Conference Opening Address

Evidence-Based Practice in Pediatric Audiology

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Introduction

“Evidence Based Practice” (EBP) is an approach to clinical service delivery that has become increasingly advocated in the past decade (McKibbon 1999). EBP was initially discussed in the field of medicine, and evidence-based medicine (EBM) received increasing attention in the 1990’s. EBM is defined as the “conscientious, explicit, and judicious use of current best evidence in making decisions about the care of patients . . . achieved through integrating individual expertise with access to systematic evidence” (Oxford-Centre for Evidence Based Medicine 2004).

EBM incorporates several elements, the primary of which is the major role of scientific evidence in clinical decision-making (McKibbon 1999). Scientific evidence is not sufficient, as in EBM clinical experience and a strong basic education of the practitioner are used in conjunction with research. Finally and importantly, EBM considers each individual’s unique situation, recognizing the preferences, expectations, culture and feelings of the patient are incorporated into the clinical decision making process (Oxford-Centre for Evidence Based Medicine 2004, on line article; McKibbon 1999).

Why is EBM so strongly advocated in the delivery of healthcare today? Numerous factors impact on delivery of medical healthcare services including resources availability, quality of life, identification, comprehensive diagnosis, and timely treatment. Therefore, there is a need to ensure that the medical practices delivered to patients are the best that can be provided. Dr. Muir Gray, Director, National Electronic Library for Health and Programs Director, National Screening Committee, United Kingdom (UK) has suggested that EBM is about helping to ensure that the services delivered to patients by conscientious and well-intended clinicians do more good than harm. EBM, Gray suggests, is about “doing the right things, right” (Gray 2001; Burton 2003).

Early on, advocates of EBM frequently were dogmatic in their insistence on the necessity of having rigorous studies (randomized controlled trials: RCTs) demonstrating the efficacy of every health care practice. While the principles of EBM were considered sound (few, if any, patients would say they’d desire a clinical service that had no evidence of effectiveness), there have been those who have criticized the principles of EBM as being too stringent. McKibbon (1999) relates that in a 1995 editorial in The Lancet titled “Evidence-based Medicine In Its Place,” editors of the prestigious medical journal accused proponents of EBM “of being subversive, narrow and lacking in finesse” (p.3). There was even a suggestion that EBM proponents as a group had exhibited “certain similarities to fundamentalist cults” (p.3).

Evidence-based practice today involves clinical decision-making not based solely on the results of literature review, but balanced by the consideration of three ‘truths’ or realities about clinical practice that have been articulated by Feinstein and Horowitz (1997):

- One (most important): practice must always be considered in view of the needs, culture, and preferences of the individual patient;
- Two: there is the real probability that some of the evidence-base supporting current practice will change or, indeed, be entirely refuted by evidence that will emerge in the future;
Three: many “best” practices will never be evaluated using the highest level of evidence-based studies (RCT) because of ethical considerations that would preclude such investigations.

The third “truth” Feinstein and Horowitz (1997) proffered is thought provoking. Clinicians have raised valid concerns about whether there is a need for a RCT to support every clinical practice or whether years of clinical knowledge, observation and forms of evidence (good investigations that are not RCTs) are sometimes sufficient. Smith and Pell (2003) published a tongue-in-cheek systematic review in 2003 in the British Medical Journal (BMJ) on available RCTs supporting parachute use to prevent death and major trauma related to “gravitational challenge.” The authors’ search strategies revealed no randomized controlled trials supporting the practice. Smith and Pell concluded that when RCTs are lacking, common sense and well-executed observational studies should be applied to support the use of certain clinical practices. The authors of the BMJ article suggested that if an RCT were required to support the practice of parachute use to prevent injury or death, then advocates “not hesitate to demonstrate their commitment [to EBM] by volunteering for a double-blind, randomised, placebo controlled, crossover trial” (Smith and Pell 2003, p.1460).

Evidence-Based Practice and Pediatric Audiology

Recently, health care professions other than medicine have begun to incorporate the principles of evidence-based practice into all aspects of patient care including screening, audiologic diagnosis, and intervention (treatment). There has been an increasing number of audiologists over the past several years who have advocated that the principles of EBP be incorporated into our profession’s clinical practices, as well as infused into the training of future audiologist-practitioners (e.g., Bess 1995; Robinson 1999; Bess 2000; Thorne 2003).

