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koonnut Timo Autio

Systematic analysis of the benefits of cochlear implants on voice production.

Coelho AC, Brasolotto AG, Bevilacqua MC.
J Soc Bras Fonoaudiol. 2012;24(4):395-402.

PURPOSE
To perform a systematic analysis of the research regarding vocal characteristics of hearing impaired children or adults with cochlear implants. RESEARCH STRATEGY: A literature search was conducted in the databases Web of Science, Bireme, and Universidade de São Paulo's and CAPES' thesis and dissertations databases using the keywords voice, voice quality, and cochlear implantation, and their respective correspondents in Brazilian Portuguese.
SELECTION CRITERIA
The selection criteria included: title consistent with the purpose of this review; participants necessarily being children or adults with severe to profound pre-lingual or post-lingual hearing loss using cochlear implants; and data regarding participants' performance on perception and/or acoustic analysis of the voice.
RESULTS
Twenty seven papers were classified according to the levels of evidence and quality indicators recommended by the American Speech-Language-Hearing Association (ASHA). The designs of the studies were considered of low and medium levels of evidence. Six papers were classified as IIb, 20 as III, and one as IV.
CONCLUSION
The voice of hearing impaired children and adults with cochlear implants has been little studied. There is not an effective number of studies with high evidence levels which precisely show the effects of the cochlear implantation on the quality of voice of these individuals.

Determinants of communication skills development in children with hearing impairment.

Novaes BC, Versolatto-Cavanaugh MC, Figueiredo Rde S, Mendes Bde C.
J Soc Bras Fonoaudiol. 2012;24(4):335-41.

PURPOSE
To establish relationships between age at onset of individual hearing aid use, functional hearing, communication skills, family involvement and family expectations regarding language development of children diagnosed with hearing loss during the first three years of life.
METHODS:
Thirty-five babies diagnosed with moderate to severe hearing loss who were receiving treatment at the Children's Hearing Center/Derdic (CeAC) were evaluated during a period of 24 months. Assessments were carried out every six months and included: VRA--Visual reinforcement audiometry (with and without amplification); IT-MAIS; MUSS; and satisfaction of family regarding child development.
RESULTS
Cluster analysis was performed among the subjects. Consistent use of hearing aids was the only variable that exhibited a strong relationship with hearing and language skills. Children whose parents were not satisfied exhibited severe hearing loss and limited auditory capacity even with the use of hearing aid, and, consequently, poor auditory skills and speech production.
CONCLUSION
Datalogging monitoring can guide the knowledge of speech-language pathologists and audiologists and it can also be used on strategic planning. Family involvement, quality of parental participation in the intervention program as well as expectations about the future are also important aspects to consider as these can aid therapists and researchers on the assessment of deaf babies intervention effectiveness

Effect of rehabilitation for prelingual deaf children who use cochlear implants in conjunction with hearing aids in the opposite ears.

Tian Y, Zhou H, Zhang J, Yang D, Xu Y, Guo Y.
2012 Oct;26(19):868-70, 873.

OBJECTIVE
To compare the effect of rehabilitation of prelingual deaf children who used a cochlear implant (CI) in one ear and a hearing aids in the opposite ear while the hearing level of the opposite ears are different. Hearing ability, language ability and learning ability was included in the content. The aim of this research is to investigate better style of rehabilitation, and to offer the best help to the prelingual deaf children.
METHOD
Accord ing to the hearing level of the ear opposite to the one wearing a cochlear implant and whether the opposite ear wear a hearing aid or not, 30 prelingual deaf children were divided into

three groups, including cochlear implant with opposite severe hearing loss and hearing aid ear (CI+SHA), cochlear implant with opposite profound hearing loss and hearing aid ear (CI+PHA), cochlear implant only (CI). The effect of rehabilitation was assessed in six different times (3,6,9,12,15 and 18 months after the cochlear implants and hearing aids began to work).

RESULT

The longer time the rehabilitation spends, the better the hearing ability,language ability and the learning ability were. The hearing ability of CI+SHA was better than those of CI+PHA ($P<0.05$) and CI ($P<0.05$). The language ability and learning ability of CI-SHA was nearly equal to those of the other two groups.

CONCLUSION

The prelingual deaf children should take much more time on rehabilitation. The effect of rehabilitation for prelingual deaf children who used cochlear implant in one ear and hearing aid in the other depend on the residual hearing level of the other ear. If a prelingual deaf children still has any residual hearing level in the ear opposite to the cochlear implant ear, it is better for him/her to wear a hearing aid in the ear.

Health-related quality of life in cochlear implanted patients in Romania.

Necula V, Cosgarea M, Necula SE.

Int J Pediatr Otorhinolaryngol. 2013 Feb;77(2):216-22. doi: 10.1016/j.ijporl.2012.10.026. Epub 2012 Dec 8.

OBJECTIVES

Cochlear implantation is a well established treatment method in severe to profound hearing impaired people. Hearing devices do not cure hearing loss, but correct the disability, so it is important to assess the benefits not only on auditory-verbal performances but in terms of health-related quality of life.

MATERIALS AND METHODS

We evaluated the health-related quality of life in a cochlear implant group (84 patients), split into two subgroups, according to the age of implantation and compared with a hearing aided group (50 patients). We used the Nijmegen cochlear implant HRQoL questionnaire which was sent to the parents. In the study group, all patients had unilateral MedEl device and at least 6 months of experience with the speech processor.

RESULTS

Although there were differences between hearing aided and implanted children in all areas of quality of life, in the physical area, these differences were greater than those in the psychological and social domains. HRQoL was positively correlated with auditory performance, speech intelligibility and negatively correlated with implantation age. The correlation coefficient, $R=0.78$, indicates that between these three variables, implantation age, SIR and CAP and quality of life, there was a very good linear and direct proportional correlation. According to the determination coefficient ($R(2)$ adjusted=0.59), 59.5% of quality of life's variation was explained by the variation of these three parameters.

CONCLUSIONS

Cochlear implant improves the auditory performance and speech production much more than hearing aids. Associated diseases have a negative effect on the evolution of cochlear implanted children but the cochlear implant may have an important impact on these children quality of life. It is well known that children implanted at a young age evolve better than older ones, but we should take into consideration that even older children can get good results, good performances if they are properly selected and well trained.

Cochlear implantation in unique pediatric populations.

Hang AX, Kim GG, Zdanski CJ.

Curr Opin Otolaryngol Head Neck Surg. 2012 Dec;20(6):507-17. doi: 10.1097/MOO.0b013e328359eea4.

PURPOSE OF REVIEW

Over the last decade, the selection criteria for cochlear implantation have expanded to include children with special auditory, otologic, and medical problems. Included within this expanded group of candidates are those children with auditory neuropathy spectrum disorder, cochleovestibular malformations, cochlear nerve deficiency, associated syndromes, as well as multiple medical and developmental disorders. Definitive indications for cochlear implantation in these unique pediatric populations are in evolution. This review will provide an overview of managing and habilitating hearing loss within these populations with specific focus on cochlear implantation as a treatment option.

RECENT FINDINGS

Cochlear implants have been successfully implanted in children within unique populations with variable results. Evaluation for cochlear implant candidacy includes the core components of a full medical, audiologic, and speech and language evaluations. When considering candidacy in these children, additional aspects to consider include disorder-specific surgical considerations and child/caregiver counseling regarding reasonable postimplantation outcome expectations.

SUMMARY

Cochlear implants are accepted as the standard of care for improving hearing and speech development in children with severe-to-profound hearing loss. However, children with sensorineural hearing loss who meet established audiologic criteria for cochlear implantation may have unique audiologic, medical, and anatomic characteristics that necessitate special consideration regarding cochlear implantation candidacy and outcome. Individualized preoperative candidacy and counseling, surgical evaluation, and reasonable postoperative outcome expectations should be taken into account in the management of these children.

Reading vocabulary in children with and without hearing loss: the roles of task and word type.

Coppens KM, Tellings A, Verhoeven L, Schreuder R.
J Speech Lang Hear Res. 2013 Apr;56(2):654-66. doi: 10.1044/1092-4388(2012/11-0138). Epub 2012 Oct 22.

PURPOSE
To address the problem of low reading comprehension scores among children with hearing impairment, it is necessary to have a better understanding of their reading vocabulary. In this study, the authors investigated whether task and word type differentiate the reading vocabulary knowledge of children with and without severe hearing loss.
METHOD
Seventy-two children with hearing loss and 72 children with normal hearing performed a lexical and a use decision task. Both tasks contained the same 180 words divided over 7 clusters, each cluster containing words with a similar pattern of scores on 8 word properties (word class, frequency, morphological family size, length, age of acquisition, mode of acquisition, imageability, and familiarity).
RESULTS
Whereas the children with normal hearing scored better on the 2 tasks than the children with hearing loss, the size of the difference varied depending on the type of task and word.
CONCLUSIONS
Performance differences between the 2 groups increased as words and tasks became more complex. Despite delays, children with hearing loss showed a similar pattern of vocabulary acquisition as their peers with normal hearing. For the most precise assessment of reading vocabulary possible, a range of tasks and word types should be used.

One-stage vs. two-stage BAHA implantation in a pediatric population.

Saliba I, Froehlich P, Bouhabel S.
Int J Pediatr Otorhinolaryngol. 2012 Dec;76(12):1814-8. doi: 10.1016/j.ijporl.2012.09.007. Epub 2012 Sep 23.

OBJECTIVES
BAHA implantation surgery in a pediatric population is usually done in two-stage surgeries. This study aims to evaluate the safety and possible superiority of the one-stage over the two-stage BAHA implantation and which one would be the best standard of care for our pediatric patients.
METHODS
A retrospective chart review of 55 patients operated in our tertiary care institutions between 2005 and 2010 was conducted. The actual tendency in our institutions, applied at the time of the study, is to perform a one-stage surgery for all operated patients (pediatric and adult), except for patients undergoing translabyrinthine surgeries for cerebellopontine tumor excision. These patients indeed had a two-stage insertion. 26 patients underwent one-stage surgery (group I)

while 29 patients had a two-stage (group II) BAHA insertion. A period of 4 months was allowed for osseointegration before BAHA processor fitting. As for the safety assessment of the one-stage surgery, we compared both groups regarding the incidence and severity (minor, moderate and major) of encountered complications, as well as the operating time and follow-up. The operating time of the two-stage surgery includes the time of the first and of the second stage.

