

What does (not having) a Cochlear Implant Cost?
Brian Lamb
Sue Archbold

The issue: the gap in CI access globally

World Health Organisation, World Report on Hearing:
 "Cochlear implant is one of the most successful of all neural prostheses developed to date."
BUT; Access to CI is low and provision inadequate. Numbers of children and adults with severe to profound hearing loss will continue to grow thus increasing costs to society if unaddressed.
 Yet only **1 in 20** who could benefit from an implant receive one.
 WHO, World Report on Hearing found that there is:
 "restricted accessibility to countries other than those in high-income groups – with considerable variation even within these."
What can we do to address this?

Cochlear Implants are often perceived as expensive

- "in privately funded systems financial incentives for non-CI providers **"weigh in favor of recommending continued HA use over CIs."**
- "Despite compelling clinical data, without up-to-date cost-effectiveness evidence, financial justification is **challenging and may be an important barrier to CI utilization.**"
(Economics of Cochlear Implant Utilization. By Mark E. Votruba et al., The Hearing Journal October 2019.)

But.....

- **"Innovative life-long CIs could achieve significant savings per case that could finance additional implant cost."**
(Christin Thum et al., Lifetime Cost of Unilateral Cochlear Implants in Adults: A Monte Carlo Simulation DOI: Eur J Health Econ. 2020 Apr 24. doi: 10.1007/s10198-020-01188-7)

So we need to provide the social and financial justification for CI's!

- **"Early rehabilitation along with use of hearing devices such as cochlear implants are also cost-effective, despite large costs associated with initial technology investments."** (The Lancet, Global Burden of Disease, March 2021)
- **"With unilateral cochlear implants, estimations based on actual costs in a high-income setting showed a return of 2.59 International dollars for every 1 dollar invested, In the example of a lower-middle-income setting, the return on investment ratio was 1.46 International dollars For an upper-middle-income setting, the return on investment ratio was estimated to be 4.09 International dollars....."**
(World Report on Hearing, page 104)

Evidence shows that Cochlear Implantation Saves Money

Neve et al., 2021 Cost-benefit Analysis of Cochlear Implants: A Societal Perspective. found that:

- **"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."

CI's cut unemployment and under employment and increase self esteem

- "In general, people with hearing loss are more likely to be unemployed, have higher levels of sick leave and need more time to recover from a working day than people with normal hearing" (Neve et al., 2001)
- A higher proportion of hearing impaired people are unemployed than in the general population. (Shield 2019)
- "While studies on the effect of productivity of CI are scarce, they all concluded that CI can empower patients to improve or retain productivity (Kos et al. 2007; Clinkard et al. 2015; Huarte et al. 2017). The present study showed that the economic impact of this effect may be considerable" (Neve et al., 2021)

Cost effectiveness compared to other health interventions in Sweden

Surgical procedure	ICER, SEK/QALY	Cost effective ²¹
Shunt surgery for idiopathic normal pressure hydrocephalus ³	80 600	Low cost
Unilateral cochlear implant ³	140 474	Moderate cost
Knee replacement ⁴	150 454	Moderate cost
Flash Glucose Monitoring System for Patients with Type 1 Diabetes Receiving Intensive Insulin Treatment ⁷	291 130	Moderate cost
Unilateral hip replacement ⁸	337 083	Moderate cost
Transfemoral amputation ⁹	868 479	High cost

(Gumbiæt al. BMC Health Services Research (2021))



CI Compared with Knee Replacement Surgery



ICER =



- 140 474 SEK/QALY
- Average age: 61 years
- Surgeries/year: 600

- 150 454 SEK/QALY
- Average age 68,8 years
- Surgeries/year: 46 000



CI compared with hip replacement Surgery



ICER =



- 140 474 SEK/QALY
- Average age: 61 y
- Surgeries/year: 600

- 337 083 SEK/ QALY
- Average age : ♂67,6 y ♀70,1 y
- Surgeries/year: 50 500



the average additional cost per hearing impaired person is approximately £242 per annum and the additional total healthcare cost for the EU28 approximately £15.6 billion.

