"Baby Talk" - Meeting the Unique Challenges of High-risk Families Through a Tele-Therapy Program

M. Farquhar, MSW¹, K. Sussman², J. Larky¹, N. Blevins¹, G. Popelka¹

¹Stanford University, Otolaryngology, Palo Alto, CA USA; ²The Weingarten Children's Center, Redwood City, CA USA

Topic: Rehabilitation/Educational Aspects

Keywords: Rehabilitation for Children, Children and Recommended Rehabilitation, Speech and Language Development with CI

Introduction: Baby Talk is a transformative parent-coaching tele-therapy program for children, ages 0-3, with cochlear implants or digital hearing aids who live in geographic areas without access to professionals who can provide auditory and spoken language services. Our team of tele-therapists provides weekly one-hour sessions using a parent-coaching model via Face-Time using iPads. The team also includes a bilingual social worker and a consulting audiologist. Eighty-six percent of the families served are considered "high-risk" families who live in rural and/or low-income communities and present with specific challenges. Categories of this “challenged” status include: low SES level, child’s behavioral issues, additional medical concerns, lack of social support and language/cultural barriers. Baby Talk provides assessments that establish a baseline of need for each family and creates a service delivery model that aims to effectively address their unique challenges.

Methods: Low SES level: social worker provides psycho-social assessments/determines family needs, advocates with caseworkers and medical teams, assists with resources, and interfaces with parent employers. Language barriers: utilizing bilingual therapists and social worker. Cultural barriers: developing culturally appropriate therapy techniques. Behavioral challenges: team analysis, social work consultation, partnering with EI providers, advocacy in IFSP meetings. Medical: consultation with medical teams. Social Support: parent groups.

Results: Therapy models that address individual barriers of high-risk families were designed. Collaboration between the Baby Talk team, outside county and medical providers resulted in an educational network and safety net for underserved families. High-risk families became successful partners in our tele-therapy program.

Conclusion: Tele-therapy targeted to the demographics that exist in rural and low-income communities necessitates a different allocation of time/support systems and resources. For high-risk families, best practices should include psychosocial assessments and ongoing supportive services in the design of a tele-therapy program. CI centers across the country serve populations that are marginalized and their complex psychosocial challenges can be impediments to successful outcomes. A tele-therapy program that includes the capacity to assess and address these challenges helps enable effective service delivery leading to a child’s listening and spoken language progress. The addition of a social worker, bilingual services, collaboration with Early Start and CI teams can improve outcomes post-implantation. Families can be successful but need guidance and more information over time in order to fully integrate medical information and understand their role in CI process, follow up care, and participation in their child’s education.
Increasing access to Cochlear Implants: Developing a satellite CI Center

D. D. Backous, MD¹, J. Voigt,AuD²

¹Swedish Medical Center, Center For Hearing And Skull Base Surgery, Seattle, WA USA ; ²Swedish Medical Center, Northern Hearing Services, Seattle, WA USA

Introduction: Access to cochlear implants continues to be a significant obstacle to patients living distant to CI centers. In the United States, market penetration for CI is estimated to be between 9-14%. In an effort to expand CI audiology access in patients in Alaska, we started an outreach in partnership with Northern Hearing Services in Anchorage.

Methods: The Alaska Cochlear Implant Network (ACIN) partnership began in 2003 with the local audiology group identifying patients in Alaska and sending them to Seattle, Washington for surgery and programming, requiring multiple 4-hour flights. As the competency of the outreach site increased, we expanded their responsibilities to include full candidacy testing and postoperative programming. Now only preauthorization, device purchasing and surgery are done in Seattle. The program was initially started with a single device and now all 3 commercially available devices are used in the Alaska patient pool. Recipients are followed longitudinally in Anchorage, Alaska. All school support is provided by Northern Hearing Services.

Results: We report on 261 CI in 187 patients implanted between 2003-2014 in the Alaska Cochlear Implant Network (ACIN). Cochlear, Med-EL and Advanced Bionics devices are offered to patients. Preoperative medical assessments are done in Alaska by local ENT surgeons. 21 devices have been replaced for failure. Our tertiary center provides regular support to the audiology team in Alaska as needed. Surgical complication rate is below 2%. Northern Hearing has established multiple support programs in conjunction with the state of Alaska, which would not be available if the patients were treated in Seattle. We report on patient satisfaction, management of device failures and the expansion of hearing services overall in Alaska due to the efforts of this local consortium. We have started a second satellite program in Fairbanks, AK in 2014.

Conclusions: The ACIN has been methodically implemented to increase the local responsibility for Northern Hearing Services as their audiology team felt comfortable with programming and device management. Patients choose which Center for implantation in Seattle. Several peripheral programs, including service in rural areas, are now in place due to the focus of care shifting to Anchorage. Patient satisfaction with this program remains high. This is a 10-year program, which can serve as a model for extension of CI care to rural communities.

COI: Cochlear Corporation¹
Introduction: While protocols and time commitments vary among implant centers, individuals frequently travel to implant centers that are sometimes quite a distance away from home, necessitating time off from work and other home responsibilities. Cochlear implant (CI) programs generally require approximately 6 or more visits to the CI center within the first year of device use, with annual or semiannual visits thereafter. This can be a hardship for patients who live significant distances from a CI center. Remote delivery of clinical CI services via telehealth is therefore an attractive option for patients in rural and other under-served areas. With the advent of personal handheld computers such as the Windows 8 tablet and GoToMeeting software, real-time video conferencing is now within the reach of many more people. Objective: Determine if remote programming of cochlear implants for patients in rural areas can deliver satisfactory care in an economically feasible model.

Methods: A remote programming model using Go To Meeting software running on a Windows 8 tablet was created. Cost savings for patients and health care providers were assessed. Data obtained from patients and providers satisfaction questionnaires were stratified into 3 categories: satisfied (Agree or Strongly Agree), not satisfied (Disagree or Strongly Disagree) or Neutral. The data was analyzed using Wilcoxon signed rank test.

Conclusion: Remote programming of cochlear implants in rural areas, using relatively inexpensive and widely available technology, provided a significant cost savings. Patient and health care provider satisfaction questionnaires are reported for this study.
ACI2014
Transforming CI service delivery: 12 Months Experience with Wireless Portable Programming
Y. Abrahams, BA,BHlthSc, MClinAud¹, K. Neal, MClinAud°, S. Lavery, MClinAud°

¹The Shepherd Centre, Newtown, NSW Australia; ²Macquarie University, Macquarie Park, NSW Australia

Topic: Audiology

Keywords: Fitting, Young and Very Young Children

Introduction: This paper reviews over 12 months of experience using wireless portable programming in a pediatric clinical setting. The usage, opportunities and clinical implications of wireless fitting will be reviewed in detail. Objective: To develop clinical guidance for the introduction and use of wireless programming tools and techniques in a pediatric setting.

Methods: The hand-held, wireless cochlear implant fitting tool was used with a diverse group of over 100 paediatric fitting sessions in a day-to-day specialist pediatric setting. Sessions were at various different stages across children’s cochlear implant journey when the fitting tool was used, ranging from initial activation right through to many years after activation. Fitting with the mobile, wireless platform was closely monitored via regular Auditory-Verbal Therapy sessions with a trained Listening and Spoken Language Specialist or via the client’s own feedback for teenagers.