RESULTS

The mean age at surgery was 8.5 years old for the group I and 50 years old for the group II patients. There was no difference in the incidence of minor (p=0.12), moderate (p=0.41) nor severe (p=0.68) complications between groups I and II. Two cases of traumatic extrusion were noted in the group I. Furthermore, the one-stage BAHA implantation requests a significantly lower operating time (mean: 54 [32-100] min) than the two-stage surgery (mean: 79 [63-148] min) (p=0.012). All pediatric cases of BAHA insertion were performed in a one day surgery. The mean postoperative follow-up was 114 and 96 weeks for groups I and II respectively (p=0.058).

CONCLUSIONS

One-stage BAHA insertion surgery in the pediatric population is a reliable, safe and efficient therapeutic option that allows a good result in a significantly lower operating time compared to the two-stage insertion and is achieved in a one day surgery. It could therefore be considered as a standard of care for pediatric patients.

Outcome assessment alternatives for young children during the first 12 months after pediatric hearing-aid fittings.

Zheng Y, Li G, Meng ZL, Xu K, Tao Y, Wang K, Soli SD.

Int J Audiol. 2012 Nov;51(11):846-55. doi: 10.3109/14992027.2012.711914. Epub 2012 Aug 24.

OBJECTIVE

Perform longitudinal evaluations of young children during the first 12 months after initial hearing-aid fitting. Document evidence of early prelingual auditory development (EPLAD), identify factors that affect EPLAD, and define performance milestones that can guide best practices.

DESIGN

Unblinded, prospective, within-subject, repeated-measures design. Audiological measures and measures of EPLAD were taken at baseline, 3, 6, and 12 months after hearing-aid fitting

STUDY SAMPLE

Subjects were 45 pediatric patients initially fitted with hearing aids between 1 and 5.5 years of age. Four groups were formed for analysis purposes based on severity of hearing loss (moderate-to-severe and profound) and initial fitting age (≤ 30 months and > 30 months).

RESULTS

All groups exhibited statistically significant increases in EPLAD within six months of hearing-aid fitting, and those with profound losses exhibited further statistically significant improvement between six and 12 months. Similar EPLAD levels were reached at 12 months regardless of severity of hearing loss. The EPLAD trajectory is similar to that following early cochlear implantation.

CONCLUSIONS
Measures of EPLAD provide a means of evaluating outcomes following early pediatric hearing-aid intervention, supplementing behavioral audiological measures.

Surgical complications in 550 consecutive cochlear implantation.

Brito R, Monteiro TA, Leal AF, Tsuji RK, Pinna MH, Bento RF.
Braz J Otorhinolaryngol. 2012 Jun;78(3):80-5.

OBJECTIVE
To describe the surgical complications of cochlear implantation.
MATERIALS AND METHODS
Information from 591 consecutive multichannel cochlear implant surgeries were retrospectively analyzed. All patients were followed-up for at least one year. Forty-one patients were excluded because of missing data, follow-up loss or middle fossa approach.
RESULTS
Cochlear implantation is a safe and reliable method for auditory restoration in patients with severe to profound hearing loss. Of 550 cochlear implantation analyzed, 341 were performed in children or adolescents, and 209 in adults. The mean hearing loss time was 6.3 ± 6.7 years for prelingual loss and 12.1 ± 11.6 years for postlingual. Mean follow-up was 3.9 ± 2.8 years. Major complications occurred in 8.9% and minor in 7.8%. Problems during electrode insertion (3.8%) were the most frequent major complication followed by flap dehiscence (1.4%). Temporary facial palsy (2.2%), canal-wall lesion (2.2%) and tympanic membrane lesion (1.8%) were the more frequent minor complications. No death occurred.
CONCLUSION
There was a low rate of surgical complications, most of them been successfully managed. These results confirm that cochlear implant is a safe surgery and most surgical complications can be managed with conservative measures or minimal intervention.

Bilateral cochlear implantation for children in nagasaki, Japan.

Kanda Y, Kumagami H, Hara M, Sainoo Y, Sato C, Yamamoto-Fukuda T, Yoshida H, Ito A, Tanaka C, Baba K, Nakata A, Tanaka H, Takahashi H.
Clin Exp Otorhinolaryngol. 2012 Apr;5 Suppl 1:S24-31. doi: 10.3342/ceo.2012.5.S1.S24. Epub 2012 Apr 30.

OBJECTIVES
The number of patients with bilateral cochlear implant (CI) has gradually increased as patients and/or parents recognize its effectiveness. The purpose of this report is to evaluate the efficacy of 29 bilateral CI out of 169 pediatric CI users, who received auditory-verbal/oral habilitation at our hearing center.

METHODS
We evaluated the audiological abilities 29 Japanese children with bilateral CIs including wearing threshold, word recognition score, speech discrimination score at 1 m from front speaker (SP), 1 m from second CI side SP, speech discrimination score under the noise (S/N ratio=80 dB sound pressure level [SPL]/70 dB SPL, 10 dB) at 1 m from front SP, word recognition score under the noise (S/N ratio=80 dB SPL/70 dB SPL, 10 dB) at 1 m from front SP.
RESULTS
Binaural hearing using bilateral CI is better than first CI in all speech understanding tests. Especially, there were significant differences between the results of first CI and bilateral CI on SDS at 70 dB SPL (P=0.02), SDS at 1 m from second CI side SP at 60 dB SPL (P=0.02), word recognition score (WRS) at 1 m from second CI side SP at 60 dB SPL (P=0.02), speech discrimination score (SDS) at 1 m from front SP under the noise (S/N=80/70; P=0.01) and WRS at 1 m from front SP under the noise (S/N=80/70; P=0.002). At every age, a second CI is very effective. However, the results of under 9 years old were better than of over 9 years old on the mean SDS under the noise (S/N=80/70) on second CI (P=0.04). About use of a hearing aid (HA) in their opposite side of first CI, on the WRS and SDS under the noise, there were significant differences between the group of over 3 years and the group of under 10 months of HA non user before second CI.
CONCLUSION
These results may show important binaural effectiveness such as binaural summation and head shadow effect. Bilateral CI is very useful medical intervention for many children with severe-to-profound hearing loss in Japan as well as elsewhere.

Speech Recognition Performance under Noisy Conditions of Children with Hearing Loss.

Yang HM, Hsieh YJ, Wu JL.
Clin Exp Otorhinolaryngol. 2012 Apr;5 Suppl 1:S73-5. doi: 10.3342/ceo.2012.5.S1.S73. Epub 2012 Apr 30.

OBJECTIVES
In order to understand the communicative abilities of hearing impaired children in noisy situations and their communication problems, this study was undertaken to examine speech recognition at different background noise levels, and to compare how context cues in noisy situations affect speech recognition.
METHODS
Thirty-four children with severe/profound hearing impairment were enrolled. Fifteen children had cochlear implants (CIs) and 19 used hearing aids (HAs). The Mandarin Speech Perception in Noise (SPIN) test was performed under two levels of background noise, signal-to-noise ratio (SNR) 10 dB and SNR 0 dB (high and low levels, respectively). High predictive (HP) and low predictive (LP) sentences SPIN test scores were recorded to test the effect of context cues on speech recognition.
RESULTS
Performance was significantly better in children with CIs (SNR 10: mean, 49.44, standard deviation [SD], 13.90; SNR 0: mean, 31.95, SD, 15.72) than in children with HAs (SNR 10: mean, 33.33, SD,

9.72; SNR 0: mean, 19.52, SD, 6.67; P<0.05) in both noise backgrounds, but no significant interaction was found between devices and background noise level. Hearing-impaired children performed better at SNR 10 dB (mean, 40.44; SD, 14.12) than at SNR 0 dB (mean, 25.0; SD, 12.98), significantly (P<0.001). Performance for HP sentences (mean, 38.6; SD, 12.66) was significantly (P<0.001) better than that for LP sentences (mean, 25.25; SD, 12.93). An interaction was found to between background noise level and contextual cues in sentences (F=8.47, P<0.01).
CONCLUSION
The study shows that SNR conditions significantly influence speech recognition performance in children with severe/profound hearing impairment. Under better SNR listening situations, children have better speech recognition when listening to sentences with contextual cues. Children with CIs perform better than children with HAs at both noise levels.

Language and behavioral outcomes in children with developmental disabilities using cochlear implants.

Cruz I, Vicaria I, Wang NY, Niparko J, Quittner AL; CDaCI Investigative Team.
Collaborators (75)
Eisenberg LS, Johnson K, Luxford W, Visser-Dumont L, Martinez A, Ganguly DH, Still J, Stika CJ, Niparko JK, Bowditch S, Chinnici J, Clark J, Francis H, Mertes J, Ostrander R, Yeagle J, Mellon N, Dougherty M, Kane MO, Ouellette M, Verhoff J, Marsiglia D, Hodges A, Balkany T, Lopez A, Goodwin L, Zwolan T, Arnedt C, Arts H, Griffin B, El-Kashlam H, Lucius S, Stach C, Starr K, Heavner K, O'Sullivan MB, Telian S, Thomas E, Vereb A, Donaldson A, Teagle HF, Buchman CA, Zdanski C, Eskridge H, Pillsbury HC, Woodard J, Tobey EA, Britt L, Lane J, Roland P, Shin S, Sundarrajan M, Warner-Czyz A, Wang NY, Bayton P, Belarmino E, Carson C, Fink NE, Grace T, Verma S, Quittner AL, Cruz I, Romero S, Hernandez C, Niparko JK, Eisenberg LS, Fink NE, Quittner AL, Thal D, Tobey EA, Wang NY, Cohen N, Evans J, Geers A, Kirk KI.
Otol Neurotol. 2012 Jul;33(5):751-60. doi: 10.1097/MAO.0b013e3182595309.

