A Sound Foundation Through Early Amplification – Summary of Proceedings

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For the fifth time the International Paediatric Conference "A Sound Foundation through early amplification" was held in Chicago from November 8-10, 2010. The sold out conference was attended by over 500 participants from more than 30 different nations, it was co-chaired by Prof. Richard Seewald and Prof. John Bamford. Together with their steering committee they have put together an excellent program, covering topics from Identification of hearing loss in infants and children to measuring outcomes. A session labelled "Thinking outside the booth" ended the conference in an emotional and informative note.

An impressive selection of internationally renowned speakers covered a wide range of topics over 2.5 days. Despite spring like temperatures, sunshine and many shopping opportunities along the magnificent mile, the audience followed the talks with great interest and attention. A tribute to the well constructed program, the excellently prepared presentations and the clinical relevance of the topics under discussion.

Homage to Prof. Judith Gravel

The conference opening lecture was dedicated to the extraordinary paediatric audiologist Prof. Judith Gravel. Dr. Gravel has been part of all previous paediatric conferences both as a speaker and as a member of the steering committee, and was very much missed by all. The lecture in her honour was presented by Prof. De Wet Swanepoel from the University of Pretoria, South Africa. His lecture opened the first section on identification of hearing loss in infants and children.

Dr. Swanepoel's fascinating lecture focused on "exposing the silent epidemic!" He talked about infant hearing loss in developing countries and pointed out that since people from these regions mainly struggle to survive; over 90% of babies with a hearing loss go unidentified. The developmental and social aspects of unidentified infant hearing loss ultimately prohibit societal integration and participation for these children. He called for integrated maternal/child health initiatives which are in line with the World Health Organization and UNICEF as a global alliance and stipulated a "sound foundation for all children!"

Prof. Karl White from the Utah State University reported about the success and continuing challenges of universal infant hearing screening. He mentioned that the screening as well as the diagnosis and intervention processes still take too long and that results are often needed earlier. He assumes that parents who want to have their children "to be normal" are the big problem causing this delay. Further, he sees the problems in the late referral of the children to hospitals, the ineffective information to the parents, loss of accurate information, shortage of paediatric audiologists and a lack of knowledge as well as of public awareness. At the end he stated that we need more efficient and better targeted screenings as well as more and better trained providers what would help to reduce the loss to follow up.

Audiological Diagnosis: Getting it Right from the Start

Prof. Martyn Hyde from the Mount Sinai Hospital at the University of Toronto introduced the next session by quoting what he felt clinicians often felt: "Buzz Off; I know what I'm doing" He then proceeded to discuss the role of protocols in Early Hearing Detection and Intervention (EHDI). He took us back in the year 400 BC where Plato had his first written thoughts about evidence-based medicine and challenged today's audiologists by asking for the best possible quality of care. But how should a good early intervention protocol look like? Which people should be involved? He has impressively shown how important adhering to clear and well thought through protocols is, the only way to ensure consistent, high-level services, to this rather challenging population.

Prof. David Stapells from the University of British Columbia started his presentation by asking the audience why they would need frequency specific information. Shortly thereafter he presented the frequency specific auditory brainstem response as the gold-standard method to determine auditory thresholds in young infants, especially those less than six months of age and reviewed the latest data on Auditory Steady-State Response (ASSR). He concluded that while ASSR delivers interesting information it is not yet the time to replace frequency specific ABR. It is useful however when used to support screening or in addition to the tone ABR.

Early and correct diagnosis in infants and young children is critical since it has significant impact on the development of children. False diagnosis based on insufficient or ambiguous data can lead to unnecessary delays in treatment and can have detrimental effects on the speech and language development of the affected children. Dr. Patricia Roush from the University of North Carolina School of Medicine discussed several illustrative case examples where a correct diagnosis was significantly delayed. She reiterated the importance of having a battery of tests, including behavioural assessment which according to her remains a critical and often underappreciated component of a comprehensive hearing evaluation.

William Campbell from Thunder Bay District Health Unit in Ontario presented a fascinating project where Telehealth has been used as part of an EHDI program. Telehealth is seen as the future technology of providing health-related services through telecommunication if for example the distance to the next hospital or clinic is too long or an audiologist is not available in this particular region. Difficult cases or rare and specialized test procedures can be guided on-line or the results, interpretations and next steps reviewed off-line, creating virtual centers of tertiary service. Goal of this approach is clearly to decrease the loss to follow up as well as the waiting list for screenings and/or diagnosis.