Country	Population	Population with ≥26dBHL BHE	Additional Healthcare cost per person	Additional Health care Costs (£) Millions
Germany	82182000	10674487	949	8726.40
Sweden	9861017	1225102	176	217.71
Netherlands	16978120	2140727	162	346.00
Spain	46436422	6062366	116	674.17
Italy	60666661	7738071	237	1833.46
Denmark	5722284	718867	-95	-66.84
Belgium	11359631	1463263	246	342.96
Czech Republic	1086089	1386089	326	446.96
Slovenia	2066371	239	239	63.46

Providing the best hearing care means lower costs on other care services

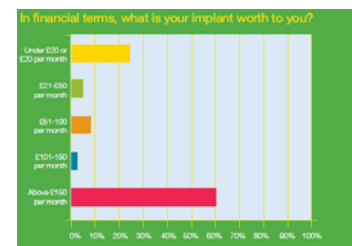


Investing creates value-Hear to Help UK

IN THE HEAR TO HELP PROJECT:



Users value their CI's



(Buhagair 2012)



But we need to be aware that personal costs often not covered

Service	Public/Govt	Private Health	Charity/NGO	Personal
1 st Implant	67%	35%	2%	9%
2 nd Implant	48%	40%	1%	14%
Mapping/Fitting	67%	24%	3%	10%
Rehabilitation	63%	20%	3%	16%
Repairs	50%	23%	2%	29%
Spare Parts	48%	21%	2%	30%
Upgrade Processor	39%	26%	1%	26%
Upgrade Processor	55%	31%	1%	14%
Streamers/Accessories	35%	16%	1%	54%
Batteries, disposable	38%	13%	2%	49%
Batteries, rechargeable	44%	20%	1%	41%

CIICA research forthcoming



CI Saves Money in Education and improves children's lives

- “Unless addressed in a timely manner, those with hearing loss have reduced school performance, slower progression through the academic system, a greater risk of dropping out of school, and lower likelihood of applying for higher education, compared with their hearing peers.” (WHO, 2021)
- CI for children “was found to lead to a reduction in educational cost of approximately €118,000.” (Neve et al., 2021).
- CIICA with Euro CIU is launching a briefing on benefits of CI for children today



Support Costs and Benefits of Early Intervention for children with CI

Table 1: Lifetime and average annual benefits, costs and BCR, NPV (\$ 2015)

	Lifetime stream (over 50 years)	Average annual stream* (2015 dollars)
Costs	\$215,556	\$4,311
Benefits	\$464,711	\$9,294
Net benefit	\$249,155	\$4,983
BCR	2.2	

Source: Deloitte Access Economics calculations.

“for every dollar invested in a First Voice early intervention program there is a \$2.20 return in benefits.”
Deloitte assessment of First Voice early intervention service. 2017.



The long term costs are not thought of but important to users....

- Without thinking about the long-term costs – which are trivial compared with the upfront costs the upfront costs can be wasted
“I need reassurance that my CI will work and be supported right up to the day I die. So, I need batteries, coils, cables, filters, chargers, upgrades etc., and also need to be convinced that my CI will be managed for me if I end up in a home for old people.” (User from CIICA survey)
- More thought needs to be given to funding models and aftercare that support better access as insurance and payer models can undermine access while ultimately increase costs for the public purse
- Better satisfaction and outcomes when users are fully supported



Issues for assessing the benefit of CI

- “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” (Borre et al., 2021)
- Most studies still underestimate the real costs of not taking action due to the difficult in estimating the utility value of CI’s, cost of care gives time, additional health impacts, productivity gains, lifetime benefits.
- But there is much we can do now with the evidence we have and how we communicate.....



Elephant in the Room- Money!

- We often talk about CI’s as an expensive solution...this leaves everyone thinking it is!
- But it costs more **not to take action** to address hearing loss.
- