BRIEF REPORTS

Predictors in the Selection of an AAC system: An Evidence-based Report on Overcoming Challenges

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ABSTRACT

Purpose: *Identification of the most suitable Augmentative Alternative Communication (AAC) device for individuals with varying degrees of communication impairments is immensely challenging. This study aimed to understand the effectiveness of analysing the various sensory, cognitive and environmental factors during the selection of an AAC.*

Methods: *Four children with different developmental disabilities were assessed in the domains of sensory ability, cognitive skills and environmental factors. The selection of an AAC was primarily dependent on the positive indicators in these domains and the specific challenges pertaining to each participant.*

Results: *Participants' progress was assessed. All the children progressed across the levels of the Communication Matrix.*

Conclusion: *Understanding of sensory perceptual capacities and an attempt to overcome environmental barriers lead to the successful use of an AAC system. The study attempts to establish a platform for further research on the efficacy of utilising sensory perceptual learning with AAC to overcome communication barriers in children with severe developmental disabilities.*

Key words: *Augmentative Alternative Communication, developmental disability, sensory perceptual capacities*

INTRODUCTION

Identification of the most suitable Augmentative Alternative Communication (AAC) device for a person with a multitude of impediments in various anatomical

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and physiological systems poses a huge challenge to the AAC interventionist. With advances in technology an assortment of AAC systems are now available in the market. At present, the selection of an AAC device is largely dependent on its multifarious constituents rather than on the person's inherent learning capacities. This study proposes to approach the selection of AAC devices on the basis of a physiological model, and elaborates on evidence-based practices for further perusal of its effectiveness. Thus, the aim was to analyse the role of sensory, cognitive and environmental factors in the selection of an AAC system with the following objectives:

1. Profiling the sensory capability of the subjects using AAC;
2. Identifying the positive and negative indicators for the selection of AAC;
3. Distinguishing the best practices during the use of AAC.

METHOD

Participants

Four participants were selected from the Department of Audiology and Speech Language Pathology at the National Institute of Speech and Hearing (NISH), Kerala, based on the following inclusion criteria:

Children with developmental disabilities who

a) Did not receive any forms of early intervention,
b) Failed to develop verbal communication through traditional speech therapy.

Assessment Procedure

Each of the four subjects underwent formal or informal assessments in the domains of sensory ability, cognitive skills and environmental factors. The assessments were done using the following tools:

1. Communication Matrix (Rowland, 2004);
2. Individual sensory learning profile (Antony, 2005);
3. Cognitive orientation measured using Functional communication measure (adapted from The ASHA National Treatment Outcome Data Collection Project, 1997);
4. Informal observation sessions.

Intervention Procedure

The AAC system was selected primarily depending on the positive indicators in the sensory and cognitive domains. A detailed profiling of likes and dislikes of each child was made prior to the intervention. Each child got a minimum of 3 sessions and a maximum of 15 sessions. The duration of each session was 45 minutes, once a week. The responses were charted in a pre-arranged format for ease of analysis, and the observations were analysed to identify specific challenges pertaining to each participant for the selection of an appropriate AAC system. The progress of the child was measured using the Communication Matrix.

RESULTS

The positive and negative indicators for sensory, cognitive orientation and environmental domains were analysed and the subject-wise description is given in Tables 1, 2, 3 and 4.

Table -1: Description of Sensory, Cognitive Orientation and Environmental factors of Subject 1 - a child (4 years old) diagnosed as Spastic CP with cortical blindness

Indicators	Analysed Domain					Management options
	Sensory			Cognitive	Environmental	
	Auditory	Visual	Tactile & vestibular			
Positive indicators	Responds to familiar auditory stimuli such as parent's voice. Attends to auditory stimuli such as music or intoned speech and noise-making toys.		No tactile aversion.	Sometimes responds to sensations. May respond more when family is present. Occasionally alert to familiar daily routines.	Motivated parents.	Sensory training, Physiotherapy, Intensive stimulation using auditory-tactile modality, Communication partner training.
Negative indicators		No response to visual stimuli with different characteristics.		Unaware of problems with communication, orientation, motor activities.	Frequent hospitalisations leading to restrictions in communication environment & opportunities. Poor communication partner competency.	

Table 2: Description of Sensory, Cognitive Orientation and Environmental factors of Subject 2 – a child (4 years and 5 months old) diagnosed as Autism Spectrum Disorder with Visual Impairment

Indicators	Analysed Domain					Management options
	Sensory			Cognitive	Environmental	
	Auditory	Visual	Tactile & vestibular			
Positive indicators	Attends to interested auditory stimuli including environmental and toy sounds. Loves to listen to music and can play keyboard tones.	Responds to brightly coloured and illuminating visual stimuli. Visual responsiveness improved when combined with auditory stimuli.		Responds purposefully to people in situations that are familiar. Requires cues to perform and is slow to respond. Attempts to request assistance when needed.	Motivated parents.	Sensory training to improve auditory reception. Communication using tactile cards. Communication partner training.
Negative indicators		Visually does not respond to human faces.	Responds adversely to being touched and to movement.	No recall or awareness of environment/ orientation. All social interactions are significantly affected.	Poor stimulating environment. Lack of knowledge of importance of communication. Lack of acceptance of AAC by family. Poor communication partner competency.	

