

## **Research Briefing-May 2024. Compiled by Brian Lamb.**

### **Costs of Cochlear Implants for Children in France**

M. Benifla, N. Martelli, E. Brenet, C. Compagnon, X. Dubernard, M. Labrousse, Costs analysis of cochlear implantation in children, *European Annals of Otorhinolaryngology, Head and Neck Diseases*, 2024, <https://doi.org/10.1016/j.anorl.2024.02.012>.

The study assessed the direct medical costs of the cochlear implantation pathway in France from the healthcare payer's perspective, in children with bilateral severe to profound hearing loss, from diagnosis to 3 years' follow-up after first implantation.

A retrospective costs analysis was performed for 56 children who received a cochlear implant in one French paediatric ENT centre. The children had severe to profound hearing loss, and were implanted before the age of 10 years. They calculated direct medical costs in 3 phases: diagnosis to pre-implantation assessment, surgical and hospital management of implantation, and 3 years' follow-up. This is important as some studies only count the direct costs of the implant not the necessary follow up support.

They found that; "Mean costs were €64,675 (range, €38,709–113,954) per child from diagnosis to 3 years after first implantation. Mean costs in congenital deafness detected on neonatal screening and on progressive deafness were respectively €65,420 and €63,930 (P=0.7)."

In considering other studies estimates of the potential savings to society from childhood implantation they note that "Economically, CI is very advantageous for society. Hutton et al....estimated that implantation in 1 child saved €90,954 in schooling costs over the child's lifetime. In the UK, Barton et al. estimated mean lifetime direct medical costs for a child with unilateral CI at €122,293..... Comparatively, in the USA a child with severe to profound prelingual hearing loss without CI generates more than €1 m social costs"

The authors concluded that "The global cost was €64,675 per child from diagnosis to 3 years after first implantation. There was no difference in cost according to congenital versus progressive hearing loss." The aim of the study was not to establish an overall cost benefit analysis but just establish the total costs with follow up. They do nevertheless conclude that "In terms of the agreed acceptability threshold applied in France, the cost to society for an implantable medical device thus seems quite acceptable."

### **Implications for Advocacy**

This study joins others in showing that the investment in Cochlear Implants in the Early Years is reasonable and has the potential to save society significant costs over the lifetime of the individual as well as improving outcomes over the course of a lifetime. Importantly there does need to be an

estimate of the rehabilitation and support elements of costs following from Implantation to ensure that children can get the full benefit from their implants.

To access this Research; <https://www.sciencedirect.com/science/article/pii/S1879729624000292>

### **Access to Cochlear Implants under new Criteria in the UK**

Helen Cullington, Ann-Marie Dickinson, Unai Martinez de Estibariz, Joseph Blackaby, Lisa Kennedy, Katie McNeill & Sara O'Neill (27 Jan 2024): Cochlear implant referral patterns in the UK suggest a postcode lottery with inequitable access for older adults; results of a pilot audit in five Audiology sites, International Journal of Audiology.

### **Impact of Advocacy Criteria on Access in the UK.**

Following the introduction of new candidacy criteria in the UK in 2019 the researchers sought to measure the referral rates across a number of sites and the factors that influenced this.

A total of 810 adults from five geographically diverse UK Audiology sites were included in the study. "The proportion of potential eligible adults (based only on audiometry) considered for CI referral was 64% (521 out of 810) and varied by site (from 50% to 83%). About 24% of patients (123 out of 521) declined CI referral; this also varied across sites (12–45%). The median age of patients where CI referral was not considered was 80 years – significantly higher than the group where CI referral was considered (73 years)."

They noted that "The centre with the highest rate of CI referral discussion had an attached CI centre; the centre with the lowest did not. It is not surprising that Audiologists working alongside a CI centre were more likely to consider CI." The authors concluded that CI referral is dependent on where adults live with a post code lottery between different areas, and how old they are. Older adults are significantly less likely to be considered for CI referral by Audiologists. Audiology clinics need more support to empower staff to talk to patients about CI referral.

They also suggested that future work should;

- Explore reasons that patients decline CI referral.
- Improve education and empowerment of Audiologists.
- Raise awareness of the benefits of CI for older adults.
- 3000Hz should be tested in cases of severe to profound hearing loss.
- Enable Audiology departments to run speech perception testing.

