Augmentative Communication News

July 2002

Volume 14
Numbers 4 and 5

Upfront

Whether AAC practitioners are speech-language pathologists, classroom teachers, occupational therapists, rehabilitation engineers, classroom teachers or others, we all rely regularly on multiple sources of "evidence" to provide "best practices." We are, in fact, accountable to a Code of Ethics and Standards of Practice that mandate that we ground our services in the available knowledge of current best practice. We collaborate frequently to conduct assessments, set short and long-term goals, and plan and implement interventions. In the course of these activities, we are constantly trying, in both formal and informal ways, to: (1) measure changes that result from our treatment approaches, (2) evaluate the outcomes of our interventions and (3) assess client satisfaction with the services we provide. To support our quest to provide best practices, AAC practitioners read journals, books and newsletters, belong to professional organizations, attend conferences and frequently consult with colleagues in an effort to stay up-to-date with AAC-related practices and policies. In short, most of us make serious efforts to ensure that our practices reflect the best information available.

What we may not yet be doing, however, is making sufficiently systematic efforts to ground our practices in the research evidence available to us. It is important, therefore, to ask whether we are ready, as a field, to adopt the more rigorous standards of evidence-based practice (EBP).

Putting EBP in perspective

In the July 18, 2002 issue of the New York Review of Books, *Sherwin Nuland, M.D. raves about the new book* Complications: A Surgeon's Notes on an Imperfect Science *by Atul Gawande, a surgeon who writes about the art of healing as it actually takes place in America's leading academic medical*

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Clinical News

Evidence-based practice (EBP): A next step for AAC clinicians?

The concept of Evidence-Based Practice (EBP) was introduced in the early 1980's as Evidence-Based Medicine (EBM), around the same time that AAC was first emerging as an area of clinical practice. Dr. David Sackett, widely recognized for his leadership in the area of EBP, has described EBM as the "conscious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients."[2]

EBM represents a paradigm shift in how physicians are trained and how they practice medicine, because it refocuses the emphasis of clinical decision-making.[3] EB practitioners seek out empirical evidence that has appeared in peer-reviewed journals, in addition to depending on their own clinical experience and knowledge and looking to traditional scientific authorities (*e.g.,* textbooks, journals, local and international experts).[4]

EBM requires that physicians gain the skills needed to make independent assessments of the quality of existing research that purports to document the efficacy of specific treatment approaches. In addition, EB practitioners learn

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centers.[1] Nuland cites Dr. Alvan Feinstein, a leading authority on the clinical use (and misuse) of statistics, when he states:

> *Much of what a well-trained physician does, and is convinced he knows, is not supported by valid scientific evidence applicable to the actual situation of the individual sick person.[1]*

Over his lifetime, Dr. Feinstein repeatedly called into question claims about so-called "evidence-based medicine" (EBM), maintaining that even clinical decisions that emerge from a review of all pertinent studies and literature cannot convert diagnosis and therapeutics into an exact science. Nuland points out that the answer to every single one of the questions below was once "Yes" (based on "empirical evidence") and is now "No."

> *Is radical mastectomy the best treatment for breast cancer? Is drinking coffee associated with an increased risk of pancreatic malignancy? Should every ruptured spleen be removed? Is a low-fiber diet the best treatment for chronic diverticulitis? Is acid production by the stomach the key factor in peptic ulcer? Should every man, or nearly all men, with prostrate cancer have surgery? Are most cases of impotence psychosomatic? Should postmenopausal woman take hormones?1*

EBP and AAC

AAC practitioners are now being asked to consider EBP. We need to do so with both a sense of its history and a knowledge of how it is used in medicine and other healthcare disciplines. We have no need to reinvent wheels, nor should we mindlessly adopt methodologies employed in EBP that may be inappropriate for our area of clinical practice at this time. We have every reason to proceed cautiously.

This issue provides basic information about EBP. In Clinical News, the principles and practices inherent to EBP are considered with regard to their application within the area of AAC. On The Web describes interesting and instructive EBP websites. The ACN Survey reports on what some speech-language pathologists who work in the AAC area know and think about EBP. The AAC-RERC section highlights empirical evidence that demonstrates how much difficulty even young children WITHOUT disabilities experience when they try to learn to use AAC devices, and what that may imply for children WITH disabilities. For Consumers illustrates the cumbersome process involved in conducting a review of research evidence to answer a clinical question. Finally, In Review gives information about two books, both in press, that AAC practitioners may find helpful.

Thanks especially to Ralf Schlosser, whose patience and collaboration on this issue was essential. Thanks also to the many others whose ideas, advice and expertise helped me in preparing the issue. They are listed in Resources and References. In summary, I've learned a great deal about EBP and its applications to AAC; I hope you will also. I've also had a glimpse at how much I still have to learn.

Sarah W. Blackstone, Ph.D., CCC-SP

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how to frame clinical questions, search for relevant evidence and evaluate existing evidence as it applies to individual patients. EBM does not mean that the daily decisions physicians make are based on elegantly designed, double blind research studies or clinical trials. Rather, it means that EB physicians systematically use available research evidence to augment their own knowledge and skills and the opinions of the expert resources on which they rely. By accessing pertinent literature and incorporating these research findings into their daily work, physicians can keep up-to-date and be better able to deliver quality patient care.[5]

EBM emerged during a time when medical research was proliferating and databases of scientific studies were becoming readily available. In addition, concerns about health-care quality and costs were burgeoning. The co-mingling of these events, along with the concurrent expansion of the World Wide Web and other resources, has led to the establishment of EBP Centers in several countries. These Centers support EB practitioners around the world by providing reviews and meta-analyses of research in specific areas that practitioners can easily access to guide their daily clinical practices. [See Figure 1 for an example.]

Requirements of EBP

Unless certain factors are in place within a field, practitioners will find it difficult to implement an EBP. These factors include: (1) the existence of a research base; (2) a way to access existing evidence in a timely manner; and (3) clinicians capable of finding and evaluating existing evidence.

