

Economic Benefits of addressing hearing loss and modifying the risk of dementia.

Naaheed Mukadam, Robert Anderson, Martin Knapp, Raphael Wittenberg, Maria Karagiannidou, Sergi G Costafreda, Madison Tutton, Charles Alessi, Gill Livingston. Effective interventions for potentially modifiable risk factors for late-onset dementia: a costs and cost-effectiveness modelling study. *Lancet Healthy Longev* 2020;1: e13–20

The authors examine what are the most cost effective interventions for potentially modifiable risk factors for late onset dementia. They examined four different interventions that had been judged to be effective; hypertension, smoking cessation, diabetes prevention, and hearing loss.

They found that “Treatments for stopping smoking and provision of hearing aids reduced cost. Treatment of hypertension was cost effective by reference to standard UK thresholds. The three interventions when fully implemented would save £1,863 billion annually in England, and reduce dementia prevalence by 8.5%, and produce quality-adjusted life-year gains.”

In respect of hearing loss they found that “Hearing aids.... save money while improving quality of life, and are worth implementing for their effect on dementia alone.” Further that for hearing loss “At age 45 years, discounted lifetime cost saving is £607 per person and QALY gain is 0.0798. Cost of therapy could be up to 68% higher without breaching the NICE threshold of £20 000 per QALY. Annual expenditure is £335 million and dementia prevalence eventually falls by 3.3%.”

The authors estimate that while the cost of therapy (Hearing Aids) will be £335m and an additional £28m in treatment costs there would be savings of £355m in social care, £423m in informal care leading to overall net savings of £755m per annum once the programme is mature.

Implications for Policy

This is further evidence of the potential cost savings that could be achieved by taking action on hearing loss to ameliorate the impact of dementia. Following from the World Report on Hearing evidence and the Lancet Review on Dementia this provides further evidence to convince health policy and commissioning decisions to invest in taking early action on hearing loss to potentially delay the onset of cognitive decline and dementia through making substantial savings on health and social care budgets. While the calculations are dependent on UK figures and assumptions the authors think that their “methods are generalisable to other countries. We expect these interventions will be valuable in similar settings. In low-income and middle-income countries with a greater PAF (Population Attributable Fraction) from hypertension, hearing loss, and smoking, they might be even more useful than we hope they will be in the UK.”

The paper can be accessed here: [https://www.thelancet.com/journals/lanhl/article/PIIS2666-7568\(20\)30004-0/fulltext](https://www.thelancet.com/journals/lanhl/article/PIIS2666-7568(20)30004-0/fulltext)

The Analysis of the Economic Impact of Hearing Loss

Ethan D. Borrea, Mohamed M. Diab, Austin Ayer, Gloria Zhanga, Susan D. Emmett, Debara L. Tucci, Blake S. Wilson, Kamaria Kaalund, Osondu Ogbuaji, Gillian D. Sanders. Evidence gaps in economic analyses of hearing healthcare: A systematic review. *EClinicalMedicine* 35 (2021) 100872

The authors have undertaken a comprehensive review of studies on the economic analysis of hearing health care. This is invaluable as it provides one of the most complete reference points for researchers and policy makers into the available research in this area. Overall the studies were clear in demonstrating the economic benefits and cost effectiveness of addressing hearing loss. From the research they conclude that the “median quality score of included studies was high and we found that more recent studies had slightly higher quality than earlier studies.” However they did also identify some key gaps in studies that should be addressed in the future. These included;

- “despite over 80% of the global burden of hearing loss lying in LMIC, (Low and Medium Income Countries) the vast majority of the included studies (82%) were conducted in a high-income setting. This is of particular importance as health policy decisions in LMIC are increasingly made based on prioritization approaches such as health technology assessments that include cost-effectiveness analyses”.
- “When considering optimal resource allocation in conditions of scarcity, policymakers and finance ministers will benefit from analyses and models that compare interventions targeting hearing loss across etiologies and the lifespan.”
- “there was no uniform source for utility values used to calculate QALYs and DALYs. Over one quarter of studies reporting QALYs or DALYs used their own methods to determine utility values of decision model health states.”
- “an evidence gap in inclusion of the indirect economic effects of hearing loss....Exclusion of the effects of hearing loss on economic productivity, education, and social support may underestimate the true economic burden of hearing loss and the potential for amelioration of the burden. Emerging evidence that associates hearing loss with cognitive decline and other medical comorbidities may further increase the indirect economic effects associated with hearing loss, such as caregiver and family burden.”

Implications for Policy

As the authors suggest this will allow “policy makers identify the most relevant and highest-quality analyses to guide their decision making on hearing healthcare provision.” The compilation and quality evaluation of the research will also allow “policy makers might compare the published cost-effectiveness ratios from high quality studies with thresholds to identify setting-specific hearing healthcare interventions that are a worthwhile investment.” The paper also provides a really comprehensive list of all the relevant research papers, summarises key findings and evaluates their effectiveness in different domains which will be invaluable as a resources for researchers and influencers looking for evidence in these areas. Crucially it also points to the need for research on the economic benefits of addressing hearing loss to consider a wider range indirect economic costs.