They also note that "A regular national audit would support better understanding of access to CI and barriers to referral."

### **Implications for Advocacy**

The analysis shows that achieving candidacy criteria which enables many more people to benefit from a CI is only the starting point for ensuring that this actually happens. Ensuring patients have the opportunity to discuss in details the implications of having a CI, knowledge of audiologists, demographic factors in respect of where the centre is and continued omissions in the criteria or testing process all contribute to less-than-optimal utilisation rates. Advocates therefore need to

focus on the whole of the patient pathway and help ensure better patient knowledge and literacy as well as supporting professionals to identify gaps in the process. Longer term monitoring of take up rates and practice is also required to assess impact of candidacy requirements and the process.

To link to this article: <https://doi.org/10.1080/14992027.2023.2298751>

### **Links between Dementia and Hearing Loss-how do we understand and frame this?**

Dawes P, Munro KJ. Hearing Loss and Dementia: Where to From Here? *Ear Hear*. 2024 May-Jun 01;45(3):529-536. doi: 10.1097/AUD.0000000000001494. Epub 2024 Feb 21. PMID: 38379156; PMCID: PMC11008448.

The Authors have produced a “Point of View” article on the association between hearing aid use and prevention of dementia.

They note that “most studies on relationships between hearing loss and cognitive outcomes are observational, are at risk of confounding, and cannot reach conclusions about causation. A recent high quality randomized controlled trial, relatively uncommon in audiology, reported no impact of a comprehensive hearing intervention in mitigating cognitive decline in older adults. Although secondary analysis revealed potential benefits in a sub-sample of adults, this finding may be spurious.” They therefore argue that “Encouraging policymakers, patients, and other health care practitioners to address hearing loss in terms of dementia prevention may be inappropriate on the grounds of both relevance at individual level and lack of clear evidence of benefit. In addition, advocating need to address hearing loss in terms of mitigating dementia risk may reduce the importance of addressing hearing loss in its own right.” They also note that “This nexus between hearing, cognition, and functioning in daily life is probably where the main benefits of hearing aids lie in terms of preventing or delaying dementia.”

They argue that “linking hearing loss to dementia risk may also exacerbate the stigma of hearing loss, inadvertently discouraging people from seeking help for hearing.” They do recognise that “treating hearing loss may have important benefits in preventing or delaying diagnosis of dementia via improving orientation and functioning in daily life, without changing the underlying pathology.”

They therefore argue that “Rather than linking hearing loss to dementia risk, we suggest a positive message focusing on the known benefits of addressing hearing loss in terms of improved communication, quality of life, and healthy aging.”

### **Implications for Advocacy**

While the article is polemical rather than being based on any new research it does provide a comprehensive summary and critique of recent claims around the association between dementia and hearing loss and the role hearing aids and Cochlear Implants in addressing cognitive decline and dementia. They do provide an important corrective to overstating the potential impact of hearing instruments on dementia and remind us that while the association between the two is strong there is no substantial evidence on causation and therefore using the data in these studies has to be done with caution.

The appeal to deal with hearing loss in its own terms as a serious health condition will also resonate with many advocates however the article has less on the considerable problems in how to make the global health community give more weight to the importance of hearing loss in its own right. For

example, they do not have any new suggestions about how to address the massive disparity between investment in hearing loss and other conditions that makes linking hearing loss with conditions which do garner more attention so attractive for many in the field despite the potential dangers they identify.

Access the article here; <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC11008448/>

These arguments follow a similar line to the recent article by. J Am Blustein J, Weinstein BE, Chodosh 'It is time to change our message about hearing loss and dementia@. J. Geriatr Soc. 2023;1-4. doi:10.1111/jgs.18323 It can be accessed here; <https://agsjournals.onlinelibrary.wiley.com/doi/10.1111/jgs.18323> which we covered in a previous research review.

### **Meta Analysis of Impact of Hearing Aids and Cochlear Implants on Cognitive Decline and Dementia.**

Yeo BSY, Song HJMD, Toh EMS, et al. Association of Hearing Aids and Cochlear Implants With Cognitive Decline and Dementia: A Systematic Review and Meta-analysis. JAMA Neurol. 2023;80(2):134–141. doi:10.1001/jamaneurol.2022.4427

As the authors note “no meta-analysis has pooled the available evidence on the cognitive benefit of hearing restorative devices. Because some studies may have an inadequate sample size, a pooled analysis may help increase the statistical power. Hence, this study aims to analyze both cognitive scores and longitudinal data to determine the long-term associations of hearing restorative devices with cognitive impairment and incident dementia.”

