

Research Outcomes of Auditory-Verbal Intervention: Is the Approach Justified?

ELLEN A. RHOADES, Auditory-Verbal Training/Consultation Services,
Florida, USA

ABSTRACT

This paper examines the construct of evidence-based practice, how existing data on the effectiveness of the Auditory-Verbal (A-V) approach for children with hearing loss are evaluated within this construct, and whether implementation of an A-V intervention model is therefore justified. It concludes with a recurrent call for action towards collaborative multi-centre research. Copyright © 2006 John Wiley & Sons, Ltd.

Key words: hearing loss; Auditory-Verbal; evidence-based practice; research

INTRODUCTION

The Auditory-Verbal (A-V) approach is a communication model employed by parents and professionals upon diagnosis of a child's hearing loss (Schwartz, 2006; Stokes, 1999). The purpose of this paper is to explore the extent of legitimacy that can be ascribed to the A-V approach as effective intervention for children with hearing impairment.

Based primarily on the number of professionals becoming certified in Auditory-Verbal Therapy (AVT) each year and publication sales of the Alexander Graham Bell Association for the Deaf (Estabrooks, 2006; Alexander Graham Bell Association staff, personal communication), this communication option is implemented by increasingly greater numbers of parents and professionals worldwide — particularly with very young children. This is likely a result of several factors, including Universal Newborn Hearing Screening, cochlear implant technology and parental communications via the internet.

Given that approaches to intervention with young children who are hearing impaired engender deep passion among adults, some important questions should be asked and answered by those involved in working with children and their

families. First, what is meant by evidence-based practice (EBP) and the A-V approach, often known as AVT? Second, what data justify implementation of the A-V approach? Thirdly, how can implementation of the A-V approach be justified?

PRINCIPLES OF A-V PRACTICE

There are 10 specific principles of practice to which A-V intervention programmes adhere (see Figure 1). Briefly, A-V practice is unique from other approaches within the broader auditory-oral spectrum, particularly when collectively considering the following characteristics: (1) parents or primary care-takers of the child *must* be actively involved in the child's individualised daily intervention strategies, primarily as the child's most significant spoken language enablers; (2) parents *must* ensure that the child takes advantage of current hearing technology in an assertive manner which results in consistently effective access to soft conversational sound; and (3) parents *must* enrol the child in regular educational programmes for normally hearing children, thereby avoiding the grouping of children with hearing loss.

1. Promote early diagnosis of hearing loss in newborns, infants, toddlers, and children, followed by immediate audiologic management and Auditory-Verbal therapy.
2. Recommend immediate assessment and use of appropriate, state-of-the-art hearing technology to obtain maximum benefits of auditory stimulation.
3. Guide and coach parents to help their child use hearing as the primary sensory modality in developing spoken language without the use of sign language or emphasis on lipreading.
4. Guide and coach parents¹ to become the primary facilitators of their child's listening and spoken language development through active consistent participation in individualized Auditory-Verbal therapy.
5. Guide and coach parents to create environments that support listening for the acquisition of spoken language throughout the child's daily activities.
6. Guide and coach parents to help their child integrate listening and spoken language into all aspects of the child's life.
7. Guide and coach parents to use natural developmental patterns of audition, speech, language, cognition, and communication.
8. Guide and coach parents to help their child self-monitor spoken language through listening.
9. Administer ongoing formal and informal diagnostic assessments to develop individualized Auditory-Verbal treatment plans, to monitor progress and to evaluate the effectiveness of the plans for the child and family.
10. Promote education in regular classrooms with typical hearing peers and with appropriate support services from early childhood onwards.

Figure 1: Principles of Auditory-Verbal practice* (adapted from principles developed by Pollack, 1970). *Auditory-Verbal practice requires all 10 principles.¹ The term 'parents' also includes grandparents, relatives, guardians and any caregivers who interact with the child. Adapted by the AG Bell Academy for Listening and Spoken Language®, 11 January 2006. © AG Bell Academy for Listening and Spoken Language®.

While a short-term goal of this approach is that of preschool integration for the child with a hearing impairment, the long-term goals include full assimilation of a communicatively competent child into the family system, academic grade school environment and social fabric of the larger community. A-V intervention is a family-focused process; at the very least, it is a parent-centred approach involving mandated parent coaching that contrasts with child-centred intervention.

The first item of discussion, then, has to do with EBP and why it is necessary to operate within the parameters of this construct. Given the historical and oftentimes divisive cultural-educational-communicative landscapes of deafness, some researchers issued a clarion call for objectivity and levity (e.g. Brookhouser and Moeller, 1986; Easterbrook, 1987; Musselman and Kircaaliftar, 1996). In fact, Easterbrook (1987) noted that longitudinal data collected on groups of children were critically needed for determining intervention efficacy. She stated that children who are deaf should, on average, demonstrate approximately 12 months of language progress per 12 months of intervention. This recognises that there is great human variability in language growth that, in turn, is affected by many variables. She further stated that predictions regarding habilitation potential should not be made based on audiologic information alone. Twenty years later, her argument remains contentious for some (e.g. MacIver-Lux, 2005; Ramsey, 2000).

