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The impact of staff training in Augmentative/Alternative Communication (AAC) on the communication abilities of adults with developmental disabilities

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Staff at a day program were trained in Augmentative/Alternative Communication (AAC) strategies and techniques. The goal was to provide training that would allow staff at the centre to use communication strategies when working with their clients. Two training sessions were provided on AAC and communication strategies for all staff at the centre. Additional training was provided on the use of Boardmaker software. The research team also worked directly with four clients and their key workers to implement AAC strategies. These selected staff members were provided with the opportunity to observe and participate in communication intervention sessions with their client. These sessions were intended to provide the staff with AAC skills and knowledge. An initial assessment established the client communication needs and obstacles. A plan was developed for each client and key-worker, and they were trained based on the plan. There was a range of success among the four clients, but impact was seen on both clients and key-workers.

Introduction

Adults who have developmental disabilities and/or cognitive impairments may also have severe communication impairments and thus benefit from communication interventions, including the use of alternative or augmentative communication (AAC) systems. Yet many adults who have developmental disabilities and severe communication disorders do not have access to AAC systems or do not use their communication system effectively.

While there is considerable information available regarding types of AAC systems and strategies for maximizing their use, there are far less data available concerning the factors affecting the success of implementing an AAC system (Calculator 1999). Calculator (1999) summarized five variables thought to influence the outcome of AAC interventions. The first two concern the AAC system itself and the person who uses the AAC system. A third variable is the conversation partners with whom the AAC user interacts. The characteristics of those partners, including their familiarity with the system, attitudes regarding AAC, knowledge of the person who uses AAC and perceptions regarding the communicative competence of the AAC user, can impact on the success of a system either positively or negatively. The fourth variable is the quality and content of the instruction regarding the AAC system that the user and his/her conversation partners receive. When instruction is of high quality and allows the AAC user to improve his or her daily communication exchanges, the communication effectiveness of the AAC user is increased (Calculator, 1999). The fifth variable refers to other contextual factors impacting on the success of the AAC intervention, including the presence or absence of communication opportunities and motivation for the AAC user to communicate.

Similar themes were identified by speech-language pathologists who provide AAC services, in a survey to identify factors that were related to their perceptions around long-term success versus inappropriate abandonment of AAC (Johnson, Inglebret, Jones, & Ray, 2006). Factors such as availability of supports for the device user and his/her family

and support team, realistic attitudes of AAC users and their partners, and device characteristics that match user needs and strengths were seen as being important to the long-term success of the AAC system, whilst the factors of lack of training, lack of support, lack of motivation, lack of maintenance/adjustment of system and poor fit were most often related to inappropriate abandonment of AAC systems.

The variables described by Calculator and Johnson et al., which centre around the AAC system, the AAC user, conversation partners, AAC instruction and contextual/environmental factors, are also reflected in the Participation Model proposed by Beukelman and Mirenda (2005). The model states that at least two types of communication barriers exist: 1) Access barriers which prevent AAC users from effective use of a communication system due to limitations in skills or within their physical environment, and 2) opportunity barriers which result from people other than the AAC user, and prevent the person from effectively using the system that is in place. These barriers may result from the attitudes, knowledge and skills of other people, or from formal or informal policies. The model proposes that effective communication intervention must address the barriers to communication that the person experiences in his or her own life.

Similar barriers were observed by Murphy, Markova, Collins, and Moodie (1996) during consultations with AAC users and their conversation partners. A common theme identified by Murphy et al. (1996) was the lack of availability of the AAC device in daily situations. Many of the AAC users were allowed to use the device at their day program, but not at home. Others were able to use their device only in therapy situations. In some cases, the AAC user was not able to go and get the system, or turn it on independently. If individuals were not able to use the device on their own, they were less likely to use it at all.

Murphy et al. (1996) further observed that many AAC users did not have appropriate vocabulary available to them in their communication systems. For example, many had a way to ask for a drink even though, in actuality, they did not need this request as drinks were offered on a regular schedule that they did not control. Conversely, the majority of

people surveyed did not have a way to open or close a conversation. Careful deliberation over vocabulary use is an important part of any AAC system or device (Murphy et al., 1996).

Many researchers have stated that effective interventions should include not only the individual AAC user, but also those with whom the individual interacts (e.g., Light, Dattilo, English, Gutierrez, & Hartz, 1992, McNaughton & Light, 1989, Calculator, 1999). Murphy et al.(1996) reported that many of the caregivers and communication partners of the AAC users did not feel that the AAC device or system was needed by the person as the staff could anticipate the person's wants and needs. This led to a lack of motivation to use the AAC system on the part of the communication partners. Further, many of the communication partners reported that they did not have enough knowledge of the AAC system and felt that additional training would be beneficial.