1. *Existence of a research base*. In medicine, there are areas in which extensive research exists, and there are areas in which it does not. EBM requires that physicians use whatever best and current research evidence is available in making clinical decisions. However, even when considerable evidence exists, it may be inconclusive. For example, the Evidence-Based Practice Center at Duke University undertook a review of research addressing evidence involving treatment of symptomatic uterine fibroids, which have a rather high (30%) incidence among women. They considered peer-reviewed journal articles (N=1084) and information from the Nationwide Inpatient Sample (NIS) and the Duke University Medical Center [http://www.ahcpr. gov/clinic/epcsums/utersumm.htm].[6] The reviewers evaluated the ability of existing evidence to inform clinical practice. Their results yielded only 18 findings based on solid research [less than two percent!]. The review concluded:

> There was a remarkable lack of high quality evidence supporting the effectiveness of most interventions for symptomatic fibroids. Lack of evidence is not equivalent to evidence of no benefit or of harm. It is possible that some of these interventions are effective in at least some patients. However, the current state of the literature does not permit definitive conclusions about benefit or harm.[7]

Empirical evidence is only one of several factors that practitioners use in making clinical decisions. Among the other factors influencing treatment decisions are the clinician's experiential evidence and values, the patient's values and preferences, physiological factors and features of the health-care system.[8]

Comment: The research base in AAC has grown over the past 20 years, but is still severely limited quantitatively when compared to other practice areas. Also, an important factor in EBP is the quality of the research. EBM, for example, has adopted various hierarchies to judge the strength of existing evidence to determine the "best evidence," so that more weight is given to large, randomized, double blind clinical trials than other research designs. However, Tonelli writes that the "best" evidence for influencing the clinical decision-making process for a particular patient cannot be predetermined and will vary from case to case. As a result, he cautions that EB hierarchies are misleading.[9]

Figure 1. Supporting EBP in Health Care

The Agency for Healthcare Research and Quality (AHRQ) has established twelve EBP Centers in the United States and Canada. The goal is to facilitate the translation of evidence-based research findings into clinical practice. The Centers develop evidence reports and technology assessments on clinical topics. Topics are selected based on their being "common, expensive, and/or significant for the Medicare and Medicaid populations." To see the topics reviewed, go to http://www.ahcpr.gov/clinic/epcix.htm

The goal of AAC interventions is to improve the ability of people to communicate in their natural environments. Thus, AAC outcomes are not typically physiological or easy to quantify. AAC outcomes are linguistic, social and psychological and therefore difficult to measure.

AAC researchers increasingly include individuals who rely on AAC and their primary communication partners as active participants in all phases of the research process. Thus, our model of EBP must find ways to value this important component of AAC research.

Also, the population of individuals who benefit from AAC interventions is diverse (children/adults; people with acquired/degenerative/developmental disabilities; young/old and so on). This makes it impossible for researchers to study intervention effects for large groups of people.

Let's face it. AAC practices are "messy." As Roger Smith, director of the ATOMS Project (Assistive Technology Outcomes Measurement) suggests:

> When clinical areas are "messy" because of the diversity of the clinical population and the multitude of variables that affect treatment over time, clinicians are more likely to continue to be dependent upon human judgment rather than pure science.[10]

AAC clinicians no doubt need to incorporate empirical evidence to a greater extent in the clinical decisions they make on a daily basis. But, what is needed most immediately in AAC are researchers who work hard to provide evidence that clinicians and AAC consumers value, and practitioners who work hard to incorporate that evidence in their daily clinical practices.

2. *Timely access to the evidence*. No physician (or any other practitioner) has the time or the capacity, between patient visits, to search the literature or evaluate the evidence that exists as it applies to individual patients. Every practition-er, however, is responsible for reading peer-reviewed journals that pertain to their area of practice. Physicians can readily access databases that provide reviews of existing evidence and EB practice guidelines. These resources are crucial to the busy practitioner who wants to locate and interpret empirical data.

Comment: AAC practitioners do not yet have access to databases that search multiple journals to find AAC or AT related empirical research. However, speech-language pathology, occupational therapy and other areas are rushing to develop EBP guidelines to support practicing clinicians. For example, the

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Academy of Neurologic Communication Disorders and Science (ANCDS) and ASHA have set up writing committees to develop and publish EBP guidelines for the management of communication disorders associated with neurological conditions. Each writing committee examines research that supports procedures used to treat specific communication disorders in neurologically impaired individuals. Then they draft "guidelines" based on research evidence, which are reviewed by experts before being disseminated. [See *On the Web*.] The writing committees also delineate areas in which additional research is needed.

3. *Providers with the knowledge and skills to evaluate existing evidence.* Many medical schools teach students to evaluate existing evidence according to EBP guidelines. Already the trend has spread to some graduate programs in health care and education.

Comment: We asked SLPs who subscribe to the ASHA Special Interest Division on AAC (SID-12) list serv about training they had received in EBP and their level of comfort implementing an EBP. Speech-language pathologists who responded said they had limited information about EBP in AAC. [See *ACN Survey]*

Are we ready for EBP?

All clinicians must accept and live with a great deal of uncertainty. This is particularly true in areas like AAC, where patient populations are diverse, outcomes are dependent upon a multitude of variables and resources are very limited. However, understanding the principles and practices inherent in EBP can help AAC practitioners deliver higher quality services. An EB practitioner in AAC has confidence in his clinical instincts and decision-making capabilities and always collaborates with families and augmented communicators when making clinical decisions. In addition, he has learned concepts and methodologies used by other EB practitioners and begun to apply these to his practice in AAC. The EB practitioner is less of a "believer." She questions the experts and is skeptical of unsubstantiated information about AAC devices, intervention approaches and outcomes. She is wary of marketing. She tries to answer clinical questions using empirical evidence as well as experiential and authoritative evidence. EB practitioners know how to search for and find EBP guidelines and are learning how to evaluate the strength of the evidence they read in journals each month.

AAC practitioners and researchers may need to be proactive in preparing to deal with outside entities, who may not understand the nature of the work being done, but may impose standards of EBM on us. Once again, we must knuckle down and work together. It's time for AAC researchers to conduct more and better research that informs daily clinical practices; and it's time for AAC practitioners to ground their clinical practices more concretely in the high quality research that does exist in our field.

On the Web

EBP websites

Websites with information about *evidence-based practice* (EBP) are numerous, but only a few mention the area of AAC. Take a look at these and learn more about key aspects of EBP.

www.ancds.duq.edu/. The Academy of Neurologic Communication Disorders and Science (ANCDS) posts EBP guidelines in areas related to neurologically-based communication disorders *(e.g.*, management of velopharyngeal function.) They have completed seven EBP guidelines (*e.g.,* laryngeal paralysis) and are working on others for the dysarthrias, apraxia of speech, TBI related communication impairments, dementia and aphasia. Writing teams prepare the EBP guidelines, which are based on exhaustive reviews of empirical research, and then peer-reviewed by experts.

www.latrobe.edu.au/hcs/research/evidencebased.html The Australian Centre for EBP in Speech Pathology describes EBP, what is evidence, ways to become an EB practitioner, examples of EBP in speech-language pathology, levels of evidence, where to look for evidence, barriers to EBP in speech-language pathology and more. It includes a list of articles, including seven articles that discuss issues related to EBP in AAC.

www-fhs.mcmaster.ca/rehab/ebp The McMaster Occupational Therapy EBP group in Canada focuses on critical reviews of research evidence with regard to the effectiveness of occupational therapy interventions. The protocols that critically review quantitative and qualitative research articles are interesting and helpful.

www.aacinstitute.com This site, located at Edinboro University in Pennsylvania, provides a section on EBP in AAC. The evidence is categorized by level and type based on an evidence classification system developed by the American Academy for Cerebral Palsy and Developmental Medicine. The focus so far is on quantitative performance measurement of communication generated using commercially available systems. Many articles listed are conference presentations, rather than peer-reviewed journal articles.

