Outcomes of Auditory-Verbal Therapy: A Review of the Evidence and a Call for Action

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While the Auditory-Verbal approach has been a popular intervention option for children with hearing loss since the 1940s, few empirical studies have evaluated the communication and academic outcomes of those children who have participated in this intervention approach. The focus of this article is to discuss the standards of evidence-based practice and to examine the existing evidence that supports Auditory-Verbal therapy (AVT) as an intervention approach. Various types of evidence are categorized in terms of the scientific strength they provide in favor of treatment approaches. The evidence that currently exists in support of AVT is presented through a review of seven studies examining various outcomes associated with this intervention approach. The article concludes with a discussion of the types of evidence that are still needed to support the outcomes of AVT and a call for collaboration in the generation of such evidence.

Introduction

Surprisingly little empirical knowledge is readily available related to the efficacy of various treatment approaches for individuals with communication difficulties. Many of the most commonly used clinical approaches in audiology and speech-language pathology have never been objectively evaluated, nor their outcomes empirically documented. In the current climate of cutbacks in health care, patient rights, quality of life issues, and pay for service, this situation has become untenable. It is no longer sufficient for clinicians to rely on their clinical training, knowledge, and experience to convince clients, other professionals, administrators, and academic and governmental agencies of the value of the services they provide. The provision of some form of objective, quantifiable evidence related to what treatments are effective, and what outcomes might be expected subsequent to these interventions, is currently becoming essential to justify not only the treatment approach adopted,

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but also the need for the employment of clinicians to supply this intervention. This attitude of accountability has led to the current emphasis on evidence-based practice in support of clinical treatment approaches and their associated outcomes.

Auditory-Verbal therapy (AVT) is an intervention approach for children with hearing loss that emphasizes the development of spoken language through early identification of hearing loss, optimal amplification, and intensive speech and language therapy where parents serve as the primary language models for their children. The Auditory-Verbal approach to language intervention is based on the notion that most children with mild to profound hearing loss can learn to communicate through oral language if provided with appropriate amplification, abundant language stimulation, and adequate opportunities to develop their residual hearing. Principles of AVT include prompt medical and audiological management, ongoing diagnostic evaluation, and the integration of listening into all areas of communication. Fostering educational and social inclusion with hearing peers is among the primary goals of this intervention approach (Auditory Verbal International, 1991, adapted from Pollack, 1985). While the Auditory-Verbal approach has been a popular intervention option for children with hearing loss since the 1940s, few empirical studies have evaluated the communication and academic outcomes of children who have participated in this intervention approach. Furthermore, studies examining the social functioning, self-perception, and personal adjustment of children participating in AVT are virtually non-existent.

The focus of this article is to discuss the standards of evidence-based practice and their importance for clinical practice, as well as to examine the existing evidence in support of AVT as an intervention approach. Various types of evidence are categorized in terms of the strength they provide in favor of treatment approaches. The evidence that currently exists in support of Auditory-Verbal therapy is presented through a review of seven studies examining various outcomes associated with AVT. The article concludes with a discussion of the types of evidence that are still needed to support the outcomes of AVT and a call for collaboration in the generation of such evidence.

Evidence-Based Practice

Evidence-based practice (EBP) in the fields of audiology and speech-language pathology typically consists of gathering some form of outcome data related to a specific clinical approach. Treatment outcomes may be gathered for a variety of purposes, such as to objectively document the effectiveness of a clinical program, to identify gains in specific domains of communication subsequent to having participated in a particular treatment, to determine whether treatments are cost effective and resources are being well spent, or to monitor clinical effectiveness (Carney & Moeller, 1998; Coyte, 1992; Enderby, 1997; Enderby & Emerson, 1995; Frattali, 1998).
The measurement of outcomes associated with various treatment approaches in the field of speech-language pathology and audiology has traditionally concentrated on clinically observed changes in the speech and language deficits associated with a particular communication disorder (Carney & Moeller, 1998; Enderby, 1997; Frattali, 1998). In the past, such evidence typically consisted of the documentation of specific behavioral changes associated with participation in an intervention program as observed in a clinical setting. As clinicians, however, we have always been aware that limiting the examination of outcome evidence only to the observed behavioral changes in the context of the therapy session did not necessarily reflect the broader range of improvements associated with our treatment approaches. In the present context, however, we must also take into account outcomes that are defined by the needs or interests of individual clients at particular points in time and which can not be assessed exclusively within the intervention context alone.