To practice evidence-based audiology (EBA), professionals are challenged to continually update the sound foundations on which our current audiological practice is based. Advocates of EBA have argued that with the explosion of information and technology, audiologists cannot continue to rely on the information and skills they learned in their formal professional academic and clinical training programs. Rather, clinicians must have a strong commitment to keeping up-to-date with methods, technologies and interventions reported in the field’s scientific journals, and continually incorporate relevant, well-executed research literature into clinical practice patterns.

In 1995, Fred Bess published a “Viewpoint” article in the American Journal of Audiology, in which he suggested that the EBM model proffered by Sackett and colleagues (Sackett, Haynes, Guyatt and Tugwell 1991) required deliberation by audiologists who found themselves practicing in an ever-changing health care environment. He called for audiologists to consider a “new practice of audiology,” an approach to clinical service delivery that: (1) de-emphasized intuition and unsystematic clinical experience as the basis for clinical decision-making; and, (2) stressed the need to understand the “rules of evidence” in order that audiologists might interpret the clinical and hearing science literature appropriately, and subsequently make their own independent judgments regarding the evidence. Bess (1995) cautioned that it was the responsibility of audiologists to evaluate the credibility of opinions offered by ‘authorities’ through knowledge of the extant literature that supported or refuted such judgments.

Building on this conviction, Bess (2000) had the opportunity to expand his belief in the need for evidence-based audiology practice in his inspiring endnote address entitled Early Amplification for Children: Implementing Change at the first “Sound Foundation Through Early Amplification Conference” held in 1998. His comments were delivered within the context of the outcomes reported in the 1994–1995 survey completed at Vanderbilt University on pediatric hearing aid fitting practices (Hedley-Williams, Tharpe and Bess 1996). The survey found that few audiologists at the time were using a systematic approach to hearing aid fitting for infants and young children; specifically, there were few clinicians employing an evidence-based pediatric prescriptive method. Acknowledging that a follow-up survey completed by Tharpe (2000) for presentation at the same 1998 Conference revealed that there had been some increase in the proportion of audiologists using an evidence-based pediatric prescriptive hearing aid fitting procedure, Bess (2000) noted that there was still reluctance among some clinicians to change their hearing aid selection and fitting practices. Thus, the lack of evidence-based practice in
pediatric audiology continued despite highly complex, rapidly changing amplification technology and real-ear measurement equipment, as well as the availability of published selection and fitting protocols specifically developed for the purpose (i.e., Pediatric Working Group 1996).

Bess (2000) stressed that adopting evidence-based audiology practice was timely and necessary, and he challenged the audience present to:

- improve audiology educational training programs to emphasize evidence-based practice;
- develop and implement innovative continuing education programs for practicing audiologists;
- develop and disseminate evidence-based clinical practice guidelines;
- educate consumers to demand evidence-based services;
- advance the concept of specialty recognition in pediatric audiology;
- link evidence-based practices to third-party coverage and payment;
- develop centers of excellence specifically to serve young children under the age of six months and their families.

Bess (2000) concluded by saying that: “if we truly desire to afford the best possible services to children and their families, we must be willing to continually modify our clinical protocols as new evidence emerges” (p. 250).

**Becoming Evidence-Based Pediatric Audiologists**

In continued support of evidence-based practice in pediatric audiology, the following section will overview: 1) steps that can lead to evidence-based pediatric audiology practice patterns; 2) pointers on becoming good consumers of the literature of our profession; and, 3) examples of good evidence that have been published recently in the audiology literature that are directly related to pediatric practice.