To evaluate the effectiveness of communication interventions and the impact of the AAC system, researchers have measured a number of variables. Light et al. (1992) measured the number of turns taken by the AAC users and their partners, as well as the number of initiations during an interaction. Calculator (1999) measured the frequency and success of client initiations of communication, number of turns taken, number of communication partners in various settings, changes in frequency of challenging behaviours, amount of time actively engaged in an activity, and change in status or acceptance by others. Foley and Staples (2003) measured outcomes for both the participants who use AAC and for the staff with whom they work. Speech production, length of utterance, and range and frequency of communicative intents were measured for the AAC users, while ratings of the user's communicative competence, potential for language and use of trained strategies were measured for the staff.

Individuals with moderate to severe cognitive disabilities typically require some level of assistance in their day-to-day functioning. This underlines the need for communication intervention directed at caregivers, family and friends of AAC users who have cognitive disabilities (McNaughton & Light, 1989). Whereas Calculator (1999) and

Beukelman and Mirenda (2005) emphasised the importance of caregiver training in theory, there have been few studies documenting the actual benefits of AAC training for residential staff. McNaughton and Light (1989) offer a single case study in which the facilitators of an adult with cognitive disabilities were taught how to provide the individual with effective communication opportunities. All staff at the woman's group home and day program received an in-service training session. In addition, one facilitator from each setting received some individual instruction. The researchers reported that after the in-service training, observational data showed that the AAC user enjoyed more active participation and increased opportunities to communicate. Light et al. (1992) studied the efficacy of using in-service training sessions to teach communication strategies to the facilitators of two adults with cognitive and physical disabilities. These facilitators were staff at a group home where the participants resided. The researchers concluded that training facilitators is an effective means to increase the frequency and quality of communicative interactions for individuals who require AAC systems.

The goal of the present study was to provide training in communication and, more specifically, AAC strategies, to the staff at a community-based day centre for adults with developmental disabilities. The communication training included information and strategies that all staff could use when working with their clients at the centre. Training was provided to the staff in the form of three in-service sessions and subsequent individual work with selected clients and their key-workers at the centre. This follows the work of Light et al. (1992), who began their intervention with staff members with introductory instructional sessions, followed by individual sessions with each facilitator and client during daily routine. The efficacy of the intervention was measured in terms of staff knowledge of AAC and communication strategies, staff comfort levels with various types of AAC systems, and staff and manager perceptions about the communication abilities of the clients.

The clients of the day centre ranged from those with hearing loss to those with developmental disabilities such as autism or Down syndrome. Some clients at the day centre exhibited behavioural problems along with cognitive disabilities. Based on the results of Danquah, Mate-Kole,

and Zehr (1996), who found that an AAC device provided to individuals with cognitive impairments resulted in a significant decrease in self-abusive outbursts, it was expected that there may be a decrease in the number of negative behavioural outbursts made by any of the clients at the day centre who typically showed these types of behaviours.

Methods

Participants

Selected participants, who were judged to be good candidates for AAC intervention and who were representative of the population at the center, were invited to participate in the project together with their respective key workers. Three adults with no functional speech and one adult with minimal functional speech were included in this study. The participants are profiled in Table 1. All adults attended the day center Mondays through Fridays. All of the individuals were ambulatory without significant physical impairments and were independent in some activities of daily living (ADLs) such as toileting and eating, but needed assistance in initiating other ADLs such as dressing.

Procedure In total, the project ran for one year, as will be described below. During that time, direct involvement with clients was over an eight month period.

Two one hour AAC training sessions, spaced one week apart, were offered to all staff at the center, including the four key workers involved directly in the study. The first training session, attended by twenty-two staff, included information about the purposes of AAC systems as well as how to select an appropriate system and determine the vocabulary and messages that should be incorporated into it. The second training session, attended by seventeen staff, included materials needed for a low-technology AAC system, ways of separating and grouping vocabulary items, conversational categories to be included and skills needed by the client to use a communication board. PowerPoint presentations for the two training sessions were based on other

Table 1
Participant profiles.

Participant	Age (sex)	Time in Program	Description	Key Worker description
1	24 M	18 mo	ASD, group home, passive, receptive communication only, used "fetch"[1] mode for expressive communication	Employed and w/client 6 mo., two other clients
2	30 M	4.5 years	ASD, group home, some ASL, no-verbal, symbolic communication through photos on wall, good comprehension, disruptive behaviour when irritated or change in routine	Employed and w/client 2 yrs., previous experience with an SLP
3	45 M	5 years	Cognitive disability, severe speech delay, foster parents, good auditory comprehension, low intelligibility of speech, redundant repetition of phrases in writing to attempt repair, personable, outgoing	Employed 1 yr. w/client 2 mo., 2 other clients
4	26 F	2 years	ASD, epilepsy, developmental disability, group home, limited use of ASL and pictures, good auditory comprehension, vocal outbursts and self-abusive behaviour w/unexpected changes in routine	Employed w/client a few months, one other client 2 yrs.