They claim that; “this is the first comprehensive quantitative synthesis looking at associations between hearing restoration and cognitive decline. While previous meta-analyses have established a significantly increased odds of dementia and cognitive impairment among participants with hearing loss, this study further adds value by suggesting that correcting for this sensory deficit is associated with a slower decline in cognition.”

The systematic review and meta-analysis covered 31 studies comprising 137, 484 participants. They found that “the use of hearing restorative devices in participants with hearing loss was found to be significantly associated with a 19% reduction in hazards of any cognitive decline, compared with their counterparts with uncorrected hearing loss, adjusting for possible confounders, including age and gender, education, socioeconomic status, and comorbidities. Importantly, this benefit is evident for both normal baseline cognition and baseline mild cognitive impairment. Furthermore, the use of these devices was significantly associated with a 3% improvement in cognitive test scores assessing general cognition.”

After reviewing a number of explanations for the association they conclude that “hearing loss in dementia is likely to be multifactorial, and a combination of these theories most likely contributes to the benefit seen from hearing aids and cochlear implants. Furthermore, our results suggest with appropriate follow-up time, hearing interventions are effective.”

The authors recommend that “A cognitive benefit of hearing restorative devices should be further investigated in randomized trials.”

Access the research here; <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9856596/>

## Hearing Aid Use and Risk of Dementia in Older Adults

**Cantuaria ML, Pedersen ER, Waldorff FB, et al. Hearing Loss, Hearing Aid Use, and Risk of Dementia in Older Adults. JAMA Otolaryngol Head Neck Surg. 2024;150(2):157–164. doi:10.1001/jamaoto.2023.3509**

This population-based cohort study was conducted in Southern Denmark between January 2003 and December 2017 and included all residents 50 years and older. The authors excluded all persons with dementia before baseline as well as those who did not live in the region 5 years before baseline. Individual hearing status was based on the Hearing Examinations in Southern Denmark database, which contains data on all pure-tone audiometry examinations performed at public hearing rehabilitation clinics in Southern Denmark.

The study population “comprised 573 088 persons with 23 023 cases of dementia and mean (SD) follow-up of 8.6 (4.3) years. Having a hearing loss was associated with an increased risk of dementia, with an adjusted hazard ratio (HR) of 1.07 (95% CI, 1.04-1.11) compared with having no hearing loss. Severe hearing loss in the better and worse ear was associated with a higher dementia risk, with an HR of 1.20 (95% CI, 1.09-1.32) and 1.13 (95% CI, 1.06-1.20), respectively, compared with having no hearing loss in the corresponding ear. Compared with people without hearing loss, the risk of dementia was higher among people with hearing loss who were not using hearing aids than those who had hearing loss and were using hearing aids, with HRs of 1.20 (95% CI, 1.13-1.27) and 1.06 (95% CI, 1.01-1.10), respectively.”

The authors conclude that “The results of this cohort study suggest that hearing loss was associated with increased dementia risk, especially among people not using hearing aids, suggesting that hearing aids might prevent or delay the onset and progression of dementia. The risk estimates were lower than in previous studies, highlighting the need for more high-quality longitudinal studies.”

### Implications for Advocacy.

This study and the meta-analysis are powerful additions that provide more evidence around the association between the potential preventative effects of hearing instruments on cognitive decline and dementia. But as with other studies no causal link is established and the discussion supports the idea that while using hearing instruments may be preventative this relates to a number of factors where hearing better supports overall cognition and health. The Danish study showed a lower effect than previous studies. While important to therefore stress the benefits of early adoption of hearing instruments care needs to be taken in how that argument is deployed.

Paper can be accessed here; <https://jamanetwork.com/journals/jamaneurology/article-abstract/2799139>

For more on the research around cognition and cochlear implants and health aging see the CIICA briefing at; <https://ciicanet.org/resources/ciica-and-eurociu-launch-new-resource-why-hearing-well-matters-for-healthy-ageing/>