**Steps for Implementing Evidence-Based Practice**

Clinicians desiring to learn more about how to become evidence-based practitioners might consider a clear and informative book by Ann McKibbon (1999) titled *PDQ Evidence-Based Principles and Practice*. In her practical, step-by-step guide, she expands upon a five-step process for evidence-based practice that can be applied to evidence-based pediatric audiology practice. McKibbon’s five steps are:

1. Define the question or problem.
2. Collect the evidence now available to answer the question or address the clinical problem.
3. Evaluate the evidence formally by completing a ‘critical appraisal’ of the information obtained through reading and analyses of the relevant research literature available on the problem or question.
4. Integrate the evidence with the individual case factors that would allow an informed decision and follow-up to be undertaken by the family.
5. Audit the entire process with the goal of improving the evidence-based approach with children (and families) referred subsequently with the same condition.

**Evidence Gathering**

To ensure continuing clinical competency, clinicians must use the audiology, hearing science, and relevant literature of other fields to support their clinical decisions. McKibbon (1999) has identified five sources that are recommended for practitioners (a “personal collection”) that can readily serve as the initial basis for a clinician’s pursuit of evidence.

1. Textbooks and review articles with knowledge of the multiple limitations of these sources including their proclivity for outdated material, opinion and bias. Still, McKibbon (1999) suggests, reading a current, comprehensive, well-written, and thoroughly referenced review within a particular clinical area may facilitate the clinician’s pursuit of sources of evidence.
2. Journal subscriptions given the caveat that even for articles published in highly regarded journals, the peer review process can be imprecise and biased (McKibbon 1999; Rosenfeld 2003a).
3. A personal collection of reprints of well-designed and executed data-based articles for specific areas of interest.
4. Access to a large database/specialty service such as MEDLINE and whenever possible, the
resources of a librarian skilled at undertaking literature searches
5. Internet access (used skillfully and skeptically).

Our need to regularly survey current scientific journals is a necessary but formidable challenge, as according to Rosenfeld (2003a, p.9) “... new research proliferates at a mind-numbing rate.” He suggests, then, that in order to manage the overwhelming literature available, different but complementary search strategies are required: “browsing strategies” and “specific problem-based search strategies.”

The need for adopting such strategies is illustrated in Thorne’s (2003) commentary on evidence-based practice in which he completed a MEDLINE search examining the number of audiology publications from 1960 forward. According to Thorne, there were 200 articles in audiology published in 1960, but by the year his article was written, that number had grown to 1700. He suggested that even the best intentioned audiologist would need to peruse over five published papers every day in order to stay current. When Thorne considered the additional relevant hearing science literature, he found that potentially over 4300 papers published in one year could be relevant to audiologists. Thorne calculated that the clinician intent on keeping up with the literature would need to examine 12 papers every day from the clinical and basic science literature.

Clearly, there is need to be selective regarding the articles we read thoroughly in our search for ‘good evidence.’ Rosenfeld in his excellent and informative chapter entitled “Critical Evaluation of Journal Articles” in his co-edited book Evidence-Based Otitis Media suggests that there are five basic questions the audiologist-consumer should ask as he/she reads and interprets any journal article (Rosenfeld 2003a, p.11).

1. How was the study performed?
2. What are the results?
3. Are the results valid within the study?
4. Are the results valid, that is generalizable, outside the study?
5. Are the results strong and consistent?

Beyond these important five basic queries, Burton (2003) reminds us that the ultimate question is whether the findings of the research are applicable (that is, specific) to the care of the individual patient with whom the clinician is working.

Strength of evidence is determined by the study’s design and methodology, and the conclusions drawn by the authors must be consistent with that level of investigation. As Rosenfeld (2003a) aptly warns: “no amount of statistical wizardry can compensate for flawed study design and biased outcome assessment” and he admonishes us to “save [our] intellectual energy for well-designed studies worthy of interpretation” (p. 25). The strength of a study is judged hierarchically. According to Burton (2003), Fletcher and Sackett defined still accepted ‘levels of evidence’ over 20 years ago in their work for the Canadian Task Force on Periodic Health Examination. Levels (1–5) of evidence range from the RCT the strongest (1), to case reports (4) and personal opinion (5), the weakest. McKibbon (1999) suggests that the majority of studies reported in the medical literature on which clinicians can formulate clinical decisions are cohort (2) or case-control studies (3) of moderate strength. (Readers are referred to Burton [2003] for a review and delineation of levels of evidence for studies evaluating therapy, prevention, and diagnostic tests.)