Fortunately, the focus of outcome measurement has recently expanded to include not only traditional client-centered models, but also evaluation of the social, academic, and employment contexts in which clients regularly participate. As a result of the widening of focus in the description of outcomes, the effectiveness of intervention approaches can now be assessed in terms of improvements in specific communication skills, as well as in terms of changes in the ability of communicative partners to facilitate communication and interaction, increased opportunities for clients to communicate and integrate into a variety of social contexts and activities, and levels of client satisfaction with services received.

The categories for description of these broader domains of outcome measurement have been defined in terms of functional, administrative, financial, social, and/or client-defined outcomes related to communication (Coyte, 1992; Frattali, 1998). Functional outcomes of a treatment approach might include the ability to use the telephone or to communicate needs in a real-world environment. Administrative evidence is typically presented in terms of the productivity of a unit or department, the number of sessions a client misses, or the referral practices of a clinical program. Financial evidence examines issues related to the cost effectiveness of a particular treatment approach. Social outcomes might include the community integration or employability of an individual. Finally, client-defined outcomes might be described in terms of satisfaction with services received or in relation to quality-of-life issues (Enderby & Emerson, 1995; Frattali, 1998; Fougéryrollas, Cloutier, Bergeron, Coté, & Michel, 1998).

Clinicians and researchers currently emphasize EBP in clinical language intervention because it allows us to demonstrate to those outside of our discipline that what we do works and is worth doing. Another benefit of EBP is that it permits us to plan for clinical practice and to develop newly improved models and approaches to intervention and service delivery. It is expected that constant upgrading of current practices will lead to improved outcomes for our clients. Finally, EBP enables us to make links with other
fields, resulting in new applications of knowledge and new treatment approaches, thus continually advancing our discipline.

**What Constitutes Good Evidence in Favor of a Clinical Approach?**

Until fairly recently, there was little consensus regarding the types of outcomes that provided the most solid evidence in favor of a treatment approach. Based on a classification system adopted from epidemiology, an outcomes measurement classification for communication intervention has recently been proposed (Frattali, 1998; Fineberg, 1990; Holland, Fromm, DeRuyter, & Stein, 1996). This classification system weighs the strength of evidence of a treatment based on the degree of scientific rigor of the methodology of the research approach used to collect the evidence and categorizes this evidence into three established classes (American Academy of Neurology, 1994). Thus a high degree of scientific methodological rigor in conducting outcomes research contributes to the strength of the evidence it provides in support of a treatment approach through the use of controlled research designs which protect against bias and subjectivity in the interpretation of findings.

Methods resulting in **Class I** evidence consist of well-designed, experimentally controlled research studies. The most scientifically controlled of such studies are randomized control trials (RCT) which typically involve large numbers of subjects randomly assigned to various treatment groups. Class I evidence provides the strongest empirical support of a treatment approach, and RCTs are considered to be the gold standard towards which outcome research should strive. Indeed, the RCT approach is the only research design that permits clear inferences to be made regarding causal relationships between treatments and their associated outcomes, in other words, to state that it was the treatment itself that caused the observable effect.