OBJECTIVE
Over the past decade, the number of deaf children with developmental disabilities receiving cochlear implants has increased dramatically. However, little is known about the developmental outcomes of these children post-implantation. The current study evaluated oral language and behavioral outcomes over 3 years after implantation in a sample of typically developing deaf children and children with developmental disabilities.
STUDY DESIGN
A three year longitudinal study of the effects of cochlear implantation on language and behavioral outcomes in children with and without additional disabilities.
SETTING
Six cochlear implant centers in the United States.
PATIENTS
The study cohort consisted of 188 deaf children. Eighty-five percent of the sample (n = 157) had a single diagnosis of severe to profound hearing loss and 15% (n = 31) had an additional disability.

MAIN OUTCOME MEASURES
Oral language was assessed using the Reynell Developmental Language Scales, and behavioral outcomes were assessed using the Child Behavior Checklist.
RESULTS
Results using multilevel modeling indicated that deaf children with and without additional disabilities improved significantly in oral language skills post-implantation. However, children with additional disabilities made slower progress. In terms of specific diagnoses, children with developmental disorders, such as autism, made the slowest progress over time. In addition, behavior problems increased significantly in this group, whereas behavior problems decreased over 3 years in the typically developing deaf sample.
CONCLUSION
Overall, given the improvements in expressive and receptive language skills documented over 3 years, these findings support the use of cochlear implants for deaf children with developmental disabilities.

Measuring what matters: effectively predicting language and literacy in children with cochlear implants.

Nittrouer S, Caldwell A, Holloman C.
Int J Pediatr Otorhinolaryngol. 2012 Aug;76(8):1148-58. doi: 10.1016/j.ijporl.2012.04.024. Epub 2012 May 28.

OBJECTIVES
To evaluate how well various language measures typically used with very young children after they receive cochlear implants predict language and literacy skills as they enter school.
METHODS
Subjects were 50 children who had just completed kindergarten and were 6 or 7 years of age. All had previously participated in a longitudinal study from 12 to 48 months of age. 27 children had severe-to-profound hearing loss and wore cochlear implants, 8 had moderate hearing loss and wore hearing aids, and 15 had normal hearing. A latent variable of language/literacy skill was constructed from scores on six kinds of measures: (1) language comprehension; (2) expressive vocabulary; (3) phonological awareness; (4) literacy; (5) narrative skill; and (6) processing speed. Five kinds of language measures obtained at six-month intervals from 12 to 48 months of age were used as predictor variables in correlational analyses: (1) language comprehension; (2) expressive vocabulary; (3) syntactic structure of productive speech; (4) form and (5) function of language used in language samples.
RESULTS
Outcomes quantified how much variance in kindergarten language/literacy performance was explained by each predictor variable, at each earlier age of testing. Comprehension measures consistently predicted roughly 25-50 percent of the variance in kindergarten language/literacy performance, and were the only effective predictors before 24 months of age. Vocabulary and syntactic complexity were strong predictors after roughly 36 months of age. Amount of speech produced in language samples and number of answers to parental queries explained moderate

amounts of variance in performance after 24 months of age. Number of manual gestures and nonspeech vocalizations produced in language samples explained little to no variance before 24 months of age, and after that were negatively correlated with kindergarten performance. The number of imitations produced in language samples at 24 months of age explained about 10 percent of variance in kindergarten performance, but was otherwise not correlated or negatively correlated with kindergarten outcomes.

CONCLUSIONS

Before 24 months of age, the best predictor of later language success is language comprehension. In general, measures that index a child's cognitive processing of language are the most sensitive predictors of school-age language

Comparison of outcomes in children with hearing aids and cochlear implants.

Fitzpatrick EM, Olds J, Gaboury I, McCrae R, Schramm D, Durieux-Smith A.
Cochlear Implants Int. 2012 Feb;13(1):5-15. doi: 10.1179/146701011X12950038111611.

OBJECTIVES

The purpose of this study was to document the performance of a group of children with moderately severe to severe hearing loss who use hearing aids on a range of speech recognition, speech-language, and literacy measures and to compare these results to children with severe to profound hearing loss, who have learned language through cochlear implants.

METHODS

This study involved 41 children with bilateral sensorineural hearing impairment, aged 6-18 years. Twenty children had moderately severe/severe hearing loss and used hearing aids, and 21 had severe to profound hearing loss and used cochlear implants. Communication and academic skills were assessed using speech recognition tests and standardized measures of speech production, language, phonology, and literacy.

RESULTS

The two groups did not differ in their open-set speech recognition abilities or speech production skills. However, children with hearing aids obtained higher scores than their peers with cochlear implants in the domains of receptive vocabulary, language, phonological memory, and reading comprehension. The findings also indicate that children with moderately severe or severe hearing loss can develop spoken language skills that are within the range expected for normal hearing children.

CONCLUSIONS

School-aged children with moderately severe and severe hearing loss performed better in several domains than their peers with profound hearing loss who received cochlear implants between age 2 and 5 years. Further research is required to evaluate the benefits of hearing aids and cochlear implants in children with hearing loss who are diagnosed and receive intervention within the first year of life

Speech recognition and communication outcomes with cochlear implantation in Usher syndrome type 3.

Pietola L, Aarnisalo AA, Abdel-Rahman A, Västinsalo H, Isosomppi J, Löppönen H, Kentala E, Johansson R, Valtonen H, Vasama JP, Sankila EM, Jero J.
Otol Neurotol. 2012 Jan;33(1):38-41. doi: 10.1097/MAO.0b013e31823dbc56.

BACKGROUND
Usher syndrome Type 3 (USH3) is an autosomal recessive disorder characterized by variable type and degree of progressive sensorineural hearing loss and retinitis pigmentosa. Cochlear implants are widely used among these patients.
OBJECTIVES
To evaluate the results and benefits of cochlear implantation in patients with USH3.
STUDY DESIGN
A nationwide multicenter retrospective review.
MATERIALS AND METHODS
During the years 1995-2005, in 5 Finnish university hospitals, 19 patients with USH3 received a cochlear implant. Saliva samples were collected to verify the USH3 genotype. Patients answered to 3 questionnaires: Glasgow Benefit Inventory, Glasgow Health Status Inventory, and a self-made questionnaire. Audiological data were collected from patient records.
RESULTS
All the patients with USH3 in the study were homozygous for the Finnish major mutation (p.Y176X). Either they had severe sensorineural hearing loss or they were profoundly deaf. The mean preoperative hearing level (pure-tone average, 0.5-4 kHz) was 110 ± 8 dB hearing loss (HL) and the mean aided hearing level was 58 ± 11 dB HL. The postoperative hearing level (34 ± 9 dB HL) and word recognition scores were significantly better than before surgery. According to the Glasgow Benefit Inventory scores and Glasgow Health Status Inventory data related to hearing, the cochlear implantation was beneficial to patients with USH3.
CONCLUSION
Cochlear implantation is beneficial to patients with USH3, and patients learn to use the implant without assistance

Cochlear implant outcomes in children with motor developmental delay.

Amirsalari S, Yousefi J, Radfar S, Saburi A, Tavallaie SA, Hosseini MJ, Noohi S, Hassan Alifard M, Ajallouyean M.
Int J Pediatr Otorhinolaryngol. 2012 Jan;76(1):100-3. doi: 10.1016/j.ijporl.2011.10.011. Epub 2011 Nov 17.

INTRODUCTION:
Multiple handicapped children and children with syndromes and conditions resulting additional disabilities such as cerebral palsy, global developmental delay and autistic spectrum disorder, are now not routinely precluded from receiving a cochlear implant. The primary focus of this study

was to determine the effect of cochlear implants on the speech perception and intelligibility of deaf children with and without motor development delay.

METHOD:

In a cohort study, we compared cochlear implant outcomes in two groups of deaf children with or without motor developmental delay (MDD). Among 262 children with pre-lingual profound hearing loss, 28 (10%) had a motor delay based on Gross Motor Function Classification (GMFC). Children with severe motor delays (classification scale levels 4 and 5) and cognitive delays were excluded. All children completed the Categories of Auditory Perception Scales (CAP) and Speech Intelligibility Rating (SIR) prior to surgery and 24 months after the device was activated.

RESULT:

The mean age for the study population was 4.09 ± 1.86 years. In all 262 patients the mean CAP score after surgery (5.38 ± 0.043) had a marked difference in comparison with the mean score before surgery (0.482 ± 0.018) (P=0.001). The mean CAP score after surgery for MDD children was 5.03, and was 5.77 for normal motor development children (NMD). The mean SIR score after surgery for MDD children was 2.53, and was 2.66 for NMD children. The final results of CAP and SIR did not have significant difference between NMD children versus MDD children (P>0.05).

CONCLUSION:

Regarding to the result, we concluded that children with hearing loss and concomitant MDD as an additional disabilities can benefit from cochlear implantation similar to those of NMD.

Quality of life in hearing-impaired children with bilateral hearing devices.

Pérez-Mora R, Lassaletta L, Castro A, Herrán B, San-Román-Montero J, Valiente E, Gavilán J.
B-ENT. 2012;8(4):251-5.

OBJECTIVE:

To evaluate the quality of life (QOL) of hearing-impaired children fitted with either a cochlear implant and a hearing aid or bilateral hearing aids, and to compare their outcomes with those of normal-hearing peers. We also investigated the impact of demographic, clinical, and audiological results on QOL.

METHODOLOGY:

Cross-sectional study using a generic QOL questionnaire. Questionnaires were completed by children and their parents. Eighty-eight children were divided into three groups: bilateral deaf children with a cochlear implant and a contralateral hearing aid (bimodal group), bilateral deaf children with bilateral hearing aids (hearing aid group), and normal-hearing children. The Spanish version of the KINDLr test was used. Responses were correlated with demographic, clinical, and audiological data.

RESULTS:

The questionnaires revealed a high health-related QOL with a total self-rating score for the children and a proxy score for the parents of 75 or higher in five out of six domains. No significant difference was found in the QOL among the three groups. Additionally, there was no significant difference between the self-rating and the proxy total scores, and no significant association was found between the QOL and the variables of the study.

CONCLUSION:
Our results indicate a high level of QOL in hearing-impaired children and their families following treatment with either bilateral hearing aids or bimodal stimulation. Children and their parents reported a QOL similar to that of normal-hearing children.

Enduring advantages of early cochlear implantation for spoken language development.