www.cebm.utoronto.ca The Centre for Evidence-Based Medicine website is designed to help develop, disseminate and evaluate resources for use in practice, and to teach EBM to undergraduates, postgraduates and health-care professionals from a variety of clinical disciplines. The site also serves as a support for the book, *Evidence-based Medicine: How to practice and teach EBM.*[11]

www.cche.net/usersguides/main.asp Maintained by the Centres for Health Evidence, the *Users' Guides to Evidence-Based Practice* promotes the teaching of EB health care in clinical practice environments. The Universities of Alberta and Manitoba are among those supporting the site.

www.york.ac.uk/inst/crd/welcome.htm The *University of York NHS Centre for Reviews and Dissemination (CRD)* in the UK promotes the use of research-based knowledge. It undertakes and commissions credible, rigorous reviews of research effectiveness in health care. CRD houses the *Database of Abstracts of Reviews of Effectiveness (DARE)*, which identifies quality reviews and offers useful search strategies to help practitioners find reviews and meta-analyses in MEDLINE. However, when one searches for "augmentative and alternative communication," only one entry is identified (http://nhscrd.york. ac.uk/online/dare/20008778.htm) because DARE does not index many journals that publish AAC research results.

infopoems.com/authors/index.cfm Each month the editors of this site review 100 journals and identify (1) all the POEMs (Patient-Oriented Evidence that Matters); (2) the important POEs (Patient-Oriented Evidence— articles that may not change clinical practice, but provide solid evidence to confirm an important existing practice); and (3) the dangerous DOEs (Disease-Oriented Evidence—articles that use intermediate outcomes and shouldn't change practice yet). The information is disseminated daily and monthly to family-oriented practitioners (for a price).

POEMs have to meet these three criteria: (1) address a question physicians face; (2) measure outcomes that physicians and patients care about; and (3) have the potential to change the way physicians practice. The site also offers criteria for evaluating research articles.

www.mdx.ac.uk/www/rctsh/ebp/main.htm is a site developed at Middlesex University in London called *Teaching/Learning Resources for EBP* and is a useful tutorial for learning how to (1) ask EBP questions; (2) find evidence; (3) critically appraise research; and (4) access references and links to other EBP sites.

ACN Survey

ASHA SID-12 survey on EBP with Ralf Schlosser

In April 2002 we distributed a survey to the ASHA Special Interest Division in AAC SID-12 list serv. The purpose was to get a better idea about how the paradigm of evidence-based practice (EBP) is perceived by speech-language pathologists who work in the area of AAC. We asked respondents to answer five questions about the use of EBP in AAC.

Identifying information

The survey yielded a total of 36 respondents [Note: 294 persons subscribe to the SID-12 list serv.] Thirty-four (34) were speech-language pathologists (SLPs) Of those, 26 identified themselves as clinicians. We also received completed surveys from 5 teachers/professors, 2 administrators, a Ph.D. student and an AAC manufacturer.

In summarizing the results, we cite raw data and, from time to time, highlight the responses of clinicians (N=26) as a group. However, no group really had a sufficient number of responses to be considered representative.

The 26 clinicians reported working for a mean of 18.5 years (range of 4 to 35 years). Teachers, administrators and others reported working for a mean of 22 years (range of 12 to 32 years).

Questions about EBP

The survey included five questions, as described below.

ACN survey question #1. *How well do you think you understand what EBP is?* Table 1 displays the data. Overall, only 5 (14%) of the respondents said they understood

Table I. How wll do you understand EBP? N=35

	Clinicians	Teachers/ Professors	Administrators	Other
Very Well	2	2		1
Fairly Well	10	3	1	1
So So	9		1	
Not very well	4			
Don't understand it	1			
Total	26	5	2	2

EBP *very well*. Nearly half (16) (44%) indicated they understood EBP *fairly well.* Ten (28%) rated their understanding as *"so so*." The remaining 5 individuals (14%) indicated they *did not understand EBP very well* or *at all*. Of the 26 individuals who reported their prime responsibilities as clinical, 12 said they understood EBP *very well* or *fairly well* and 14 (54%) said they

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felt *so so, not well informed or didn't understand* EBP.

Comment: A majority of the clinicians who responded did not feel particularly well-informed about EBP. Given that EBP is a way of conducting a clinical practice, AAC service providers could benefit from additional information and training in EBP. In addition, an ongoing dialogue between AAC clinicians and researchers might help to: (1) identify the nature of the current evidence in AAC and assistive technology and (2) prioritize areas in which more clinical evidence is needed.

Table II. Have you taken any couses/workshops? N=33

	Clinicians	Teachers/ Professors	Administrators	Other
YES*	5	2	1	1
NO	21	1	1	1
TOTAL	26	3	2	2

*Presentations (8); Course at university (3); Other (3); Workshop (2).

Question #2. *Have you taken any courses/workshops to learn how to implement an EBP?* As depicted in Table II, 9 (27%) of the 33 who responded to this question indicated they had received training in EBP. Only 5 clinicians (12%) had attended a conference presentation, workshop and/or a course. Other sources respondents relied on were the Internet and "experts."

Comment: These data suggest that (1) most AAC professionals who responded had minimal, if any, preservice or continuing education training in EBP, and (2) the types of training available are limited. Attending a conference or workshop may increase awareness of issues in EBP, but is unlikely to enable a clinician to implement an EBP.

Question #3. *Do SLPs have access to sufficient research evidence to use EBP approaches in their AAC clinical practices?* According to the raw data shown in Table III, only 6 (16%) of those surveyed believe that SLPs have access to sufficient evidence in AAC to support an EBP. Even so, respondents listed 16 areas in which they felt sufficient research does exist in AAC.

- Use of Picture Exchange Communication Strategies (PECS) to teach picture/symbol discrimination and increase functional communication abilities.
- Use of the Participation Model as an assessment framework.
- Strategies for building nonsymbolic functional communication.
- Incidental teaching techniques.
- Strategies for selecting vocabulary.
- Use of aided language stimulation.
- The relationship between AAC systems and enhancing, rather than inhibiting, speech production.
- Use of nondirective vs. directive teaching strategies in AAC interventions.
- Benefits of visual supports for people with pervasive developmental disorder/autism/Asperger's Syndrome.
- Benefits of AAC for expressive communication.
- Applications of AAC to challenging behaviors.
- Use of low-tech approaches in early intervention and to support emergent literacy.
- Use of AAC with people who have severe aphasia.
- Use of AAC approaches in young children with developmental apraxia of speech.
- Use of AAC with individuals who have amyotrophic lateral sclerosis (ALS).
- Use of AAC with individuals with traumatic brain injury.