**Class II** evidence is obtained from quasi-experimental designs, often in the form of cohort studies or program evaluations. Cohort studies are prospective studies in which a group of individuals with a common characteristic are followed over time to examine the particular outcome(s) under investigation. Such studies may involve a control group, allowing inter-group comparisons to be made on variables of interest to the research. Class II evidence is often cited in program evaluations, which are typically carried out to determine whether a program is meeting its goals. Program evaluations are systematic and include pre-established standards or benchmarks against which a program is judged. Studies resulting in Class II evidence are based on less methodologically rigorous research approaches than Class I and therefore are seen by some as presenting less compelling evidence in favor of a particular treatment. Such studies are considered to be more open to the influence of extraneous factors that may bias the results of the investigation of intervention effectiveness and are often limited in their generalizability due to the limited number of participants and the lack of a control group.
Class III evidence is typically obtained through non-experimental research designs. Such designs are often retrospective in nature and may include case studies, registries and database studies, group judgments, or expert opinions of performance. These designs lack experimental control or contain important flaws in research design and are often criticized as being subjective and/or anecdotal in nature. Evidence from studies utilizing Class III research approaches are considered to provide the least compelling evidence in favor of a treatment approach.

The classification system described above is based on an epidemiological model. In clinical speech-language applications, for example, Class I evidence may be unattainable or unethical. For this reason, Class II evidence is becoming widely acceptable as good evidence in favor of a treatment approach in clinical outcome measurement, while Class III evidence is considered to be useful in lending support to more experimental studies. Such evidence can help in shaping and informing the development of more methodologically rigorous research. Nevertheless, a primary goal of outcome-based research is to seek the strongest possible evidence in support of a clinical intervention approach.

The Evidence in Favor of AVT as a Treatment Approach

Historically, research examining the performance of children with hearing loss in various domains of communication outcome has been fraught with methodological difficulties. Confounds in terms of groupings of children based on mode of communication, intervention approach, degree of hearing loss, chronological age, amplification devices, and cognitive status (among other variables) have made this research almost impossible to interpret.

Reports of the effectiveness of AVT as an intervention approach have not been immune to criticism and accusations of being subjective and anecdotal. A perception that outcomes of AVT were in fact based on the performance of "AVT Stars" and not representative of the population of children with hearing loss has led to a certain lack of credibility of the reported benefits of AVT outside of the field.

In this section, seven studies that have specifically examined various treatment outcomes of AVT are described. These studies vary widely in the age of the participants involved, the geographical region implicated, and the form of evidence collected. Each study is presented in light of the strength of evidence it provides in favor of AVT as a treatment approach. Studies are presented in the chronological order in which they were published. Only those studies that have specifically examined domains of outcome associated with AVT are described.

The earliest seminal outcome study of AVT is a survey study conducted by Goldberg and Flexer in 1993. The study was an attempt to examine the efficacy of AVT practices and to document the status of graduates of a number of AVT programs in the U.S. and Canada. The research used a consumer survey.
approach to examine the question, "How do these now grown-up recipients of AV practice describe themselves and their histories?" The data were collected in the form of a six-page survey which provided descriptive information related to the degree and etiology of hearing loss, age of onset, amplification, educational history, and employment history of the participants. One hundred and fifty-seven individuals with hearing loss, who had obtained pre-school AVT intervention and who ranged in age from 18-47 years, responded to the questionnaire. All responses were in the form of self-report and included individuals' self-perceptions of their current levels of functioning. On the basis of these responses, the researchers concluded that the majority of the respondents to the survey identified themselves as successfully functioning in their communities, local schools, and post-secondary institutions.

The results of this study provide interesting insights into a self-selected group of graduates of various AV programs in North America. However, since all of the data are descriptive and based on self-reports and self-perceptions, no cause-effect relationships related to AVT and subsequent outcomes can be inferred. This study can thus be rated as providing Class III evidence in favor of AVT as a treatment approach. The research was nevertheless a milestone in the examination of AVT and delineated a number of crucial variables that have been utilized in subsequent survey-based examinations of the outcomes of AVT.

The second study specifically examining outcomes related to AVT was carried out by Robertson and Flexer in 1993. These authors conducted a survey study requesting parents to provide standardized test scores of reading development for their school-aged children with pre-lingual hearing loss who were educated through AVT. Additional variables examined included age, etiology and degree of hearing loss, age at amplification, description of school placement, extracurricular activities, and early contact with reading. Questionnaires were distributed to parents through therapists known to have been practicing AVT in the U.S. and Switzerland. The survey consisted of such questions as, "What is your impression of your child's reading ability compared to the hearing children in his/her class?" Parents were also asked to submit standardized test scores of reading performance.