Results: Clinical guidelines for the appropriate use of wireless fitting were extrapolated from this experience and are now being further refined as they continue to be implemented in the clinical setting and beyond via remote fitting support tools. These guidelines and case examples will be detailed in the presentation

Conclusion: Fitting with the mobile, wireless platform provides the opportunity for a variety of clients to have greater comfort, flexibility and speed during fitting sessions. For the clinicians involved, greater emphasis can be placed on the functional use of the child’s listening and working directly with the family to improve this, rather than the technical, prescriptive and rigid nature of traditional programming sessions. Clinicians can also spend a great amount of time with more complex clients using standard programming tools. Overall the wireless platform allows the greatest opportunity to date for the professionals working with children with CIs to be client and family-centred in the provision of CI services.
ACI2014
Teleaudiology Net Between World Hearing Centers (Kajetany, Poland) and Other Countries
P. H. Skarzynski, MD,Ph.D.1,2,3, A. Wasowski, MS,Ph.D.1, A. Walkowiak, MS1, A. Lorens, MS,Ph.D.1, H. Skarzynski, MD,Ph.D.,Prof.1

1Institute Of Physiology And Pathology Of Hearing, W, Warsaw, MAZOWIECKIE Poland; 2Medical University Of Warsaw, Warsaw, MAZOWIECKIE Poland; 3Institute Of Sensory Organs, Kajetany, MAZOWIECKIE Poland

Topic: Audiology

Keywords: Fitting

Introduction: Telemedical solutions are more and more popular in present medicine. Otorhinolaryngology and audiology specialties give possibilities to fulfil procedures in diagnostic and rehabilitation procedures. From many years have been working teleaudiology net in Poland. It consists of 20 centers where patients could have fitting of cochlear implants speech processors. It allows for patient to save money and time. Another gain is condition of each patient. Especially children are more relaxed and not exhausted after long travel to Kajetany. Objective: Describe the advantages and application of the telemedical tools in everyday clinical practice.

Methods: After success in Poland we started cooperation with different centers in other countries. Such example is Odessa in Ukraine where there is cooperation with Black Sea Center of Hearing and Speech "Medincus". There is a possibility to diagnose patients with complicated ear diseases with videotoscopy and objective hearing assessment (for example ABR). In Bishkek Kyrgyzstan there were first telefitting between World Hearing Center as well as ABR assessment. In another countries there was hearing screening in children performed with automated database analysis. A coded data was sent to the central database and the centers taking part in the project received already elaborated feedback information. Such project was conducted also in Tajikistan. Further projects are being conducted in Africa (Senegal and Ghana), they include screening and assessment.

Conclusion: To sum up we think that telemedical applications are a very good tools to support less experienced centers. They allow to share knowledge and experience with medical staff in the remote medical center or clinic.
Family Perceptions and Experiences with the Early Hearing Detection and Intervention System in Rural Communities

M. L. Bush, MD¹, M. Hatfield, MSW¹, J. Elpers, BA², C. Lester, MSSW³, J. Shinn, Ph.D.¹

¹University Of Kentucky, Department Of Otolaryngology - Head And Neck Surgery, Lexington, KY USA ; ²University Of Kentucky, College Of Medicine, Lexington, KY USA ; ³Kentucky Cabinet For Health And Family Services, Commission For Children With Special Health Care Needs, Louisville, KY USA

Topic: Audiology

Keywords: Young and Very Young Children

Introduction: Although universal newborn hearing screening (UNHS) implementation is currently practiced in most states and managed by Early Hearing Detection and Intervention (EHDI) systems, many rural regions, such as Appalachia, face significant disparities in hearing health care. The goal of UNHS is early identification and subsequent treatment of children with hearing loss. Rural children are frequently delayed in identification and treatment of hearing loss. The accessibility of care and the barriers in the EHDI system in rural communities is not well understood. We sought to understand the problems faced by rural parents of families involved in the EHDI system. Objective: The objective of this research was to better understand the difficulties families face in rural areas of Appalachia in receiving hearing health care for children. Through direct family interviews, we assessed parental knowledge, attitudes, and behaviors regarding newborn hearing screening, follow up diagnostic testing, and hearing loss rehabilitation.

Methods: In collaboration with the Kentucky Cabinet for Family and Health Services, the families of children who failed newborn hearing screening and were involved in the EHDI system in Appalachian counties of Eastern Kentucky were identified. 55 participants were contacted by phone and participated in an interview that assessed demographics (relationship to child, county of residence and type of insurance) along with family experiences with the EHDI system. The interview assessed the timing of UNHS, family knowledge of UNHS results, the process of follow-up testing, and evaluation of further intervention from a family perspective to gain an understanding of problems and barriers to access of care. Qualitative coding analysis was conducted to find commonalities that families are facing in rural communities.

Results: Results from the investigation revealed that there were shared themes among families of children who fail the UNHS living in rural communities. Families reported financial barriers to care such as a lack of reliable transportation as well as limited access to local care. Many families reported traveling great distances to hearing health provider offices. They also reported barriers to timely diagnosis such as mechanical failure of diagnostic equipment (causing extended wait times) and lack of appropriate provider scheduling timeframes. These obstacles proved to be frustrating for families of children who needed further testing within recommended time points.

Conclusion: In conducting direct interviews with Appalachian families of children involved in the EHDI system, we gained a greater understanding of the difficulties these families face regarding access to care of the timeliness of the care received. Considering the importance for timely pediatric hearing healthcare, this information can be used to identify and implement mechanisms for change within EHDI programs providing care for rural residents.

Med El¹, Advanced Bionics²
Changing Public Health Policy in Vermont To Ensure Access To Universal Newborn Hearing Screening For Homebirth Families: Midwives’ Perceptions

L. A. Hazard, Ed.D

Vermont Department Of Health, Children With Special Health Needs, Burlington, VT USA

Introduction: In 2000 the Joint Committee on Infant Hearing Screening recommended hearing screening for all infants born in the United States and its’ territories. The committee endorsed that all infants receive a screen by one month after birth, any hearing loss be identified by three months and any intervention commence by six months of age. Annual statistics from the individual states submitted to the CDC identified a rise in planned out-of-hospital births across the United States thus Early Hearing Detection and Intervention Programs nationwide became concerned about the number of homebirth infants who received a hearing screening. Two percent of the infants born in the state of Vermont are planned homebirths. Between 2008 and 2010 less than 10% of infants born at home received a hearing screening as compared to over 98% of hospital born infants. As part of a Health Resources and Services Administration grant awarded in September of 2010, the Vermont Early Hearing Detection and Intervention Program (VTEHDI) initiated a pilot project to collaborate with homebirth midwives to provide culturally sensitive access for homebirth infants to newborn hearing screening. By 2013 70% of infants born at home in Vermont received a newborn hearing screening. Objective: This study recruited Licensed Midwives in Vermont to focus on midwives perceptions and experiences of partnering with a public health model of care for newborn hearing screening in the homebirth population.

Methods: Narrative inquiry was used in this qualitative study. In order to have a cross section of Vermont Licensed Midwives represented, midwives were recruited based on regions of the state, time in the profession, varying ages and number of births attended per year. The goals of the research plan were addressed through the use of individual interviews, observations of midwives screening infants and a focus forum. Cross-case analysis techniques were used to analyze these data.

Results: Through changes in policy the VTEHDI program works collaboratively with midwives. Two infants recently in the homebirth cohort were identified with significant hearing loss and received timely identification and intervention services. Three key themes were identified in the success of the Licensed Midwives and VTEHDI partnership: 1) fostering a holistic model, 2) promoting informed choice, and 3) fostering collaboration.

Conclusion: The findings highlight the importance of access to hearing screening and diagnostic testing, fostering collaboration, inclusion, mentoring, education and training between midwives and medical models of care such as VTEHDI. By exploring midwives’ perceptions, this study offers insight to professionals about the experiences of midwives and their multifaceted role with homebirth families and a public health program. Thus this study has opened up potential future collaborations between the medical model and this unique, often underserved, population.
Session 2: Bone Anchored Implants and Other Implantable Auditory Prostheses

ACI2014

Determination of Bone-Anchored Implant Candidacy and Outcomes in the Pediatric Population
S. A. Sydlowski, Ph.D., AuD

Cleveland Clinic, Head And Neck Institute, Cleveland, OH USA

Topic: Audiology

Introduction: Review of the literature for pediatric bone-anchored implants (BAI) reveals limited data regarding determination of candidacy for or outcomes following bone-anchored implantation in children. To date, pediatric BAI research has primarily focused on surgical techniques and medical outcomes, but identification of appropriate audioligic candidates and assessment of hearing outcomes are critical for success, particularly when determining management options for the pediatric population. Several recent studies have described the utility of speech-in-noise (SIN) measures for determining candidacy and evaluating outcomes for adult BAI candidates and recipients. In the adult population, demo devices are often utilized to assess the patient's subjective perception and potential outcomes. Although demo devices are frequently not optimally fit, research has suggested they offer consistent predictive value for adult patients. The objective of this project was to evaluate the efficacy of objective measures for the evaluation and management of pediatric BAI candidates and recipients with conductive hearing loss (CHL) and single-sided deafness (SSD) and to initiate discussion and reflection regarding best practices for evaluation and management of this unique population.