Table III. Having a sufficient research base for EBP N=35

	Clinicians	Teachers/ Professors	Administrators	Other
YES	3	2		1
NO	14	3	2	1
I don't know	8			1
Total	25	5	2	3

Comment: Although respondents felt sufficient evidence exists in these areas, closer examination reveals that empirical evidence is really insufficient to support the technique or approach, and that the evidence relied on is often experiential. For example, there is little research to support using specific strategies for selecting vocabulary, the use of nondirective vs. directive teaching approaches in AAC, incidental teaching techniques in AAC or even the benefits of AAC for expressive communication. Only one study has evaluated the use of the Participation Model assessment framework, even though it is widely used and accepted.[12] We know of no studies that compare the presence or absence of augmented input/aided language stimulation, a strategy that is also widely used and accepted. The evidence for using specific AAC intervention approaches with individuals with amyotrophic lateral sclerosis, traumatic brain injury, cerebral palsy and aphasia is still largely descriptive and correlational. Obviously, a limited evidence does not mean the strategy or approach is lacking in any way. Rather, it means that, to date, researchers have not sought evidence that can substantiate the use of the approach with specific groups of individuals.

Respondents may report more evidence than exists because it appears they are relying on experiential rather than empirical evi-

dence. Widespread exposure over years may appear to constitute strong empirical evidence, even when this is not the case.

Finding evidence that supports clinical practice in AAC is challenging because AAC interventions cut across a number of population areas and intervention strategies, some of which are not even identified as AAC interventions in the literature (*e.g.*, simultaneous communication, photo books used with individuals with aphasia and so on.) Current empirical evidence in AAC supports (1) the use of AAC to mediate challenging behaviors, (2) the role of iconicity for symbol learning and (3) the attitudes and preferences regarding speech synthesis in AAC devices.[13,14,15]

Question #4. *List two questions that you wish AAC researchers would address to help clinicians in their day-to-day clinical work.* A total of 66 questions were submitted by 36 respondents. Of those, the 26 clinicians submitted 50 questions. Table IV provides a glimpse of the flavor of the clinical questions respondents asked, which we grouped loosely into ten categories, as described below.

1. Determining which technologies to use. Clinicians raised 4 questions about clinical decision-making for AAC devices and low-tech as applied to specific age groups and populations.

2. Selecting assessment instruments. One clinician wanted to know how to assess education and daily function for individuals with autism.

3. Predicting the impact of AAC approaches on speech, language and literacy development in children. Many clinicians were interested in knowing more about the impact of AAC approaches (low-tech, no-tech and high-tech) on the development of speech, language and literacy in young children. Other questions addressed the nature of the syntactical development of children who rely on pictographic symbols and how it differs from that of speaking children. Finally, clinicians want research on how (1) preprogrammed sentences versus (2) word-by-word construction of sentences affect the language development of children.

Table IV. Questions raised by AAC clinicians

1. Determining which techologies to use	Children: Which methods can be used to determine which low tech and/or high tech communication technologies are appropriate for children who are nonspeaking?
	Aphasia: What is the best way to decide whether high tech or low tech AAC technologies will be most successful with aphasic individuals?
	Traumatic brain injury (TBI): When prescribing equipment for adults with TBI, should current or anticipated function dictate equipment decisions?
	How can clinicians determine which device is best for a client?
2. Determining which assessments tools to use	Pervasive developmental disabilities/autism: Which evaluation tools provide the best picture of educational and functional skills for children with PDD or autism?
3. Impact of AAC approaches on speech, language and literacy	What are the speech and language outcomes of using AAC at an early age with different populations?
	What is the best way to help parents understand that AAC intervention does not mean the SLP is "giving up" on speech?
	How does an AAC device introduced at an early age influence a child's rate of language acquisition?
	What early, pre-literacy experiences predict future literacy (reading and writing) skills in children at risk for severe speech and language delays?
	Do nonspeaking children who use picture symbols learn to comibne them in the same linguistic patterns as typical children do using spoken words?
	What criteria help predict if/when individuals will generate grammatically correct sentences from individual words/pictures?
	What criteria help predict if/when individuals will be more successful with a system that requires the child/person to construct messages from single words/symbols or to use prestored sentences?
	What is the best way to introduce graphic symbols to support the language development of individuals with severe communication impairments?
	What methods are most effective in teaching children with PDD or autism to read?
	What vocabulary should be included on AAC systems for a young child?

4. *Determining outcomes and practice guidelines*. Respondents asked 7 questions about the outcomes of using AAC devices, low-tech approaches and intervention strategies with specific populations, particularly adults with developmental disabilities. They also asked for practice guidelines in specific areas.

5. *Selecting intervention strategies and methods*. Respondents had questions about the effectiveness of intervention strategies for people with aphasia, developmental disabilities and autism. They also wanted to know how to introduce AAC devices and low-tech approaches to clients.

6. *Adjusting AAC systems as ALS progresses*. Three questions related specifically to individuals with amyotrophic lateral sclerosis and their management over time.

7. *Selecting activities and environments*. Two questions related to specific environments, and/or

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activities, including the cost/benefit ratio of students with autism enrolled in regular classrooms.

8. *Selecting intervention strategies to train partners*. Respondents had 4 questions about how to train support staff, significant others, AAC teams and other communication partners.

9. *Selecting and organizing symbols and vocabulary*. The largest number of questions involved issues related to representing and organizing vocabulary on AAC devices and low-tech systems with specific populations. [Note: New evidence is summarized in the *AAC-RERC* article.]

10. *Maximizing efficiency of communication.* Respondents also had questions about how to maximize the efficiency of communication, including how best to store and retrieve language.

Table IV. Questions raised by AAC clinicians (continued)