Classification of Evidence

McKibbon (1999) classifies the research literature into two broad categories: Primary Clinical Research and Secondary Publications. She delineates Primary Clinical Research studies as being comparative and preplanned and breaks them down into four general types that differ with respect to the questions they address and as well as specifics of their research designs or methodology: 1) Therapy or Intervention; 2) Screening and Diagnosis; 3) Etiology and Causation; and, 4) Natural History and Prognosis studies. McKibbon (1999) defines Secondary Publications as those in which researchers summarize and analyze previously published and unpublished data to develop: 1) Systematic Reviews and Meta-Analyses; 2) Clinical Practice Guidelines; or, 3) Economic Analyses.

In order to better understand these types of publications, examples of Primary Clinical Research studies are provided below, defined according to McKibbon’s (1999) classifications. Each of these examples would arguably qualify as moderate to strong evidence for use in the practice of pediatric audiology. Following the examples of Primary Clinical Research are several illustrations of Secondary Publications, which are valuable to clinical audiologists desiring to adopt evidence-based practice patterns.
Examples of Primary Clinical Research

Therapy/Intervention Studies

A good example of a well-done therapy trial was undertaken recently by researchers at the National Centre for Audiology in Canada, and the National Acoustics Laboratory in Australia (Seewald, Ching, Dillon, Joyce, Britton and Scollie 2002). The research design and results analyses used in this study will likely become the benchmark for future studies of children's use of amplification. Two popular prescriptive methods (the Desired Sensation Level [DSL i/o]; Seewald, Cornelisse, Ramji, Sinclair, Moodie and Jamieson 1997 and National Acoustics Laboratory [NAL-NL1]; Byrne, Dillon and Ching 2001) used clinically for selecting and fitting hearing aids to children with hearing loss were examined. The question was which prescriptive method yielded better performance on laboratory measures of speech recognition ability, and which associated gain and output targets were preferred by children for use in a variety of everyday listening environments. Two groups of children ages 7 to 14 years, with mild to moderate-severe sensory hearing losses and who had been previously fitted with amplification were studied: 24 in Canada and 24 in Australia. The majority of children were fitted with the identical hearing aid binaurally; the instruments incorporated wide dynamic range compression and were two channel, dual memory instruments with omni-directional microphones; the noise reduction algorithm was inactivated for the study.

In a counter-balanced design, the children were assigned first to either the NAL or DSL arm. To avoid bias, the audiologist and the child were blinded as to which prescription was being used during the eight-week trial period. The child had access only to the allocated program during the trial period: volume controls were fixed; output limiting was determined by averaging the NAL and DSL fitting targets.

Laboratory tests consisted of consonant recognition and adaptive speech-in-noise measures. At the end of the laboratory phase of the study, the child's hearing aids were switched to the second program and another eight-week trial with the second prescription was begun. Laboratory testing followed this second trial period. During the third eight-week phase of the study, the child was allowed access to both programs and could switch between them at will. Each child kept a diary of use and was asked to rate which program was preferred in 12 different listening situations. Children used a rating scale to indicate preference of one program over the other in each listening condition. A researcher blind to the specific prescriptive procedure completed a qualitative analysis of the diary recordings. Publication of the findings is forthcoming and will provide important, unbiased information about the effect of prescriptive procedure on speech recognition and children's preferences for a prescriptive approach as a function of listening environment.