Methods: A retrospective review of pediatric patients who were evaluated for BAI using speech-in-noise measures in a large academic medical center was conducted. Results of objective pre- and post-operative SIN measures will be reported with case studies offered as supporting evidence of the importance and clinical utility of objective testing in this population.

Results: Nine pediatric patients (ages 6 years, 3 months to 12 years, 7 months) were seen for BAI evaluation appointments. All patients were evaluated using the BKB-SIN with no device and demo device (pre-operatively) and patient’s own programmed device (post-operatively). Results suggest that probable clinically significant improvement may be identified pre-operatively, similar to the adult population. In several cases, objective measures were particularly useful for selection of management option (e.g., non-implantable option versus BAI).

Conclusion: Further research in the use of objective verification methods that could result in the development of consistent clinical protocols for use with the pediatric BAI population is necessary. Results from this small sample of children with CHL and SSD suggest that use of demo devices and speech in noise measures have similar utility for the pediatric population as the adult population and add valuable information for the determination of candidacy and prediction of outcomes.

COI: Oticon Medical
Baha Attract: Indications, Results and Complications Compared to Baha Connect  
P. Weber¹, A. Murray,AuD¹, U. Findlen¹

¹University Of Massachusetts Medical School, Otolaryngology, Worcester, MA USA

Introduction: The Baha Attract system is a new osseointegrated implant system that does not have a percutaneous component. There is a paucity of published reports on the results, indications, or complications with this new device. Knowledge of which patients will benefit from the Attract system and which may be better served with the Connect system is important. Objective: We will compare the results obtained in our consecutive Baha Attract patients with results from our previously published data on the minimally invasive surgical technique for the Connect system and a current consecutive group of patients who received the Connect System.

Methods: We included each patient who was implanted with either the Attract or Connect system since the release of the Attract system. We report on type of hearing loss as well as degree. We delineate pre and post operative hearing results, whether patients use/like the device and magnet strength. We also report on any complications/complaints of the device/procedure.

Results: We had 23 Baha Attract patients and 6 patients who received the Connect system over the last 6 months. Of the Attract patients 9 had unilateral sensorineural loss, 8 had conductive loss and 6 had mixed loss. For the Connect system 3 were unilateral and 3 were conductive. All the Connect patients improved significantly with the Connect system. For the Attract system, 22/23 improved significantly. One patient, is awaiting the power Baha 4 as she has hearing loss on the opposite ear and although benefits with the Attract, more power will be beneficial for her. There have been no significant complications with the Attract system. We did note that those whom required flap thinning did have more post op edema initially but that this dissipated by the time of fitting. Three patients with the Connect system required topical steroids and antibiotic ointment and one of these patients was also given an oral antibiotic. All resolved and are using their devices.

Conclusion: The Baha Attract system appears to be a viable alternative for patients who would like to avoid a percutaneous abutment. As long as the patient hears well with the Softband they hear better with the Attract. The Attract may demonstrate less complications.

COI: Cochlear Corp¹
Implantation of a New Transcutaneous Bone Conduction Device: Outcome Measures in Performance and Quality of Life

J. M. Chen\textsuperscript{1,2}, K. Williams\textsuperscript{1,2}, L. Smith\textsuperscript{1,2}, V. Lin\textsuperscript{1,2}, J. M. Nedzelski\textsuperscript{1,2}

\textsuperscript{1}Sunnybrook Health Sciences Centre, Otolaryngology, Toronto, ONTARIO Canada; \textsuperscript{2}University of Toronto, Otolaryngology, Toronto, ONTARIO Canada

Topic: Audiology

Keywords: Objective Measures, Outcomes

Introduction: We are describing a new implantable bone conduction-floating mass transducer. It is indicated for patients with conductive or mixed hearing loss as well as single-sided deafness. Its transcutaneous activation significantly reduces the skin related issues of percutaneous devices. Objective: To present our early results with this device.

Methods: 13 patients were implanted with a transcutaneous bone conduction device; ages ranged from 41 to 77 years, 11 female and 2 male. 7 patients had conductive or mixed hearing loss and 6 had single-sided deafness. All patients underwent preoperative testing including air and bone conduction audiometry in pure tone and speech, high resolution CT scanning and health related quality of life questionnaire assessment. Inter-aural attenuation measurements and adaptive Hearing In Noise Testing (HINT) were also conducted at 0, 90 and 270 degrees with noise at 0 degrees. Data from the Hearing Utility Index Mark 3 (HUI-3), the Speech, Spatial and Quality of Hearing Scale (SSQ), the Tinnitus Handicap Inventory (THI) and the Bern Benefit in Single Sided Deafness questionnaire (BBSS) were collected. Follow up was performed at 1 month and 6 months post activation.

Results: Tinnitus Outcomes: All 7 patients reporting tinnitus preoperatively experienced significant improvements in their tinnitus perception as measured on the THI one month post-activation (p<.05). Overall, patients improved by 41% on the THI. Within the functional and emotional subcategories, patients improved by 31% and 52%, respectively, with a trend towards significant improvements in the catastrophic subcategory (p =.096). Notably, six patients did not have tinnitus prior to implantation and none reported it post-op. Adaptive HINT Outcomes: At 1-month post implantation, there was a mean improvement in signal-to-noise ratio as measured by the adaptive HINT of 4.56 dB HL (range 3.21 to 5.91) when the device was on compared to off. Other Qualitative Outcomes: The mean utility as measured by the HUI-3 increased from 0.62 to 0.88. Furthermore, marked improvements in all subsets of the SSQ questionnaire emerged. High frequency gains were significantly improved at 4k and 6k Hz. DISCUSSION: Preliminary results suggest that this transcutaneous device is not only a preferred choice over percutaneous devices, but also provides significant benefit by reducing tinnitus, improving signal-to-noise ratios, and overall improvements in quality of life measures. All of the participants in this study are reporting positive gains from this experience. Further outcomes at the 6 month follow up period will be presented.

Conclusion: Transcutaneous implantation of this bone conduction device appears to be an effective option for those with the appropriate indications. Benefits are significant in reducing tinnitus perception, improving signal to noise ratio, and enhancing health-related quality of life measures.
Middle Ear Implant VS Hybrid Cochlear Implant For High Frequency SNHL

M. Glasscock, MD

\(^1\)Vanderbilt University Medical Center, Nashville, TN USA

Topic: Other Implantable Devices

Keywords: Future of Implantable Devices, Engineering

Profound SNHL responds well to a standard Cochlear Implant with rewarding results. However, if the individual has residual hearing in the low frequencies there is a reasonable chance that the pure tones will be lost. Hybrid Cochlear Implants have been suggested as a solution for this problem. Unfortunately, there continues to be a loss of the low frequency pure tones in a large number of these patients. One solution would be to use a middle ear implant instead of a hybrid CI. The Maxum middle ear implant has the advantage of being a minimally invasive surgical procedure that can be performed under local anesthesia. A small magnet is attached to the stapes through a transcanal approach. After three weeks an integrated processor coil (IPC) is inserted into the external auditory canal. The IPC has an electromagnet driver. By driving the stapes directly it is possible to obtain as much as 60 dB of functional gain in the high frequencies without distortion, acoustic feedback, or the sensation of occlusion. For these reasons the author believes a Maxum should be considered in these patients before a Hybrid Cochlear Implant. If the SNHL progresses, then a CI can still be performed at a later date. This sequence of events delays the invasion of the cochlea and in some cases prevents the need for a CI altogether.
ACI2014
The Bonebridge Bone Conduction Instrument: Audiological Results in SSD Patients
H. Maier, Ph.D., R. B. Salcher, B. Schwab, T. Gerdes, T. Lenarz

1Medical University Hannover, Dept. Of Otalaryngology, Hannover, Germany

Topic: Audiology
Keywords: Outcomes

Introduction: In the therapy of conductional, mixed hearing losses and single-sided-deafness (SSD) bone anchored hearing aids are well established. Since 2012 the Bonebridge, a new transcutaneous bone conducting instrument is CE marked. This new active device requires no percutaneous connection.