We now live in an age of accountability. Service providers must prove the viability of what they do to those families they serve and to those administrators and funding sources who are their employers. Of course, both parents and professionals must prove the viability of what they do for and to their children. Data must justify the why, how, when and wherefores of intervention efforts. Do intervention services work and are they worth doing? A lack of empirical evidence is no longer tenable.

EBP

Approximately 20 years ago, EBP began its life in healthcare as evidence-based medicine (Foster, 1999). This de-emphasised opinion, intuition, precedent, or past practice due to either habit or tradition; oftentimes such practice reflected unsystematic clinical experience. It focused on sufficient grounds for clinical decision-making, stressing the examination of evidence from clinical research. Initially, this required new skills of the medical practitioner, including efficient searching of literature and the application of formal rules of evidence in evaluating the clinical literature.

EBP is a construct defined as the 'conscientious, explicit, and judicious use of current best evidence in making decisions about care of individual patients' (Sackett et al., 1996). EBP is:

a total process beginning with knowing what clinical questions to ask, how to find the best practice, and how to critically appraise the evidence for validity and applicability to the

particular care situation. The best evidence then must be applied by a clinician with expertise in considering the patient's unique values and needs. The final aspect of the process is evaluation of the effectiveness of care and the continual improvement of the process (DePalma, 2000).

In other words, EBP involves making clinical decisions based on best evidence, either from the research literature or clinical expertise, to improve the quality of care and the patient's quality of life. EBP is unique because it includes the preferences and values of the patient and family in the process. While the clinician may utilise the best evidence available, application and outcomes will differ based upon the patients' values, preferences, concerns and/or expectations.

As it currently stands, the scientific literature is graded on its strength of evidence. A-V professionals must access the best available clinical evidence. This entails the compilation of clinically relevant child-driven research, empirical institutional data and external data indicating how to achieve child outcomes that we wish to achieve.

Thus EBP became the new paradigm for early intervention with children and their families. This necessitates a 'bottom-up' approach in that the best clinical evidence must be integrated with individual clinical expertise and consideration of child and family preferences. This conceptual approach will be revisited later in this paper. In short, EBP is a constant process of inquiry whereby the intervention service provider looks for evidence that can serve as a guide towards improved child outcomes. Placing the child's needs and family benefits first, today's evidence-based practitioners then adopt a process of life-long learning. This process continually involves posing specific questions of direct practical importance to both child and family, persistently searching objectively and efficiently for the current best evidence and implementing appropriate action guided by such evidence (Sackett et al., 1996).

From another perspective (see Figure 2), there are three necessary premises of EBP concerning the A-V approach: research evidence, clinical expertise and stakeholder perspectives (Dollaghan, 2004; Frattali, 2004). Research evidence should be taken from A-V studies that are current and systematic. The evidence must be based on outcomes of clearly identified A-V programmes. Clinical expertise should encompass the extensive experience of the A-V professional. Stakeholder perspectives are those values and preferences of A-V professionals, parents, administrators and funding sources. All three premises must be integrated for the EBP foundation to be both solid and strong. Just as it is possible that some believe EBP to be just another unrealistic demand placed on already overburdened A-V clinicians, it is also possible that some still do not engage in assessment before the provision of intervention services (e.g. Rhoades, 2003). Indeed, every intervention service provider currently practising today must include differential diagnosis as an integral part of EBP.

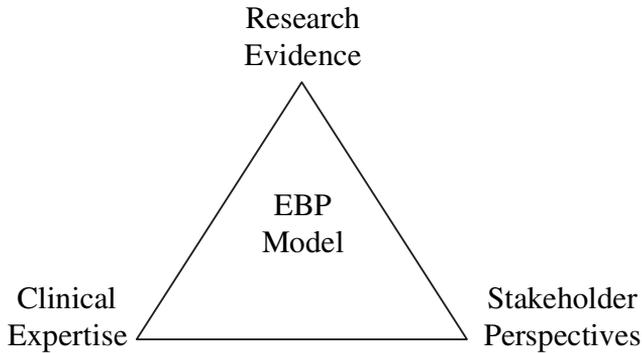


Figure 2: Framework for intervention.

A-V DATA

When reviewing the A-V data, a reference point is that of the outcomes measurement classification system proposed by Frattali (1998). This system weighs the strength of treatment evidence based on the degree of scientific rigour or research methodology based on three levels.

Class 1 studies represent the first level of evidence consisting of well-designed, experimentally controlled research studies that include a good, thorough review of all related studies. These investigations typically include randomised, controlled trials involving large numbers of children assigned to various treatment groups, for example, experimental and control groups with at least 30 children enrolled at the same point in intervention and having similar points of diagnosis and amplification. Clearly, this is difficult to attain given the low incidence of deafness. Moreover, treatment of data includes multi-way analysis that results in significant differences with reliable narrow confidence intervals.

The second level of evidence consists of Class II studies that involve quasi-experimental designs often in the form of cohort studies or programme evaluations. These investigations may involve a group of children with a common characteristic of identification of deafness during infancy who are followed over time to examine the particular outcome in question. Published studies at this level of evidence should also include a thorough review of all related studies. Although these studies are based on less rigorous methodological research designs and may be limited in their generalisability, this type of observational evidence is now widely acceptable as good evidence in favour of a treatment approach.