Results from 37 children with hearing loss who ranged in age from 6-19 years were used in the analysis. According to Robertson and Flexer (1993), 30 of the 37 children scored at the 50th percentile or higher on a variety of reading tests normed on children with normal hearing. Performance on 17 different standardized measures of reading are reported in order to support the authors' conclusion that, "The children in this study, all of whom acquired language through the process of listening, developed reading ability comparable to their peers who hear normally" (p. 253).

While those parents who provided standardized reading test scores for their children with hearing loss indicated that these children had attained high levels of achievement, it is difficult to make comparisons across the various reading measures reported as well as across the ages of the children.
involved. Other than the fact that AV therapists distributed the questionnaires, no information related to the comparability of the centers in which these children received their intervention is provided. Results are anecdotal in that they rely on parent report, making it impossible to conclude that there is a causal relationship between participation in AVT and the reading scores attained by these children. While the study provides some interesting descriptive information related to a self-selected set of families of children with hearing loss, their children, and their home literacy practices, we are again presented with Class III evidence in support of AVT outcomes.

In 1994, Roberts and Rickards conducted an extensive survey of graduates of an Australian integrated auditory/oral pre-school (Roberts & Rickards, 1994a, 1994b). The authors utilized a 26-item descriptive self-report questionnaire to examine participants’ perceptions of their amplification usage, communication practices, speech intelligibility, academic achievement, use of support services, and friendship patterns. One hundred graduates of this preschool AVT program, who ranged in age from 7 to 17 years, responded to the questionnaire. The survey contained questions such as, “Do you receive extra help in school? What sort of help? What sort of help would you like?” Based on the descriptive information provided by the participants, the authors concluded that,

The majority of students reported that they used hearing aids consistently, used speech as their major mode of communication, were less reliant on supplementary modes of communication than their deaf friends, and perceived themselves as better listeners than speakers. Eighty three percent of children perceived their overall academic progress to be “average” to “above average” as compared to their class peers. Nearly all children received audiological support and over one third were supported by speech therapists and integration aides. Nearly two thirds of the children reported that most of their friends had normal hearing (p. 207).

The authors are careful in stating that their findings cannot be interpreted as being causally related to the pre-school AVT services received by the participants. Results presented in this study are again based on a self-selected sample of participants and are primarily retrospective in nature. Information related to these individuals’ perceptions, experiences, and current levels of functioning present an interesting description of a sample of graduates of a specific AVT program, but provide only Class III evidence in favor of AVT as a treatment approach.

A study conducted by Lewis in 1996 examined the reading achievement of children with severe-to-profound hearing loss who had been educated through an aural approach and had graduated from classes in five school boards and two special schools for children with hearing loss in the U.K. This descriptive, retrospective study examined relationships among hearing levels, hearing status of parents, educational management, non-verbal IQ,
and reading age levels in 82 children with pre- or peri-lingual, severe-to-profound hearing loss who had spent the last 5 years of their schooling in Natural Aural programs. No details on age range, programs attended, comparability of programs, or tests used in the study are provided in the body of the article. Instead, the author refers the reader to a previous study by Conrad (1979) for this information. Conrad documented poor educational outcomes and reading achievement levels for children with severe to profound hearing loss educated in both integrated and special classroom contexts. Results of Conrad's study indicated that only 1.4% of school graduates with profound hearing loss and 8% with severe hearing loss had a reading age commensurate with their chronological age.

The objective of Lewis' study was to re-examine Conrad's findings and to illustrate that the potential for reading achievement in this population of children might be higher than indicated by Conrad's previous findings. Lewis' results showed that 17% (or 14 of the sample) representing all degrees of hearing loss were reading at levels at or above their chronological age. Students with profound hearing losses of 120 dB HL, represented by 24% of the sample, attained high levels of reading achievement by the time they left school. Unfortunately, the lack of detail regarding intervention program, educational context, and the measures and methods used to evaluate the reading performance of the participants with hearing loss make the findings hard to interpret with respect to other studies examining reading achievement in children with hearing loss. Therefore, the results can be interpreted as providing only Class III evidence in support of AVT as an intervention approach.

