

**Case Report**

Developing an Augmentative and Alternative Communication System for a Child with Autism Spectrum Disorder: A Case Study

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Abstract: An area of great interest to speech and language therapists and educators, holding promise to support the individual with autism spectrum disorder (ASD), is that of augmentative and alternative communication (AAC). Oftentimes, the person with ASD cannot speak at all or struggle with language skills. The use of AAC is becoming widely accepted as beneficial for individuals with ASD. The current study aimed to develop the theoretical framework and the practice trends of AAC with ASD. The ways that the AAC is introduced to children with ASD, the promotion of a successful engagement with the AAC as a communication tool, and the development of a language system that sustains over time, were the attainable goals of the study. Furthermore, a relevant case study was presented. The case study demonstrated a classical presentation of a step by step development of AAC communication system, for a pre-school boy diagnosed with ASD. The ways that the AAC is introduced to children with ASD, the promotion of a successful engagement with the AAC as a communication tool and the development of a language system is not an easy case. However, it becomes widely accepted that AAC is beneficial and supportive for the individual with ASD as part of an intensive treatment approach to address communication needs.

Keywords: Autism Spectrum Disorder, Augmentative and Alternative Communication, Practice Trends, Case Study

1. Introduction

Autism spectrum disorder (ASD) is a very complex, often baffling developmental disability [1]. It onsets in childhood and continues into adulthood. ASD can be reliably diagnosed at two years of age and sometimes earlier [2]. Most cases involve a complex and variable combination of genetic risk and environmental factors that influence early brain development. It is more common in boys than girls and it occurs in all racial, ethnic, and social groups [1, 2]. The types of disorders on the ASD range from high functioning to very severe.

ASD impacts normal development of the brain in areas of social interaction and communication skills [2]. Children and adults with ASD may communicate, interact, behave, and learn in ways that are different than most people. A broad range of abilities may occur, from no verbal communication to

quite complex skills [3]. The most common determiner of ASD is difficulties with social interaction, including pragmatics, trouble making friends, missing social cues, lack of eye contact etc [2]. Communication impairments can involve difficulties with pragmatics, language and speech. It is characterized by impairments in communication and in social interaction, presence of repetitive behaviours and restricted behaviours, attention and motor difficulties, physical and health problems [4].

With respect to social communication children or adults with ASD might have trouble relating to others or not have an interest in other people at all, avoid eye contact and want to be alone, appear to be “in their own world”, not point at objects to show interest and not look at objects when another person points at them. Furthermore, they might have trouble understanding other people’s feelings or talking about their own feelings [3]. Along with that, the communication and language characteristics of individuals with ASD include: a)

delayed language, a failure in children to develop language abilities at the usual age appropriate for their developmental timetable and b) echolalia a meaningless repetition of another person's spoken words [3, 1]. There are two main categories of echolalia: the immediate echolalia which has been defined as "the meaningless repetition of a word or word group just spoken by another person" and the delayed echolalia which has been defined as the "echoing of a phrase after some delay or lapse of time".

Regarding restricted and repetitive interests, the children or adults with ASD might have trouble adapting when a routine changes, they repeat actions over and over again, play with toys or objects non-functionally and they have unusual motor movements. Quite often they might have unusual reactions to the way things smell, taste, look, feel, or sound [5].

Additionally, they need repetition in their life and a pattern in their daily activities; they might have some unusual movements and repeat certain movements or phrases, too [2]. However, it is noteworthy that each person is incredibly different, and will show some combination of these characteristics in addition to many others that may not listed. It is estimated that approximately 25-30% of individuals with ASD are minimally verbal. Heterogeneity exists among cognitive and linguistic skills of minimally verbal children. The high prevalence of communication impairment among individuals with ASD makes effective communication interventions a high priority [6].

Last decades, the use of alternative and augmentative communication (AAC) is proved to be beneficial for individuals with ASD [4]. Specifically, the AAC devices utilize the individual's strengths of visual processing while augmenting the deficits of expressive speech and language and thus allows the individual to communicate and function successfully and somewhat independently in their own environments [4]. Moreover, for individuals who are nonverbal, AAC devices can provide a way to communicate his/her wants and needs, while at the same time they allow the individual to engage in meaningful communicative exchanges with others in his/her environment. In some cases, these alternative devices will help foster oral speech and language development. However, it is worth mentioning that the use of AAC with the ASD population as well as the way to establish a foundation for developing an effective communication system is often the least understood by educators and clinicians [5].

The current study aimed to develop the theoretical framework and the practice trends of AAC with ASD. AAC is defined as the use of other communication modalities to support or replace verbal communication. AAC systems are directed at maximizing individuals' abilities to communicate effectively and efficiently. "AAC is any tool, strategy, or technology that compensates for, enhances, expands, or helps develop communication skills" [5].

