As a result of the complex and changing needs of children using AAC, support and implementation of an AAC system is an ongoing process which requires the careful consideration and balancing of the views, skills and preferences of a range of stakeholders. The provision of an AAC system should never be viewed as an end in itself, but rather as one part of a broader interventional strategy to support and develop children's communication and, consequently, to enhance their participation. Contemporary intervention approaches focus not only on the child using the AAC system but also on the key role of the child's communication partners, developing their understanding of the system and seeking to make them aware of the range of communication modalities each child uses (for example not requiring the child to provide a response on their powered AAC if they have already communicated their response clearly through other means) and how best to support new AAC communicators through modelling and giving opportunities to use the system as more than a response method, avoiding excessive use of yes / no questions which limit the interaction and the child's communication experience.

In line with a renewed focus on participation, implementation of AAC systems has shifted away from having a primary focus on linguistic goals (where proficiency or success is measured by the length or complexity of utterances produced) and towards functional goals, embedded in children's routines. Consequently, current best practice is for AAC to be implemented as part of existing activities, rather than being the activity itself. The focus is now considered to be on targets, not tools, with clinicians encouraged to set targets around what the child will do with the AAC system, rather than setting targets focused on aspects of the system such as navigating between pages.

Organisation of UK Services

Services are organised differently in the four countries of the United Kingdom, however in general, the local education and therapy teams are often the first people to approach for assessment and consideration of AAC. Speech and Language Therapists should have the skills to define a treatment pathway and support children and families in finding a route to provision of an appropriate system. Thereafter, routes to provision of complex, powered AAC differ in each country, although centres of excellence or specialised AAC services exist

in all four. The reader is directed to the website of *Communication Matters* (www.communicationmatters.org.uk), the UK charity that represents AAC users and their support teams, where the latest information on service provision and referral routes is maintained.

Practice Points

- Children who are unable to rely on the use of clear speech face barriers to their participation
- These children may benefit from the provision of augmentative and alternative communication (AAC) systems, strategies and tools
- AAC systems are classified as being either "unaided" (manual signs, gesture and pointing) or "aided" (systems of symbols or text displayed on paper or screens)
- The terms "low-tech" and "high-tech" describe the complexity of the technology, rather than the complexity of the communication
- The selection and provision of AAC systems and strategies is highly individualised and should be the result of careful assessement by a multi-professional team and consultation with multiple stakeholders, including the user and their family
- The World Health Organisation's *International Classification of Function, Disability and Health for Children and Youth* can be a useful framework to guide assessment and support decision-making.

Further Reading

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