Objective: In a monocentric, retrospective study the audiological outcome in Bonebridge patients with SSD was investigated.

Methods: Ten patients (4?, 6?, mean age 46.2 ± 17.2 years (min. 21 yrs. / max. 70 yrs.)) with single-sided-deafness, implanted with a Bonebridge at the Dept. of Otalaryngology of the Medical University Hannover between June 2012 and Feb. 2013 were audiologically analysed. After activation and sufficient fitting, patients were examined audiologically post-surgery (> 12 weeks). Tests included air conduction (AC) and bone conduction (BC) thresholds with headphones and unaided and aided thresholds in sound field with the contralateral ear plugged and muffled. The speech intelligibility was determined with the Freiburg monosyllable test in sound field with speech coming from the front (S0) and the contra-lateral ear occluded. Hearing in noise was tested with the Oldenburg sentence test (OLSA) in sound field in several configurations relevant for SSD. The subjective benefit was assessed with the APHAB.

Results: Average pure tone thresholds in sound field were improved by 37.9 ± 13.6 dB (PTA, 0.5 – 4 kHz; MV ± SD). The average Freiburg monosyllable score at 65 dB SPL was improved from 18.0 ± 31.9 % (unaided) to 89.5 ± 8.0 % (aided) and at 80 dB SPL from 52.5 ± 39.1 % (unaided) to 97.5 ± 4.2 % (aided). Hearing in noise measured with the OLSA, with speech from the front and noise from the non-occluded hearing side (S0Ncontra), was significantly improved by the Bonebridge from SNR = -1.8 dB to SNR = 3.1 dB (mean). When noise was presented from the hearing side and speech from the implanted side (SipsiNcontra) the signal-to-noise-ratio was significantly improved from SNR = +1.8 dB to SNR = -0.6 by the device: The assessment of the subjectively perceived benefit with the APHAB showed a clear trend for an improvement in the aided situation, except in the category Aversiveness, where only minor changes were found.

Conclusion: The Bonebridge is an audiological equivalent alternative to percutaneous bone anchored devices in single-sided-deafness patients. It requires less care and is less prone to infections by the transcutaneous transmission across the intact skin.

Med-El1, Med-El2
Vibrant Soundbridge Long Term Follow Up in SNHL

H. Maier, Ph.D.¹, A. Hinze¹, T. Gerdes¹, S. Busch¹, R. B. Salcher¹, B. Schwab¹, T. Lenarz¹

¹Medical University Hannover, Dept. Of Otolaryngology, Hannover, Germany

Introduction: The middle ear implant Vibrant Soundbridge (VSB, Med-El) is successfully used to treat sensor neural hearing loss (SNHL) for over one decade. Objective: The aim of the here presented monocentric study was to assess the safety and effectiveness of the VSB in patients with moderate-to-severe SNHL > 10 years after the intervention.

Methods: 131 VSB implantations at the Otolaryngology Dept., Medical University Hannover, Germany between February 1997 and March 2012 were included in the study. In 113 patients with the VSB coupled to the incus with sensor neural hearing loss and medical conditions preventing the use of conventional hearing aids audiological results were analyzed. After exclusion of children and mixed hearing loss cases (ABG > 20 dB), 105 adults (50 females and 55 males; mean age 54.5 years, min. 19.0 years and max. 80.4 years at the time of implantation) contributed data to this study. For analysis 122 implantations (17 bilateral) were divided into 4 groups according to the time after surgery.

Results: Bone conduction (BC) thresholds shortly after surgery (group 1 < 1 year; avg. 0.5 yr (0.1 - 0.8 years; N = 34) revealed a small (< 3.2 dB), but significant drop at high frequencies (> 3 kHz) that disappeared in group 2 (1 < 4 years; avg. 2.4 years; min: 1.2 – max: 3.8 years; N = 51). At longer periods after implantation (4 years < group 3 < 8 years and group 4 > 8 years) no accelerated progression in BC thresholds was found compared to the non-implanted side in monaurally implanted subjects. Comparison of air-bone-gaps (ABGs) at activation and the last visit in all groups showed neither trends nor statistical significant differences. The functional gain and monosyllable intelligibility was still satisfactory in group 4 (> 8 years; avg. 11.1 years; min: 8.2 – max: 13.9 years; N = 16).

Conclusion: No acceleration in SNHL progression due to the implantation of the VSB was found in our analysis and ABGs were stable after activation. The functional gain and monosyllable intelligibility was still satisfactory in long-term (> 10 years) follow-up.

Med-El¹, Med-El²
Stability Of Osseointegrated Implants For Bone Conduction In Children

J. A. Rivas1, L. E. Garcia1, J. Muñoz2, V. H. Forero1, E. Bernal Flóga3, A. Rivas2

1Clinica Rivas, Investigacion, Bogota, DISTRITO CAPITAL Colombia; 2Vanderbilt University Medical Center, Division Of Otology-Neurotology & Skull Base Surgery, Nashville, TN USA

Introduction: BAHA system is a well-established implantable device used in conductive hearing loss, mixed hearing loss and single sided deafness. Achieving and maintaining implant stability are prerequisites for successful clinical outcomes before loading. Clinical studies have reported a healing period of 4-6 months in adults and 6-8 months in children before connecting the hearing processor. The rational is to allow enough time for osseointegration to occur particularly in thinner bones as the ones found in children. An objective clinical method to evaluate whether osseointegration has occurred prior to loading the processor is lacking. Resonance frequency analysis (RFA) technique is a potential method to non-invasively measure implant stability. RFA measures implant stability as a function of stiffness of the bone–implant complex in terms of implant stability quotients (ISQ), ranging from 1 to 100 ISQ units. At implant placement mechanical ISQ can vary from 57 to 62 and biological ISQ can vary from 63 to 70 depending on the age and period at measurement. Thus, this technique can be easily utilized to monitor implant stability over time.

Methods: Prospective study in children who underwent BAHA system surgery. The stability of the abutment was assessed with RFA measurements taken intra-operatively, 1 week post-surgery, every month for 1 year after surgery, and immediately after loading the processor. Statistical analysis: Mean and 95% CI ISQ values by period and correlation between ISQ by age and ISQ by body mass index (BMI).

Results: 12 consecutive patients were recruited. The age range was 6-17 years with an average age of 10 years at time of surgery for implant. 1 patient had bilateral percutaneous bone-anchored hearing aid fitted giving a total of 13 implants. The mean implant stability value at time of surgery was 51.8 (95% CI = 47.2 - 56.3), at 4 weeks was 55.5 (95% CI = 40.3 - 70.6), at 8 weeks (loading the hearing processor) was 61.5 (95% CI = 55.1 - 67.8) and one year after loading was 60.0 (95% CI = 56.4 – 63.1).

Conclusion: The ISQ values recorded at the baseline dropped 1 week post-surgery with no significant loss in stability and returns at 6 weeks. After bone healing, neo-formation and maturity, bone modelling predominates and stability levels increase.
Session 3: Therapeutic Considerations for Children and Families

ACI2014
Parents in the Driver's Seat: Using Auditory-Verbal Therapy to Create Road Maps--From Therapy Room to Home, From Birth to School-Age, From Silence to Conversation
C. Haney, MCD, CCC-SLP, LSLS Cert. AVEd.1, J. Fainberg, MA,FAAA2

1 Auditory-Verbal Center, Inc., Macon, GA USA; 2 Atlanta Speech School, Cochlear Implant Clinic, Atlanta, GA USA

Topic: Rehabilitation/Educational Aspects

Keywords: Children and Recommended Rehabilitation, Rehabilitation for Children, Quality of Life

Introduction: "Auditory-Verbal Therapy" (AVT) is an approach to teaching deaf or hard-of-hearing children to learn to listen and speak. An integral part of the auditory-verbal approach is believing that parents and caregivers are their child’s primary teachers. In fact, six of the ten foundational principles of AVT begin with “Guide and coach the parents”. Typically developing, normal hearing children learn to communicate through interactions with their parents and caregivers in their natural environments. Once children who are deaf or hard-of-hearing gain clear access to speech through appropriate hearing technology, they can do the same.

