RESEARCH REVIEW

COCHLEAR IMPLANT INTERNATIONAL COMMUNITY OF ACTION

Brian Lamb provides a Research Review of recent papers for advocacy work: April 2021

Systematic Review on Late Cochlear Implantation in Early-Deafened Adults and Adolescents: Clinical Effectiveness. Debruyne, Joke A; Janssen, A. Miranda; Brokx, Jan P. Ear and Hearing: November/December 2020 - Volume 41 - Issue 6 - p 1417-1430 doi: 10.1097/AUD.0000000000000884

There has been a long standing concern that cochlear implantation in early-deafened patients, implanted as adolescents or adults, delivers poor expected outcomes. The authors of this study set out to test if concerns about poor outcomes is justified by undertaking a systematic review to gather all available evidence on outcomes achieved by early-deafened patients using a state-of-the art cochlear implant (CI).

The authors used a wide range of five electronic databases (PubMed, Embase, the Cochrane library, CINAHL, and PsycInfo) which were searched for studies in English, French, German, or Dutch, published between 2000 and September 2017 that reported pre- and postoperative outcomes on speech or sound perception, audio-visual and subjective benefits such as quality of life.

Only twenty five studies were judged to be of high quality. From these it was concluded that "late cochlear implantation in early-deafened subjects resulted in significantly improved open-set speech perception, audiovisual speech perception, and (hearing-related) quality of life in the majority of the studies involved."

Key implications for Policy

There has been continued debate about the effectiveness of CIs for early defended patients in adolescents or as adults. This systematic review shows that there are significant benefits in major areas of objective and subjective tests including improved speech perception, audio-visual speech perception and quality of life. This suggests that advocates should feel confident in promoting the benefits of CI for the group of potential recipients and that health policies and commissioners should be ensuring that this group can access CI in any eligibility criteria. As the authors note "the findings of this review suggest that clinics should reconsider whether to exclude these patients as CI candidates."

The full article can be accessed here; https://journals.lww.com/ear-hearing/Fulltext/2020/11000/Systematic_Review_on_Late_Cochlear_Implantation_in.1.aspx

Association of the use of hearing aids with the conversion from mild cognitive impairment to dementia and progression of dementia: A longitudinal retrospective study

Magda Bucholc Paula L. McClean Sarah Bauermeister Stephen Todd Xuemei Ding Qinyong Ye Desheng Wang Wei Huang Liam P. Maguire. First published: 14 February 2021
https://doi.org/10.1002/trc2.12122

There is a growing body of evidence suggesting that hearing aid usage is linked to improvements in cognition, communication, and socialization. However the extent to which hearing aid use can affect the incidence and progression of dementia is still not known. The authors examine the effect of the use of hearing aids on the conversion from mild cognitive impairment (MCI) to dementia and progression of dementia.

The study looked at a large referral-based cohort of 2114 hearing-impaired patients obtained from a National Alzheimer's Coordinating Center. They assessed the effect of hearing aid use on the risk of conversion from MCI to dementia and risk of death in hearing-impaired participants.

They found that participants who used hearing aids were at significantly lower risk of developing all-cause dementia compared to those not using hearing aids. No association between hearing aid use and risk of death was observed. The percentage of participants who had not developed dementia five years after the baseline MCI diagnosis was 19% for non-users of hearing aids and 33% for those using hearing aids. The authors concluded that “Among hearing-impaired adults, hearing aid use was independently associated with reduced dementia risk. The causality between hearing aid use and incident dementia should be further tested.” The authors note that more work needs to be done on the what the causal mechanisms are.

The full article can be accessed here; https://alz-journals.onlinelibrary.wiley.com/doi/10.1002/trc2.12122

Key Implications for Policy

This study adds to the growing evidence that wearing hearing aids can ameliorate or reduce the risk of dementia. Such research supports the Lancet commission conclusion (https://www.thelancet.com/article/S0140-6736(20)30367-6/fulltext) that taking action early on hearing loss could help prevent dementia. While research on the impact of CIs on dementia is on-going this is important additional evidence that hearing loss should be addressed and that screening and health checks for hearing loss should also be considered to help identify those at risk to help prevent or delay the onset of dementia.

Cost-benefit Analysis of Cochlear Implants: A Societal Perspective.

Olaf M. Neve , Jenneke A. Boerman, Wilbert B. van den Hout , Jeroen J. Briaire, Peter P.G. van Benthem , and Johan H.M. Frijns. Ear & Hearing 2021.

The perceived costs of cochlear implants can be a major barrier to the wider adoption and support for investment by health systems in implants. The costs and outcomes of cochlear implantation (CI) have been widely assessed but many of these studies focus on direct healthcare costs. This study looks at the costs and benefits of CI in the Netherlands and also includes educational cost, and productivity losses and gains as well as health outcomes and costs.

The costs and benefits were analyzed by looking at three typical groups, representing the majority of cochlear implant patients: prelingually deaf children implanted at the age of 1, adults with progressive profound hearing loss implanted at the age of 40 and seniors implanted at the age of 70 with progressive profound hearing loss. It was found that in all three patient groups, "the total benefits of CI exceeded the total cost, leading to a net benefit of CI." For prelingually deaf children with a bilateral CI there was a lifetime positive outcome net benefit of €433,000. Adults and seniors with progressive profound hearing loss and a unilateral CI had a total net benefit of €275,000 and €76,000, respectively. Based on the author's estimates from modelling, "the increased healthcare costs due to CI were more than compensated by the value of the health benefits and by savings in educational and productivity costs. In particular, for children and working adults, the societal benefit was positive even without taking health benefits into account. Therefore, CI generates an advantage for both patients and society."

Key points for policy.