Geers AE, Nicholas JG.
J Speech Lang Hear Res. 2013 Apr;56(2):643-55. doi: 10.1044/1092-4388(2012/11-0347). Epub 2012 Dec 28.

PURPOSE:
In this article, the authors sought to determine whether the precise age of implantation (AOI) remains an important predictor of spoken language outcomes in later childhood for those who received a cochlear implant (CI) between 12 and 38 months of age. Relative advantages of receiving a bilateral CI after age 4.5 years, better pre-CI-aided hearing, and longer CI experience were also examined.
METHOD:
Sixty children participated in a prospective longitudinal study of outcomes at 4.5 and 10.5 years of age. Twenty-nine children received a sequential second CI. Test scores were compared with normative samples of hearing age mates, and predictors of outcomes were identified.
RESULTS:
Standard scores on language tests at 10.5 years of age remained significantly correlated with age of first cochlear implantation. Scores were not associated with receipt of a second, sequentially acquired CI. Significantly higher scores were achieved for vocabulary as compared with overall language, a finding not evident when the children were tested at younger ages.
CONCLUSION:
Age-appropriate spoken language skills continued to be more likely with younger AOI, even after an average of 8.6 years of additional CI use. Receipt of a second implant between ages 4 and 10 years and longer duration of device use did not provide significant added benefit.

Language understanding and vocabulary of early cochlear implanted children.

Percy-Smith L, Busch G, Sandahl M, Nissen L, Josvassen JL, Lange T, Rusch E, Cayé-Thomasen P.
Int J Pediatr Otorhinolaryngol. 2013 Feb;77(2):184-8. doi: 10.1016/j.ijporl.2012.10.014. Epub 2012 Nov 8.

OBJECTIVES:
The aim of the study was to identify factors associated with the level of language understanding, the level of receptive and active vocabulary, and to estimate effect-related odds ratios for cochlear implanted children's language level.
METHODS:

The patient material included all children born in Denmark between January 2005 and January 2011, having received a cochlear implant (CI) and with a minimum of 6 months of hearing with their CI (N=94). The participation rate was 88% (N=83). Sixty-eight (82%) of the participating children were implanted bilaterally. Mean age at implantation was 19.6 months. The mean age at test was 46.3 months and the mean age of hearing with CI was 25.9 months. The children were tested with three different tests, the PPVT-4, the Reynell receptive part and a Danish test "Viborgmaterialet" for active vocabulary. Logistic regression models were used for analysis of the potential influence of eighteen different factors upon the test outcomes.

RESULTS:

The majority of children did not have age equivalent language understanding and vocabulary. There was significant effect of the following factors upon the test outcomes: age at hearing aid start before implantation, age at implantation, length of hearing, communication mode, mode of implantation, amount of support teaching, residence and educational placement. Children who started HA treatment before 6 months of age, were implanted before 12 months or did not use total communication had the highest odds of having age equivalent language understanding and vocabulary.

CONCLUSIONS:

The majority of hearing impaired children in Denmark received hearing aids before six months of hearing and the majority was implanted before 18 months of age. Despite these medical and technical advances the vast majority did not have age equivalent language understanding and vocabulary. Data suggest that the language gap is not closed in two years after implantation.

Listen up: children with early identified hearing loss achieve age-appropriate speech/language outcomes by 3 years-of-age.

Fulcher A, Purcell AA, Baker E, Munro N.

Int J Pediatr Otorhinolaryngol. 2012 Dec;76(12):1785-94. doi: 10.1016/j.ijporl.2012.09.001. Epub 2012 Oct 17.

OBJECTIVES:

Age-appropriate speech/language outcomes for children with early identified hearing loss are a possibility but not a certainty. Identification of children most likely to achieve optimal outcomes is complicated by the heterogeneity of the children involved in outcome research, who present with a range of malleable (e.g. age of identification and cochlear implantation, type of intervention, communication mode) and non-malleable (e.g. degree of hearing loss) factors. This study considered whether a homogenous cohort of early identified children (≤ 12 months), with all severities of hearing loss and no other concomitant diagnoses could not only significantly outperform a similarly homogenous cohort of children who were later identified (>12 months to <5 years), but also achieve and maintain age-appropriate speech/language outcomes by 3, 4 and 5 years of age.

METHODS:

A mixed prospective/retrospective comparative study of a homogenous cohort of 45 early identified (≤ 12 months) and 49 late identified (> 12 months to < 5 years) children with hearing loss

was conducted. The children all attended the same oral auditory-verbal early intervention programme. Speech/language assessments standardized on typically developing hearing children were conducted at 3, 4 and 5 years of age.

RESULTS:

The early identified children significantly outperformed the late identified at all ages and for all severities of HL. By 3 years of age, 93% of all early identified participants scored within normal limits (WNL) for speech; 90% were WNL for understanding vocabulary; and 95% were WNL for receptive and expressive language. Progress was maintained and improved so that by 5 years of age, 96% were WNL for speech, with 100% WNL for language.

CONCLUSIONS:

This study found that most children with all severities of hearing loss and no other concomitant diagnosed condition, who were early diagnosed; received amplification by 3 months; enrolled into AV intervention by 6 months and received a cochlear implant by 18 months if required, were able to "keep up with" rather than "catch up to" their typically hearing peers by 3 years of age on measures of speech and language, including children with profound hearing loss. By 5 years, all children achieved typical language development and 96% typical speech.

Bilateral cochlear implants in children: acquisition of binaural hearing

Ramos-Macías A, Deive-Maggiolo L, Artiles-Cabrera O, González-Aguado R, Borkoski-Barreiro SA, Masgoret-Palau E, Falcón-González JC, Bueno-Yanes J.

Acta Otorrinolaringol Esp. 2013 Jan-Feb;64(1):31-6. doi: 10.1016/j.otorri.2012.06.011. Epub 2012 Oct 9.

INTRODUCTION AND OBJECTIVES:

Several studies have indicated the benefit of bilateral cochlear implants in the acquisition of binaural hearing and bilateralism. In children with cochlear implants, is it possible to achieve binaurality after a second implant? When is the ideal time to implant them? The objective of this study was to analyse the binaural effect in children with bilateral implants and the differences between subjects with simultaneous and sequential implants with both short and long intervals.

PATIENTS AND METHODS:

There were 90 patients between 1 and 2 years of age (the first surgery), implanted between 2000 and 2008. Of these, 25 were unilateral users and 65 bilateral; 17 patients had received simultaneous implants, 29 had sequential implants before 12 months after the first one (short interimplant period) and 19 after 12 months (long period). All of them were tested for silent and noisy verbal perception and a tonal threshold audiometry was performed.

RESULTS:

The silent perception test showed that the simultaneous and short period sequential implant patients (mean: 84.67%) versus unilateral and long period sequential implants (mean: 79.66%), had a statistically-significant difference (P=0,23). Likewise, the noisy perception test showed a difference with statistical significance (P=0,22) comparing the simultaneous implanted and short period sequential implants (mean, 77.17%) versus unilateral implanted and long period sequential ones (mean: 69.32%).

CONCLUSIONS:
The simultaneous and sequential short period implants acquired the advantages of binaural hearing.

Social competence and empathy in young children with cochlear implants and with normal hearing.

Ketelaar L, Rieffe C, Wiefferink CH, Frijns JH.
Laryngoscope. 2013 Feb;123(2):518-23. doi: 10.1002/lary.23544. Epub 2012 Sep 19.
OBJECTIVES:
To examine the levels of social competence and empathic behavior in children with cochlear implants in comparison with normal-hearing children, and to determine whether empathy predicts social competence to the same extent in both groups of children.
STUDY DESIGN:
Retrospective cohort study.
METHODS:
A total of 150 children (mean age 39 months) participated in the study; 61 with cochlear implants and 89 without hearing loss. Parent reports and observation measures were employed to measure empathy and social competence.
RESULTS:
Levels of empathy and social competence in children with cochlear implants and normal-hearing children were similar. Empathic behaviors were predictive of social competence in both groups alike. Emotion acknowledgment was more predictive of social competence for children with cochlear implants than for normal-hearing children. Language skills were unrelated to social competence or empathic behaviors in children with cochlear implants.
CONCLUSIONS:
Children with cochlear implants showed no delay concerning social competence or empathic behavior. The factors contributing to social competence, however, differed between the groups. This should be kept in mind when developing rehabilitation programs for children with cochlear implants.

Pediatric cochlear implants: additional disabilities prevalence, risk factors, and effect on language outcomes.

Birman CS, Elliott EJ, Gibson WP.
Otol Neurotol. 2012 Oct;33(8):1347-52. doi: 10.1097/MAO.0b013e31826939cc.

OBJECTIVE:
To determine the prevalence of additional disabilities in a pediatric cochlear population, to identify medical and radiologic conditions associated with additional disabilities, and to identify the effect of additional disabilities on speech perception and language at 12 months postoperatively.

STUDY DESIGN:
Retrospective case review.
SETTING:
Tertiary referral center and cochlear implant program.
PATIENTS:
Records were reviewed for children 0 to 16 years old inclusive, who had cochlear implant-related operations over a 12-month period.
INTERVENTIONS:
Diagnostic and rehabilitative.
MAIN OUTCOME MEASURES:
Additional disabilities prevalence; medical history and radiologic abnormalities; and the effect on Categories of Auditory Performance (CAP) score at 12 months postoperatively.
RESULTS:
Eighty-eight children having 96 operations were identified. The overall prevalence of additional disabilities (including developmental delay, cerebral palsy, visual impairment, autism and attention deficit disorder) was 33%. The main conditions associated with additional disabilities were syndromes and chromosomal abnormalities (87%), jaundice (86%), prematurity (62%), cytomegalovirus (60%), and inner ear abnormalities including cochlea nerve hypoplasia or aplasia (75%) and semicircular canal anomalies (56%). At 12 months postoperatively, almost all (96%) of the children without additional disabilities had a CAP score of 5 or greater (speech), compared with 52% of children with additional disabilities. Children with developmental delay had a median CAP score of 4, at 12 months compared with 6 for those without developmental delay.
CONCLUSION:
Additional disabilities are prevalent in approximately a third of pediatric cochlear implant patients. Additional disabilities significantly affect the outcomes of cochlear implants.