The paper can be accessed here; [https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370\(21\)00152-8/fulltext](https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370(21)00152-8/fulltext)

Cost Effectiveness of CI's in Sweden.

Gumbie, M., Olin, E., Parkinson, B. et al. The cost-effectiveness of Cochlear implants in Swedish adults. *BMC Health Serv Res* 21, 319 (2021). <https://doi.org/10.1186/s12913-021-06271-0>

Only 13% of eligible Swedish adults currently use a unilateral CI. The authors sought to estimate the cost-effectiveness of unilateral CIs compared to a hearing aid for Swedish adults with severe to profound hearing loss. The authors developed a Markov model to estimate the benefits and costs of unilateral CIs from the Swedish health system perspective. Health outcomes were reported in terms of Quality Adjusted Life Years (QALYs).

Unilateral CIs for Swedish adults with severe to profound hearing loss are likely to be deemed cost-effective when compared to a hearing aid (SEK 140,474 per QALY gained). Interestingly the authors compared the cost effectiveness of CI's to other interventions and found that that unilateral CIs are potentially more cost-effective compared to some common medical interventions for adults in Sweden. For example, the cost per QALY gained for a unilateral CI is lower than that "for knee replacement surgery (SEK 150,454 per QALY gained), unilateral hip replacement surgery (SEK 337,083 per QALY gained) and prostheses for patients with trans femoral amputation (SEK 868,479 per QALY gained)." As the authors note these other procedures are elective but eligibility is primarily determined by the specialist, who is incentivised to induce demand whereas access to CI's is governed by guidelines outside of the clinician's control.

An increase in the prevalence of Swedish adults with severe to profound hearing loss is expected as the population ages. They concluded that "CI is a cost-effective option to improve hearing in Swedish adults with severe to profound hearing loss who gain some benefit from hearing aids. It also found that earlier implantation of unilateral CIs improves the cost-effectiveness, as does improved identification of people eligible for CIs."

Implications for Policy

This paper adds more weight to evidence from across the world that Cochlear Implants are cost effective in respect of criteria used in that health system. Further that they are cost effective compared to a number of other standard and accepted interventions for other health problems that are routinely addressed, such as knee replacement surgery. Given that these other interventions are not restricted by guidelines it also questions why access to CI's is more restrictive given the positive evaluation of cost effectiveness. Advocates should be encouraged by these results and use them to promote CI's as a routine intervention for profound hearing loss and the research points to fact that far from being 'expensive' CI's are actually more cost effective than other accepted medical interventions that are not often thought of as expensive interventions. CI's improve patient wellbeing while benefiting society by addressing the additional costs of hearing loss if not addressed. Criteria need to be relaxed to ensure that those who could benefit do so as is the case for other interventions.

The paper can be accessed here; <https://doi.org/10.1186/s12913-021-06271-0>

The Association of Hearing Loss and Dementia.

Stevenson JS, Clifton L, Kuźma E, Littlejohns TJ. Speech-in-noise hearing impairment is associated with an increased risk of incident dementia in 82,039 UK Biobank participants. *Alzheimer's Dement.* 2021;1-12. <https://doi.org/10.1002/alz.12416>

Large scale studies are crucial in ensuring that evidence is less likely to be subject to chance effects in the population studied. The UK Biobank data has provided a very large scale sample for the study of the association between hearing impairment and dementia.

The authors found that “SiN (Speech in Noise) hearing impairment is associated with an increased risk of incident dementia with a lack of evidence for reverse causation and limited evidence of mediation by social isolation and depressive symptoms.”

Further, the association between hearing impairment and dementia risk was largely attenuated in those who wore hearing aids. However, statistical power to detect an effect was limited due to the small size of the hearing aid subgroups in our study and the test for interaction was not significant...”

They were not able to answer how far SiN hearing impairment and pure tone hearing impairment are independently associated with dementia however and called for further research integrating testing with concurrent measurement of both components of hearing impairment to establish what the association is with dementia.

As with other recent studies they also note that if SiN hearing impairment is a modifiable risk factor for dementia, then this has important implications for the provision of hearing interventions to address hearing loss.

Implications for Policy

This research provides powerful new evidence of for hearing impairment as a potential modifiable dementia risk factor. It is especially helpful given the large size of the study. While there is some indication of the potential impact of Hearing Aids in attenuating dementia risk the effect was not statistically significant enough to draw conclusions.

The paper can be accessed here; <https://alz-journals.onlinelibrary.wiley.com/doi/10.1002/alz.12416>