In 1997, Wray, Flexer, and Vaccaro examined the classroom performance of children who were deaf or hard of hearing and who learned spoken language through the Auditory-Verbal approach. A questionnaire was used to examine the classroom performance of 19 children who were deaf or hard of hearing who had attended a pre-school AVT program at the University of Akron. These children were between the ages of 2 and 5 and were being educated in mainstream classrooms. These students ranged in age from 5.5 to 15.2 years. Teachers completed the Screening Instrument for Targeting Educational Risk (SIFTER) (Anderson, 1989) which assesses teacher perceptions of student performance in the areas of academics, attention, communication, class participation, and school behavior through 15 questions rated on a Likert scale. Additionally, teachers provided reading level and qualitative information about classroom and support services for individual children, while parents reported on involvement in community and school activities. Descriptive information regarding demographics, degree of hearing loss, and type and use of amplification technology was also collected as part of the study. The authors concluded that 16 of the 19 children who had attended the program were fully included in their local schools and, according to their teachers, read at or above grade level.

In this study, a standardized tool, the SIFTER, was utilized in order to obtain information about students with hearing loss in integrated settings.
The SIFTER is considered to be a screening tool. However, it does not have any associated normative data other than providing a cut-off score indicating those students who may be experiencing difficulties in the classroom setting. Additional information obtained through the study is descriptive and based on parent and teacher reports and anecdotal information. It should be noted that the stated goal of this study was to examine the treatment efficacy of AVT rather than to document specific outcomes related to this treatment approach. Treatment efficacy studies are typically conducted to demonstrate that a program was able to produce a specific predicted outcome, which was a subtly different objective than studies that are conducted to examine broader domains of outcome. The study provides Class III evidence in favor of AVT as a treatment approach.

The only research examining outcomes of AVT that can be classified as utilizing a true experimental design is a study reported by Rhoades and Chisholm (2000) and Rhoades (2001), which examined global language growth rates in children who had received intensive AVT for a period of 1 to 4 years. Participants in this study were children with moderate-to-profound hearing losses, 13 of whom wore hearing aids and 27 who had cochlear implants. These children ranged in age from 50 to 120 months. Participants were administered three measures of global language development normed on children with normal hearing. The language measures used were the Sequenced Inventory of Communication Development (SICD) (Hedrick, Prather, & Tobin, 1984), which measures overall language development in children from 0–4 years; the Preschool Language Scale–3 (PLS–3) (Zimmerman, Steiner, & Pond, 1992), which assesses language from 1–7 years; and the Oral-Written Language Scale (OWLS) (Carrow-Woolfolk, 1995), which measures language development in individuals from 3–21 years. All of these measures have documented psychometric properties and are frequently used in assessing language development in pre-school and school-aged children.

The research documented changes in receptive and expressive age equivalency scores over time and as a function of the number of years the child was enrolled in AVT. Results indicated that all children, regardless of amplification technology used, showed some growth in expressive and receptive language development over time, a finding that might easily be explained through normal developmental maturation. Results from some of the graduates of the AVT program showed no gap between their chronological age and their receptive and expressive language age-equivalency scores, indicating age appropriate language skills. The authors conclude that,

Group performances in receptive and expressive language for each year indicate that a reasonable overall expected average rate of growth should be 100% for each of the first 2 years of AVT, even for typical older preschool children. Furthermore, performance of the “graduates” in this study shows that the gap between CA and LA was closed - these children essentially attained linguistic competency at levels commensurate with peers who have normal hearing (p.5).
The authors are careful with respect to implying that a direct cause-effect relationship exists between AVT and the achievement of high degrees of language skills in the participants. They make no implication that it was AVT alone that led to the outcomes reported in the study. The authors conclude only that AVT is a "highly viable communication option" (p. 24) for children with hearing loss. The study did not utilize a control group, represented a relatively small sample size, and recruited participants from a single AVT program. Results are therefore limited in terms of their generalizability to other children with hearing loss enrolled in AVT. Through use of an experimental design and the administration of standardized test measures, this research provides solid Class II evidence in favor of AVT as an intervention option and is the only study of its kind to date that examines outcomes utilizing a prospective, objective research methodology.