Growing up with a cochlear implant: education, vocation, and affiliation.

Spencer LJ, Tomblin JB, Gantz BJ.
J Deaf Stud Deaf Educ. 2012 Fall;17(4):483-98. Epub 2012 Sep 4.

Abstract
The long-term educational/vocational, affiliation, and quality-of-life outcomes of the first and second cohorts of children with bilateral, profound hearing loss who received cochlear implants under a large National Institutes of Health-funded study was investigated in 41 of 61 eligible participants. Educational and vocational outcomes were collected from user survey data. Affiliation and quality-of-life data were collected from the Satisfaction-with-Life scale and the Deaf Identity Scale. Qualitative results indicated that compared with their hearing, adult-age peers, this group obtained high educational achievement, and they reported a very high satisfaction of life. With respect to forming an identity in these first 2 cohorts of cochlear implant users, we found that most of the individuals endorsed a dual identity, which indicates they feel just as comfortable with Deaf individuals as they do with hearing individuals. Quantitative results revealed a significant relationship between ability to hear and ability to speak, in addition to consistency of device use.

Additional relationships were found between mother's and the individual's educational statuses, hearing scores, and communication system used. Younger individuals scored higher on satisfaction-with-life measures, and they also tended to endorse a dual identity more often. Taken together, these findings diminish concerns that profoundly deaf individuals growing up with cochlear implants will become culturally bereft and unable to function in the hearing world.

Bilateral versus unilateral cochlear implants in children: speech recognition, sound localization, and parental reports.

Asp F, Mäki-Torkko E, Karltorp E, Harder H, Hergils L, Eskilsson G, Stenfelt S.
Int J Audiol. 2012 Nov;51(11):817-32. doi: 10.3109/14992027.2012.705898. Epub 2012 Sep 3.

OBJECTIVE:
To compare bilateral and unilateral speech recognition in quiet and in multi-source noise, and horizontal sound localization of low and high frequency sounds in children with bilateral cochlear implants.
DESIGN:
Bilateral performance was compared to performance of the implanted side with the best monaural speech recognition in quiet result. Parental reports were collected in a questionnaire. Results from the CI children were compared to binaural and monaural performance of normal-hearing peers.
STUDY SAMPLE:
Sixty-four children aged 5.1-11.9 years who were daily users of bilateral cochlear implants. Thirty normal-hearing children aged 4.8-9.0 years were recruited as controls.
RESULTS AND CONCLUSIONS:
Group data showed a statistically significant bilateral speech recognition and sound localization benefit, both behaviorally and in parental reports. The bilateral speech recognition benefit was smaller in quiet than in noise. The majority of subjects localized high and low frequency sounds significantly better than chance using bilateral implants, while localization accuracy was close to chance using unilateral implants. Binaural normal-hearing performance was better than bilateral performance in implanted children across tests, while bilaterally implanted children showed better localization than normal-hearing children under acute monaural conditions.

Word learning processes in children with cochlear implants.

Walker EA, McGregor KK.
J Speech Lang Hear Res. 2013 Apr;56(2):375-87. doi: 10.1044/1092-4388(2012/11-0343). Epub 2012 Aug 15.

PURPOSE:
To determine whether 3 aspects of the word learning process-fast mapping, retention, and extension-are problematic for children with cochlear implants (CIs).

METHOD:
The authors compared responses of 24 children with CIs, 24 age-matched hearing children, and 23 vocabulary-matched hearing children to a novel object noun training episode. Comprehension and production were measured immediately following training (fast mapping) as well as 1 day later (retention). Extension was measured in terms of the ability of the participants to identify new (untrained) exemplars.
RESULTS:
Compared with their hearing age-mates, children with CIs performed marginally more poorly on fast mapping as measured by the comprehension probe and more poorly on retention as measured by comprehension and production probes. The age-mates improved over the retention interval, but the children with CIs did not. Most of the children with CIs performed similarly to their age-mates on extension, but 2 children underextended, and 5 children failed to understand the task. Compared with younger vocabulary-matched peers, children with CIs did not differ at fast mapping, retention, or extension.
CONCLUSIONS:
Children with CIs demonstrated deficits in word learning, with retention being especially problematic. Their learning did not differ from that of younger children with similarly sized vocabularies.

Speech perception in noise by children with cochlear implants.

Caldwell A, Nittrouer S.
J Speech Lang Hear Res. 2013 Feb;56(1):13-30. doi: 10.1044/1092-4388(2012/11-0338). Epub 2012 Jun 28.

PURPOSE:
Common wisdom suggests that listening in noise poses disproportionately greater difficulty for listeners with cochlear implants (CIs) than for peers with normal hearing (NH). The purpose of this study was to examine phonological, language, and cognitive skills that might help explain speech-in-noise abilities for children with CIs.
METHOD:
Three groups of kindergartners (NH, hearing aid wearers, and CI users) were tested on speech recognition in quiet and noise and on tasks thought to underlie the abilities that fit into the domains of phonological awareness, general language, and cognitive skills. These last measures were used as predictor variables in regression analyses with speech-in-noise scores as dependent variables.
RESULTS:
Compared to children with NH, children with CIs did not perform as well on speech recognition in noise or on most other measures, including recognition in quiet. Two surprising results were that (a) noise effects were consistent across groups and (b) scores on other measures did not explain any group differences in speech recognition.

CONCLUSIONS:
Limitations of implant processing take their primary toll on recognition in quiet and account for poor speech recognition and language/phonological deficits in children with CIs. Implications are that teachers/clinicians need to teach language/phonology directly and maximize signal-to-noise levels in the classroom.

Sound localising ability in children with bilateral sequential cochlear implants.

Strøm-Roum H, Rødvik AK, Osnes TA, Fagerland MW, Wie OB.
Int J Pediatr Otorhinolaryngol. 2012 Sep;76(9):1245-8. doi: 10.1016/j.ijporl.2012.05.013. Epub 2012 Jun 20.

OBJECTIVES:
To evaluate the sound localisation ability in children with sequential bilateral cochlear implants and the potential influence of age at the time of the first implantation, years of experience with the first implanted ear and the inter-implant interval (time between the first and the second cochlear implantation).
METHODS:
Sixty-three prelingually deaf children (mean age, 11.03; range, 6.5-17 years; SD, 3.09) were tested after 12 and 24 months of using bilateral cochlear implants. Every child was tested with each ear alone and both ears together. Five loudspeakers were placed in a 180° horizontal arch with 45° of separation between each loudspeaker. The child was placed 1.5m from the speakers. For each test run, three stimuli were presented at 65dB (A) from each speaker for a total of 15 stimulus presentations. For each test run, we calculated the mean angular error (MAE) and the proportion of correct speakers identified (CSS: correct speaker score). Performance by chance for the MAE was 72° and for the CSS was 20% (1 of 5 speakers).
RESULTS:
After 12 months of using bilateral CIs, the added effect of the second CI in the MAE was minor, and there was no significant difference in CSS between listening in the unilateral condition and listening in bilateral condition. After 24 months, however, the added effect of the second CI in the MAE was significant (mean diff=12.2°; 95% CI; 4.5-20.0°, p=0.003). The mean bilateral CSS increased significantly to 38% (diff=7.7%; 95% CI; 1.4-14.0%; p=0.019) while the mean unilateral CSS remained at a similar level (27%). The influence of age at the time of the first implantation on CSS after 24 months was not significant (p=0.96). However, the inter-implant interval showed a significant decrease in score by 1.4% per year between the two implants (p=0.04).
CONCLUSION:
Sound localisation with two versus one CI in children with a sequential bilateral cochlear implantation was significantly improved 24 months (but not 12 months) after the second implantation. A shorter inter-implant interval showed a small but significant beneficial effect on sound localisation.

Speech intelligibility and prosody production in children with cochlear implants.

Chin SB, Bergeson TR, Phan J.

J Commun Disord. 2012 Sep;45(5):355-66. doi: 10.1016/j.jcomdis.2012.05.003. Epub 2012 Jun 2.

OBJECTIVES:
The purpose of the current study was to examine the relation between speech intelligibility and prosody production in children who use cochlear implants.
METHODS:
The Beginner's Intelligibility Test (BIT) and Prosodic Utterance Production (PUP) task were administered to 15 children who use cochlear implants and 10 children with normal hearing. Adult listeners with normal hearing judged the intelligibility of the words in the BIT sentences, identified the PUP sentences as one of four grammatical or emotional moods (i.e., declarative, interrogative, happy, or sad), and rated the PUP sentences according to how well they thought the child conveyed the designated mood.
RESULTS:
Percent correct scores were higher for intelligibility than for prosody and higher for children with normal hearing than for children with cochlear implants. Declarative sentences were most readily identified and received the highest ratings by adult listeners; interrogative sentences were least readily identified and received the lowest ratings. Correlations between intelligibility and all mood identification and rating scores except declarative were not significant.
DISCUSSION:
The findings suggest that the development of speech intelligibility progresses ahead of prosody in both children with cochlear implants and children with normal hearing; however, children with normal hearing still perform better than children with cochlear implants on measures of intelligibility and prosody even after accounting for hearing age. Problems with interrogative intonation may be related to more general restrictions on rising intonation, and the correlation results indicate that intelligibility and sentence intonation may be relatively dissociated at these ages.
LEARNING OUTCOMES:
As a result of this activity, readers will be able to describe (1) methods for measuring speech intelligibility and prosody production in children with cochlear implants and children with normal hearing, (2) the differences between children with normal hearing and children with cochlear implants on measures of speech intelligibility and prosody production, and (3) the relations between speech intelligibility and prosody production in children with cochlear implants and children with normal hearing.

Cognitive outcomes and familial stress after cochlear implantation in deaf children with and without developmental delays.

Oghalai JS, Caudle SE, Bentley B, Abaya H, Lin J, Baker D, Emery C, Bortfeld H, Winzelberg J.
Otol Neurotol. 2012 Aug;33(6):947-56. doi: 10.1097/MAO.0b013e318259b72b.