ASD=Autism Spectrum Disorder, ASL= American Sign Language, SLP= Speech-language Pathologist

presentations[2]. Boardmaker[3] software that had been previously installed at the center was not being used. Boardmaker is a program that allows design and printing of individual pictures and communication boards to meet particular needs. It includes a large set of Picture Communication Symbols (PCS) as well as various written text fonts. The pictures and communication boards produced (generally printed on paper and

[1] The client would get up and retrieve an object he wanted rather than ask for it.

[2] The presentations were based on material shared by P. Oraund and P. Barker.

[3] Mayer Johnson, San Diego, CA , http://www.mayer-johnson.com/

laminated) are then used in intervention. A tutorial session was provided to staff including step-by-step demonstration and handout on how to use the program. Staff also created a sample communication board for their clients based on the needs assessment previously conducted. The intended purpose of the tutorial was to give staff access to the knowledge and resources they would need in order to be able to create their own PCS symbols and communication boards for their respective clients

Surveys were administered prior to and following the training sessions to obtain information about participants' initial knowledge and perceptions of AAC, and to evaluate if and in what way the training sessions affected their knowledge. Additional surveys were given to the four specific key workers involved in the study. These surveys were created to obtain information about their knowledge and perceptions of their individual clients.

Assessment and Intervention Following the training sessions, AAC assessments were conducted with each of the four participants and corresponding key worker to identify symbol systems and choice making abilities. Various objects, photographs, PCS symbols, words and phrases were used to assess each client's receptive and expressive abilities and preferred communication methods.

The following guidance regarding assessment, vocabulary selection and intervention was provided to the staff through the group training sessions and individual client/key worker interaction. In order to determine relevant vocabulary and situations in which intervention might be useful and successful, the following steps were recommended:

- Using the Environmental Inventory Chart (Figure 1), observe the client three times during the day, in different places, and doing different things.
- Who does the client talk to, what does he/she talk about, and where does the client spend his or her time?
- Include **meaningful** words and phrases that the individual can use for initiating an interaction, greetings, making

requests, exchanging information, commenting, social etiquette, and repairing conversation breakdowns

Environmental Inventory Chart			
Name of Client _____			
Date of Observation _____			
Directions:			
Print copies of this form.			
Watch the person for 10-15 minutes each time.			
Write down what you see.			
	What did the individual do?	***Who*** did s/he do it with?	***Where*** did s/he do this?

Figure 1:
Environmental Inventory Chart Recommended for use by staff in setting client goals and determining relevant vocabulary.

Table 2
Assessment recommendations.

Participant	AAC recommendation
1	Picture Exchange Communication System (PECS) to be introduced. PECS selected because one staff member had PECS training.
2	(1) Continued use of existing system within day centre - modified ASL and selected photographs. (2) Simple communication display using Picture Communication Symbols (PCS) developed for community use and to widen circle of communication. Partners
3	(1) Phrase-based communication display for initiation and to repair communication breakdowns. (2) Scripts to help initiate communication on specific topics.
4	Communication display for expressing basic emotions to be used each morning. Key worker to model his/her feelings and encourage participant to do same.

For some clients, introducing vocabulary was most effective if it was done initially with one item. To avoid the situation in which the client responds to prompts to point to a communication symbol rather than selecting the symbol to meet a communicative need, the Prompt-Free

Strategy was recommended (Mirenda & Santogrossi,1985). The steps in this teaching strategy are outlined in Table 3.

Table 3
The prompt free approach to teaching vocabulary.

Give the client a picture of an item he/she wants to request. Then do something else that has nothing to do with the item. Anytime the client moves towards or looks at the picture, act as if he/she had selected it. Then, give him/her the item and comment on it, "Oh, you want some coke."
Move the picture a bit further away so the client must use more effort to select it.
Move the picture so that it is out of sight (i.e., covered by a piece of translucent paper which the client must uncover). Reinforce the choice as before.
Place two pictures on the table in front of the client so he/she can make a choice.

Once situations in which enhanced communication might be motivating and useful to the client were determined, then suitable vocabulary was chosen and Boardmaker was used to make communication boards. Table 3 shows the assessment recommendations.

Since the clients were generally severely disabled and had little experience with independent communications, the following recommendations were provided for situations in which more than one vocabulary item was to be included initially:

1. Select one item the client likes and one item that he/she doesn't like. This will allow you to tell whether or not the client is making a conscious choice. If the client selects the preferred item, you know that he/she is making a real choice and not just pointing randomly.
2. Be sure the choices you give the client are real ones. When an item or activity is selected, be sure it can be provided to the client.
3. When the client is consciously making a choice, increase the number of choices by giving him/her a different pair of picture choices.
4. If the client is physically and cognitively capable, you can increase the number of choices on one board. If he/she is not capable of selecting from a larger array, present the items as pairs, one pair at a time.