A second example of a treatment/intervention study has the potential of being the strongest evidence addressing the question of if and when infants with unilateral hearing loss should be fit with a hearing aid in their impaired ear. The Health Technology Assessment (HTA) Group of the United Kingdom's Department of Health has recently funded a Randomized Control Trial (RCT) on the question to Adrian Davis and colleagues at the University of Manchester (A. Davis, personal communication). The design calls for 135 infants and toddlers whose unilateral hearing loss will be identified through newborn hearing screening (NHS), to be randomly assigned to one of three treatment arms. Group 1 will be an 'early' aiding group: infants will be fitted with a hearing aid on the impaired ear as soon as the hearing loss is confirmed. Group 2, the 'later' aiding group, will receive a hearing aid in the 2nd year of life. Group 3, the 'current practice' group, will receive no form of amplification, as is often the case for young children with unilateral hearing loss. The investigators plan to examine acceptance (use) of the hearing aid by the child and the family, as well as to measure communication and overall development at two-years and three-years of age. A sub-project of the HTA-RCT study will enroll young children with bilateral permanent hearing loss of mild to mild-moderate degree who also will be identified through NHS. These children will be fitted with binaural hearing aids immediately upon confirmation of their hearing losses, as currently is considered best practice. Because of ethical considerations, this group of children will not be randomized into the treatment arms described above for the participants with unilateral hearing loss. Rather, this fourth observational/control group with bilateral hearing loss will be assessed at the same ages and with the same measures as the unilateral children involved in the RCT, in order to examine hearing aid acceptance and developmental outcomes at the same points in time. This study
should provide valuable evidence for the development of amplification fitting protocols for infants and young children with unilateral hearing loss.

**Diagnosis and Screening Studies**

A good example of a strong study on screening is the multi-center investigation completed by Norton and her colleagues (Norton et al. 2000) that examined the performance of four hearing screening technologies applied in the neonatal period against later hearing status. Visual reinforcement audiometry (VRA) at 8 to 12 months of age was used as the ‘gold standard’ diagnostic test. Seven centers across the United States (US) enrolled over 7,000 newborns for study: a large proportion (about 62%) were at increased risk for hearing loss because of their neonatal intensive care unit (NICU) experience.

The study examined three screening technologies: transient evoked otoacoustic emissions (TEOAE), two conditions of distortion product otoacoustic emissions (DPOAE), and auditory brainstem response (ABR). Neonates enrolled in the study received all tests; regardless of their outcomes all were invited back for behavioral audiometry follow-up at 8–12 months of age. This study provided pediatric audiologists with information about test performance characteristics (sensitivity, specificity, positive and negative predictive values, positive and negative likelihood ratios, and false positive and false negative rates). Among the important clinical issues addressed, the study found that while all screening technologies were equally “good” in identifying permanent hearing loss of moderate degree or worse, no test was perfect: about 20% of infants with behaviorally-confirmed permanent hearing loss at 8–12 months of age were not identified by one or more of the screening tests applied in the neonatal period. A limitation of the study was a lower (64%) than desired (> 80%; Rosenfeld 2003a) follow-up rate despite aggressive efforts to bring infants back for behavioral testing.

Another multi-center, prospective cohort study recently completed by Johnson and colleagues (in press) examined the outcomes of neonates who had failed an otoacoustic emissions (OAE) screening and subsequently passed a second stage automated-ABR (A-ABR) screening before hospital discharge. The question addressed was whether the two-stage screening protocol (OAE/A-ABR) failed to identify some infants with permanent hearing loss. Comprehensive audiologic evaluation (VRA, otoacoustic emissions, and tympanometry) was completed on 973 infants (64% of the original study cohort enrolled as newborns, drawn from a birth population of over 86,500) at an average age of 9 months. The Johnson et al. (in press) investigation found 21 of the 973 infants who passed the two-step OAE/A-ABR hearing screening protocol had permanent sensorineural or permanent conductive hearing loss in one or both ears later in infancy; 71% of these confirmed hearing losses were mild in degree. The study concluded that the two-step OAE/A-ABR hearing screening protocol would miss an estimated 23% of infants with permanent hearing loss. Limitations of the study included that infants who passed OAE screening were not followed to examine the prevalence of undetected hearing loss in that group, and similar to the Norton et al. (2000) investigation, only 64% of infants enrolled in the newborn period were actually tested at follow-up. Regardless, this study provides clinicians with evidence to support the development of surveillance programs beyond the newborn period and further emphasizes the strengths and limitations of our early identification efforts.