Paediatric Hearing Instrument Fitting using Modern Technologies: What, When, and Why?
Away from the hearing instruments towards implantable hearing technologies, Dr. Craig Buchman from the University of North Carolina at Chapel Hill showed candidacy considerations for modern implantable hearing technologies: an otologist's perspective and outlined the current state of knowledge for the various devices. Besides a conventional cochlear implant (CI) and Bone Anchored Hearing Aid (BAHA) he also covered the hybrid and fully implantable middle ear devices. While each has a relatively sound rationale for usage, the clinical experience especially for use in the paediatric population is still too scant. He further discussed the dilemma between "destruction of residual hearing" and "earlier is better". Referring to Dr. Roush's presentation he emphasized again the importance of a comprehensive evaluation of the auditory status, rather than relying on single test results.

Dr. Patty Johnstone from the University of Tennessee Health Science Center wondered whether the type of earmolds can have an effect on spatial hearing. In her talk about earmold considerations for optimal spatial hearing in children she hypothesized that there might be a link between localisation and speech intelligibility in noisy contexts. Her case studies demonstrated the positive impact of open fit earmold in the presence of normal hearing in the low frequencies.

Dr. Todd Ricketts from Vanderbilt University Medical Center presented on "directional microphone use with school aged children? – not as simple a question as it sounds" and mentioned that the more we investigate, the less we know. While directional microphones are beneficial for children in school environments if the signal is coming from the front, it might be detrimental if the sound source is located three to four meters behind. Especially when considering automatic directional activation it seems that children's listening environments require special consideration. Evaluating the number of microphone switchings for a four months old child showed that in 44% of the time the omnidirectional mode would be appropriate, for 30% of the time the directional mode and for 26% of the time either mode would do. For older kids with less group interactions in the classroom, only 1/3 of school situations required directional microphones. We need to consider however that for children, overhearing is important and therefore, directional microphones might be in their way.

The impacts of digital noise reduction (DNR) in children were discussed in the next talk. Ryan Mc Creery from Boys Town National Research Hospital in Omaha discussed the most recent data from a study evaluating the effects of DNR on children's speech recognition, word learning and listener ratings of comfort. He showed that DNR does not degrade speech for children aged 5-12 years with

a mild to moderate hearing loss. However, he pointed out that with DNR gain has to be maintained since audibility of the speech signals has to be maintained. In a next step additional algorithms, more severe hearing losses, younger children as well as more realistic "real world environments" will be evaluated in order to draw a complete picture of the effects of DNR on children's speech recognition.

Leisha Eiten also from Boys Town National Research Hospital presented new developments in FM technology for infants and children. She reviewed current FM technologies including Dynamic FM with the myriad of new features it offers. She pointed out that each child may need a different approach in selecting which FM features are most appropriate. The biggest challenge is convincing older children that FM will improve their access to learning. New connectivity options allowing access to MP3 players and phones may be the key to these children's hearts.

Andrea Pittman from Arizona State University sharpened the pencil and discussed the benefits of high frequency amplification in children during word-learning tasks. Recent research for children showed that high-frequency amplification significantly improved perception of some fricatives. In related studies, the lack of high-frequency amplification or narrower bandwidth was thought to be responsible for delayed fricative production in younger children during speech and language development. In a current study the effects of bandwidth on word-learning were examined in normal hearing children and compared to children with hearing loss. Results indicated that children with hearing loss do almost as good as normal hearing kids with broadband bandwidth. Without high-frequency amplification children with hearing loss needed 5 times longer to learn words compared to normal hearing ones. Further, high-frequency amplification significantly increased the rate of word-learning. While clearly broadband amplification is essential, she pointed out that current broadband instruments still do not provide sufficient high-frequency audibility. In addition, as a rule, fitting formulae do not provide targets above 6000 Hz, this makes verification difficult.

The following panel discussion on frequency-lowering technologies was let by Prof. Susan Scollie from the University of Western Ontario. Building on Dr. Pittman's presentation she acknowledges the importance of high frequencies and opened the discussion on whether frequency lowering could serve as a viable alternative. Dr. Jace Wolfe from the Hearts for Hearing Foundation in Oklahoma presented results which indicated that non-linear frequency compression (NFLC) might be beneficial for children with a moderate hearing loss. Andrea Bohnert from the University Clinic in Mainz in Germany, suggested significant benefits of NLFC for children with a severe to profound hearing loss with either sloping or flatter hearing losses. Dr. Danielle Glista from the University of Western Ontario studied acclimatization and NLFC. The use of NLFC yielded significant improvements of speech perception as well as significant acclimatization effects after six weeks in children. Dr. Michael Boretzki from Phonak in Switzerland presented a new test method to verify NLFC settings and results. The nonsense VCV syllable test was shown to be a valid method to determine recognition, detection and discrimination of high-frequency speech cues in order to evaluate the benefits of NLFC for mild to moderate high-frequency hearing losses.