The severity of the disabilities and the life-long non-expressive experience both were indicative of a long and slow intervention process.

Results

Table 4
Results of intervention.

Participant	Results
1	(1) insufficient time to develop skill. (2) worker needed additional training.
2	Participant failed to used PCS display, relied on ASL and photographs for expressive communication.
3	Limited success, participant tended to rely on previous methods that had been used for years.
4	Decrease in self-abusive behaviour and angry vocalizations.

AAC Intervention Outcomes

As shown in Table 4, each of the four participants showed a different level of success with the implemented communication plan. For participant 1, the Picture Exchange Communication System (PECS) was introduced, but required a training period that exceeded the length of this study. Participant 1's key worker also required maximal support to implement the PECS program due to her limited experience with AAC interventions, and the centre staff member trained in PECS was not available on a daily basis to ensure the consistent implementation of PECS by the keyworker. For participant 2, the intervention strategy of using picture symbols for communication resulted in limited success. Despite assessment success with PCS symbols, he had become accustomed to using photographs and ASL at the day centre, and he did not learn to use the boards during the timeframe of the study. His key worker did express interest in continuing to pursue the use of PCS symbols as an additional method of communication.

For Participant 3, scripts composed of written phrases, which he could point to in order to take his turn in the conversation, and phrase boards were developed. The "scripts" were based upon his preferred topics of an exciting emergency event that had happened near the centre and a

movie that he had recently seen. They included conversation openers and closers (such as, "Hey, how's it going?"; "Well, I'll let you go now"), as well as comments on the topic. The phrase boards included items he could point to when his speech was not understood (e.g., "You misunderstood me") and some general comments (e.g., "Hey, what's up?"; "What have you been up to today"). As with the previous two participants, these new communication strategies were met with limited success. Participant 3 was very eager to engage in communication and willing to participate in all attempts researchers made to try to teach him how to use the scripts and phrase boards. However, he had difficulty understanding the purpose of these communication systems and needed maximal support in order to use any of the strategies provided. He did not spontaneously use the script with others at the day centre, and did not use the conversation repair phrases when his speech was misunderstood. When misunderstandings occurred, he would simply continue to repeat the phrase or word that the conversation partner had not understood.

Participant 4 received a communication board that included pictures of various feelings, such as "happy," "angry," and "frustrated." At the conclusion of the study, her key worker reported that the amount and severity of self-abusive behaviours had decreased as a result of introducing the communication board. The key worker expressed interest in continuing to use the board as part of her client's daily routine as well as developing additional symbols and boards from Boardmaker, which would enable participant 4 to express herself in more situations.

Staff & Management Post Interviews Upon completion of all training with staff, the four key workers and two managers were interviewed individually to determine their opinions and ideas regarding the outcome of the study. The following is a compilation of the results of the interviews with the managers.

1) Have you noticed any changes in the practices or attitudes of any of your staff?

- provided staff with another tool that supported their work.

- allowed their staff to receive training and information from outside sources.
- helped the staff be more open and receptive to new ideas.
- increased staff enthusiasm and motivation with regard to different approaches to communication.
- made the staff "step outside of the box" to implement new systematic approaches to communication.

2) Have you noticed any changes in the communication abilities of the four clients?

- increased participants' abilities to express themselves were having positive effects on their interactions with staff at the day centre.
- impact varied by participant.

3) Do you have any ideas for possible next steps with the clients?

- positive but realistic about future steps.
- next step is sharing the knowledge and skills learned with other staff and thus transferring the tools over to other clients.
- would be beneficial to build in accountability and scheduling time for staff to implement and use AAC strategies.
- enthusiasm to continue to build on the ideas provided, especially finding other ways to improve visual communication.
- there is a "need for commitment and consistency over several months."
- "everything put in place will be continued."
- part of their plan is to attach printed words and picture or symbol labels to objects in the rooms.

4) In what areas did this project meet your expectations?

- motivated the staff at the centre.
- attitudes among staff had become more open and enthusiastic.
- pleased that the interventions had included various types of AAC modalities, such as PECS, sign language and other symbol or photograph-based communication supports.

5) In what areas did it not meet your expectations?

- scheduling and time spent at the centre by researchers were insufficient.
- due to other education commitments, the student researchers could only commit to one day a week at the centre leading to problems at times trying to match student/researcher availability with staff availability.
- "it would have been better if you could have physically been at the centre more often."
- disappointed that no high-technology AAC devices had been offered to the clients.

6) What obstacles did you see in terms of implementing the AAC strategies suggested by researchers with the staff and clients?

- biggest obstacle was time or lack of time for staff to incorporate the AAC strategies into the clients' daily schedules.
- researchers' strategies seemed more like an "add-on" to their workload rather than something to make it easier.
- if staff had a number of hours a week set aside specifically to work on planning, they would see huge changes.
- related to this obstacle was staffing levels due to funding.
- would have enhanced the study if the researchers could have gone out with staff and clients to the swimming pool, bowling alley, or shopping mall to provide more direct feedback about strategies.