**Summary: Evidence in Support of AVT**

The combined observations regarding the studies reviewed allow a number of conclusions to be drawn about research examining the outcomes of AVT and the types of existing evidence to support this intervention approach. This evidence would be classified as providing only limited support in favor of AVT as a treatment approach, due to a number of significant problems related to research design. These issues are summarized below.

First, research examining the outcomes of AVT tends to be retrospective and/or anecdotal in nature. A number of the studies reviewed relied on questionnaires, expert opinions, and data contained in student files. This type of information is considered to provide only the lowest level of evidence in favor of a treatment approach.

Second, research examining outcomes of AVT has often been based on a small participant pool or a self-selected or convenience sample of participants rather than a sample population enrolled at the beginning of a particular study. In most of these studies, no clear inclusion criteria other than the child’s previous enrollment in a particular AVT program are cited as eligibility criteria for participation. None of the studies utilized a control group for comparison purposes in their documentation of outcome. Only one of the studies used standardized measures whose normative data was based on scores from children with normal hearing at the same chronological age. This normative data provided a point of comparison for the performance of the students with hearing loss.

Third, comparisons of results across studies are difficult as a wide variety of communication skill outcomes have been examined using many different measures. The studies reviewed concentrated on differing domains of communicative competence including speech intelligibility, reading, and academic achievement using a variety of research tools and approaches. None of the studies reported on these children's levels of functioning across multiple domains. Furthermore, the social development and psychosocial functioning
of children who participated in AVT as a valid domain of outcome remains largely unexplored.

Finally, much of the reviewed research contains methodological problems. Combined results are presented from children with widely differing degrees of hearing loss, age of diagnosis, chronological and hearing ages, and type of amplification. While intervention approach is assumed to be constant across the studies reviewed, few details are provided regarding the specific teaching principles used in the various treatment centers which might support the categorization of the intervention approach as AVT.

**What Evidence is Still Needed to Support AVT as a Treatment Approach?**

The scientific evidence reviewed demonstrates that children with hearing loss who are enrolled in AVT are able to make substantial progress in the development of speech, language, and reading skills in spite of their hearing difficulties. Some of these children have reportedly been able to achieve levels of language and literacy development that are commensurate with those of their peers with normal hearing. It thus appears that AVT intervention for children with hearing loss may have a substantial positive effect on oral communication and literacy skill development. Nevertheless, based on the evidence, it is not possible to conclude that a direct cause-effect relationship exists between AVT and the documented outcomes reported by the researchers, because the research methodologies utilized in these studies provide primarily Class III evidence in support of AVT as an intervention approach.

There is currently an urgent need for more sophisticated and controlled research examining the outcomes of AVT that incorporates the high standards associated with scientific evidence required to illustrate intervention effectiveness. Class III evidence is no longer considered to be sufficient to justify intervention approaches, particularly in the current atmosphere of government cutbacks to healthcare and pay-for-service health insurance plans. It is crucial that we move toward the collection of data that is methodologically sound and provides the best possible class of evidence in favor of AVT as an intervention approach. The danger of not having such evidence available is illustrated in the recent criticisms leveled against universal newborn hearing screening by the United States Preventative Services Task Force (USPSTF, 2001) where the lack of prospective, controlled studies examining outcomes of newborn hearing screening, and early intervention were cited repeatedly as grounds for the conclusion that there is insufficient scientific evidence to make recommendations either for or against routine neonatal hearing screening. As the basis for its conclusions, the report utilized available research results in two central domains, both of which have implications for outcomes documentation in AVT: evidence of the effectiveness of existing universal hearing screening programs and evidence that early
identification and treatment of hearing loss result in better speech and language outcomes.