Methods: Families are taught how to create a friendly listening, and language rich, environment in their homes. Through active participation in routines of daily living (i.e. diaper changes) and play activities (i.e. swinging), parents and caregivers are coached on how to incorporate normal developmental patterns of audition, language, speech, cognition and communication, individualized for their home environment.

Results: Engaging families in familiar routines from their child’s day (i.e. getting ready for bed) increases their comfort level, making it easier to implement their child’s individualized communication goals, which increases the chance for effective carryover. Using daily events in which the parent and child would naturally interact (i.e. eating lunch) helps to integrate listening into the child’s personality. Parents and caregivers become confident in being their child’s primary teacher and advocate.

Conclusion: Through direct guidance and coaching, parents and caregivers of deaf and hard-of-hearing children can become their child’s primary language facilitator, helping them achieve conversational competence through teaching and support in their natural environments.
Introducio**: Auditory rehabilitation is important for language development in children with significant hearing loss. Oral communication provides better outcomes in language development than total communication in implanted children who were prelingually deaf. The Auditory-Verbal approach was developed to assist hearing impaired children to learn to listen and speak. Listening and Spoken Language Specialist (LSLS) Certification aims to provide educators and clinicians involved in the care of children with significant hearing loss, a standardized competence to diagnose, educate and optimize language development in these children. Objective: Quantify the need for LSLS certified specialists in the United States.

Methods: We reviewed the CDC-Early Hearing Detection and Intervention databases, the National Health and Nutrition Examination Surveys, the National Health Interview Surveys for demographics of children and youth up to 21 years of age with hearing loss up to 2012. We identified from the AG Bell Academy database the number of Listening and Spoken Language Specialists (LSLS). These incidence statistics provide estimates of the target population who could benefit from a LSLS as well as the need for a LSLS per state.

Results: In 2012, 96.6% of infants were screened at birth, with 1.8% referred for follow-up. Approximately 5% of these children were referred to early intervention programs for hearing loss. To this date there are 501 certified LSLS in the US in the AG Bell academy database. Given a prevalence of hearing loss (primarily moderate, severe and profound) at neonatal screening of 1.5/1000, an estimate of the number of children younger than 6 years of age who have significant hearing impairment in 2013, is at least 30,000. For children and youth 6 to 21 years of age, the Individuals with Disabilities Education Act (IDEA) identifies over 70000 individuals with hearing loss of educational significance. Thus, a conservative estimate of a potential target population for LSLS intervention, based on audiometric data, could be in the vicinity of 100,000 individuals. The ratio of children younger than 6 with significant hearing loss to LSLS is 60:1. If we include the number of children and youth in an IDEA program, the ratio becomes 200 children with hearing loss per LSLS. These estimates differ significantly by state. Eleven states have 0 LSLS. Five states have one LSLS each. In contrast, in Texas where there are 44 registered LSLS, the ratio is 79. In California, the state with the highest total population and with 43 registered LSLS, this ratio reaches 106 children per LSLS.

Conclusion: Auditory Verbal practice provides children with significant hearing loss an excellent chance for a good communication and language development outcome. LSLS-certified professionals are critical for the success of these children. The reviewed data demonstrates an obvious shortage of qualified experts nationwide.
Use of a Family Characteristics Questionnaire to Examine Broader Perspectives Regarding Pediatric Cochlear Implant Users Outcomes

S. J. Dettman, Ph.D.1,2,3, D. Choo1, J. Holland1, J. Leigh1,3, S. Lettieri3, G. Thompson3, D. Courtenay3

1The University Of Melbourne, Department Of Audiology And Speech Pathology, Parkville, VICTORIA Australia; 2The HEARing CRC, Parkville, VICTORIA Australia; 3The Royal Victorian Eye And Ear Hospital, East Melbourne, VICTORIA Australia

Topic: Rehabilitation/Educational Aspects

Keywords: Children and Recommended Rehabilitation, Speech and Language Development with CI, Rehabilitation for Children

Introduction: Longitudinal studies have demonstrated speech and language benefits for hearing-impaired children following access to cochlear implants. Variation in child outcomes due to factors such as age at implant, surgical/anatomical limitations, presence of co-occurring cognitive delays/disabilities, degree/progression of hearing loss, and communication approach choices are well understood. Studies demonstrating child communication outcome variance due to family factors (e.g. socio-economic status [SES] and maternal education) are also emerging. Few studies, however, have examined the specific nature of the family environment of the child. Objective: This study describes the relationships between the child (e.g. aetiology, IQ, hearing loss, age at CI, communication mode), the family (e.g. SES, Maternal Education), the child’s participation in family activities/linguistic opportunities in the home and child outcomes (e.g. open set speech perception results, language and speech production scores) for a large cohort of children who received cochlear implant(s) at a young age.

Methods: All families attending a high volume cochlear implant clinic from 2008 to 2014 completed a 39-item Family Characteristics Questionnaire; over 410 questionnaires were completed at pre-, 1-, 2-, 3- and 5-years post-implant by over 270 families. Children received their first implant at a mean age of 2.23 years (range 0.52 - 9.28 years; SD 1.69). Children were aged 4.09 years (mean) at completion of the Family Characteristics Questionnaire (range 0.3 - 11.4 years; SD 2.65). Children also completed speech perception, receptive/expressive language and speech production testing pre- and post-implant where suitable for the age and stage of the child.

Results: Trends towards greater inclusion in family activities over time and preferences for oral-aural communication approaches were seen. Relationships between family characteristics such as SES, maternal education, communication mode and family activities were complex. Strengths and limitations of the Family Characteristics Questionnaire will also be discussed.

Conclusion: The Family Characteristics Questionnaire provided valuable information (in addition to the more standard quantitative measures of speech and language outcomes) as it reflected subjective perspectives of the device users and their families. This may be increasingly important as we counsel families, and attempt to gauge benefit from cochlear implants in infants and children who have additional special needs.
**Introduction:** Parents serve as primary language models for their children; supporting parents in providing enriching language environments enhances overall development. While related service interventions should strive for parent participation, most early intervention settings actually use traditional child-centered services (Peterson et al., 2007; Campbell & Sawyer, 2007). Quittner et al. (2013) suggest that cochlear implant programs can likely improve child outcomes if maternal sensitivity training were incorporated in intervention programs. Several parent interaction training programs incorporate didactic and/or hands-on experiential coaching to guide parents in effective interaction with their children. One such program is Parent-Child Interaction Therapy (PCIT), an empirically supported behavioral treatment that works with parents and children together, along with a therapist, to promote child development and foster parent-child relationships. Parents are taught skills they can apply at home to promote child development, establish a nurturing and secure relationship with their child, increase their child’s prosocial behavior, and decrease negative behavior. PCIT treatment is structured in two parts: Child Directed Interaction (CDI), which is similar to play therapy and engages parents and children in play situations; and Parent Directed Interaction (PDI), which teaches parents consistent and effective behavior management techniques as they play with their child. The therapist is a “coach” for the parent, providing live, real-time feedback using an earpiece as play is observed and directed through a one-way mirror. The objective of this study was to evaluate the effectiveness of treatment to change parent behavior and verbalizations, and child behavior over the course of treatment.

**Methods:** Participants include 7 parent and child dyads, where the child is identified as having hearing loss. All child participants were between the ages of two and seven. Parent-child dyads participated in weekly PCIT therapy sessions with a trained PCIT therapist. Outcomes were measured using a weekly report of child behavior completed by the parents (Eyberg Child Behavior Inventory), and weekly coding of parent behaviors using a validated coding system (Dyadic Parent-Child Interaction Coding System – Third Edition).