Due to time and scheduling constraints, the researchers were not able to follow staff and clients out into the community to help integrate the communication systems into more of the clients' daily lives. This led one manager to comment that the study had "missed the whole connection to the community." Centre managers were very excited about staff starting to make this connection and think more in terms of Person Centered Planning (PCP). A goal of the day centre was for clients to chair their own case conference meetings.

The four staff key workers were also interviewed separately but asked the same questions. Table 5 summarizes their responses.

Table 5
Post-intervention evaluation by Key workers.

Participant	Key workers' assessment
1	small improvements in communication abilities; plans for further intervention; more consistency for applying the strategies was required.
2	small improvements in communication abilities; plans for further intervention; her client should work with picture symbols rather than manual signs, as these would be understood by others in the community.
3	no significant changes in ability to communicate; no plans for further intervention;"he's 45 years old and I don't think we can change much in his life now."
4	small improvements in communication abilities; was now able to respond to others effectively by pointing to pictures of how she is feeling in the morning; expression of her feelings helped decrease her negative behaviours, learned what to do through modeling procedures; plans for further intervention; a logical next step would be to try and have her client use two or more symbols together.

Three of the four key workers surveyed felt that outcomes of the study had met their expectations. One felt that the study had "lent credence to what a couple of us had been trying to do," while another felt that "for now, for starters, it's enough." Another felt that the study gave her a better understanding of using pictures and symbols to communicate, and that her client had begun to communicate more effectively with the picture communication system. Only one staff member felt that it had not met her expectations, but did note that her client enjoyed spending time with the researchers at the centre. Most key workers felt that the researchers were not at the centre often enough, and for long enough, to truly support the staff with the communication suggestions and plans. This caused a lack of ongoing support for the staff, which some felt they needed. One key worker further commented that the intervention was too general and that it could have been more specific to her client.

In terms of obstacles affecting the implementation of the suggestions, key worker 1 emphasized how hard it was to teach her client to initiate communication. The PECS system is designed to teach the client how to spontaneously initiate communication, although this step was not consistently achieved with the client. The key worker found that it would often take a very long time to "outwait" her client and have him

initiate. In some trials, he never did initiate. She also felt that a long-term plan should have been created to help with implementing the suggestions. Key worker 4 felt that this study required a team and that this concept was lacking among some of the staff at the centre.

Pre- and Post-Training Evaluation of Knowledge by Staff A questionnaire that asked about their knowledge of communication and AAC, their comfort level with various AAC systems or strategies, and their perceptions of their client's communication skills and abilities was administered both before the training and after training to the four key workers and any other staff members who attended at least one of the training sessions. Twenty-two key workers completed the survey prior to the sessions, and seventeen of those returned the survey after the sessions.

The results of the surveys are summarized in Table 6.

Table 6
Staff responses to survey questions before and after attending training sessions.

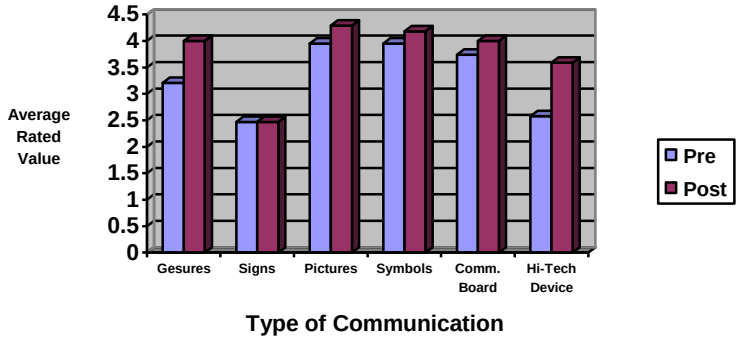
Survey Questions	Percentage	
	Pre	Post
1. Overall staff knowledge about communication and AAC.	72.7%	74.4%
2. Percentage of staff who believed that their clients did have the skills to use an AAC system.	80.0%	94.0%
3. Percentage of staff who felt that AAC systems could help make their clients more interactive.	82.0%	65.0%
4. Percentage of staff who felt that communication is important to the lives of the clients with whom they work.	100%	100%
5. Percentage of staff who felt that their clients had adequate communication skills at this time both before and after training.	36.0%	41.0%
6. Clients could have their communication skills improved.	64.0%	59.0%

A surprising result was a decrease from 82% pre- training to 65% post-training in the number of staff who felt that AAC systems could help make their clients more interactive. The training may have dispelled the

belief that some staff may have had that simply providing a client with an AAC system or device would allow him/her to communicate effectively. Following the training, the staff may have understood more completely the selection process, training and support required for a client to be successful in using an AAC system. At no time did any staff members feel that any of their clients did not have the potential to improve their skills.