**Etiology, Causation and Harm**

An example of a prospective cohort study (a study design that can provide good evidence to support clinical practice) is a study on the relation of early otitis media with effusion (OME) and early hearing loss to later auditory abilities (Gravel et al. 2005). Two groups of clinical researchers from North Carolina and New York studied inception cohorts, prospectively documenting the number of episodes of OME, as well as average hearing levels experienced by children for the period of time from seven-months to 39-months of age. When the children turned six, seven and eight years of age, they all received measures of their communication skills, behavior and academic performance. At the age of eight years, a series of auditory tests were completed on the children. Multiple regression analyses were used to determine the relation between early OME and early hearing loss, and later peripheral and central auditory processes measured with behavioral audiometric, electrophysiologic, psychoacoustic and speech-in-noise tests. The protocol addressed multiple design limitations that often arise in studies purporting to examine the consequences of early OME and temporary hearing loss on child development that have used data collected retrospectively or estimated rather than measured...
hearing levels. Therefore, the study had strengths not addressed by previous investigations. However, several factors, including differences in the method used for delineating middle ear state in early life, limit the generalizability of the findings.

Examples of Secondary Publications

Systematic Review

A systematic review provides professionals with an analysis of multiple studies in one circumscribed topic area. A systematic review is undertaken using predetermined criteria and well-defined search strategies and may or may not involve a meta-analysis, a statistical method that adds together and numerically summarizes results of studies that meet minimum quality criteria (Clinical Evidence 2000). Such reviews can be extremely useful for clinical decision-making.

Several recent examples of systematic reviews are relevant to audiologists. One published in 2001 in the *Journal of the American Medical Association* summarized the evidence on Universal Newborn Hearing Screening (UNHS) (Thompson et al. 2001). The review was undertaken and subsequently published in support of the findings of the US Preventative Services Task Force’s (USPSTF) conclusion, that while “modern screening tests for hearing impairment can improve identification of newborns with permanent hearing loss, the efficacy of UNHS to improve long-term language outcomes remains uncertain” (USPSTF 2001, p.2000). Based on their systematic review, the USPSTF concluded there was insufficient evidence to either recommend for or against UNHS as public health policy. While concerns have been raised regarding the questions addressed (see Hyde, Chapter 23 in this volume), the methodology used by the USPSTF for its systematic review was sound and carefully applied.

Another systematic review and meta-analysis relevant to the pediatric audiologist was published by Stapells (2000). The intent of the systematic review and meta-analysis was to determine the performance of the air-conducted tone-evoked ABR for threshold estimation in adults and infants/children with normal hearing and sensorineural hearing loss. Thirty-two studies systematically reviewed were included in the meta-analysis. The meta-analysis considered the results of over 1200 individuals, over half of whom were infants and children and 388 of whom had sensorineural hearing loss. Stapells’ meta-analysis provides strong evidence for the use of tone-evoked ABR for threshold estimation in infants and children, particularly important for achieving the goal of early fitting of amplification. Evidence such as this is critical to our clinical decisions regarding the choice of electrophysiologic procedure for use in determining amplification targets in infants too young for reliable behavioral threshold measurement.

Clinical Practice Guidelines

The availability of Clinical Practice Guidelines for support of evidence-based pediatric audiology practice is likely to increase over the next several years as these documents, in general, across all areas of health care are systematically being developed to assist both clinicians’ and patients’ decision-making (McKibbon 1999). Guidelines have been developed by associations, societies, state agencies or national professional groups and then disseminated to members of the organizations or societies, by government departments or published in the literature and thus are available for wide-spread consideration. There have been literally thousands of guidelines published in all areas of health care by professional organizations and other entities (McKibbon 1999). Clinical Practice Guidelines provide recommendations for ‘best practice’ based on an exhaustive review of the literature, as well as expert clinical judgment. Guidelines are not required standards nor practice regulations, rather they are intended to foster care targeted to specific audiences (Rosenfeld 2003b). It is important to remember that a guideline is considered evidence-based when it provides the specific methodology used for the review of the literature, evidence tables developed based on the selected literature considered in the guideline, and a rating of the strength of recommendations based on the evidence available.

A series of evidence based Clinical Practice Guidelines for assessment and intervention with children birth to three years with various disabilities were developed under the auspices of the New York State Department of Health (NYSDOH) Early Intervention (EI) Program using the same strict methodology and format. The target audiences for the Guidelines were parents, professionals, and early intervention providers. A clinical practice guideline on assessment and intervention for infants and toddlers with hearing loss was timely because of approaching NYS legislation mandating newborn
hearing screening. The development of the New York State Clinical Practice Guideline on Assessment and Intervention of Children with Hearing Loss: Birth to 3 Years (in press) involved the following steps.