The lowest level of evidence is Class III because these studies are considered non-experimental research designs that are often retrospective in nature. These typically include case studies, registries, database studies, group judgments, or

expert opinions of performance. While these investigations provide the least compelling evidence in favour of a treatment approach, they may be useful in providing support for or shaping Class II evidence, particularly if these studies were published in peer-review journals.

Class III level of evidence

Eight A-V studies have been published that fit within the Class III level of evidence, five of them retrospective in nature. Upon examination of the peer-reviewed A-V case studies, two presented longitudinal, well-documented objective case data (McCaffrey et al., 2000; Warner-Czyz et al., 2005). McCaffrey et al. (2000) present a carefully designed case study of a typical child with profound congenital bilateral deafness whose family received A-V intervention. Other than deafness, this child's speech production was repeatedly analysed from just before implantation at 2.0 to 2.9 years of age. The child's early speech was initially found to be typical of other infants with severe-profound deafness, that is, few canonical syllables, mostly nasal phonemes and labial stop consonants with some mid-central vowels. However, post-implantation and over a period of the next five sessions, the child began to engage in both variegated and reduplicated canonical babbling as well as expressive language that included two-word combinations. While this case study cannot have any generalisability, it is an excellent example of data analysis on one child and can clearly support Class II evidence for A-V intervention. The second longitudinal case study (Warner-Czyz et al., 2005), as extension of the aforementioned, focuses on the toddler's production during the first year of A-V intervention concurrent with cochlear implantation. Results of the child's volubility, phonetic inventory, lexical targets and accuracy over a nine-month period showed significantly greater improvement and variation, often similar to normal development.

Another Class III study focuses on six children with Down's syndrome whose families participated in A-V intervention over a period of one year. The researchers (Pappas et al., 1994) found that, with aggressive audiological and otological management coupled with AVT, no language delays were noted after 12 months of treatment. Given the small sample and limited data presented, this is considered minimal Class III evidence regarding AVT for young hearing aid users.

The five retrospective studies reported in peer-review journals have significant limitations due, in part, to the lack of standardised assessment instruments that were employed, the anecdotal nature of the data and that the samples of people studied largely represent self-selected groups. Robertson and Flexer (1993) surveyed parents of children who were beneficiaries of A-V intervention, also hearing aid users, in order to ascertain the children's reading levels. Most of the 76 parents reported that their children had average or higher levels of reading performance.

A survey employed by Goldberg and Flexer (1993) was directed to adults who participated in A-V intervention programmes when young, and parents of young children receiving A-V intervention to determine their level of integration into their respective learning and living environments. Findings from 157 completed surveys indicated most respondents felt these hearing aid users were fully mainstreamed and that most received AVT for an average of 11 years. Although this investigation produced no specific outcome, the same authors followed it up with another survey 10 years later (Goldberg and Flexer, 2001). Again, the same limitations apply to this updated survey with both studies based on self-perceptions of a self-selected sample.

The Wray et al. (1997) study assessed the classroom performance of 19 grade school children who received A-V intervention; the SIFTER (screening instrument for targeting educational risk) (Anderson, 1989), a screening questionnaire completed by their teachers, was the assessment instrument employed by the investigators. Findings show that teachers felt these hearing aid users performed well, both socio-emotionally and academically within the mainstreamed setting. Unfortunately, the screening instrument used has no associated normative data.

Still another retrospective study (Easterbrook et al., 2000) examined 10 years of data from an A-V centre and then surveyed those identified children. They found that most of those children continued to be fully mainstreamed, had less than a one-year language gap subsequent to AVT and were from affluent White families. Again, largely because findings were based on anecdotal data, this survey remains the lowest level of evidence.

Either individually or collectively, those studies providing Class III level of evidence are insufficient justification for the A-V option to be considered EBP. Yet, during the last decade of the 20th century, these researchers at least provided A-V practitioners with some support, even if minimal, for counteracting some sceptics. Surely, they at least provided the challenge for A-V practitioners to conduct investigations utilising improved research methods to yield objective data.

Class II level of evidence

Upon examination of objective A-V data that involves quasi-experimental designs, the evidence is more compelling for the A-V approach as viable intervention. The first researcher to present this higher level of evidence was Duncan (1999). She compared the conversations of 11 young children receiving A-V intervention with 10 normally hearing children within a mainstream preschool setting. All of the children with hearing loss were hearing aid users, most with profound deafness. Data were compiled within naturalistic group and quasi-naturalistic dyadic settings, that is, there was an absence of structured elicitation. The preschoolers' social discourse skills such as topic initiation, maintenance and shifting of topics, and termination were coded and quantified,

all of which represent a collective indicator of communicative competence. The outcome of this investigation demonstrated that most of the preschoolers receiving A-V intervention had normal social discourse skills and that they compared favourably to their normally hearing peers. The subtle differences noted included the manner in which children receiving A-V intervention maintained conversation, for example, hearing aid wearers used more minimally contingent responses such as head nod and 'mhm' vocal confirmations, whereas the normally hearing children made more significant linguistic contributions. Although the sample size was small and this limited its generalisability, the study used a matched pairs research design that allows for some intergroup comparisons.