4. Determining outcomes and practice guidelines	Young children: What are guidelines for using voice output devices (of some complexity) with the 0-3 population?	**7. Selecting activities and environments**	What expectations shouild exist for children with PDD or autism in "regular education" placements? What are the benefits? the sacrifices?
	What is a realistic number of SLP sessions for training various language encoding systems (*e.g.* spelling, word prediction, iconic encoding?)		How do you decide what type of functional activities to use with a student with multiple disabilities in AAC intervention?
	When do high-end VOCA's vs. low -tech systems vs. low -end VOCAs meet an individual's communication needs?	**8. Selecting intervention strategies to train partners**	Support staff: What is the best way to get staff to follow through with AAC recommendations for a client?
	What are the long-term communication outcomes for specific populations who use AAC devices? Under specific circumstances?		Significant others: How can you involve primary partners in the communication device/program being recommended?
	How are low-tech modes and VOCAs used over time (% of the time used, in which situations, with which partners, for which communicative functions)?		General: What methods are most effective for training communication partners to recognize an individual's nonsymbolic communication behaviors, to respond appropriately to communicative intents and to provide communication opportunities?
	Adults with Developmental disabilities: What factors contribute to use and non-use of AAC systems among adults with DD?		Team: How can SLPs collaborate most effectively with classroom teachers, parents, and other team members to enhance the likelihood that an AAC system will be accepted and used effectively by a nonspeaking individual?
	Adults with DD: How can carryover/use of an AAC system be maximized with adults with developmental disabilities and mental retardation?	**9. Selecting and organizing symbols and vocabulary**	General: What is the best way to introduce graphic symbols to a potential AAC user in ways that help him/her develop/relearn language?
5. Selecting intervention strategies and methods	Aphasia: Which techniques provide the best communication outcomes for people with aphasia?		Young children: What vocabulary should you include on an AAC system for a young child?
	Aphasia: What is the best way to teach indivdiuals with aphasia to use icons for communication?		Visual impairment: What symbols are effective for use on communication systems for children with visual impairment?
	Early communicators: What are effective strategies for transitioning nonsymbolic communicators into symbolic communication?		Adults: What categories, phrases, topics are most critical to include on AAC systems for cognitively intact adults?
	DD adults with cognitive impairments: How can we maximize carryover/use of an AAC system? What factors contibute to use and nonuse of systems?		Adults: What core vocabulary should be used with adults with severe dysarthria and adequate fine motor skills?
	How should clinicians introduce (a) high -tech, (b) really high -tech or (c) low-tech AAC systems?		General: What graphic symbol sets and AAC methods/techniques are most appropriate at different cognitive/linguistic levels?
	Autsim: Which intervention techniques enable people with autism to generate novel messages and achieve successful outcomes using communication books and/or voice-output devices (*e.g.,* using a most to least prompting hierarchy, ABA, drill tasks, modeling/imitation, *etc*)?		School age: What questions, phrases or statements should be programmed on a student's AAC device to increase daily participation in the classroom with peers and teachers?
	School age: What methods are most effective and efficient in insuring augmented communicators participate in school settings?		Young children: What is the best way to organize symbols on a device *(e.g.,* by language category or by activity) for a young child just beginning to use an AAC system?
6. Adjusting AAC systems as ALS progresses	What percentage of patients with ALS no longer can use movement to activate a communication device at later stages of the disease?	**10. Maximizing efficiency of communication**	What is the best way to enhance the conversational rate for a person who uses AAC devices?
	What is the most efficient and cost effective AAC system for ALS patients to use as the disease progresses?		What "patterns of use" yield the most effective/efficient communication?
	What is the best way to reevaluate access needs for patients with ALS as the disease progresses?		What are the best ways to organize and store vocabulary to enhance efficient retrieval?
			What techniques can realistically and effectively increase the communication speed of people who access language using single switch scanning, and does this result in AAC users being successful in ininclusive and least restrictive education environments?

Question #5. *When you look for evidence, what sources do you consult most often?* The 35 who responded said they depended on many sources for evidence:

AAC Journal: 22 (61%)

Conference Presentations: 19 (53%)

Colleagues: 16 (44%)

Textbooks: 14 (39%) (Beukelman & Mirenda; Glennon & DeCoste; Lloyd)

Workshops: 13 (36%)

Other Journals 12 (33%) *(AJSLP, CEC Journal, JSHR*)

Expert contacts: 11 (31%)

Newsletters: 9 (25%) (*ACN, ISAAC Bulletin, Speak Up!, Closing the Gap, ASHA SID-12* newsletter)

Other: Experience (3); ASHA List Serv (2); ASHA materials (2); Web (2), Consumers (2)

Comment: All respondents use multiple sources. A majority look to the *AAC Journal,* which is peer-reviewed. Half rely on conference presentations. More than a third rely on evidence from colleagues, textbooks, workshops, and other journals. A quarter or more depend upon experts, newsletters and other sources.

Summary

Survey results suggest that respondents are interested in EBP and would seemingly benefit if they had more access to information about EBP.

The evidence: Organizing language in AAC technologies for young children

Important pieces of evidence are missing about (1) whether young children can learn current AAC technologies and (2) what their rate of learning is at various developmental levels. This article highlights AAC-RERC research underway at Pennsylvania State University.

Drs. Janice Light and Kathryn Drager have conducted four studies to investigate the learning demands of the layouts and organization of language concepts in AAC technologies with respect to young children. The studies involved typically developing children ages 2;5 (two years, 5 months) to 5;11, and sought to obtain developmental data on the learning demands of different systems. Children who participated met the following criteria: (a) hearing and vision within normal limits; (b) no known speech, language, hearing or other disabilities; (c) English as a first language; (d) comprehended all probes in the learning conditions. The sample included children from diverse cultural and linguistic backgrounds.

Study 1 involved 30 children ages 2;5-2;11.

Study 2 involved 40 children ages 3;1-3;11.

Study 3 involved 40 children ages 4;1-4;11 and 40 children ages 5;1-5;11.

Study 4 involved 20 children ages 4;1-5;11.

Studies 1,2 and 3

These studies investigated the learning demands for children ages 2 years, 3 years and 4 to 5;11 years of age. The organizational approaches varied across studies, depending on the ages of the children. The three studies looked at different combinations of systems and issues.

2 year olds. This study investigated the learning of a taxonomic grid (TG), schematic grid (SG) and schematic scene (SS) organization by two year olds.

3 year olds. This study involved the learning of a TG with a traditional menu page (one symbol used to represent each page), SG with a traditional menu page, SG with screen shots of pages used to represent each page for the menu page, and SS with screen shots of pages for menu page with three year olds.

4 and 5 year olds. This study investigated the learning of TG, SG, SS and iconic encoding (Minspeak-based system) without prediction with four and five year olds. It also included a follow-up study to investigate iconic encoding with, and without, prediction.

The layouts and organization of language concepts employed in the AAC technologies are described below:

Taxonomic grid (TG). Vocabulary grouped in categories such as people, actions, places.

Schematic grid (SG). Vocabulary grouped in events such as snack time, circle time.

Schematic scene (SS): Vocabulary presented in an integrated scene organized schematically.

Iconic encoding (IE): Vocabulary organized and presented through iconic encoding (*i.e.* Minspeak) with or without icon prediction.

In all the studies, the children were introduced to 12 to 30 (depending on age) target vocabulary items in a series of four learning sessions. Each session was structured around a play context involving a birthday party for a teddy bear (Bobby) who could not talk and used an AAC system to communicate. In each session, children were presented with a play situation and asked to help the teddy bear locate target vocabulary on the AAC system (*e.g.*, Bobby wants to call his Mommy. Find "Mommy.") Feedback was provided for all incorrect selections during the learning sessions. Data were collected on the accuracy of the children's responses. After three learning sessions, the children participated in a generalization session in which 12 to 30 novel words were introduced and the children were asked to locate these target concepts in the context of a play scenario.