Many AAC devices make it easy to communicate and help teach the person how to gradually and properly socialize. Moreover, when an individual has severe verbal communication disorders, AAC can improve quality of life by

optimizing function, and providing opportunities for personal growth [6]. Using an AAC device, a person with no or unintelligible speech can communicate without speaking and thus participate more fully in educational, daily care and social situations. The main goals for AAC users are to be able to produce words / phrases / sentences spontaneously that are not scripted or predetermined by their communication partner. AAC provides non-speaking individuals with ways to greet others, to ask questions, gain information from others, engage in socially appropriate / expected exchanges, make comments, recall past events, tell stories, show empathy / sympathy etc [6].

The first attempts regarding AAC began in the 1970s with emergence of sign language and gestural symbols. The improvement of technological capabilities gave rise to AAC technologies, which were introduced in the early 1990s. In order to produce a more convenient and affordable tool, AAC apps were created which are often used nowadays by many individuals [6, 3]. Initially, AAC was used with laryngectomy, individuals with cerebral palsy, and individuals with aphasia [6].

The most well-known low tech AAC non speech generating devices are: Picture Exchange Communication System (PECS) and Word/Letter Boards [7, 8]. On the other hand, some high tech AAC speech generating devices/ voice output communication aids most used are: Tango, Xpress, iPad or iPod with Proloquo2go [7, 8]. High tech AAC speech generating devices are highly customizable; they allow a lot of room for linguistic growth and for a variety of vocabulary options. Although, most of them are expensive, they can break very easily and they require higher maintenance than lite-tech or mid-tech options [9].

Each device has unique specifications and software options. Unfortunately, the advanced high tech AAC systems frequently become abandoned due to the lack of engagement with the technology from the individual with ASD and his/her family and friends.

There are two main categories of AAC: a) the aided systems and b) the unaided systems. The most common aided system of AAC used by schools is the Picture Exchange Communication System (PECS) [9]. Individuals with ASD can be easily engaged in PECS by visual stimuli. More precisely, PECS is a 6 step system and proved to be an inexpensive option to start with a child diagnosed with ASD. During speech therapy, any one of the 6 phases can be practiced depending on where the child's skills are at the present [10]. The unaided systems of AAC are referring to: gestures, body language and sign language. The unaided systems are usually used in the cases of individuals with difficulty demonstrating poor imitation and poor motor skills which may lead to frustration. However, the communication barrier with peers and teachers often still remains despite the use of the AAC system. Although, the unaided systems are often used less than aided systems, some individuals with ASD show preference for and great success with unaided systems [9, 10].

The ways that the AAC is introduced to children with ASD,

the promotion of a successful engagement with the AAC as a communication tool, and the development of a language system that sustains over time, were the attainable goals of the study. Initially, the assessment for the use or not of Alternative Augmentative Communication was introduced [11]. The ways that communication needs were known through interviews, surveys, and observations, were identified. The assessment of speech, language and communication skills was included, combined with the determination of the appropriate type of AAC. The introduction and the teaching of AAC to the user and facilitators were specified.

Furthermore, a relevant case study was presented. The case study demonstrated a classical presentation of a language assessment/ assessment for alternative augmentative communication and step by step development of AAC communication system, for a pre-school boy diagnosed with ASD. The pre-school boy (from now on referred as J. M.) was diagnosed with ASD at 3 years of age. J. M. lived with his parents and his 5-year-old brother. There was no family history of speech, language, or learning problems. Cypriot Greek dialect was the primary language spoken in the home. His parents described him as quiet and reserved.

2. Methodology

It is essential to assess an individual before determining a specific type of alternative communication. Primarily, the needs and the capabilities of an individual and its needs should be established [12, 13].

Therefore, during the language assessment/assessment of J. M. for alternative augmentative communication, the capabilities and the communication needs through interviews, surveys, and observation were identified. The receptive and expressive language, verbal speech, cognitive skills, literacy, sensory skills, motivation and family support were assessed with no formal assessment procedures due to the fact that there are no standardized tests in Cypriot Greek dialect. Furthermore, the appropriate type of alternative communication and how J. M. was going to be taught the necessary skills were determined. The possibility of other people to facilitate communication and environmental barriers was also identified. Additionally, the environment that J. M. was going to use the AAC was noted. This is vital to be included in the initial assessment and later reassessments, as the introduced AAC communication method will be the prime way of individual's socializing. The fatigue and endurance were also considered.

Following the findings of the assessment, the decisions of the family and the multidisciplinary team of relevant professionals a list of requirements for an AAC device was revealed (a High-Tech AAC was considered to be effective for J. M.). Collaboration and consultation among multidisciplinary team members is essential to attain goals related to the creation of an AAC communication system. Due to the variety of AAC devices, ranging from high technology speech synthesizers to low technology communication boards, members of multidisciplinary team, usually are facing a

number of dilemmas when attempting to meet the communication needs of persons with severe disabilities [13].

Therefore, concerning the properties of the Grid 2, it was chosen as the communication system that seemed to be more appropriate for the individual needs. The Grid 2 is used to create powerful communication systems for people with no speech or limited speech. It comes with high quality voices for voice output communication and it has settings for both symbol and text communication and many tools to help users communicate [11]. The Grid 2 allows the selection of symbols, text, pictures, music and sounds in many different ways via a wide range of access methods [11].