Another longitudinal study (Duncan and Rochecouste, 1999) examined the length and complexity of utterances of 13 normally hearing and 13 children receiving A-V intervention, all in preschool settings. A standardised assessment tool was used to analyse each child's production of free and bound morphemes, MLU-m representing the mean length of utterance measured in morphemes, and MSL representing the mean syntactic length or measurement of utterance length in words. Again, data were collected in both naturalistic and structured dyadic settings, the latter with the inclusion of high specificity toys. This study showed that four-year-old normally hearing children had average scores of 3.8 MLU-m and 3.5 MSL, compared to scores of 2.6 MLU-m and 2.5 MSL for peers receiving A-V intervention, the latter using fewer bound morphemes and less frequently. At this age level, most A-V children's bound morphemes were present progressive /-ing/, plural /s/, and contracted third person copula /s/, for example, that one's bigger. The five-year-old normally hearing children had average scores of 4.9 MLU-m and 4.4 MSL, compared to scores of 3.3 MLU-m and 3.1 MSL for peers receiving A-V intervention. The former used a range of 12 grammatical bound morphemes, while the latter used a range of 11 bound morphemes but less frequently. While this study shows a language delay for children receiving A-V intervention, it is noted that although they had severe-profound deafness, they were all hearing aid users. The authors did not statistically consider the significance of any factors, other than to note that the children did not have any disability other than hearing loss, were within the average IQ range and all had normally hearing parents.

An investigation conducted by Duquette et al. (2002) collected data from parents through questionnaires and focus groups. Parents in this study had children with hearing loss, ranging from mild to profound, with half of the children participating in this study diagnosed as having severe-profound deafness. At the time of data collection, the children were between 14–30 years old, with most still in high school. Most of these children were fitted with hearing aids at an average age of 2 years 6 months, having received A-V intervention from one particular programme for a mean of two years. Moreover, most children were raised in well-educated dual parent households. The purpose

of this study was to determine 41 parents' perceptions of their children throughout the mainstream process, subsequent to A-V preschool intervention.

Through questionnaires and focus groups, findings show that parents perceived themselves as having four critical roles in the process of facilitating academic and social integration within the mainstream. These four roles were: (1) to act as a teacher from the time their children were initially mainstreamed until high school graduation; (2) to serve as advocate for their children; (3) to become involved in a support group; and (4) to actively and accurately facilitate the social integration of their children with normally hearing peers. A resultant recommendation of this investigation is that schools should recognise parents of children with hearing loss as active, collaborative partners of the mainstream process.

Incorporating the aforementioned parents, their children and itinerant teachers were included in a later study (Eriks-Brophy et al., 2006) that involved participation in one of 10 focus groups. Nearly 30% of these parents' children received some sort of special education services at some point in their educational history. The purpose of this investigation was to identify facilitators and barriers to school inclusion. Findings emphasised the importance of examining factors external to individual children with hearing loss in preparing for mainstreaming. Findings from this study strongly suggest that successful mainstreaming requires commitment from all stakeholders: parents, administrators and itinerant teachers. In particular, the itinerant teacher was identified as being the most frequent and important facilitator. Normally hearing peers were recognised as having potentially important facilitative roles. The majority of identified barriers to successful mainstreaming were lack of knowledge, negative attitudes and insensitivity of other key players in the mainstream process. As recognised by the investigators, findings of this study are limited in their generalisability.

In another longitudinal investigation (Rhoades and Chisolm, 2001; Rhoades, 2001), the language progress of 40 children from one A-V centre was examined over one to four years of A-V intervention. These children had varying degrees of hearing loss, with most being severe-profound. Their average age was 40 months at the time of commencing A-V intervention, and their parents tended to be well-educated. Only widely recognised norm-referenced and standardised global language assessment instruments were employed to ascertain children's rates of language progress. Twenty-five per cent of the children started and ended the study as hearing aid users, another 25% started and ended the study as cochlear implant users; the remaining 50% started as hearing aid users but ended as cochlear implant users. During the course of A-V intervention, 78% of the children were diagnosed by occupational therapists as having sensory integration issues and half were identified as having oral-motor dysfunctions by speech pathologists.

Outcomes show that these children typically made 100% rates of language growth, that is, the same rate of growth as normally hearing children. While

30% of these children did not continue with the programme at the A-V centre for a variety of reasons, ranging from insufficient home follow-up to family relocation, most still demonstrated language progress. For most children in this study, their receptive language growth was more rapid during the first two years of A-V intervention, but their expressive language growth rates quickly increased in the third and fourth intervention years. It was also noted that the gap between chronological age and language age was closed so that linguistic competency commensurate with normally hearing peers was attained. This investigation showed that 100% rate of language growth for each A-V intervention year can and should be an accurate benchmark for effective delivery of services.

With 20 children from the preceding study, Rhoades and Morrison (E.A. Rhoades and H.M. Morrison, *Morpho-syntactic and lexical-semantic progress by children with hearing loss in an A-V programme, in preparation*) examined their morpho-syntactic and lexical-semantic rates of growth over a one to four year period of A-V intervention that stressed function word learning and comprehension of morpho-syntax rather than speech or lexical-semantic learning. Although the language assessment instruments employed for this study were different, they were also widely used norm-referenced, standardised tools. Findings indicate that the children's chronological age upon initiation of A-V intervention was a significant predictor in rates of language progress. The rates of morpho-syntactic language growth exceeded the rates of lexical-semantic growth demonstrated by the children, although both rates were considered equivalent to the rates of language growth of normally hearing children. While this investigation involves a small sample that limits its generalisability, it is considered a Class II level of evidence.