Results

Two-year-old children performed with low levels of accuracy on the TG, SG and SS organizations. Children were more accurate after 4 sessions using the schematic scene layout (average 4.1 correct answers out of 12) than either

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the taxonomic grid layout (average 1.6 correct answers) or the schematic grid layout (average 1.7 correct answers). While they learned more concrete than abstract vocabulary across all systems, these children made only slight average gains in vocabulary items correctly located. There was no evidence of generalization of system organization to novel vocabulary. This finding suggests very slow rates of learning over time. Results suggest that all three of these AAC systems impose onerous learning demands for typically developing 2-year-old children.

Three-year-old children also performed with low levels of accuracy on all systems, although they were more accurate than the 2 year olds. Averages were 5.7, 7.6, 8.9 items correct out of 18 for the (a) schematic grid with traditional menu page, (b) schematic grid with screen shots menu page and (c) schematic scene conditions respectively. The average gains from session 1 to 4 were 3.4, 5.5, and 7.0 items. Children learned more concrete than abstract vocabulary across all systems and sessions. While there was some evidence of generalization to new items, gains were minimal. The children performed best using schematic scenes, but differences were not statistically significant.

4-year-old and 5-year-old children were more accurate locating target vocabulary in the TG, SG, SS conditions than the iconic encoding (IE) technique. These differences were statistically significant. The children more accurately learned concrete than abstract vocabulary. However, the advantage for concrete vocabulary was less pronounced in the iconic encoding technique. The four- and five-year-old children were better able to generalize knowledge of system organization to facilitate learning of novel vocabulary. However, their performance in the generalization sessions exceeded that in the initial learning session only an average of 0.3 - 4.2 items across the systems.

In a follow-up study to investigate the effect of icon prediction on learning, five-year-old children performed with low levels of accuracy using IE with and without icon prediction. Performance was better with icon prediction than without, but this was not statistically significant.

Study 4

Results of studies 1, 2 and 3 suggest that young, typically developing children have significant difficulty learning the layouts and organizations of current AAC technologies. Thus, Drs. Karen Fallon and Janice Light conducted a study to investigate how young children would organize language concepts themselves. Specifically, researchers asked 20 children (ages 4 and 5) to organize 42 pictures, which depicted various familiar vocabulary items, including nouns, verbs, descriptors, prepositions, pronouns and question words. During and after the sorting task, researchers asked the children to talk about the rationales for their arrangements.

Results

Most of the children showed some evidence of purposeful organization of the graphic symbols and organized AAC symbols in pairs or small groups. No child used "page level" organizations. This is in contrast to current AAC technologies that typically employ page level organizations. A majority of the organizations used by the children were schematic (*i.e.*, grouped items according to a familiar event schema (such as circle time at school). Only a small percentage used taxonomic groupings (such as people, places).

Summary

With regard to the daily clinical practices of AAC practitioners, these studies suggest the following:

1. Current approaches to the organization of language in AAC systems are difficult for young children to learn. They impose a significant cost of learning. Clinicians should be mindful of the findings with regard to young children, as well as consider the possible difficulties older individuals with language skills at these developmental levels might face.

2. Two and three year olds demonstrated slow rates of learning and demonstrated limited, if any, evidence of generalization to new vocabulary, suggesting that rates of learning may not increase significantly over time.

4. Two-year-olds seemed to perform more accurately when language concepts were embedded in integrated scenes than when concepts were organized in traditional grid layouts.

5. Children seem to perform best with schematic organizations that group concepts together based on event schema. Clinicians should consider using these organizations when working with young children.

6. Children do not use "page level" organizations themselves; rather, they group symbols in pairs or small groups. Clinicians who are teaching AAC systems to young children may need to develop instructional strategies to bridge the children from small groups of symbols to larger groupings.

While limitations to these studies exist, the results are important in many ways. It is critical that we realize that typically developing children with language skills between 2;5 and 5:11 have difficulty learning to use AAC devices as they are configured today. Thus, AAC practitioners may wish to be far more cautious about the expectations they place on young children, as well as on individuals with limited language skills, when introducing AAC devices.

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[The AAC-RERC section is partially funded by the National Institute on Disability and Rehabilitation Research of the Department of Education under grant number H133E9 0026. The opinions are those of the grantee and do not necessarily reflect those of the U.S. Department of Education. This article was published June, 1999.]

University & Research

EBP: An illustration

By Ralf Schlosser

Drs. Ralf Schlosser and Pammi Raghavendra describe the steps involved in implementing evidence based practice in AAC as follows: (1) ask an answerable question, (2) select evidence sources and execute a search strategy, (3) examine the evidence, (4) apply the evidence, (5) evaluate the application of the evidence and (6) disseminate the findings.[16] The following example illustrates this complex process as it applies to AAC intervention and the development of natural speech.[17]

Steps in implementing EBP

1. Ask an answerable question.

The first step is to decide what you need to know to provide effective intervention and formulate questions that are stated in a way that allows them to be answered. Then, determine if the research evidence exists to answer the question(s). If so, proceed to the next step. If not (and this is apt to be the case in many areas of AAC), the clinician will rely on traditional types of evidence without the added benefit of empirical data, such as clinical experience, authoritative sources like textbooks, conference presentations and non peer-reviewed literature. A typical scenario follows:

> Charlie is a 4-year-old child with severe intellectual disability secondary to Down syndrome. He is unable to meet his daily communication needs through natural speech. However, he recently learned to imitate sounds such as /mama/, /dada/, /kwak/ 'kwak/ and /bae/ bae/. To date, he does not use these sounds as words to communicate. Charlie's family and the staff at his early intervention program anticipate many of his needs and are good at reading his pre-symbolic behaviors. He relies on pointing and gesturing to communicate.

Charlie's parents hope he is just a "late talker" and that he will eventually speak. Until recently, they were not interested in exploring augmentative forms of communication because they had serious concerns about the impact of AAC techniques on Charlie's potential for learning to speak. His parents want to know, "Will the use of AAC modes hinder or benefit Charlie's natural speech development?" Their current goals for Charlie are that he (1) improves his speech and (2) becomes a better communicator through whatever means are appropriate.

The short question relating to this clinical scenario is, *"Will the use of AAC modes hinder or benefit Charlie's natural speech development?"* The longer scenario contains the essential components of an answerable question because the scenario:

> (1) describes the client and his capabilities relevant to the clinical question—a four-year-old child with severe intellectual disabilities who is currently communicating through presymbolic means;
>
> (2) explains Charlie's current and future environment and relevant other stakeholders—early/intervention program/home and service providers/ parents;
>
> (3) makes explicit the clinical or educational problem—parent's fear that the introduction of an AAC system will hinder his natural speech development; and
>
> (4) defines the desired clinical/ educational outcomes—AAC intervention will result in Charlie becoming a better communicator, while improving his speech.