It is generally accepted that every AAC intervention program is unique and should become adjusted and change as the individual's needs and skills change [14, 15]. The steps for developing the AAC communication system in the Grid 2 for the specific child were as follows: 1) one-word utterance, 2) two words utterance, 3) telegraphic speech, 4) function words, 5) singular - plural, 6) negative sentences, 7) questions. An AAC system includes rules for combining symbols to create messages that are maximally intelligible and comprehensible for the broadest audience of communication partners [16, 17]. It also relies on conventions relative to the selection and organization of vocabulary [18, 19]. A similar approach can be used with older adolescents and young adults as well [20, 21].

The development of the AAC communication system lasted for 2 years and the child was under speech and language therapy three times per week. Ongoing evaluation, treatment, training, and support for J. M. and the family were a priority [22, 23]. The family and the teachers in the school were trained to react positively to J. M.'s vocalizations with the use of AAC and to any attempts to get their attention. They further participated in the development of AAC communication system, by maximizing ability to understand what it was said with Grid 2, providing models and examples of the language system expected to be used and providing a context in which J. M. was not the only person in the room communicating differently. The speech and language therapy and the special education were not terminated at the end of the study.

3. Results

This section presents the results of the language assessment/ assessment for alternative augmentative communication and the development of AAC communication system, for the pre-school boy diagnosed with ASD.

The language development appeared to be delayed, with milestones accomplished at the following ages: babbling at 8-10 months; using sounds (mama, dada) (not meaningfully) at 20-24 months. J. M. demonstrated little tolerance for task completion, and he was hesitant to interact with people. His attention was brief and sporadic. He actively explored some toys; however, he generally held or bit small toys. J. M. enjoyed watching the Muppets and jumping around the room. He frequently had his fingers in his mouth for stimulation. He was able to choose an item that he wanted from a choice of two; however, he was unable to perform this task with

common objects of no value to him. He comprehended very little of what was said to him. J. M. pulled adults to reach a desired object, but did not point appropriately to get objects or to differentiate wants. He was unable to follow directions consistently, but sometimes appeared to understand a single word that was presented. He didn't respond when he was called.

J. M. was limited in his preverbal skills. He did not consistently exhibit certain skills that were prerequisite for effective communication. Most pre-symbolic skill weaknesses were in the areas of pragmatics, such as visual attention and turn taking, although motor imitation, receptive language, sound imitation, and communicative gestures were severely delayed. J. M.'s receptive language skills were also severely delayed: he did not respond consistently to simple questions or requests with words. He verbalized infrequently.

J. M.'s expressive language consisted of limited vocalizations, including mainly vowel sounds, laughing and frequent crying. J. M. currently used some gestures and sounds inconsistently to communicate wants and needs, but communicative frustration was also evident. His verbal output was minimal and he would completely "shutdown" if he was pressured. Determining the communication abilities of J. M. allowed the multidisciplinary team together with the family, to ascertain the introductory stages of AAC and the following relative stages of use.

During the introduction of the one-word utterance the first set of core vocabulary words included mainly the production of the names of the most familiar persons, nouns, verbs and the basic needs of the child. The vocabulary that was important to J. M. was chosen and developed.

The expression of the child's basic needs was the main result in the production of the two words utterance as well. However, communication is a basic human right and it should extend beyond conveying basic wants and needs. Individuals should be able to independently express all aspects of their personality [24]. Consequently, later on concerning telegraphic speech the essential points of meaning in a sentence or certain key words were used, without using what is considered to be the correct grammatical modifiers that connect the words together.

From the whole range of function words that are words that have little lexical meaning like prepositions, pronouns, auxiliary verbs, conjunctions, grammatical articles and particle, only prepositions were used by J. M. Plural appeared in the AAC communication system of the boy as the grammatical category in nouns and verbs that refers to more than one thing. In the negative sentences, at the beginning the word 'not' was added before the first auxiliary verb e.g. «not hungry», «not want» and «baby not drink». The questions were worded or expressed so as the child would be able to elicit information from the family, school and social environments.

Through the foregoing steps, the continuous use and the development of the AAC system for the child with ASD, communication was successfully established. When the communication skills were set up with the use of Grid 2, J. M.

gained access to the curriculum of the school and to social interaction. However, these steps for developing the AAC communication system were not efficient and effective with all communications partners and thus they were retained as additional methods of communication.

4. Conclusions

An AAC system refers to an ongoing program of decision-making that involves individuals, their methods of communicating, the effectiveness of that communication with a variety of communication partners, and the environmental variables that foster or impede communication. It neither begins nor terminates with the prescription of a communication aid.

It is underlined that the steps on the developing of the AAC language system can be modified and adjusted to the needs, age and development of any child considered candidate for AAC. The ways that the AAC is introduced to children with ASD, the promotion of a successful engagement with the AAC as a communication tool and the development of a language system is not an easy case. However, it becomes widely accepted that AAC is beneficial and supportive for the individual with ASD as part of an intensive treatment approach to address communication needs.

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