Finally, Wu and Brown (2004) examined eight A-V therapists' and 12 parents' expectations of AVT's influence on children at three A-V centres. This study employed a checklist adapted from a norm-referenced, standardised language instrument for pre-selected parents and A-V therapists. The children, mostly preschoolers, received A-V intervention from one to 80 months at the time the questionnaire was completed, and they used either hearing aids and/or cochlear implants. Parents tended to be well-educated. The primary outcome of this study is that all adult participants maintained high expectations of the child's progress during A-V intervention. Based on a widely recognised and norm-referenced, standardised language assessment tool, the child's language development was predicted by a factor relating to age of diagnosis, device fitting, age at time of A-V initiation and professional expectation of the child. This Class II study, the first to involve a multi-centre collaborative effort, strongly suggests existence of the self-fulfilling prophecy at work among those embracing the A-V model of intervention, that is, high expectation levels related to rate of language growth.

Given the importance of accountability, it is critical that all investigators purporting to provide Class II level of evidence submit their investigations to

peer-review publications. This necessitates the inclusion of methods and procedures, data analyses, results and discussion within each manuscript reviewed by well-respected colleagues. Consequently, only seven of these studies published in peer-review journals can be considered as providing optimal Class II level of evidence. As such, they represent a first step towards the accumulation of an objective body of data that enables the A-V intervention model to be considered EBP. Again, however, the strength of justification depends on the variety and number of investigations that yield empirical data in support of the A-V approach as an effective intervention model for young children and their families.

THE CASE FOR LEGITIMACY

Confirmation that some of the above-mentioned studies are either Class II or III levels of evidence is obtained from Eriks-Brophy (2004, 2006). There are no known investigations pertaining to the A-V approach that merit status as Class I level of evidence. As Eriks-Brophy also notes, Class III studies are insufficient to justify any intervention approach, particularly in the current atmosphere of financial restraint. Therefore, the impact of Class II studies on A-V intervention as a viable EBP model cannot be overstated.

In summary, as can be seen in Table 1, there is emergent justification for the implementation of the A-V approach. While no study in and of itself is considered *de facto* evidence of the A-V approach as a highly effective intervention option, collectively the Class III studies only tenuously support the overwhelmingly positive outcomes shown in the number of Class II studies herein reported. Professionals such as Ramsey (2000) can no longer make the claim that there is insufficient evidence for the A-V approach to be an appropriate intervention model for children born deaf. Those professionals who would continue to argue that children with severe-profound degrees of deafness have not demonstrated they can learn to hear and speak the prevailing language seem to be unaware of the evidence now at hand.

ISSUES FOR CONSIDERATION

There are some salient issues pertinent to this discussion on EBP. Awareness of these ongoing issues allows for engagement in the more intelligent decision-making process that is now integral to EBP (Garber, 2005). Adopting a 'bottom-up' approach to the inquiry process of opting for a particular intervention model can facilitate more effective decision-making (see Figure 3 for an example of how A-V literature can be categorised). Clinical reference texts that provide information about the intervention model (e.g. Pollack et al., 1997) must first be considered. Next to be considered are clinical practice guidelines (e.g. Estabrooks, 2006) as well as objective, well-designed case studies such as those examined in this paper as Class III level of evidence. From that point,

| Table 1: Peer-adjudicated Auditory-Verbal evidence. | | | | |
|-----------------------------------------------------|------------------------|-----------------------------------------------------------------------------------------------------------------------------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Year | Author | Title | Class | Research summary |
| 1993 | Goldberg and Flexer | Outcome survey of A-V graduates: Study of clinical efficacy | III | Retrospective survey found most A-V were fully mainstreamed throughout school years; that they typically received AVT for 11 years |
| 1993 | Robertson and Flexer | Reading development: a parent survey of children with hearing loss who developed speech and language through the A-V method | III | Retrospective survey found most parents felt their A-V children had average or higher levels of reading performance |
| 1994 | Pappas et al. | Otological and habilitative management of children with Down Syndrome | III | After following up six children with Down's syndrome with aggressive audiological and otological management and AVT for 12 months, no language delays were noted |
| 1997 | Wray et al. | Classroom performance of children who are hearing impaired and who learned spoken communication through the A-V approach | III | Retrospective study; teachers felt 19 A-V grade school children performed well, both socio-emotionally and academically within the mainstreamed setting |
| 1999 | Duncan | Conversational skills with hearing loss and children with normal hearing in an integrated setting | II | Longitudinal study compared conversations of A-V children to normally hearing children within a mainstream preschool setting. A-V preschoolers were found to have normal social discourse skills albeit with subtle differences noted |
| 1999 | Duncan and Rochecouste | Length and complexity of utterances produced by kindergarten children with impaired hearing and their hearing peers | II | Longitudinal study compared the length and complexity of utterances produced by normally hearing and A-V preschoolers. Latter group showed a productive language delay |