One area of difference was seen in staff levels of comfort with various AAC strategies and devices. Staff were asked to rate their comfort level from one to five, with one being least comfortable and five being most comfortable. As shown in Figure 2, staff comfort levels following the training sessions were higher for every form of AAC except sign language, which remained the same at an average of 2.47 out of a maximum of 5.

Figure 2. Staff comfort levels with types of AAC strategies.



Discussion

The Participation Model (Beukelman & Mirenda, 2005) identified opportunity and access barriers that can restrict an AAC user's ability to communicate. Opportunity barriers relate to the contexts within which the individual communicates. This includes the policies and practices that are present in each setting, as well as the attitudes, knowledge and skills of the individual's communication partners. Access barriers relate

to all aspects of the specific AAC user and include the individual's strengths and difficulties in terms of motor, cognitive and linguistic abilities, literacy skills and sensory/perceptual abilities. Both types of barriers must be addressed in order to create an effective communication system.

Opportunity Barriers:

These barriers include formal or informal rules and regulations that exist in every program. At the day program, three policy barriers that affect the communication potential of the clients were identified. All are related to low government funding level for adult day programs.

1) Staffing ratios: A single key worker may be responsible for two or more clients. This limits the amount of time the key worker can spend working on communication goals with each client. For example, as key worker 3 was responsible for more than one client, she did not have adequate time to focus on one-to-one communication enhancement intervention with client 3.

2) Limited access to staff with communication training: The day program had no funding allocated for a communication specialist such as a speech-language pathologist or speech-language pathology assistant. There was also no formal provision for access to knowledgeable staff. For example, one centre staff member had attended PECS training, and Participant 1 was learning PECS. Due to time restrictions and scheduling, Participant 1's key worker had limited access to the staff member who had received PECS training.

3) No funding for AAC devices: At the time of the completion of the study there was no funding available to purchase high-technology AAC devices for clients at the centre. Augmentative communication devices that cost more that $800 are usually referred to as "high technology." Another distinction is that these device have many more features such as speech output, large stored vocabularies and a variety of ways of retrieving the vocabulary. These devices can be costly to purchase, yet can provide great benefit to those individuals for whom they are

appropriate. One of the managers at the centre mentioned disappointment that no high-technology devices had been offered to the clients as a part of the study. This may reflect the view that "the device is the solution," rather than the more appropriate position that the device is a tool and is only useful if the client has sufficient skills and motivation to utilize its features.

Practices which impact on the abilities of AAC users to communicate are further examples of opportunity barriers. Such practices include procedures that have become accepted practice in a setting but have not been formalized as policies. In this study, numerous practice barriers were found to have a detrimental impact on the clients' communication abilities.

One such barrier was that clients were not allowed to take individual AAC systems from the day program to the client's home. For example, client 2 used photographs to make choices at the day program, and yet was not able to take these photographs home in the evenings or on weekends.

The schedule at the day program was a second practice barrier to effective communication by AAC users. Because work on communication strategies had not been included in the day program, there was minimal time allotted during the day for it. A similar situation existed for time for staff and clients to prepare AAC systems requiring pictures or photographs.

The attitudes, knowledge and skills of communication partners contribute to other opportunity barriers for the AAC user. Attitude barriers exist when a person in the AAC user's environment has a specific belief that can affect the user's involvement in life activities. For example, researchers found that, due to the general lack of expressive communication abilities, many of the staff perceived the overall communication abilities and potential of their clients to be quite low. Key workers 1 and 2 were surprised to discover that their clients were able to recognize familiar items when photographs previously used by the client were replaced by PCS symbols. When key worker 3 was shown the

AAC strategy that was provided to her client, her first response was to comment, "Oh, he won't use it." The staff group and one-on-one training was aimed at overcoming this barrier. In this regard the results presented in Table 6 are discouraging. While the percentage of staff who believed their clients had the skills to use AAC increased after group training, the percentage of staff who felt that AAC systems could help make their clients more interactive or that clients could have their communication skills improved both decreased after training.

Comments heard following the general communication training sessions revealed a second attitude barrier. Many of the staff mentioned that they did not feel they could use the provided strategies and information. Their attitude was that, if they did not work directly with a client who used AAC systems, then knowledge of the strategies was of no use to them. When pressed, however, some mentioned that they did interact daily with clients who use AAC strategies, and that they could use the strategies in these conversations. Clearly, the training session were not effective in altering attitudes of staff regarding their clients' communicative potential and skills.

Knowledge barriers exist when an individual other than the AAC user has a lack of knowledge that results in the user experiencing reduced participation in activities. There were many instances of knowledge barriers encountered. For example, one of the key workers was not aware of the communication system her client used at home, resulting in no carry-over or consistency between what happened at home and at the day program. In another example, staff did not have training in signed English or ASL, even when their assigned clients used sign as one of their primary modes of communication. Key worker 2 admitted that she did not know as many signs as her client did, and that sometimes she could not understand what he was trying to convey to her.

Lack of familiarity with the software used to create communication displays contributed to another knowledge barrier. Most staff did not understand how to use the Boardmaker program to create specific symbols, even though it was on many of the computers at the site. The

training in Boardmaker that was provided was aimed at overcoming this barrier.

Skill barriers exist when communication partners lack knowledge about the correct technique or strategies to implement an AAC system. A number of skill barriers were found at the day program. Some of these were related to the new approach being recommended by the project team. For example, some key workers had difficulty following through with the recommended AAC strategies after receiving training. Key worker 1 had difficulty implementing the strategy of waiting for her client to initiate communication instead of answering for him or not requiring a response even when the researchers were present and provided cues and reminders. In another example, a key worker selected a particular AAC strategy with her client and had agreed to keep practicing it with the client during the week. When the researchers arrived the following week, it was clear that no follow-through had been made, even though the staff member knew what to do. These outcomes may have been due to the recommendations not being appropriate to the constraints and setting of the program or they may have been related to resistance to change from the staff.

A further skill barrier involved staffing at the day program. One common difficulty at centres such as this is the high staff turnover rate. It is common for staff to work at the day program for a relatively short time, or to move from working with one set of clients to another. The average length of time that the four key workers had worked at the centre was 1.25 years. With the exception of key worker 2, who had worked with her client for two years, the average time spent as key worker to their respective client was just four months. The frequent changing of key workers can be difficult for the many clients who require consistency in their daily routine, and to long-term intervention programs such as those required for communication enhancement.. It can also lead to existing AAC systems being abandoned, as the new staff member may not have the skills or knowledge necessary to assist AAC users with their communication system.

Access Barriers:

Access barriers refer to the intrinsic strengths and limitations of AAC users that affect their participation in activities. This can include their physical, perceptual, cognitive and linguistic strengths and difficulties as well as any strong attitudes or beliefs they hold. During this study, some access barriers were encountered with the four participants. Participant 1's largest barrier was due to his passive nature, possibly due to "learned helplessness." At the time of the study, he was not aware that he could have some control over his environment through communication, whether verbal, sign or through pictures. Instead, he depended on his conversation partner to provide cues as to what he/she expects him to do. This was a problem for him as he did not initiate communication through any of these modes with any person during the study. Participant 3's main access barrier was his severe dysarthria which resulted in his speech not being understood well by others. He often spoke to others at the day program and was not understood. He did not have any way of repairing the communication breakdowns as they occurred during conversation. Another possible barrier was a difficulty with reading comprehension. In addition, environmental factors such as audible and visual distractions were present. This may have reduced the effectiveness of the AAC intervention.

A further challenge faced during this study was the lack of integration of the study with the concept of Person Centred Planning (PCP). PCP was an initiative of the society which runs the day program in this study. One of the purposes of PCP is "to transfer the control to the persons receiving services by assisting them in communicating their wants, needs and beliefs, which ultimately will direct the circle of support in how services are delivered." Based on this statement, the society is committed to helping clients communicate as effectively as they can, in order to express their opinions. Unfortunately, the researchers were not informed of this initiative until the very end of the study, when a newsletter on the topic of "choice" was distributed. If further research were completed at this centre, making an explicit link from PCP to communication intervention would be beneficial for the staff, clients and researchers.

In summary, numerous barriers to effective communication were found at the day program centre. These included barriers based within the individual who uses AAC and barriers unwittingly caused by staff at the day centre. In this setting, the barriers which were most limiting were opportunity barriers relating to attitude, knowledge and practices. Attitude barriers were caused primarily by staff having low expectations of their clients, and not seeing their true potential for communication or other skills. Knowledge barriers resulted from staff and management not being trained in basic communication strategies and how to use them with clients at the centre. Staff were unaware of the process of AAC intervention, and that clients need time, training and practice in order to use their system effectively. This lack of knowledge can influence staff attitudes, such as when a staff member may observe a client progressing very slowly. The attitude may be that the client will never progress to being functional with the system, and a decision could be made that the client is not capable of learning and using the system.

Practice barriers can impact negatively on communication when staff turnover is high, or when staff are not given any time in the day to focus on communication. Interestingly, a common theme from the staff and managers was the lack of funding for AAC devices available to the day centre clients. They felt that this policy was a significant barrier to their clients reaching their full communication potential whereas staff attitudes about their clients as well as their knowledge about communication systems and techniques may be factors. With further knowledge, they would learn that it is often not the device or system itself that is crucial to the client gaining functional communication skills, but rather the training and support provided to the client as well as to those who work with the client on an ongoing basis. Changes in education levels and attitudes of the individuals and staff members, as well as changes in policies and practices at the day centre, could all impact positively on the clients' abilities and opportunities to communicate.

Recommendations

The results and implications of this study have led to several recommendations that would improve the communication effectiveness between staff and their clients at this day program.