OBJECTIVE:
The benefits of cochlear implantation for children with developmental delays (DD) often are unclear. We compared cognition, adaptive behavior, familial stress, and communication in children with and without DD.
STUDY DESIGN:
Retrospective review.
SETTING:
Two tertiary care pediatric hospitals.
PATIENTS:
Two hundred four children who underwent cochlear implantation assessed before and more than 1 year after implantation.
MAIN OUTCOME MEASURES:
The Mullen Scales of Early Learning (MSEL), vineland adaptive behavior scales (VABS), Parental Stress Index, and Preschool Language Scale.
RESULTS:
We developed a specific definition of DD for hearing-impaired children based upon diagnostic and statistical manual of mental disorders, fourth edition, criteria for mental retardation; 60 children met the criteria for DD, and 144 children did not. Before implantation, multiple linear regression demonstrated that children with DD had lower scores in every domain of the MSEL and VABS ($p < 0.05$), but no differences in any domains of the parental stress index and preschool language scale ($p > 0.1$) compared with children without DD. After implantation, children without DD demonstrated significant improvements in intelligence as measured by the MSEL and age-appropriate improvements in adaptive behavior as evaluated by the VABS, and their familial stress levels were not increased after cochlear implantation. In contrast, children with DD underwent implantation at a later age and demonstrated less comprehensive developmental improvements after cochlear implantation and higher stress levels. However, when the age differences were taken into account using multiple linear regression analyses, the differences between the 2 cohorts were reduced.
CONCLUSION:
These data indicate that our definition of DD is a reliable method of stratifying deaf children. Although children with DD have a normal developmental rate of adaptive behavior after cochlear implantation, their developmental rate of intelligence is lower, and they have higher stress levels than children without DD. However, our data suggest that if children with DD could be implanted as early as children without DD, their intelligence and stress outcomes would be improved.

Cochlear implanted children present vocal parameters within normal standards.

de Souza LB, Bevilacqua MC, Brasolotto AG, Coelho AC.

Int J Pediatr Otorhinolaryngol. 2012 Aug;76(8):1180-3. doi: 10.1016/j.ijporl.2012.04.029. Epub 2012 May 30.

OBJECTIVE:
to compare acoustic and perceptual parameters regarding the voice of cochlear implanted children, with normal hearing children.
METHOD:
this is a cross-sectional, quantitative and qualitative study.
METHODS:
Thirty six cochlear implanted children aged between 3 y and 3 m to 5 y and 9 m and 25 children with normal hearing, aged between 3 y and 11 m and 6 y and 6 m, participated in this study. The recordings and the acoustics analysis of the sustained vowel/a/and spontaneous speech were performed using the PRAAT program. The parameters analyzed for the sustained vowel were the mean of the fundamental frequency, jitter, shimmer and harmonic-to-noise ratio (HNR). For the spontaneous speech, the minimum and maximum frequencies and the number of semitones were extracted. The perceptual analysis of the speech material was analyzed using visual-analogical scales of 100 points, composing the aspects related to the overall severity of the vocal deviation, roughness, breathiness, strain, pitch, loudness and resonance deviation, and instability. This last parameter was only analyzed for the sustained vowel.
RESULTS:
The results demonstrated that the majority of the vocal parameters analyzed in the samples of the implanted children disclosed values similar to those obtained by the group of children with normal hearing.
CONCLUSION:
implanted children who participate in a (re) habilitation and follow-up program, can present vocal characteristics similar to those vocal characteristics of children with normal hearing.

Cognitive skills and academic achievement of deaf children with cochlear implants.

Huber M, Kipman U.

Otolaryngol Head Neck Surg. 2012 Oct;147(4):763-72. Epub 2012 May 22.

OBJECTIVE:
To compare cognitive performance between children with cochlear implants (CI) and normal-hearing peers; provide information about correlations between cognitive performance, basic academic achievement, and medical/audiological and social background variables; and assess the predictor quality of these variables for cognition.
STUDY DESIGN:
Cross-sectional study with comparison group, diagnostic test assessment.

SETTING:
Data were collected in the authors' clinic (children with CI) and in Austrian schools (normal-hearing children).
SUBJECTS AND METHODS:
Forty children with CI (of the initial 65 children eligible for this study), aged 7 to 11 years, and 40 normal-hearing children, matched by age and sex, were tested with (a) the Culture Fair Intelligence Test (CFIT); (b) the Number Sequences subtest of the Heidelberger Rechentest 1-4 (HRT); (c) Comprehension, (d) Coding, (e) Digit Span, and (f) Vocabulary subtests of HAWIK III (German WISC III); (g) the Corsi Block Tapping Test; (h) the Arithmetic Operations subtests of the HRT; and (i) Salzburger Lese-Screening (SLS, reading). In addition, medical, audiological, social, and educational data from children with CI were collected.
RESULTS:
The children with CI equaled normal-hearing children in (a), (d), (e), (g), (h), and (i) and performed significantly worse in (b), (c) and (f). Background variables correlate significantly with cognitive skills and academic achievement. Medical/audiological variables explain 44.3% of the variance in CFT1 (CFIT, younger children). Social variables explain 55% of CFT1 and 24.5% of the Corsi test.
CONCLUSIONS:
This study augments the knowledge about cognitive skills and academic skills of children with CI. Cognitive performance is dependent on the early feasibility to hear and the social/educational background of the family.

Strengths and difficulties in children with cochlear implants--comparing self-reports with reports from parents and teachers.

Anmyr L, Larsson K, Olsson M, Freijd A.
Int J Pediatr Otorhinolaryngol. 2012 Aug;76(8):1107-12. doi: 10.1016/j.ijporl.2012.04.009. Epub 2012 May 19.

OBJECTIVE:
The aim was to explore and compare how children with cochlear implants, their parents, and their teachers perceive the children's mental health in terms of emotional and behavioral strengths and difficulties.
METHODS:
The self-report, parents', and teachers' versions of the Strengths and Difficulties Questionnaire (SDQ) were used to assess the mental health of 22 children with cochlear implants. The children's assessments were then compared to the parents' and 17 teachers' assessments. The data were analyzed using the SPSS software package.
RESULTS:
Total difficulties (p=.000), emotional symptoms (p=.000), and conduct problems (p=.007) were greater according to the children than according to parents and teachers. Younger children (9 years, n=12) reported more emotional symptoms than older children (12 and 15 years, n=10). Almost a quarter of the children rated themselves in a way indicating mental ill-health. Parents and teachers each indicated mental ill-health for one child.

CONCLUSIONS:
Children with cochlear implants express greater concerns about their mental health than their parents and teachers do. This is important knowledge for adults in families, schools, and health care in order to support these children and offer treatment when needed.

Emergent literacy in kindergartners with cochlear implants.

Nittrouer S, Caldwell A, Lowenstein JH, Tarr E, Holloman C.
Ear Hear. 2012 Nov-Dec;33(6):683-97. doi: 10.1097/AUD.0b013e318258c98e.

OBJECTIVE:
A key ingredient to academic success is being able to read. Deaf individuals have historically failed to develop literacy skills comparable with those of their normal-hearing (NH) peers, but early identification and cochlear implants (CIs) have improved prospects such that these children can learn to read at the levels of their peers. The goal of this study was to examine early, or emergent, literacy in these children.
METHOD:
Twenty-seven deaf children with CIs, who had just completed kindergarten were tested on emergent literacy, and on cognitive and linguistic skills that support emergent literacy, specifically ones involving phonological awareness, executive functioning, and oral language. Seventeen kindergartners with NH and eight with hearing loss, but who used hearing aids served as controls. Outcomes were compared for these three groups of children, regression analyses were performed to see whether predictor variables for emergent literacy differed for children with NH and those with CIs, and factors related to the early treatment of hearing loss and prosthesis configuration were examined for children with CIs.
RESULTS:
The performance of children with CIs was roughly 1 SD or more below the mean performance of children with NH on all tasks, except for syllable counting, reading fluency, and rapid serial naming. Oral language skills explained more variance in emergent literacy for children with CIs than for children with NH. Age of first implant explained moderate amounts of variance for several measures. Having one or two CIs had no effect, but children who had some amount of bimodal experience outperformed children who had none on several measures.
CONCLUSIONS:
Even deaf children who have benefitted from early identification, intervention, and implantation are still at risk for problems with emergent literacy that could affect their academic success. This finding means that intensive language support needs to continue through at least the early elementary grades. Also, a period of bimodal stimulation during the preschool years can help boost emergent literacy skills to some extent.

Cortical processing of musical sounds in children with Cochlear Implants.

Torppa R, Salo E, Makkonen T, Loimo H, Pykäläinen J, Lipsanen J, Faulkner A, Huotilainen M.
Clin Neurophysiol. 2012 Oct;123(10):1966-79. doi: 10.1016/j.clinph.2012.03.008. Epub 2012 May 2.

OBJECTIVE:
We studied the neurocognitive mechanisms of musical instrument sound perception in children with Cochlear Implants (CIs) and in children with normal hearing (NH).
METHODS:
ERPs were recorded in a new multi-feature change-detection paradigm. Three magnitudes of change in fundamental frequency, musical instrument, duration, intensity increments and decrements, and presence of a temporal gap were presented amongst repeating 295 Hz piano tones. Independent Component Analysis was utilized to remove artifacts caused by the Cochlear Implants.
RESULTS:
The ERPs were similar in the two groups across all perceptual dimensions except for intensity increment deviants. CI children had smaller and earlier P1 responses compared to controls, and their MMN responses showed less accurate neural detection of changes of musical instrument, sound duration, and temporal structure. P3a responses suggested that poor neural detection of musical instruments affected their involuntary attention shift.
CONCLUSIONS:
The similarities of neurocognitive processing are surprising in the light of the limited auditory input provided by the CI, suggesting that many types of changes are adequately processed by the CI children.
SIGNIFICANCE:
Our results indicate that CI children's auditory cortical functioning may be enhanced, and difficulties in auditory perception and in attention switching towards sound events alleviated, by multisensory musical activities.

Cochlear implantation in children with postlingual hearing loss.

Ahmad FI, Demason CE, Teagle HF, Henderson L, Adunka OF, Buchman CA.
Laryngoscope. 2012 Aug;122(8):1852-7. doi: 10.1002/lary.23362. Epub 2012 May 1.