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|------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2000 | Easterbrooks et al. | Child and family factors associated with deaf children's success in AVT | III | Survey of children from a 10 year period shows that most continued to be fully mainstreamed, had less than one-year language gap, than were from affluent White families |
| 2000 | McCaffrey et al. | Multichannel cochlear implantation and the organization of early speech | III | Case study of implanted A-V toddler shows speech progressed to include variegated and reduplicated canonical babbling and two-word combinations in expressive language |
| 2001 | (1) Rhoades and Chisolm (2) Rhoades | (1) Global language progress with an A-V approach (2) Language progress with an A-V approach for young children with hearing loss | II | Longitudinal study shows A-V children typically made 100% rate of language growth, i.e., the same rate as normally hearing children. The gap between chronological age and language age was closed so that linguistic competency commensurate with normally hearing peers was attained |
| 2001 | Goldberg and Flexer | A-V graduates: Outcome survey of clinical efficacy | III | Retrospective follow-up survey 10 years later (Goldberg and Flexer, 1993). Mainstreaming continues with children in this study |
| 2002 | Duquette et al. | Parents' perspectives on their roles in facilitating the inclusion of their children with hearing impairment | II | Parents perceived themselves as having four critical roles in the process of facilitating academic and social integration within the mainstream. These four roles were: (1) to act as a teacher from the time their children were initially mainstreamed until high school graduation; (2) to serve as advocate for their children; (3) to become involved in a support group; and (4) to actively facilitate the social integration of their children with normally hearing peers. A resultant recommendation of this investigation is that schools should recognise |

| | | | | |
|----------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2004 | Wu and Brown | Parents' and teachers' expectations of A-V therapy | II | parents of children with hearing loss as active, collaborative partners of the mainstream process Adults had high expectations of the child's progress with A-V intervention; the child's language development was predicted by a factor relating to age of diagnosis, device fitting, age at time of A-V initiation and professional expectation of the child |
| 2005 | Warner-Czyz et al. | Production accuracy in a young cochlear implant recipient | III | Case study of toddler shows speech volubility, phonetic inventory and lexical targets improved similarly to normal development |
| 2006 | Eriks-Brophy et al. | Facilitators and barriers to the inclusion of orally educated children and youth with hearing loss in schools: Promoting partnerships to support inclusion | II | Parents, teachers and A-V young adults felt itinerant teachers were the most essential facilitator to mainstreaming. Knowledgeable parents, accepting peers and good A-V skills were also facilitators for inclusion. Successful mainstreaming warrants commitment from many sources. Barriers to inclusion involve lack of knowledge, insensitivity and negative attitudes of others, e.g., classroom teachers |
| In preparation | E.A. Rhoades and H.M. Morrison | Morpho-syntactic and lexical-semantic progress by children with hearing loss in an A-V program | II | Longitudinal study shows chronological age upon initiation of A-V intervention to be a significant predictor in rates of language progress. Children's rates of morpho-syntactic language growth exceeded their rates of lexical-semantic growth, although both rates were equivalent to the rates of language growth of normally hearing children |

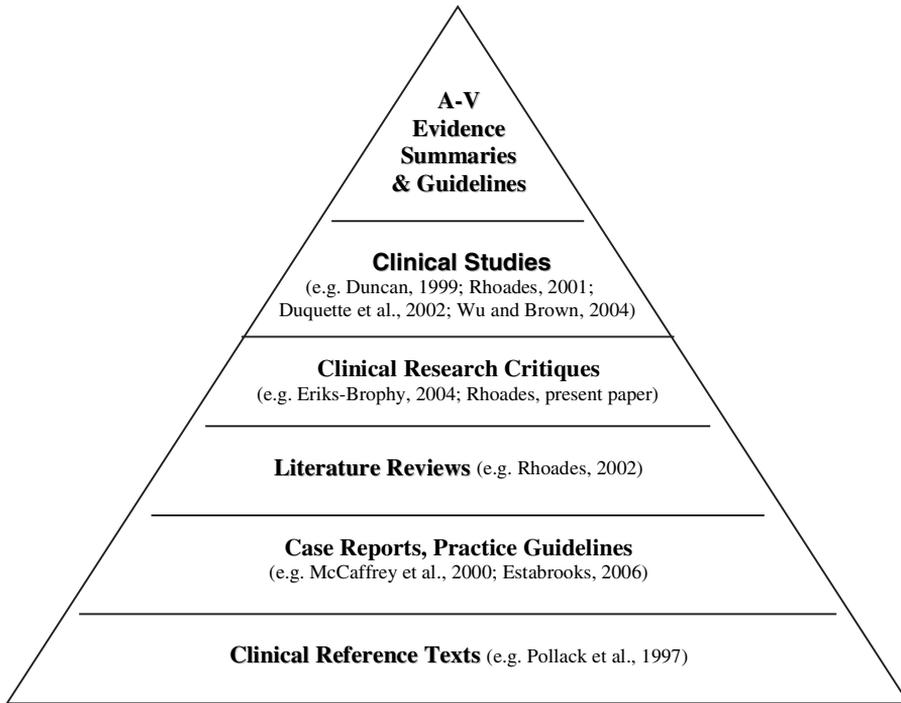


Figure 3: Decision-making process.

the literature on particular issues directly pertaining to any clinical strategy or issue, such as the position paper on verbal language assessment by Rhoades (2003) that advocates for the use of reliable and valid, norm-referenced assessment instruments standardised on normal hearing children, can be reviewed. The next step is that of either independently engaging in or consulting with existing clinical research critiques; this is known as research utilisation, that is, the grading of available evidence, such as that presented by Eriks-Brophy (2004, 2006) or in this paper. Finally, it is important to examine actual investigations that represent the systematic scientific process of determining A-V effectiveness, for example, those studies presented in this paper as Class II level of evidence. The pinnacle of this inquiry lies in clinical studies that either generate new knowledge or validate existing knowledge.