2. Select evidence sources and execute a search strategy.

EB practitioners routinely read the pertinent literature and look for evidence that appears in peer-reviewed journals, particularly articles that synthesize research. A first step is to engage in database searches to find narrative reviews and meta-analysis articles. These provide more information on which to base conclusions than do individual articles. The EB practitioner can search electronic databases using keywords, such as *augmentative communication, alternative communication*, combined with the keywords *review, synthesis or meta-analysis*. For our example, a keyword search on ERIC, PsycINFO and Medline will yield several reviews, although none address natural speech development as an outcome variable. If no review articles are found, the EB practitioner searches for original research in order to take into account the results of empirical research in making informed clinical decisions.

Drs. Diane Millar, Janice Light and Ralf Schlosser conducted a meta-analysis of evidence addressing the clinical question highlighted in this article, which they presented at the 2000 Biennial Conference of the International Society of Augmentative and Alternative Communication (ISAAC) in Washington, D.C.[18] A meta-analysis is a summary and analysis of the research studies on a specific topic. Participants learned that existing evidence relates primarily to the use of manual signs, rather than to aided communication approaches. These authors are currently preparing their manuscript for publication.[19]

Review articles rarely cover all available research. Thus, an EB practitioner often will need to supplement the information. For example, an ERIC search of articles published since 1999 yielded three additional studies.[20,21,22] In these

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studies, all participants had a diagnosis of autism. Thus, no study found since 1999 was relevant to the clinical question being asked because individuals with autism and individuals with Down syndrome have different characteristics.[23,24]

3. *Examine the evidence*

After amassing evidence on AAC and natural speech development, the EB practitioner examines *both* the quality *and* quantity of evidence that exists. Because of Charlie's diagnosis, the EB practitioner is particularly interested in studies that include participants with intellectual disabilities. Using a "best evidence" model, greater weight is given to studies that are strong methodologically. For example, only four of the studies reviewed by Millar *et. al*. that involved individuals with intellectual disabilities provided "preponderant" evidence or "suggestive" evidence. See Figure 2. The remaining studies had problems methodologically, so no conclusions could be drawn about the speech outcomes and their relationship to AAC intervention.

The Millar *et. al.* meta-analysis was completed on a total of seven participants.[25,26,27,28] These studies all focused on the use of manual signs. Table V summarizes: (1) the purpose of each study, (2) the age of participants involved in the intervention, (3) the type of research designs employed, (4) the quantitative outcomes, (5) the speech gains, and includes (6) a critical appraisal of the evidence.

The purpose of all the studies was to determine the effects of simultaneous communication on speech and sign production. Participants ranged in age from 2 to 13 years. Two strong research designs were employed. The outcomes

Figure 2. Levels of Evidence[13]

Conclusive level of evidence: Natural speech outcomes were undoubtedly the result of the AAC intervention

Preponderant level of evidence: Natural speech outcomes were more likely to have occurred as a result of the AAC intervention than not.

Suggestive level of evidence: With AAC intervention, positive natural speech outcomes are plausible.

Inconclusive levels of evidence: Evidence is inconclusive that AAC intervention affects natural speech.

column shows the Percentage of Nonoverlapping Data (PND) measure. This measure enables reviewers to synthesize effect sizes within and across studies.

> A high percentage of overlapping data suggests that the individual's performance during/after the intervention was "better" than baseline most of the time. Low levels of PND indicate the individual's performance during/after the intervention was only better than baseline in a few sessions, suggesting that the intervention was not very effective.
>
> For example, if the PND is only 11%, then the individual showed an increase in speech production in only 11% of the sessions conducted during or after intervention. In 89% of the sessions, the person's performance was no better than baseline levels, suggesting that speech production did not increase consistently as a result of the AAC intervention. If, on the other hand, the PND is 100% of the sessions conducted during or after intervention, then the data suggest the AAC intervention did result in increases in speech production.

It is important to note that PND does not tell the clinician how small or how great the increases in speech production were. Separate analyses are required to determine this.

Millar *et al*. found that, for the most part, speech gains were minimal. Gains for participants ranged from one to five words, with the exception of one participant in the Kouri study who gained 36 words during treatment #2. The Clarke *et al.* study reported speech gains not in terms of the number of words, but rather in terms of the percent of words.

The EB practitioner needs to engage in a critical appraisal of the quantitative results to be sure the research is high quality. This includes ensuring that (1) the design is appropriate; (2) the procedures were followed correctly; (3) the measurements are reliable, and so on. In cases where the quality is not high, the results may be inaccurate.

In summary, the Millar *et al.* meta-analysis suggested that: (1) AAC interventions (use of manual signs) do not hinder natural speech development; (2) with AAC intervention, positive natural speech outcomes are plausible; (3) AAC interventions studied are limited to those using manual signs; (4) gains in natural speech were relatively modest, but need to be viewed within the context of how many words the learner spoke prior to the intervention; and (5) observed gains in natural speech development were not within functional communication situations.

Interventions involving aided communication. In anticipation of the next step (*i.e.*, applying the evidence), the EB practitioner might wish to explore whether research exists that examines the effects of low-tech aids and AAC devices on natural speech development with people who have intellectual disabilities. Drs. Mary Ann Romski and Rose Sevcik conducted a two-year longitudinal study and reported improvements in natural speech intelligibility in 13 youth with moderate to severe intellectual disabilities (two participants also had a diagnosis of autism) as a result of a treatment package known as the System for Augmenting Language (SAL), which involved the use of a speech generating device.[29] Other studies have also considered interventions involving the relationship between aided AAC and natural speech production; however, all have methodological limitations so it is not possible to draw any conclusions.

Table V. Critical appraisal of selected AAC intervention studies and their effects on natural speech development[17,18]

Study	Purpose	Participant Age	Type of Design	Outcomes (PND)	Speech Gains	Levl of evidence[18]
Barrett & Sisson (1987)	To compare oral, simultaneous communication and modified simultaneous communication in terms of expressive speech and/or signing of sentence parts and sentences	J (5;3)	Adapted alternating treatments design (AATD)	T1a: 81 T1b: 33 T2a: 41 T2b: 58	+ 3 words + 2 words + 2 words + 1 word	Preponderant
		M (13)		T1a:65 T1b: 11 T2a: 78 T2b: 67	+ 1 word + 1 word + 1 word + 2 words	Preponderant
Kouri (1988)	To determine the effects of simultaneous communication on language behaviors	B. V. (2;10)	ABAB	T1: 71 T2: 94	+ 5 words + 36 words	Preponderant
Sisson & Barrett (1984)	To compare oral versus simultaneous communication in terms of vocal and/or signed sentence imitation	E (7)	AATD with multiple probe design	T1: 100 T2: 100 T3: 100	+ 4 words + 3 words + 2 words	Suggestive
		T (4;8)		T1: 100 T2: 97 T3: 100	+ 4 words + 3 words + 3 words	Suggestive
		M (8;1)		T1: 100 T2: 98 T3: 100	+ 4 words + 4 words + 4 words	Suggestive
Clarke, Remington & Light (1986)	To compare known with unknown words in terms of expressive signing, receptive speech and expressive speech	M. (6)	AATD	Not possible to calculate	+32% known words +42% unknown words	Suggestive

Other factors that may predict natural speech development. In examining the evidence, the EB practitioner will also consider that improvements in natural speech could be the result of other factors. Several researchers have hypothesized that the ability to imitate vocalizations may predict natural speech development in individuals involved in AAC interventions, information.[30,31,32,33,34] All the studies involved manual signing and reported post-hoc evidence that participants with good vocal imitation skills improved in natural speech whereas participants without vocal imitation skills did not.[30,31,32] Two studies involved the use of manual signs with five learners with severe intellectual disabilities between the ages of 5;5 and 9;9 years.[30] In one study, only two of four participants' speech improved during simultaneous communication. Both showed reliable vocal imitation skills during training. In the other study, the 12-year-old participant showed no changes in speech, consistent with his poor vocal imitation performance. Both studies were based on post-hoc evidence, which is considered speculative and has limited value for an EB practitioner.