OBJECTIVES:
Although it is clear that early auditory stimulation through cochlear implantation (CI) has been shown to improve speech and language development trajectories for children with prelingual hearing loss, data supporting implantation in postlingual children are mostly lacking. The purpose of this study was to characterize speech perception abilities following CI in a group of children with previously well-developed language abilities.

STUDY DESIGN:
Retrospective analysis.
METHODS:
Twenty-eight hearing-impaired children who received CIs were selected for study based on the presence of well-developed spoken language skills before implantation. Fifteen children with prelingual hearing loss served as a control group. Speech perception skills were assessed using developmentally appropriate measures.
RESULTS:
Children with postlingual hearing loss showed a statistically significant improvement in open-set speech perception scores as early as 6 months following CI, whereas prelingual children demonstrated significant improvements only after 24 months of use. Despite these early disparities in performance, the two groups were similar 36 months after implantation and beyond (60 months of implant use).
CONCLUSIONS:
Children with well-developed language abilities before CI showed substantial (and statistically significant) early improvements in open-set speech perception abilities following implantation that continued beyond 2 years of follow-up. These results suggest that postlingual children are excellent candidates for CI.

Early intervention and assessment of speech and language development in young children with cochlear implants.

May-Mederake B.
Int J Pediatr Otorhinolaryngol. 2012 Jul;76(7):939-46. doi: 10.1016/j.ijporl.2012.02.051. Epub 2012 Apr 17.

OBJECTIVE:
Age is one of the most important determinants of the benefit achieved in the cochlear implantation of pre-lingually deafened children. Earlier age at implantation increases the exposure of children with a hearing impairment to auditory stimuli. Earlier auditory stimulation enables children to better understand spoken language and to use spoken language themselves. Furthermore, there appears to be critical period under 2 years of age during which access to spoken language is essential in order for language development to proceed appropriately. The present study aimed to assess the impact of cochlear implantation under 2 years of age on subsequent speech and language development.
METHODS:
28 children implanted with a cochlear implant prior to 2 years of age were included in this study and the effects of age at implantation were determined using a reception of grammar test, active vocabulary test and speech development test. Demographic features were described using descriptive statistics and data were compared to the normative values (T-values) of their hearing peers by t-test or Mann-Whitney U-test.

RESULTS:
The present data indicates that overall children with a hearing impairment implanted at less than 2 years of age perform as well as or better than their hearing peers in speech and grammar development. Word Comprehension was significantly greater in children with a cochlear implant compared to their normative peers (p=0.003), whereas Phonological Working Memory for Nonsense Words was poorer (p=0.031). An effect of age on grammatical and speech development could be found for younger implanted children (<12 months), who reached higher scores than children implanted after 12 months of age.
CONCLUSIONS:
The data suggests that early hearing loss intervention via cochlear implantation in children benefits the speech and language development of children. A potential sensitive period exists for implantation before 12 months of age. These outcomes support the recent trend toward early cochlear implantation in pre-lingually deaf children.

Auditory skills, language development, and adaptive behavior of children with cochlear implants and additional disabilities.

Beer J, Harris MS, Kronenberger WG, Holt RF, Pisoni DB.
Int J Audiol. 2012 Jun;51(6):491-8. doi: 10.3109/14992027.2012.664291. Epub 2012 Apr 17.

OBJECTIVE:
The objective of this study was to evaluate the development of functional auditory skills, language, and adaptive behavior in deaf children with cochlear implants (CI) who also have additional disabilities (AD).
DESIGN:
A two-group, pre-test versus post-test design was used.
STUDY SAMPLE:
Comparisons were made between 23 children with CIs and ADs, and an age-matched comparison group of 23 children with CIs without ADs (No-AD). Assessments were obtained pre-CI and within 12 months post-CI.
RESULTS:
All but two deaf children with ADs improved in auditory skills using the IT-MAIS. Most deaf children in the AD group made progress in receptive but not expressive language using the preschool language scale, but their language quotients were lower than the No-AD group. Five of eight children with ADs made progress in daily living skills and socialization skills; two made progress in motor skills. Children with ADs who did not make progress in language, did show progress in adaptive behavior.
CONCLUSIONS:
Children with deafness and ADs made progress in functional auditory skills, receptive language, and adaptive behavior. Expanded assessment that includes adaptive functioning and multi-center collaboration is recommended to best determine benefits of implantation in areas of expected growth in this clinical population.

Age or experience? The influence of age at implantation and social and linguistic environment on language development in children with cochlear implants.

Szagun G, Stumper B.
J Speech Lang Hear Res. 2012 Dec;55(6):1640-54. doi: 10.1044/1092-4388(2012/11-0119). Epub 2012 Apr 5.

PURPOSE:
The authors investigated the influence of social environmental variables and age at implantation on language development in children with cochlear implants.
METHOD:
Participants were 25 children with cochlear implants and their parents. Age at implantation ranged from 6 months to 42 months (M (age) = 20.4 months, SD = 22.0 months). Linguistic progress was assessed at 12, 18, 24, and 30 months after implantation. At each data point, language measures were based on parental questionnaire and 45-min spontaneous speech samples. Children's language and parents' child-directed language were analyzed.
RESULTS:
On all language measures, children displayed considerable vocabulary and grammatical growth over time. Although there was no overall effect of age at implantation, younger and older children had different growth patterns. Children implanted by age 24 months made the most marked progress earlier on, whereas children implanted thereafter did so later on. Higher levels of maternal education were associated with faster linguistic progress; age at implantation was not. Properties of maternal language input, mean length of utterance, and expansions were associated with children's linguistic progress independently of age at implantation.
CONCLUSIONS:
In children implanted within the sensitive period for language learning, children's home language environment contributes more crucially to their linguistic progress than does age at implantation.

Determining early speech development in children with cochlear implants using the ELFRA-2 parental questionnaire.

May-Mederake B.
Int J Pediatr Otorhinolaryngol. 2012 Jun;76(6):797-801. doi: 10.1016/j.ijporl.2012.02.045. Epub 2012 Mar 31.

OBJECTIVES:
Increased early identification of hearing loss has led to infants younger than 24 months of age being implanted with cochlear implants. The objective of this study was to assess early speech development in children implanted with a cochlear implant before 24 months of age using the German questionnaire Elternfragebogen für Risikokinder 2 (ELFRA-2), and to compare these results to normative data of the ELFRA-2 in order to determine any performance differences.

METHODS:
Two groups of children were included in this study. The first group included 6 children with a mean age at implantation of 11 months (range: 8-14 months). These children were tested by their parents or caretakers with the ELFRA-2 at the chronological age of 24 months. The second group included 9 children with a mean age at implantation of 13 months (range: 6-20 months) who were tested with the ELFRA-2 after 24 months of cochlear implant use.
RESULTS:
Comparison analyses of children tested with the ELFRA-2 demonstrated a statistically significant difference in all ELFRA-2 scales between children with cochlear implants (CIs) at the chronological age of 24 months and the norm group (productive vocabulary: $p=0.002$; syntax: $p=0.003$; and morphology: $p<0.001$), and no significant difference between children with CIs at 24 months of device use and the norm group in all scales (productive vocabulary: $p=0.335$; syntax: $p=0.965$; and morphology: $p=0.304$).
CONCLUSION:
Children implanted before 24 months of age reach a speech production level after 24 months of device use that is comparable to that of their normal hearing peers.

Cochlear implants in children younger than 6 months.

Colletti L, Mandalà M, Colletti V.
Otolaryngol Head Neck Surg. 2012 Jul;147(1):139-46. doi: 10.1177/0194599812441572. Epub 2012 Mar 27.

OBJECTIVES:
(1) To determine the long-term outcomes of cochlear implantation in children implanted younger than 6 months and (2) to evaluate auditory-based performance in very young children compared with older children, all with profound sensorineural bilateral hearing loss.
STUDY DESIGN:
Prospective cohort study.
SETTING:
Tertiary referral center.
SUBJECTS AND METHODS:
Twelve subjects aged 2 to 6 months, 9 aged 7 to 12 months, 11 aged 13 to 18 months, and 13 aged 19 to 24 months, all with profound bilateral hearing loss, were fitted with cochlear implants and followed longitudinally for 4 years. Subjects were developmentally normal with no additional disabilities (visual, motor, or cognitive). Auditory-based communication outcomes included tests for speech perception, receptive language development, receptive vocabulary, and speech production.
RESULTS:
Age at cochlear implantation was a significant factor in most outcome measures, contributing significantly to speech perception, speech production, and language outcomes. There were no major complications and no significantly higher rates of minor complications in the younger children.

CONCLUSION:
This article reports an uncontrolled observational study on a small group of infants fitted with cochlear implants following personal audiological criteria and, up to now, with limited literature support due to the innovative nature of the study. This study shows, for the first time, significantly improved auditory-based outcomes in children implanted younger than 6 months and without an increased rate of complications. The data from the present study must be considered as explorative, and a more extensive study is required.

Perceptions of parents and speech and language therapists on the effects of paediatric cochlear implantation and habilitation and education following it.

Huttunen K, Välimaa T.
Int J Lang Commun Disord. 2012 Mar-Apr;47(2):184-96. doi: 10.1111/j.1460-6984.2011.00094.x. Epub 2011 Nov 2.

BACKGROUND:
During the process of implantation, parents may have rather heterogeneous expectations and concerns about their child's development and the functioning of habilitation and education services. Their views on habilitation and education are important for building family-centred practices.
AIMS:
We explored the perceptions of parents and speech and language therapists (SLTs) on the effects of implantation on the child and the family and on the quality of services provided. Their views were also compared.
METHODS & PROCEDURES:
Parents and SLTs of 18 children filled out questionnaires containing open- and closed-ended questions at 6 months and annually 1-5 years after activation of the implant. Their responses were analysed mainly using data-based inductive content analysis.
OUTCOMES & RESULTS:
Positive experiences outnumbered negative ones in the responses of both the parents and the SLTs surveyed. The parents were particularly satisfied with the improvement in communication and expanded social life in the family. These were the most prevalent themes also raised by the SLTs. The parents were also satisfied with the organization and content of habilitation. Most of the negative experiences were related to arrangement of hospital visits and the usability and maintenance of speech processor technology. Some children did not receive enough speech and language therapy, and some of the parents were dissatisfied with educational services. The habilitation process had generally required parental efforts at an expected level. However, parents with a child with at least one concomitant problem experienced habilitation as more stressful than did other parents.
CONCLUSIONS & IMPLICATIONS:
Parents and SLTs had more positive than negative experiences with implantation. As the usability and maintenance of speech processor technology were often compromised, we urge implant

centres to ensure sufficient personnel for technical maintenance. It is also important to promote services by providing enough information and parental support.