Table 3: Description of Sensory, Cognitive Orientation and Environmental factors of Subject 3 - a teenager (14 years and 5 months old) diagnosed as Fragile X syndrome

Indicators	Analysed Domain					Management options
	Sensory			Cognitive	Environmental	
	Auditory	Visual	Tactile & vestibular			
Positive indicators	Responds to auditory stimuli such as music (favourite songs),	Visual responsiveness is improved when accompanied by auditory stimuli.	Accepts touch by family members. Aversion to touch	Responsiveness is functional for simple living activities. Requires occasional	Motivated parents.	Sensory training to improve reception through touch and audition. Communication

	environmental sounds and in-context auditory verbal commands.		objects of varied textures at first attempt, but improves with several trials.	cues to start, continue, change, and divide attention during routine activities. Understanding of cause-effect present.		book for functional communication. Communication partner training.
Negative indicators	Adversely affected by noise-making sounds.		Aversion to being touched by therapist, and with objects of varied textures.	Less evidence of learning and recall during everyday activities. Social and family interaction and communication significantly affected.	Restricted communication environment and limited communication opportunities. Lack of acceptance of AAC by family. Poor communication partner competency.	

Table 4: Description of Sensory, Cognitive Orientation and Environmental factors of Subject 4 - a child (5 years old) diagnosed as Autism Spectrum Disorder

Indicators	**Domain Assessed**				**Management options**
	Sensory		**Cognitive**	**Environmental**	
	Auditory	**Tactile & vestibular**			
Positive indicators	Responds to auditory stimuli such as music (favourite songs), environmental sounds and in-context auditory verbal commands.		Cues are sometimes needed to begin very familiar and simple activities. Is oriented sometimes to family members. Understanding of cause-effect emerging.	Motivated parents.	Behavioural modification. Picture exchange communication. Communication partner training.
Negative indicators		Responds adversely to movement.	Responds adversely to movement. Difficulty attending to tasks, supervision for safety is required. Behavioural problems significantly evident.	Poor communication partner competency.	

After analysis of each factor, best practices were contemplated and these are described in Table 5.

Table 5: AAC and Best Practice

Subjects	No. of sessions	Sensory domain selected for AAC	Progress (using Communication Matrix)	Best Practice
1	3	Auditory-tactile mode of intervention	Progressed from emerging level I to mastery of level I	Identification of appropriate sensory system for AAC
2	10	Auditory-visual-tactile mode of intervention	Progressed from level II to mastery of level III	
3	15	Auditory-visual-tactile mode of intervention	Progressed from level III to mastery of level V	
4	4	Auditory-visual-tactile mode of intervention	At level II (no progress)	

DISCUSSION

Across the seven levels of communication as stated in the Communication Matrix, each of the four subjects exhibited a pre-intentional or an unintentional communication pattern. AAC was introduced into their intervention plan with the objective of utilising each child's sensory perceptual capacities for learning. Positive indicators in the sensory domains were found to be the suitable predictor for initiating AAC intervention. Capitalising on the stronger sensory modality for learning is well documented (Boulmetis and Sabula, 2011). Similar principles can be incorporated into assistive technology as well. Children who are strong visual learners (e.g., children with severe developmental disabilities or autism) could use assistive systems using visual tools to improve communication, behaviour, socialisation, and independence (Brill, 2011). Reported evidence-based studies on the selection of AAC systems on the basis of a physiological model are scarce. The present study attempts to establish a platform for further research on the efficacy of utilising sensory perceptual learning with AAC to overcome communication barriers in children with severe developmental disabilities.

CONCLUSION

Since perceptual learning through sensory modalities forms an important foundation for complex cognitive processes such as language, it becomes an integral predictor in the selection of an appropriate AAC system. Thus, awareness of the learning style is important to adapt and provide AAC systems to maximise learning potential and communication participation. Understanding the sensory perceptual capacities of a child with developmental disability, combined with an attempt to overcome environmental barriers, will define the success of an AAC system.

Clinical Implication

Developmental disabilities begin anytime during development up to 22 years of age and usually last throughout a person's existence (U.S. Centres for Disease Control and Prevention, 2004).Since the ability for perceptual learning is retained throughout one’s life, an AAC system focussed on utilising sensory perception would, at any point of time, enhance learning to communicate in an individual with severe developmental disability.

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