Christine Jones from Phonak US presented Paediatric Hearing Instrument Fitting in 2010: What's New? Based on data collected from over 5000 paediatric fittings in the US she described current trends in paediatric hearing instrument fittings. The data analysis showed that children overall spend 30% of their time in complex listening situations, 40% of children wear their hearing instruments only two to four hours a day, 63% of children in the US are fitted with "economy" hearing instruments and 97% of children wear a Behind-The-Ear hearing instrument. Especially for Prof. Richard Seewald it must have been nice to hear that in 2010, 85% of the children were fitted based on the DSL prescription formula.

An approach to outcome evaluation in paediatric hearing aid fitting was presented by Dr. Marlene Bagatto who introduced the University of Western Ontario Paediatric Audiological Monitoring Protocol (UWO PedAMP). With this protocol designed to evaluate the auditory performance, the missing gap in paediatric hearing instrument fitting is filled. The protocol which is an outcome measure is mainly based on questionnaires such as the LittleEars and the PEACH as well as on RECD and MPO measures and the determination of the speech intelligibility index (SII). This outcome evaluation guideline consists of several tools which aim to measure auditory-related subjective assessments. The UWO PedAMP has been implemented with children of varying ages, developmental abilities and degrees of hearing loss.

Dr. Mary Pat Moeller from Boys Town National Research Hospital in Omaha introduced new tools and gave insights in understanding early communication outcomes. New tools have been developed to address gaps in existing measurement batteries, increase the sensitivity of evaluation strategies and/or broaden the focus of assessments for children with mild to severe hearing loss. Preliminary data from the first year of experience with these tools yielded that children with mild to severe hearing loss may have developmental vulnerabilities related to issues of language access and/or experience. In the future there might be improvements on the test battery in terms of utility of these tools as well as implications for clinical use.

Demonstration of successful outcomes with cochlear implants and hearing aids depend to a large extent on speech perception data. Thus, test results are the most direct indicator of improvement, benefit or lack thereof. Over the last 30 years major efforts have been made to improve test measures, device candidacy, programming devices and tracking performances which resulted in the establishment of guidelines to measure auditory performance of paediatric cochlear implant users. Dr. Laurie Eisenberg from the House Ear Institute in Los Angeles impressively reported the history of speech perception test development for adult and child recipients and showed what could be learned for children who use hearing instruments.

Dr. Josephine Marriage from Chear Ltd claimed that speech-based testing is possible and necessary as the child starts to evolve speech understanding. She claimed that since low frequencies are important during the early development of speech it would not make sense if the high and the mid but not the low frequencies are fitted appropriately. Sensitive speech tests which will give a reliable measure of phoneme detection and discrimination would allow fine-tuning of hearing aid prescription but are not clinically available at the moment.

Thinking Outside the Booth

In the last session of the conference families of infants and children with a hearing loss were the main focus. Stephanie Olsen, herself a CI user, from the Bill Daniels Center for Children's Hospital impressively described what the diagnosis of hearing loss means to families. One key challenge for many families is a lack of information about hearing loss. However, this is not a learning issue but more an access issue. The diagnosis of a hearing loss changes the identity of the entire family. Therefore, the role of a Family Consultant is of importance since he helps families remember that there is more to their child than just his hearing. She advised audiologist that "people will forget what you said and what you did, but they will never forget how you made them feel!"

Janet DesGeorges from Hands and Voices discussed the implications of working with "under-involved" families. She discussed the meaning of the term and whether the families alone are at fault. Further she pointed out that one of the main problems families have is dealing with feelings of guilt. Appropriate counselling for these families is therefore the key to getting them involved.

Dr. Alys Young from the University of Manchester in England mentioned how important quality of the provided services is. A parent report has been developed which includes a measure of the services rendered according to timeliness and availability. Further, the significance of embedding an understanding of quality within parent defined priorities and family-led outcomes are considered as well. Finally, this report provides a good picture of the characteristics and quality of early intervention.

Kris English from the University of Akron finally challenged the audience by saying that they will forget around 90% of what they have listened to today within one month (the so-called forgetting curve). In her talk "Child and Teen Education and Counseling" she discussed concepts of how one could support children not only with a hearing loss to remember things they have learned. One way would be to break down the information in little chunks and distribute learning over time. According to her, the acquired information has to be reviewed over and over again in little pieces each day. She concluded that this method is the way how audiologists can determine if their paediatric patients are ready to learn and ready to change since "growing up well" with hearing loss is easier said than done.

The endnote presentation was made by Prof. John Bamford. He pointed out once more the challenges associated with the need to provide services of good and qualitatively high standard for

infants and children. His inspiring and thoughtful talk served as the perfect ending to a truly interesting conference.

For those interested, all of the Power Point presentations as well as recordings of the presentation are available on the Phonak website www.phonak.com/conference.