The first recommendation is to hire a speech-language pathologist (SLP) and/or a speech-language pathology assistant (SLP assistant). Access to communication professionals would help address knowledge, skill and attitude barriers which were identified as causing the greatest difficulties to the clients. These professionals would have a role in providing knowledge and skills to the clients and staff at the day centre, as well as in setting up in-service sessions or other means of explaining the importance and consequences of staff having low or negative expectations of their clients' abilities. An SLP or SLP assistant would provide expertise in communication strategies for staff and, in the case of the assistant, continuous daily support for clients with AAC and other communication needs. The SLP consultant would alleviate some of the responsibility of staff and management by taking the time to address all individual clients' communication needs and design specific AAC strategies if necessary. The SLP assistant would be available daily to provide ongoing support for staff to implement these strategies, trouble-shoot and create solutions to problems that arise. AAC intervention can be a lengthy process and having support for small improvements would encourage staff to continue with these strategies. The SLP/SLP assistant would help to build the confidence of staff in terms of using communication strategies and, in turn, this would increase the opportunities for more effective communication among the clients at the day center. By employing an SLP/SLP assistant, this person would facilitate carryover of the AAC strategies throughout the centre as well as out in the community. As management alluded to during the study, the presence of the student researchers at the centre helped increase enthusiasm and motivation among the staff in regard to trying new and different types of communication. An SLP/SLP assistant may act as a trigger for staff and management to take ownership of the communication knowledge and skills they have and start to more consistently put these into practice. Their presence would highlight the

need and importance of communication to all staff. The SLP/SLP assistant would ensure training of various types of communication strategies would be available to all staff in order to generalize these skills and knowledge to benefit all clients at the day centre.

The second recommendation is to allot time within the week for staff to work on communication with their clients. This recommendation will address a practice barrier in which staff are not allotted specific time to work on communication. Additionally, it will indirectly address attitude and skill barriers. When staff have time to practice working on communication with their clients, they will develop additional skills. They may also see progress with the client, and this can positively affect their expectations and attitude toward the client. In order for AAC strategies to be successful, staff need to have time in their busy day to prepare, brainstorm and begin to implement the ideas and AAC strategies. If they need to create or adjust communication boards, create symbols, or do other important tasks, they require time to access computers or other resources. Especially when working with clients who have developed "learned helplessness" habits, staff need the time and support to develop strategies to "undo" these habits. This "learned helplessness," where clients rarely initiate communication, has developed over years. Therefore, it will require more than a few sessions to teach clients that, when they do initiate, they can control their environment. In addition, every client who receives a new type of communication system, whether that be printed words, new sign language signs, or switching from the use of photographs to picture symbols, will need time to be introduced to the system and to become proficient in its use.

The third recommendation is to upgrade the Boardmaker software program to the most current version. The version that currently exists at the centre does not allow for staff to create symbols and communication boards effectively. The most current version would be easier for staff to use and provide more flexibility tailoring boards and symbols to specific clients. This one-time purchase would be a good investment that could benefit the staff and clients for many years.

Future Considerations

Further research is needed in the area of AAC and its use with adults with developmental disabilities, particularly, investigating the training of paid care workers in AAC strategies in a wider range of settings to determine whether the barriers discovered in the current study pertain to other similar settings. Given the findings of this study, more research that addressed the above mentioned barriers could improve the delivery of AAC training to this particular population.

Looking at the limited access adults with developmental disabilities and severe communication disorders have to AAC systems, it is extremely important to develop an effective delivery model to teach AAC strategies and to motivate care workers. A model that allows for tailoring to programs' and individuals' specific needs and differences would improve the quality of care for these adults, as well as improve their communicative interactions.

Another area to further examine is looking at the impact a speech-language pathologist and a speech-language pathology assistant working with this population have on the communication interactions and effectiveness between care workers and these adults. Also more research working at the policy level to change schedules of care workers to allot time for AAC training and implementation of strategies would better the care of this population and ease the communicative frustration for care workers.

The present study demonstrated that simply providing knowledge about communication, some practical skills, and a carefully selected AAC system to day program staff does not necessarily indicate that this intervention will cause an increase in the client's ability to communicate. Neither does it mean that the staff's expectations of their client's abilities or potential will increase. In addition, this study demonstrated the importance of staff "buy-in" for assistive technologies. The most successful intervention reported in this study included the use of a feelings board which was intended to help decrease frustration levels and consequently negative behavioural outbursts in a particular client.

When the negative behaviours were decreased, the key worker would have experienced a positive change in her working conditions at the centre. The key worker for this client felt quite positively toward this study and AAC systems in general, which may have been due to her positive experience with the functional effects of the intervention.

Additional research is required to provide efficacious evidence-based practice for the implementation of training care workers in the use of AAC strategies when working with adults with developmental disabilities and severe communication difficulties.

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