Clearly, similar criticisms regarding the lack of sound scientific evidence can be leveled against the existing research examining outcomes of AVT. It is unlikely that Class I evidence generated through RCTs will ever be obtainable to support AVT outcomes, as it is parents, not clinicians and researchers, who make decisions related to the adoption of a communication approach for their children with hearing loss. Nevertheless, it is imperative that future research studies examining outcomes of AVT apply the highest possible degree of scientific rigor in their research designs in order to provide the strongest possible Class II evidence in favor of this intervention approach. In order to accomplish this, such designs should be minimally expected to: 1) administer objective assessments utilizing assessment tools with well validated psychometric properties; 2) incorporate an appropriate comparison group; 3) be prospective and longitudinal rather than retrospective in nature; 4) delineate specific predictor variables for the outcomes it proposes to assess; and 5) provide the opportunity for conducting correlational statistical analyses of the variables proposed to be predictive of outcome results.

It should be noted that there are numerous methodological challenges to conducting outcomes research that can generate sufficiently high levels of evidence in favor of AVT as an intervention approach. These include, among others, the small number of children with hearing loss enrolled in an AVT program in any given geographical area; the variety of factors that influence intervention outcomes that include family involvement, the cultural and language background of the family, and the skill of the individual therapist; and individual variables related to the children themselves, such as degree of hearing loss, level of cognitive functioning and temperament. Designing research studies examining the outcomes of AVT that can control for such variables is therefore an enormously difficult task.

To overcome these limitations, the development of collaborative, multicenter research projects may be the most effective method of obtaining the high degree of scientific rigor required for strong outcome evidence. In order to accomplish this, it may be advantageous to engage in a discipline-wide discussion regarding the aspects of functioning that might constitute the strongest possible evidence in favor of AVT and the methods through which these data might be collected. A preliminary list of such issues is presented in Table I. This discussion could include the various skill domains that should be included in the assessment of outcome, the child and family variables that might need to be controlled in order to reduce potential bias in the findings, and the importance of acknowledging cultural, language, and socioeconomic factors as important potential variables in the examination of outcomes of AVT. A preliminary list of specific questions to consider in conducting such research is provided in Table II.

We have a responsibility to document that AVT works, not only to satisfy the demands of policymakers, employers, health insurance agencies, and the
Table I. Issues for Discussion

- The aspects of functioning that might provide the strongest possible evidence in favor of AVT
- The skill domains to be included in assessment of outcome
- The measures that might most effectively be used to assess outcome in children across a wide range of ages and language abilities
- The child and family variables that might need to be controlled to reduce bias in the findings
- The importance of recognizing cultural, second language, and socio-economic factors as potential influences in the examination of outcome
- The establishment of collaborative, multi-center research projects to circumvent the limitations of previous research and to obtain the highest degree of scientific rigor possible for strong outcome evidence in favor of AVT

Table II. Questions to Consider

- Which domains are essential to measure?
- How do we want to measure outcome?
- Standardized assessments allow comparisons to peers with normal hearing. Do we want to specify which standardized tests to use to facilitate collaboration and comparison of results across centers? [See for example discussion in Rhoades (2003)].
- How do we deal with cultural bias in standardized assessments?
- What do we do for children whose language levels do not yet permit the use of standardized measures?
- Are standardized assessments enough? Questionnaires allow collection of a range of information not available from the standardized tests but are not objective, do not generally permit statistical analysis, and are more difficult to summarize. Nevertheless, not all domains are measurable through standardized assessment tools.
- Are there tools that do not yet exist that are needed in order to examine outcomes of AVT?
- How do we deal with the impact of individual variables that we believe have an impact on outcome, such as:
  - access to services (e.g. rural, urban)
  - parental involvement
  - technological advances (e.g. cochlear implants)
  - multicultural issues
  - school factors, including resource support
  - socioeconomic factors

children and families we serve, but also for ourselves. The debate regarding the effectiveness of our work has raged for too long. The pressures and demands to demonstrate objective, scientifically rigorous outcomes related to AVT are increasing. It is time we take a proactive approach to resolving the issues by organizing, participating in, and conducting objective, empirical
research that will demonstrate categorically and definitively that AVT is an effective communication option for children with hearing loss.

References


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