Simultaneous cochlear implantation in children: the Great Ormond Street experience.

Grainger J, Jonas NE, Cochrane LA.
Cochlear Implants Int. 2012 Aug;13(3):137-41. doi: 10.1179/146701011X12950038111891. Epub 2011 Jun 29.

OBJECTIVES:
To analyse the surgical aspects and safety of bilateral simultaneous cochlear implantation in children.
METHODS:
A retrospective case series at a tertiary paediatric centre in the United Kingdom. Surgical times, analgesia and antiemetic use, and complications were analysed for the first 25 bilateral simultaneous cochlear implants performed at Great Ormond Street Hospital for Children between September 2007 and December 2009. These were compared with a consecutive group of sequentially implanted children whose second implant was performed during the same period.
RESULTS:
Total time for simultaneous implantation was significantly less than the cumulative time required for sequential implantation ($P < 0.05$). In addition, the number of paracetamol, non-steroidal anti-inflammatory, and antiemetic doses was significantly less for simultaneous implantation than for sequential implantation ($P < 0.001$). Furthermore, the number of doses of analgesia and antiemetic required for simultaneous implantation were no higher than for single-side surgery ($P > 0.05$). No difference in complication rates was seen between the groups.
DISCUSSION:
Bilateral simultaneous cochlear implantation in children is safe and results in a reduction in total theatre time when compared with the cumulative time required for sequential implantation. Simultaneous implantation also reduces total analgesia and antiemetic requirements and length of stay to levels comparable with single-side implantation.

Auditory, visual, and auditory-visual perceptions of emotions by young children with hearing loss versus children with normal hearing.

Most T, Michaelis H.
J Speech Lang Hear Res. 2012 Aug;55(4):1148-62. doi: 10.1044/1092-4388(2011/11-0060). Epub 2012 Jan 23.

PURPOSE:
This study aimed to investigate the effect of hearing loss (HL) on emotion-perception ability among young children with and without HL.

METHOD:
A total of 26 children 4.0-6.6 years of age with prelingual sensory-neural HL ranging from moderate to profound and 14 children with normal hearing (NH) participated. They were asked to identify happiness, anger, sadness, and fear expressed by an actress when uttering the same neutral nonsense sentence. Their auditory, visual, and auditory-visual perceptions of the emotional content were assessed.
RESULTS:
The accuracy of emotion perception among children with HL was lower than that of the NH children in all 3 conditions: auditory, visual, and auditory-visual. Perception through the combined auditory-visual mode significantly surpassed the auditory or visual modes alone in both groups, indicating that children with HL utilized the auditory information for emotion perception. No significant differences in perception emerged according to degree of HL. In addition, children with profound HL and cochlear implants did not perform differently from children with less severe HL who used hearing aids.
CONCLUSION:
The relatively high accuracy of emotion perception by children with HL may be explained by their intensive rehabilitation, which emphasizes suprasegmental and paralinguistic aspects of verbal communication.

Contribution of family environment to pediatric cochlear implant users' speech and language outcomes: some preliminary findings.

Holt RF, Beer J, Kronenberger WG, Pisoni DB, Lalonde K.
J Speech Lang Hear Res. 2012 Jun;55(3):848-64. doi: 10.1044/1092-4388(2011/11-0143). Epub 2012 Jan 9.

PURPOSE:
To evaluate the family environments of children with cochlear implants and to examine relationships between family environment and postimplant language development and executive function.
METHOD:
Forty-five families of children with cochlear implants completed a self-report family environment questionnaire (Family Environment Scale--Fourth Edition; Moos & Moos, 2009) and an inventory of executive function (Behavior Rating Inventory of Executive Function [Gioia, Isquith, Guy, & Kenworthy, 2000] or Behavior Rating Inventory of Executive Function--Preschool Version [Gioia, Espy, & Isquith, 2003]). The authors also evaluated children's receptive vocabulary (Peabody Picture Vocabulary Test--Fourth Edition; Dunn & Dunn, 2007) and global language skills (Preschool Language Scale--Fourth Edition [Zimmerman, Steiner, & Pond, 2002] and Clinical Evaluation of Language Fundamentals--Fourth Edition [Semel, Wiig, & Secord, 2003]).
RESULTS:
The family environments of children with cochlear implants differed from those of normal-hearing children but not in clinically significant ways. Language development and executive function were found to be atypical but not uncharacteristic of this clinical population. Families with higher levels

of self-reported control had children with smaller vocabularies. Families reporting a higher emphasis on achievement had children with fewer executive function and working memory problems. Finally, families reporting a higher emphasis on organization had children with fewer problems related to inhibition.

CONCLUSION:

Some of the variability in cochlear implantation outcomes that have protracted periods of development is related to family environment. Because family environment can be modified and enhanced by therapy or education, these preliminary findings hold promise for future work in helping families to create robust language-learning environments that can maximize their child's potential with a cochlear implant.

Sequential bilateral cochlear implantation in children: parents' perspective and device use.

Sparreboom M, Leeuw AR, Snik AF, Mylanus EA.

Int J Pediatr Otorhinolaryngol. 2012 Mar;76(3):339-44. doi: 10.1016/j.ijporl.2011.12.004. Epub 2011 Dec 30.

OBJECTIVE:

The purpose of this study was (1) to measure parental expectations before surgery of a sequentially placed second cochlear implant and compare these results with parental observations postoperatively and (2) to measure device use of the second cochlear implant and compare to unilateral implant use.

METHODS:

Thirty prelingually deaf children with a unilateral cochlear implant (mean age at first implant 1.8 years) received a second implant at a mean age of 5.3 years. To measure parental expectations and observations, parents completed the Parents' Perspective before surgery of the second implant and after 12 and 24 months. The questionnaire included 1 additional question on sound localization. Device use of both the first and second implants was assessed retrospectively after 6, 12 and 24 months of implant use. Device use of the study group was also compared to a reference group of 30 unilateral implant users matched for age at second implantation.

RESULTS:

Parental expectations with regard to sound localization were significantly higher than the observed changes within the first year of bilateral implant use. The observed changes in communication, listening to speech without lipreading, and speech and language skills met or surpassed parental expectations. Irrespective of age at second implantation, the second implant was significantly less worn than the first implant. No significant difference was observed between the use of the second implant of the study group and device use of the reference group. Second implant use was significantly correlated with the difference in speech recognition between the 2 implants alone.

CONCLUSIONS:

Preoperative parental expectations were too high with regard to the observed localization skills within the first year of bilateral implant use. The study showed that several of these sequentially

implanted children had more difficulties in wearing the second implant than in wearing the first implant during the rehabilitation period. The present results suggest that this is caused by the dominant first implant performance. Such data are of high importance in order to provide parents with realistic counseling on what they can expect from sequential bilateral cochlear implantation.

Evaluation of long-term patient satisfaction and experience with the Baha® bone conduction implant.

Rasmussen J, Olsen SØ, Nielsen LH.
Int J Audiol. 2012 Mar;51(3):194-9. doi: 10.3109/14992027.2011.635315. Epub 2011 Dec 1.

OBJECTIVE:
Evaluate long-term patient satisfaction with bone-anchored hearing aids (the Baha®, now referred to by Cochlear as a 'bone conduction implant') in our hospital clinic spanning the eighteen-year period from the inception of our Baha program. The researchers further wished to analyse the various factors leading to patient satisfaction/dissatisfaction with their Baha. We developed a new questionnaire to obtain a comprehensive impression of individual patient practices, general satisfaction, and experiences with their Baha in respect to time spent using Baha, sound quality, annoyance from noise disturbance, ease of communication, cosmetic appearance, and satisfaction with the Baha amongst patient relatives, an aspect not previously investigated.
DESIGN:
The study design was retrospective and executed as a postal questionnaire. The questionnaire was developed by the authors of this paper.
STUDY SAMPLE:
Patients operated on for a Baha at our hospital from 1989 to 2007.
RESULTS:
The response rate was 92.4%. Eighty-six percent were satisfied or very satisfied with their Baha. Ninety-one percent of respondents could communicate using their Baha in a one-on-one conversational setting. A primary factor leading to dissatisfaction, experienced by 70% of responding patients, was annoyance from wind noise.
CONCLUSIONS:
Baha was found to yield good overall patient satisfaction over the long-term, and it was possible to identify specific factors attributing to satisfaction/dissatisfaction.

Comparison of bilateral and unilateral cochlear implants in children with sequential surgery.

Strøm-Roum H, Laurent C, Wie OB.

Int J Pediatr Otorhinolaryngol. 2012 Jan;76(1):95-9. doi: 10.1016/j.ijporl.2011.10.009. Epub 2011 Nov 8.

OBJECTIVE:
The objective of this study was to evaluate the effect of bilateral versus unilateral cochlear implants and the importance of the inter-implant interval.
METHODS:
Seventy-three prelingually deaf children received sequential bilateral cochlear implants. Speech recognition in quiet with the first, second and with both implants simultaneously was evaluated at the time of the second implantation and after 12 and 24 months.
RESULTS:
Mean bilateral speech recognition 12 and 24 months after the second implantation was significantly higher than that obtained with either the first or the second implant. The addition of a second implant was demonstrated to have a beneficial effect after both 12 and 24 months. Speech recognition with the second implant increased significantly during the first year. A small, non-significant improvement was observed during the second year. The inter-implant interval significantly influenced speech recognition with the second cochlear implant both at 12 and 24 months, and bilateral speech recognition at 12 months, but not at 24 months.
CONCLUSIONS:
A small, but statistically significant improvement in speech recognition was found with bilateral cochlear implants compared with a unilateral implant. A major increase in speech recognition occurred with the second cochlear implant during the first year. A shorter time interval between the two implantations resulted in better speech recognition with the second implant. However, no definitive time-point was found for when the second implant could no longer add a positive effect.