FUTURE A-V EVIDENCE

There is no question that adherents of the A-V approach must continue to engage in ongoing data collection which includes a battery of widely used norm-referenced language assessment instruments standardised on normally hearing children, beginning with the attainment of baselines — even for ‘languageless’ children (Rhoades, 2003). At the very least, there should be a well-coordinated effort to engage in multi-centre collaborative investigations with

similar assessment protocols in order to involve large numbers of children receiving A-V intervention and then employ control groups for comparison purposes (Eriks-Brophy, 2004).

Furthermore, another important issue should be considered when developing further studies. Reported studies should provide information regarding the principles, strategies, techniques, therapeutic emphases and service components of each A-V intervention programme. While Rhoades and Morrison (in preparation) made the first step in the direction of answering this question when they described the focus of the A-V intervention services for the children in their study, it was not enough. It is imperative that researchers include more detailed descriptions of the A-V intervention services being provided to children and their families being studied (Eriks-Brophy, 2006). In the absence of such descriptive information, assumptions about quality and equality of intervention services should be avoided. There is great likelihood that qualitative variations in A-V services exist, notwithstanding the increasing numbers of children who present with multiple challenges and diverse families entering A-V programmes (Rhoades et al., 2004). Merely stating that an A-V approach was provided for children being studied is no longer enough.

One final caveat seems worth mentioning at this point. EBP lends itself to outcomes management. When child outcomes are investigated, there may be a tendency to present them as efficacy studies. However, outcomes management involves both efficacy and effectiveness (Frattali, 1998). Efficacy entails the results of an intervention applied under 'ideal conditions.' On the other hand, effectiveness means the results of an intervention as applied in 'the real world' where there are fewer controls and perhaps lack of random assignment (Hall, 2003). For A-V practitioners, effectiveness is more important than efficacy. A goal of researchers is to present findings that a difference in outcomes is primarily due to application of a particular intervention programme.

With the minimal Class II level of evidence now accessible, there are some looming but timely unanswered questions. For one, Eriks-Brophy (2004) notes that questions concerning the social functioning, self-perception and personal adjustment of children receiving A-V intervention have yet to be addressed. Moreover, in addition to improving child performances, the quality of A-V intervention likely warrants improvement. Data focusing on the A-V 'process' as well as on individual A-V children are needed. What are the indicator conditions in which the management and performance of child and family care create a difference in child outcomes? Is the A-V approach just as effective for children from low-income families as it is for children from middle-income families? Can the A-V approach be a viable option for multilingual and/or ethnically diverse families? Which, if any, and to what degree do additional disabilities negatively influence the child's rate of language progress as a result of A-V intervention? To what extent do variations in the provision of A-V intervention services differentially affect child progress and/or parent satisfaction? Which A-V strategies are more critical or more efficient than

others? Furthermore, how does A-V intervention outcomes compare to outcomes from other interventions such as the Natural Aural and Auditory/Oral Approaches? Can we even control for qualitative differences being practised by those embracing particular approaches in order to engage in valid comparative research?

CONCLUSION

Eriks-Brophy (2004) issued a call for action. The A-V approach is no longer without substantive data. It is a legitimate communicative approach for children with varying degrees of deafness, irrespective of hearing prosthesis type. Given that there is now minimal empirical evidence for the validity and effectiveness of the A-V intervention model, even more rigorous and well-designed multi-centre studies need to be developed in order to meet the challenge of directly benefiting many more families who want their children to speak their language.

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REFERENCES

- Anderson K. Screening Instrument For Targeting Educational Risk (SIFTER) in Children with Identified Hearing Loss. Tampa, Florida: Educational Audiology Association, 1989.
- Brookhouser PE, Moeller MP. Choosing the appropriate habilitative track for the newly identified hearing-impaired child. *Annals of Otolaryngology, Rhinology, Laryngology*, 1986; 95: 51–59.
- DePalma J. Evidence-based clinical practice guidelines. *Seminars in Perioperative Nursing*, 2000; 9(3): 115–120.
- Dollaghan C. Evidence-based practice: Myths and realities. *The ASHA Leader* 13 April, 2004; 12: 4, 5, 12.
- Duncan J. Conversational skills with hearing loss and children with normal hearing in an integrated setting. *The Volta Review*, 1999; 101(4): 193–211.
- Duncan J, Rochecouste J. Length and complexity of utterances produced by kindergarten children with impaired hearing and their hearing peers. *Australian Journal of Education of the Deaf*, 1999; 5: 63–69.
- Duquette C, Durieux-Smith A, Olds J, Fitzpatrick E, Eriks-Brophy A, Whittingham J. Parents' perspectives on their roles in facilitating the inclusion of their children with hearing impairment. *Exceptionality Education Canada*, 2002; 12 (1): 19–36.
- Easterbrook SR. Speech/language assessment and intervention with school-age hearing-impaired children. In: Alpin J, McCarthy P (Eds) *Rehabilitative Audiology: Children and Adults*. Baltimore: Williams & Wilkins, 1987: 188–240.
- Easterbrook SR, O'Rourke CM, Todd NW. Child & family factors associated with deaf children's success in A-V therapy. *The American Journal of Otolaryngology*, 2000; 21: 341–344.

- Eriks-Brophy A. Outcomes of auditory-verbal therapy: A review of the evidence and a call for action. *The Volta Review*, 2004; 104(1): 21–35.
- Eriks-Brophy A. Outcomes of AVT. In: Estabrooks W (Ed.) *Auditory-Verbal Therapy and Practice*. Washington, DC: AG Bell Association, 2006.
- Eriks-Brophy A, Durieux-Smith A, Olds J, Fitzpatrick E, Duquette C, Whittingham J. Facilitators and barriers to the inclusion of orally educated children and youth with hearing loss in schools: Promoting partnerships to support inclusion. *The Volta Review*, 2006; 106(1): 21–35.
- Estabrooks W. *Auditory-Verbal Therapy and Practice*. Washington DC: AG Bell Association for the Deaf, 2006.
- Foster RL. Evidence-based practice. *Journal of the Society of Pediatric Nurses*, 1999; 4(1): 4–5.
- Frattali C. Outcomes measurement: Definitions, dimensions, and perspectives. In: Frattali C (Ed.) *Measuring Outcomes in Speech-language Pathology*. New York: Thieme, 1998: 1–27.
- Frattali C. Developing evidence-based practice guidelines. *The ASHA Leader* 13 April, 2004: 13–14.
- Garber AM. Evidence-based guidelines as a foundation for performance incentives. *Health Affairs*, 2005; 24(1): 174–179.
- JGoldberg D, Flexer C. Outcome survey of A-V graduates: Study of clinical efficacy. *Journal of the American Academy of Audiology*, 1993; 4: 189–200.
- Goldberg D, Flexer C. Auditory-Verbal graduates: Outcome survey of clinical efficacy. *Journal of American Academy of Audiology*, 2001; 12: 406–414.
- Hall DS. Evidence-based practice [online]. Available: <http://www.pitt.edu/~super1/lecture/lec10311/001.htm> [15 September 2005], 2005.
- MacIver-Lux K. Predicting Auditory Potential in babies. *The Listener*, 2005: 49–71.
- McCaffrey H, Davis BL, MacNeilage PF, von Hapsburg D. Multichannel cochlear implantation and the organization of early speech. *The Volta Review*, 2000; 101(1): 5–28.
- Musselman C, Kircaali-Iftar G. The development of spoken language in deaf children: explaining the unexplained variance. *Journal of Deaf Studies and Deaf Education*, 1996; 1(2): 108–121.
- Pappas DG, Flexer C, Shackelford L. Otological and habilitative management of children with Down Syndrome. *Laryngoscope*, 1994; 104(9): 1065–1070.
- Pollack D, Goldberg D, Caleffe-Schenck N. *Educational Audiology for the Limited Hearing Infant and Preschooler*. Springfield, IL: Charles C. Thomas, 1997.
- Pollack D. *Educational Audiology for the Limited Hearing Infant*. Springfield, IL: Charles C. Thomas, 1970.
- Ramsey CL. Ethics and culture in the deaf community response to cochlear implants. *Seminars in Hearing*, 2000; 21(1): 75–86.
- Rhoades EA. Language progress with an Auditory-Verbal approach for young children with hearing loss. *International Pediatrics*, 2001; 16(1): 41–47.
- Rhoades EA. Lexical-semantic and morpho-syntactic language assessment in auditory-verbal intervention: a position paper. *The Volta Review*, 2003; 103(3): 169–184.
- Rhoades EA, Chisolm TH. Global language progress with an auditory-verbal approach. *The Volta Review*, 2001; 101(2): 5–24.
- Rhoades EA, Price F, Perigoe CB. The changing American family and ethnically diverse children with multiple needs. *The Volta Review*, 2004; 104(4): 285–305.
- Robertson L, Flexer C. Reading development: A parent survey of children with hearing impairment who developed speech and language through the A-V method. *The Volta Review* 1993; 95(3): 253–261.
- Sackett DL, Rosenberg WMC, Gray JAM, Haynes RB, Richardson WS. Evidence-based medicine: What it is and what it isn't. *British Medical Journal*, 1996; 312: 71–72.

- Schwartz S. Choices in Deafness. Baltimore, MD: Woodbine House, 2006.
- Stokes J. Hearing Impaired Infants: Support for the First Eighteen Months. Baltimore, MD: Paul H. Brookes Publishing, 1999.
- Warner-Czyz AD, Davis BL, Morrison HM. Production accuracy in a young cochlear implant recipient. *The Volta Review*, 2005; 105(1): 5–25.
- Wray D, Flexer C, Vaccaro V. Classroom performance of children who are hearing impaired and who learned spoken communication through the A-V approach: An evaluation of treatment efficacy. *The Volta Review*, 1997; 99(2): 107–119.
- Wu CD, Brown PM. Parents' and teachers' expectations of Auditory-Verbal therapy. *The Volta Review*, 2004; 104(1): 5–20.

Address correspondence to: Ellen A. Rhoades, Auditory-Verbal Training/ Consultation Services, 10710 N.W. 1 St, Plantation, FL 33324, USA. (E-mail: ellen@AuditoryVerbalTraining.com)