**Results:** Statistically significant changes were found across measured parent behaviors, including an increase in positive parenting skills and a decrease in negative parent skills, from pre to post treatment. Statistically significant improvements in child behavior across treatment were demonstrated.

**Conclusion:** Preliminary results with parent-child dyads where the child has hearing loss indicate that PCIT has the ability to significantly change parent and child behavior over the course of treatment. Implications for child development and child outcomes are discussed.

COI: The River School/RiverREACH Clinic
Implementation of LENA for clinical and research use in Sweden

U. List, Ph.D.¹

¹Karolinska University Hospital/Karolinska Institutet, Stockholm, Sweden

Title: Rehabilitation/Educational Aspects

Keywords: Children and Recommended Rehabilitation, Speech and Language Development with CI, Rehabilitation for Children

Introduction: Language Environment Analysis (LENA) is an objective method that measures spoken language environment in the home and preschool environments. LENA can be described as a "pedometer for words" and has so far been used for evaluation of hearing impaired children aged 0-3 years as well as children with normal hearing, especially in USA. LENA reports provide caregivers with important visual feedback of the listening and spoken language environment. In combination with the guidance of an early interventionist these reports can help caregivers to facilitate a change in their communicative behaviours, regardless of SES (Aragon & Yoshinaga-Itano, 2012; Soderstrom & Witt Bolle, 2013; Leffel & Suskind, 2013).

Objective: The main aim of the project is to include LENA for evaluating the influence of environmental factors for spoken language development in children with hearing impairment in Sweden. A second aim is to implement LENA as a way of improving the habilitation work with families, especially those with lower SES.

Methods: LENA is now being introduced for the first time in Scandinavia and Sweden, at the Cochlear Implant Section, Karolinska University Hospital. LENA will be used in regular clinical follow-ups for children with CI or hearing aids. Another aim is to implement LENA as part of a new Very Early Intervention Program, especially designed for caregivers with low SES and/or multilingual background with HI and with age- and SES matched NH controls. Another part of the project is to conduct a norm study of Swedish children 0-36 months who are normal hearing.

Results: Preliminary results will be presented as well as an overview of the LENA implementation project.

Conclusion: LENA can be used as an evidence-based assessment tool and habilitation option in different contexts and for different reasons, both in clinical settings and for research use.
ACI2014

Working to Improve Caregivers’ Intra-Rater Reliability on the Infant-Toddler Meaningful Auditory Integrations Scales (IT-MAIS) via Video

B. A. Barker, BS,MA,Ph.D.1, N. J. Donovan2, C. Gibbons2

1University Of Iowa, Dept Of Otolaryngology, Iowa City, IA USA ; 2Louisiana State University, Dept Of Communication Sciences & Disorders, Baton Rouge, LA USA

Topic: Audiology

Keywords: Young and Very Young Children , Outcomes

Introduction: Recently, Barker and colleagues used Rasch analysis and showed that caregivers’ intra-rater reliability on the Infant-Toddler Meaningful Auditory Integrations Scales (IT-MAIS; Zimmerman-Phillips, et al., 2001) is weak. Weak psychometric support lowers the measure’s overall reliability and causes concern over the consistency of the IT-MAIS’ results both in the laboratory and the clinic. Barker, et al. suggested three possible factors contributing to unreliable caregiver responses: 1) audiologists provided caregivers with variable prompts and examples use to elicit responses, 2) caregivers lacked understanding about their child’s listening behaviors, and 3) ill-worded questions did not reflect identifiable or observable behaviors. Objective: To create videos that accurately depict targeted auditory behaviors for each IT-MAIS item with the long-term goal of using these videos to improve caregivers’ intra-rater reliability.

Methods: A series of qualitative studies were conducted using SurveyMonkey to: 1) generate video scenarios for each IT-MAIS item, 2) determine if different pediatric audiologists judged each video to accurately depict its corresponding IT-MAIS item, and 3) determine if naïve caregivers judged each video to accurately depict its corresponding IT-MAIS item.

Results: Ten final videos were successfully filmed and edited. Both pediatric audiologists and caregivers found the same videos to be most representative of the targeted auditory behaviors in each IT-MAIS item.

Conclusion: These data imply that both groups of participants had understandings of the IT-MAIS’ targeted auditory behaviors with the use of video examples. We suggest that the present study’s videos be employed in the every-day clinical administration of the IT-MAIS in order to determine if these videos indeed improve intra-rater reliability on the IT-MAIS items and subsequently improve the IT-MAIS’ overall reliability.
Development of Joint Engagement in Pediatric Patients Over Two Years Post-Implantation

I. Cejas, Ph.D. 1, D. H. Barker 3, A. L. Quittner 2

1 University Of Miami, Otolaryngology, Miami, FL USA; 2 University Of Miami, Psychology, Coral Gables, FL USA; 3 Brown University, Providence, RI USA

Topic: Rehabilitation/Educational Aspects

Keywords: Cognitive and Social Development of Implanted Children, Patterns of Early Social-emotional Development in Young Children with Cochlear Implants

Introduction: Joint engagement (JE) develops in the first three years of life (Adamson et al., 2004) and has been conceptualized as a precursor to early communicative and linguistic development (Wetherby & Prizant, 2002). Studies report that JE develops similarly in children with and without hearing loss until 18 months of age, when language begins to significantly affect its development (Cejas et al., in press). To date, no studies have assessed the impact of cochlear implantation on the development of JE. The purpose of this study was to evaluate JE in children with and without hearing over 2 years post-implantation.

Methods: The CDaCI study is a multi-site study of 188 severe-to-profoundly deaf children who received cochlear implants (CI) and 97 hearing controls (NH). JE was evaluated in a 10-minute videotaped Free Play task with parents at Baseline, 12 and 24 months post-implantation. Coders identified the JE state using 8 possible codes. JE states ranged from the lowest (unengaged) to the highest level (symbol-infused), with 4 states falling within the broader category of JE. The percentage of time spent in the 4 JE states were combined as the primary outcomes to describe 2 composite states highlighting different dimensions of JE: Symbol-Infused Joint-Engagement (SIJE; use of language, symbols or gestures during play) and Total Joint-Engagement (TJE; sum of all JE states). To evaluate the influence of implantation, mixed models were used to compare the linear growth trajectory across 24 months post-implantation to pre-implant development of JE, which was estimated as the slope of baseline scores regressed on baseline age. Cox regression was used to compare CI and NH cohorts (time to achieving ≥ 90% of total play in a JE state). All analyses were stratified by baseline age (<18, 18-36, and ≥ 36 months).

Results: Mixed models indicated that children in the younger age category showed significant improvements following implantation for TJE (in 9.31% more of play per year; p < .01) and SIJE (17.11% of play per year; p < .01) compared to the baseline, pre-implant trajectory. Significant improvements were also observed for the middle age category on TJE (9.89% of play per year; p < .01). There were no significant differences in JE trajectories 2-years post-implantation from the baseline trajectory for the oldest age category. By age 38 months, a majority of the NH cohort spent 90% or more of their play in a JE state, limiting the ability to model linear growths of JE. Using 90% of play as a threshold, Cox regression indicated that NH cohort was 4 times more likely to reach the threshold over the 2-year follow-up period than the CI group for each age category (4.55; p < .01).

Conclusion: Implantation appears to benefit the development of JE, particularly for children implanted prior to 18 months of age. However, across age categories, the CI cohort remained significantly delayed in JE development compared to their NH peers.
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**Little Ears Auditory Questionnaire & Diary**

Jeanne. S. Fredriksen, M.Ed., Taylor. Sands, SLP, LSLS1

1MED-EL Corporation

**Topic:** Rehabilitation/Educational Aspects

**Keywords:** Children and Recommended Rehabilitation

**Introduction:** Language Acquisition & Development (e.g. giving therapists tools to evaluate and maximize auditory development on an ongoing basis for the first 3 years of acquisition.) Early intervention along with technology advances, have given children an extraordinary opportunity to advance auditory brain development. The Little Ears Auditory Questionnaire and Diary helps to provide the clinician/therapist with early auditory development information based on lack of auditory stimulation. The assessment, which was standardized based on normal listening milestones, can help to identify delays as well as be used to monitor auditory development pre and post CI implantation/activation or Hearing Aid stimulation. The Diary is designed to guide parents’ observations of their child and allow them to share that information with their therapist or clinician. It can be used as an evaluation tool in the first year after fitting. Beyond that, it can help optimize the child’s rehabilitation process and device fitting.