A prospective study with a group design also supported the hypothesis; however, it involved individuals with autism, so the results may not generalize to children with Down syndrome and intellectual disabilities.[34] While data are very speculative at this point, they do suggest that vocal imitation skills contribute to natural speech development in learners with severe intellectual disabilities who receive simultaneous communication training.

4. *Apply the evidence*

After gathering and examining the evidence, an EB practitioner would share the findings with Charlie's parents and service providers in his early intervention program. For example, he might say:

> There is no evidence that the use of manual signs in any way hinders natural speech development. In fact, there *is* some evidence that suggests it is quite plausible that the use of manual signing may actually facilitate natural speech production. Unfortunately, we really don't know about the use of aided interventions at this point, because this question has not yet been researched.

In addition to sharing this information, the EB practitioner would present information about the goals of AAC interventions, which are to help compensate for the lack of functional speech and improve communication skills. The EB practitioner would assure the family that the intervention team would continue to encourage Charlie's natural speech, as well as investigate the use of manual signing, gestures, finger spelling, pointing, graphic symbols, speech generating devices, communication boards and computers. After presenting the evidence, the EB practitioner would listen and respond to any questions, concerns or comments Charlie's parents or service providers may have. Should the team decide to pursue AAC

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further with Charlie, the practitioner would recommend assessment of his skills and his current and future environments to determine the best strategies to achieve the desired outcomes.[15] Should the family decide not to pursue AAC intervention, the practitioner would respect their views.

5. *Evaluate the application of the evidence*

Effectiveness of an intervention cannot be assumed (even when all the evidence points toward a particular approach, which in this case it doesn't). An EB practitioner will collect and share data that address important questions. Since some clinicians have research training, and some researchers have strong clinical backgrounds, collaborations are not difficult to form.

6. *Disseminate the findings*

The last step involves the dissemination of findings. EB practitioners seek ways to share their experiences and outcomes so that other EB practitioners and AAC stakeholders can increase their knowledge base.

Editor's note

The *American Journal of Occupational Therapy* (AJOT) has an "Evidence-based Practice Forum" edited by Tickle-Degnen that is very informative. Over the past few years, articles in the EBP Forum have shown how occupational therapists can integrate research into practice and delineated the following steps: (1) Write down a clinical question; (2) Gather current published evidence to answer the question; (3) Evaluate the gathered evidence to determine what is the "best" evidence for answering the question; (4) Communicate with clients and colleagues about the evidence as decisions are being made during occupational therapy; and (5) Evaluate the chosen procedures as they are implemented with clients, revising and individualizing as appropriate.

See EBP Forum articles (1999-2002). Available from *AJOT*. Vol. 53-56.

In Review

In Press: Books on EBP

Two books that promise to help clarify issues relating to EBP in AAC are due out in early 2003.

1. *The Efficacy of Augmentative and Alternative communication: Toward Evidence-based Practice*. Ralf W. Schlosser, Ed., New York: Academic Press. This book will assist AAC professionals to engage in EBP. It aims to arm them with tools that will allow them to evaluate research evidence so they actually may find the answers they seek. Schlosser collaborates with Mary Ann Romski, Rose Sevcik, Jeff Higginbotham, Jeff Sigafoos, Jan Bedrosian, Doreen Blischak, Rajinder Koul, Mats Granlund, Cecilia Olson, Pammi Raghavendra, and Linda Lombardino. The book is a strong step toward EBP in the area of AAC and is arranged in three major sections:

First section. The foundations of EBP are laid. Chapter 1 tackles notions of efficacy and efficacy research and how they relate to outcomes, outcomes research and outcomes measurement. Chapter 2 proposes a framework for conceptualizing efficacy research. Chapter 3 reviews four types of validity, the foundation for studying and evaluating the efficacy of AAC interventions.

Second section. Equips the reader with "tools" and the background for engaging in EBP. Content includes how to formulate research questions, issues pertaining to subject selection, research designs for evaluating the efficacy of AAC interventions (*i.e.*, single-subject experimental designs, group designs, longitudinal designs), the assessment of treatment integrity, methods for assessing the social validity of AAC interventions, methods for synthesizing a body of AAC efficacy studies, and a framework for EBP in AAC.

Third section. Exemplifies EBP in specific content areas including efficacy research with presymbolic communicators, beginning communicators and people with chronic severe and/or global aphasia; graphic symbol selection; the role of AAC interventions in natural speech development; literacy development in learners using AAC; the effects of speech output; promoting generalization and maintenance; and comparing the efficacy of two or more interventions.

Finally, the epilogue offers directions for next-generation efficacy research and for moving further toward EBP.

2. *Evidence-Based Practice in Speech Pathology.* S. Reiley, A. Perry, & J. Douglas (Eds.), London, UK: Whurr. The book addresses several areas of practice within speech-language pathology. A chapter by Teresa Iacono, "The Evidence Base in Augmentative and Alternative Communication" highlights the nature of AAC and the stage of development of the field, and raises questions about the appropriateness of applying standards of evidence used with other clinical fields. Concerns about strategies to ensure control, such as randomization, are discussed when research in AAC is considered. This thoughtful chapter has important considerations for the application of EBP in the area of AAC.

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Augmentative Communication News (ISSN #0897-9278) is published quarterly.
Author: Sarah W. Blackstone Technical Editor: Carole Krezman Managing Editor: Harvey Pressman One Year Subscription: Personal check US/Canada = $50 U.S.; Overseas = $62 U.S. Institutions, libraries, schools, hospitals, etc.: US/Canada=$75 U.S.; Overseas = $88US Single rate for this issue = $20. Special rates for consumers and full-time students. Periodicals Postage rate paid at Monterey, CA. POSTMASTER send address changes to *Augmentative Communication, Inc.* 1 Surf Way, Suite 237, Monterey, CA 93940. Telephone: (831) 649-3050. FAX: (831) 646-5428. e-mail: sarahb@Augcominc.com http://www.Augcominc.com

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