This is an important addition to the cost benefit analysis of CIs. It shows clearly that not only are there significant benefits for the health system in investing in cochlear implants but that significant gains are also achieved through educational and productivity gains. As the authors note "When the health benefits were taken into account, the advantages of CI outweighed those of care without CI, and CI provided clear benefits for both the patients and society."

This research adds the growing weight of evidence that both health systems and society more generally achieves very significant benefits far beyond the costs of fitting cochlear implants. While this study was for the Netherlands the authors make clear that it has wide application for high income countries. It is also likely that similar gains would also be demonstrated more widely, if not necessarily to same extent, depending on context. Advocates should use this evidence to ensure that health commissioners and health policy decisions on funding fully reflect an understanding of the substantial gains from investment in cochlear implants. This study demonstrates that these savings go beyond just health care to education and employment.

The research can be accessed here; https://journals.lww.com/ear-hearing/Abstract/9000/Cost_benefit_Analysis_of_Cochlear_Implants__A.98538.aspx?fbclid=IwAR14ZNShOW1tel37ilo2-QfLWSd71P32fSSyxlHAVWVbLKyEG9Ldzg-Rm3k

David McDaid , A-La Park & Shelly Chadha (2021): Estimating the global costs of hearing loss, International Journal of Audiology, DOI: 10.1080/14992027.2021.1883197

The authors used hearing loss data from the 2019 Global Burden of Disease study and then estimated the additional non-hearing related health care costs, educational support, exclusion from the labour force in countries with full employment and societal costs posed by lost quality of life. All costs were reported in 2019 purchasing power parity (PPP) adjusted international dollars.

They found that “the total global economic costs of hearing loss exceeded $981 billion. 47% of costs were related to quality of life losses, with 32% due to additional costs of poor health in people with hearing loss. 57% of costs were outside of high-income countries. 6.5% of costs were for children aged 0–14. In scenario analysis a 5% reduction in prevalence of hearing loss would reduce global costs by $49 billion.”

Their analysis highlights the economic consequences of not taking action to address hearing loss worldwide. They also show how small reductions in prevalence and/or severity of hearing loss could avoid substantial economic costs to society. These cost estimates can also be used to help in modelling the cost effectiveness of interventions to prevent/tackle hearing loss and strengthen the case for investment.

Key Points for policy

This research has been influential and informs the analysis in the WHO World Report on Hearing Loss. It demonstrates not just the huge cost of unaddressed hearing loss but also that making relatively small inroads through early intervention and addressing hearing loss can have a very significant impact on the overall costs of hearing loss. As the authors conclude “it is important to recognise that while having global estimates of costs highlights the relevance of addressing hearing loss it is essential to subsequently assess the cost effectiveness of prevention and intervention strategies in different countries.” Investment in Cochlear Implants are crucial part of the intervention strategies that can help improve lives and reduce costs to society and improve individual wellbeing.

The paper can be accessed at;
https://www.tandfonline.com/doi/full/10.1080/14992027.2021.1883197

Hearing loss prevalence and years lived with disability, 1990–2019: findings from the Global Burden of Disease Study 2019. Lancet 2021; 397: 996–1009.

The Lancet review of hearing loss prevalence and years lived with disability is a crucially important resource. This paper updates the estimates from the Global Burden of Disease (GBD) study on the prevalence of hearing loss in 2019, and the associated disability related to hearing loss.

The authors undertook a systematic review of population-representative surveys on hearing loss prevalence from 1990 to 2019. They calculated severity-specific prevalence while accounting for hearing aid coverage, cause, and the presence of tinnitus. They also forecasted the prevalence of hearing loss until 2050.

They found that an estimated 1·57 billion people globally had hearing loss in 2019, accounting for one in five people. Of these, 403·3 million people had hearing loss that was moderate or higher in severity after adjusting for hearing aid use, and 430·4 million without adjustment. The largest number of people with moderate-to-complete hearing loss resided in the Western Pacific region (127·1 million people). Of all people with a hearing impairment, 62·1% were older than 50 years. By 2050, a projected 2·45 billion people will have hearing loss, a 56·1% increase from 2019. As moderate-to-complete hearing loss is concentrated in countries with low health-care quality and access, they argue that “stronger health-care provision mechanisms are needed to reduce the burden of unaddressed hearing loss in these settings.”

The study found that “age-related and other hearing loss was the third largest cause of global Years Lived with Disability’s in 2019 after low back pain and migraine, and was ranked first among sensory disorders. Age-related and other hearing loss was the leading cause of global YLDs compared with all causes that were explicitly modelled in the GBD for individuals older than 70 years.”

As populations age, the number of people with hearing loss will increase. Interventions such as “childhood screening, hearing aids, effective management of otitis media and meningitis, and cochlear implants have the potential to ameliorate this burden.” The report goes onto note that for Cochlear Implants “Other studies show that early rehabilitation along with use of hearing devices such as cochlear implants are also cost-effective, despite large costs associated with initial technology investments” They also conclude that “The results of this study point to a growing public health challenge, which needs global attention and a definitive response.”

Key points for Policy

This authoritative report shows that hearing loss imposes a very significant burden on society and individuals in terms of the years lived with disability compared to other conditions that form part of the Global Burden of Disease study. Further that hearing loss is only going to increase across the population. This creates a powerful case for taking action to ensure that the technologies available and hearing screening are used to the full to address the consequences of hearing loss. This includes the greater access to cochlear implants and good rehabilitation services as the report illustrates. As the authors conclude “Health system capacity must be scaled up to address growing needs, particularly in low-income settings.”

The report can be accessed here; https://www.thelancet.com/action/showPdf?pii=S0140-6736%2821%2900516-X