**Methods:** Case study and practice of filling out the Auditory Skills and Questionnaire form and evaluating the process.

**Results:** Video of Parents who use auditory strategies/techniques with their CI Child.

**Conclusion:** Primary auditory skill development takes place within the first few years after access to sound. Monitoring skill development is necessary to provide timely intervention and to make sure progression occurs appropriately and naturally. Professional’s knowledge of the auditory hierarchy of skills, and timelines of expectation for acquisition of these skills, is paramount. Using this assessment will provide the documentation needed to assess progress. Using the Diary helps the therapist to focus on the listening strategies and techniques needed to facilitate development of auditory skills with the family, including a review of auditory skills hierarchy that progress from awareness, discrimination, identification and comprehension.
Session 4: Hot Topics in Cochlear Implantation

ACI2014
Transcutaneous Bone Conduction with the Bonebridge
Geoffrey. R. Ball, BS,MS

1MED-EL

Topic: Other Implantable Devices

Keywords: Future of Implantable Devices, Engineering

Introduction: This talk will focus on the theory of operation and the positive and challenging events surrounding the design and development of the Bonebridge, the world’s first active bone conduction implant. A new MRI safe bone conducting transducer was developed and serves as the principal drive device for the Bonebridge hearing system. Methods: Our principal objective was to develop an active bone conduction implant that could treat patients with mixed and conductive deafness threshold of 45 dB or better. Our design team was able to leverage our many years of experience in making vibratory implant systems including the Vibrant Soundbridge. We designed a detailed list of system requirements for the transcutaneous BC system and then designed a new transducer platform called the BCI-FMT. Having a stable reliable design platform is key to any implantable hearing system and we leveraged our implant technology in the Bonebridge design. Extensive pre-clinical evaluation, design verification and surgical anatomical studies were conducted. As a result of this extensive pre-clinical work the implant and the related installation tools were successfully developed.

Results: The Bonebridge has been subject to clinical trial in both adults and pediatric populations with excellent results that are consistent with our system design objectives, clinical utility and patient outcomes. The design has proven to be a robust, reliable and functional design that meets the output and frequency response requirements for successful patient outcomes and that can offer patients an alternative treatment option that can significantly improve their hearing. Another requirement was for the device to be MRI safe. Clinical results shall be presented.

Conclusion: The Bonebridge is an active implant stage that is a new platform that does not directly vibrate a vibratory structure of the ear (i.e. ossicular chain or window) but rather is the first active transcutaneous bone conduction system. The Bonebridge is now in use and approved (and/or CE marked) in approximately 60 countries world-wide including Canada for conductive, mixed and single sided deafness. The Bonebridge is not approved at the time of this abstract submission by the US FDA and cannot be purchased or obtained by US centers.
Pediatric Cochlear Implantation: Associated with Minimal Post-Operative Pain and Dizziness

C. S. Birman, MBBS FRACS,1,2 E. J. Elliott, MD, MPhil FRACP FRCPCH FRCP1, W. P. Gibson, MD, FRACS, FRCS3

1University Of Sydney, Discipline Of Paediatrics And Child Health, Sydney Medical School, Sydney, NSW Australia; 2Royal Institute For Deaf And Blind Children, Sydney Cochlear Implant Centre, Sydney, NSW Australia; 3University Of Sydney, Sydney, NSW Australia

Topic: Surgery/Medical
Keywords: Medical/Surgical Issues, Young and Very Young Children

Introduction: To prospectively document the surgical pain, assessing analgesia use as a proxy, and post-operative dizziness in children over the first week following cochlear implantation.

Methods: The prospective data collection was performed at the Sydney Cochlear Implant Centre on a cohort of children operated on by a single surgeon. Children were 0-16 years inclusive, undergoing cochlear implant surgery, who returned to see the surgeon for the post-operative one week follow up appointment. Data collected included analgesia use, duration of analgesia use, dizziness (nil, slight, moderate), type of surgery and radiological findings.

Results: Data were available for 61 children (out of 98 children) aged 5 months to 15 years. Children underwent first side implant (n=27), sequential second side implant (n=15), bilateral simultaneous (n=16), explant reimplant (n=3). On average children used Paracetamol for only 1.9 days following discharge from hospital. Longer average Paracetamol use was associated with bilateral simultaneous surgery (3.3 days following discharge from hospital); and also the younger age group 0-12 months (3.2 days). Slight dizziness was reported by 8% of all children at one week post-surgery. No child had marked dizziness or unsteadiness. Four children had Large vestibular aqueducts on radiology scans, two (50%) of these children has slight unsteadiness at one week post-operatively.

Conclusion: Our study shows cochlear implant surgery is well tolerated by children. This information enables better counselling of families and children considering cochlear implantation.
Cochlear Implantation for Rehabilitation of Unilateral Deafness in Children: First experiences

D. Tavora-Vieira, G. Rajan

1University Of Western Australia, Otolaryngology, Head & Neck Surgery, School Of Surgery, Fremantle, WA Australia

Keywords: New Indications, Borderline Cases, Quality of Life

Introduction: In the pediatric population, unilateral deafness have been linked to delayed speech and language development, and poorer academic performance. Similarly to the adult population, bone conduction devices have been used as a rehabilitation option for children older than 5 years of age. However, hearing rehabilitation encounters further challenge with young children who are unlikely to wear CROS and/or FM systems. To date, there is very limited data regarding cochlear implantation for hearing rehabilitation of unilateral deafness in children. Objective: This study was designed to investigate the implication of cochlear implantation in children with congenital and acquired unilateral deafness, following “the earlier the better” intervention approach.

Methods: This is an ongoing prospective study with 4 children (age 1.5 to 9 years old) implanted so far. All patients were implanted with a Flex Soft Med-EL electrode and complete insertion. Localization test and age appropriate speech perception in noise were performed on the 2 older children. For the younger child, behavioral testing in the sound proof room was performed with the normal-hearing ear masked with speech noise 70dB. The sound-field hearing thresholds of 20dB were obtained at 1000Hz and 4000Hz.

Results: Up to date, there is a good subjective acceptance of the implant and 3 children are full time wearers. Localization and lateralization skills as well as speech perception in noise scores have improved through the first 12 months of CI usage.

Conclusion: Cochlear implantation may represent the only option that will fully assist children with unilateral deafness to make usage of binaural hearing benefits. It is possible that “the earlier the better” approach is the most suitable path for cochlear implantation in the pediatric population.
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Health-Related Quality of Life in Romanian Cochlear Implanted Patients

M. Cosgarea¹, V. Necula¹

¹"Iuliu Hatieganu" University Of Medicine And Pharmacy, ENT Department, Cluj-Napoca, CLUJ Romania

Topic: Rehabilitation/Educational Aspects

Keywords: Quality of Life, Rehabilitation for Children, Speech and Language Development with CI

Introduction: Cochlear implant is a well-established treatment method in severe to profound hearing loss. It is important to assess the benefits in term of health-related quality of life not only on auditory-verbal performances.

Methods: We compared the HRQoL between two groups, a hearing aided group (50 patients) and a cochlear implant group (84 patients), spitted in two subgroups, according to the age of implantation. We used the Nijmegen cochlear implant HRQoL questionnaire. All the implanted patients had MedEl devices and more than 6 months of experience with the speech processor.