A consensus panel consisting of topic experts, specialists, generalist providers, end users, and parents was assembled; multiple 2–3 day meetings were held over an 18-month period. The scope of the Clinical Practice Guideline was limited to infants and toddlers with bilateral permanent hearing loss of 30–40 dB HL or greater (JCIH 2000). Evidence on efficacy, harms, and costs was evaluated. Over 6000 abstracts on assessment and intervention were reviewed in the Guideline development process. Approximately 300 were selected and systematically reviewed for assessment and less than 250 were similarly handled for intervention. The articles that met the criteria for evidence numbered 27 under assessment and 17 under intervention and evidence tables were developed for these studies. Recommendations were developed and rated as strong, moderate, or limited, based on the strength of the evidence reviewed; when adequate scientific evidence was not found, recommendations were based on panel consensus. The process for the decisions regarding the recommendations was thoroughly documented. The Guideline was sent for peer review and revisions were completed.

Publication of the Clinical Practice Guideline on Assessment and Intervention of Children with Hearing Loss: Birth to 3 Years (in press) is anticipated in the Winter of 2005 and is intended to promote quality delivery of assessment and intervention services for infants and toddlers with hearing loss in New York State.

Summary and Recommendations

Over the course of the third International Conference: A Sound Foundation Through Early Amplification and the resulting publication of the proceedings, pediatric audiologists will become aware of evidence that will support their current practice in pediatric audiology. Undoubtedly, however, new information and ideas are likely to challenge many professionals’ current approaches to assessment and management of children with hearing loss.

As Fred Bess suggested at this conference six years ago, only the implementation of evidence-based pediatric audiology practice can lead us to the highest quality service provision for children who are deaf or hard-of-hearing and their families. It is incumbent upon us as a specialty profession to pursue an evidence-based approach to pediatric audiology practice in order for us to build and maintain the respect of parents and other professionals for the services we provide, as “effective clinicians . . . constantly question and evaluate the evidence, methods, and procedures, discarding the unproductive, and developing and testing the new” (Bess 2000, p. 250).

Thus, it is an appropriate time for the practice of pediatric audiology to become evidence-based, a worthy goal in our desire to provide the highest quality audiological services to the infants, children and families we serve everyday. As our specialty considers the role of Evidence-Based Pediatric Audiology, it is appropriate to add to the challenges offered by Fred Bess at the first Sound Foundations Conference. As such, let us:

- Become more frequent consumers of the evidence supporting our clinical practices.
- Question the bases for, and the evidence that supports our screening, assessment, intervention and management, and counseling practices. Let us question routinely aspects of what we consider common practices; for example:
  - “What evidence is there that supports the tests I use and the way I deliver audiologic services to infants and children?”
  - “Have the tests and interventions I use been examined against well-studied ‘gold-standard’ procedures?”
  - “Is what I say during my counseling supported by evidence?”
- Be vigilant about separating good scientific evidence from hearsay, tradition, opinion, and marketing.
- Remember that all evidence, no matter how strong, may not generalize across age.
- Examine and interpret the evidence with a focus on the individual child within his/her family unit.

Evidence-based practice and pediatric audiology are now irrefutably linked, particularly as we confront the rapid expansion of our literature and select among the technologies and interventions that are available to us as practitioners. The need to maintain the credibility and highest respect for our profession in these times could not be greater. The
practice of evidence-based pediatric audiology calls for us to use computer bibliographic database search strategies, literature reviews, our educational preparation, and our continuing education activities in our work with children. Importantly, evidence-based practice promotes what experienced clinicians do best: recognize those unique circumstances of an individual child and his/her family and apply best practice based on the evidence that meets their unique situation. Let us remember that while partly art and partly wisdom honed by experience, the practice of pediatric audiology must always be a science.

References

linear gain and wide-dynamic-range compression hearing instruments. London, Ontario, Canada: Hearing Healthcare Research Unit, University of Western Ontario.