Results: Although there were differences between children with hearing aids and implanted children in all areas of HRQoL, in the physical area these differences were greater than for psychological and social domains. HRQoL was positively correlated with auditory performance, speech intelligibility and negatively with implantation age. Good auditory performance and speech intelligibility had a positive influence on HRQoL. The correlation coefficient, R = 0.78 indicates a very good linear and directly proportional correlation between the three variables, implantation age, SIR and CAP and HRQoL. 59.5% of quality of life’s variation is explained by the variation of these three parameters.

Conclusion: Cochlear implant improves the auditory performance and speech production more than hearing aids. Children implanted at young age evolve better than older but even older children can get good results, good performances, if they are properly selected. Associated diseases had a negative effect on these children outcomes but cochlear implant may have an important impact on quality of life.
Quality Of Life Outcomes For Pediatric Cochlear Implant Recipients In Singapore

V. Looi, Ph.D.¹, Z. Lee, BS², J. Loo, Ph.D.²

¹Sydney Cochlear Implant Centre, Macquarie University, NSW Australia; ²National University Hospital, Department Of Otolaryngology, Head & Neck Surgery, Singapore, SINGAPORE Singapore

Topic: Audiology

Keywords: Outcomes

Introduction: Cochlear implantation in children has also been associated with improved speech and language, mainstream educational placements, and improved well-being. However implantation not only affects the child, but also their parents/family. It could make some of the common parenting demands more challenging, as well as create new demands. Typically outcomes for children have been assessed using clinical measures such speech and language assessments, and hearing thresholds. However, these do not reflect the impact of implantation on either the child and/or their family's quality of life (QOL). The aim of this current study proposal is to evaluate the QOL of children with a cochlear implant (CI) in Singapore, and compare this to aged-matched children using hearing aids (HAs), as well as normally-hearing (NH) children. There are no previous pediatric QOL outcome studies for Singapore.

Methods: Three age-matched groups of at least 20 children were recruited: i) children with CIs; ii) children with HAs; iii) NH children. Three different QOL measures were administered face-to-face: i) Children using Hearing Implants Quality of Life (CuHIQoL) Questionnaire, ii) Hearing Environments and Reflection on Quality of Life (HEAR-QL) Questionnaire, and iii) Health Utilities Inc. 3 (HUI3) questionnaire. The HEAR-QL was administered to hearing impaired children aged 7+, the CuHIQoL to parents of hearing impaired children, and the HUI3 to all parents and children. Additionally, demographic, auditory and education performance results were collected to investigate for any co-relationships.

Results: Data analyses will compare QOL outcomes for the three groups, as well as investigate for correlations between participant variables and QOL scores. Additionally, by administering questionnaires to both parents and children, this will allow for evaluation of consistencies and/or discrepancies between the parent’s and child’s ratings.

Conclusion: Cochlear implants impact on not only a child's QOL, but also that of their parents and families. QOL scores for children with CIs differ to those with HAs, as well as NH children, however individual demographic factors contribute to outcomes. The findings of this study are not only important to better inform clinical practice, but the data is also of interest to Government, funding bodies and reimbursement authorities.
Adipose-Derived Stem Cells Serve as a Neurotrophin Source and Enhance the Survival of Spiral Ganglion Neurons in Vivo

A. Radeloff, MD¹, P. Schendzielorz, MD¹, K. Rak¹, K. Froelich, MD¹, S. Schraven¹, R. Mlynski¹,², R. Hagen¹

¹Julius-Maximilians-University, Wuerzburg, BAVARIA Germany; ²Rostock University Medical Center, Rostock, MECKLENBURG-VORPOMMERN Germany

Topic: Basic Research

Keywords: Drug Delivery

Introduction: Neurotrophin (NT) application has been proposed to enhance the survival of spiral ganglion neurons (SGNs) in the deaf ear and thus may improve the results after cochlear implantation (CI). Adipose-derived stem cells (ASCs) are progenitor cells from adipose tissue and are known to produce NTs. Objective: To evaluate ASC application into the deaf inner ear.

Methods: ASCs and SGNs have been co-cultivated. The survival of SGNs and the neurite outgrowth were evaluated. Then, in a guinea pig model of sensory hearing loss, ASCs were harvested individually from each animal and were implanted into the inner ear of one side. The contralateral ear served as a control. Histologic evaluations were performed after 2-8 weeks.

Results: ASCs promoted survival of SGNs and neurite outgrowth in the co-culture experiments. Moreover, ASC application significantly improved SGN survival and peripheral process density after induced hearing loss in vivo.

Conclusion: The presented results suggest that ASC application may improve the function of the auditory nerve and thus may be beneficial for cochlear implantation.
ACI2014
On-site Review and Administration Of Immunizations Improves Vaccination Compliance In Children Receiving Cochlear Implants
P. S. Malhotra, MD, K. Davis, L. Keating

1Nationwide Children's Hospital, Pediatric Otolaryngology, Columbus, OH USA; 2Ohio State University, Otolaryngology-Head And Neck Surgery, Columbus, OH USA

Topic: Surgery/Medical

Keywords: Medical/Surgical Issues, Complications

Introduction: In 2002, the FDA recognized a greater risk of bacterial meningitis in children with cochlear implants, primarily from Streptococcus Pneumoniae. The Centers for Disease Control (CDC) subsequently provided recommendations to decrease this risk. Cochlear implant centers generally require vaccination prior to implantation. However, there is no standardization of the practice of administering immunizations, and this is often left to primary care providers who may have variable knowledge of the appropriate vaccination guidelines. The objective of this study was to evaluate the impact on compliance with current CDC vaccination recommendations and on documentation of vaccination status after implementation of a nurse-reviewed and nurse-administered, on-site vaccination protocol during outpatient clinic visits to our cochlear implant center.

Methods: We performed a retrospective review of vaccination status of all children with cochlear implants, aged 0-18, implanted in 2009 or after and seen in our Hearing Clinic. We assessed pre- and post-vaccination documentation and compliance with current CDC recommendations in cochlear implant recipients from 2009 to June 2012 and evaluated the impact of the new on-site review and vaccination protocol in July 2012.

Results: We found that uniform documentation of cochlear implant patient’s vaccination status was variable at our facility prior to initiation of our protocol, and often difficult to assess. We demonstrated improved documentation of vaccination status, and improved compliance with current CDC recommendations prior to cochlear implantation at our center, after institution of our on-site vaccination protocol. We also improved compliance with updated CDC guidelines in children implanted in the past or at other centers, who followed up in our Hearing Clinic.

Conclusion: It is difficult to ensure that recommended vaccinations are completed for cochlear implant patients. Standardization of this process with an on-site, nurse reviewed and nurse-administered immunization by a member of our Cochlear Implant program improved our ability to document and ensure patients received recommended vaccines.
Introduction: The previous published papers before 2009 show a high carrier rate of 35delG in the Southern part of the Europe, demonstrating a South to North gradient. The papers published after 2009 bring new data about the distribution of the 35delG mutation in the Eastern part of the Europe.

Objective: The aim of this study is to describe and to compare the carrier rates of 35delG in different European populations.

Methods: We have performed a search on PubMed using keywords:“35delG”,”GJB 2” and “carrier”. We obtained data from 29 European countries including 25,422 healthy random choosen individuals from which 517 were 35delG carriers. Results: The mean carrier frequency of 35delG for Europe was 2.1%. In the East part of the Europe we found a rate of 35delG carriers higher (Estonia - 4.5%, Belarus -5.73%) or at least similar (Ukraine - 3.3%, Romania - 3.38%) with those found for the South of Europe (Greece being considered, until now, the country with the highest carrier frequency in the world - 3.54%). We found also that the highest carrier rate of 35delG mutation was in Belarus (5.73%).The lower carriers frequencies were found in countries from North (Norway - 0.52%, Sweden - 1.51%), Central (Austria - 1.3%, Slovenia - 0.55%, Bulgaria 0.64%) and West of Europe (UK 1.34%).

Conclusion: Our study confirm once more the South-to-North gradient in the carrier frequency of 35delG in Europe and brings in the attention the East part of the Europe where was found a rate of mutation at least similar with that found in the South suggesting an East-to-West European gradient.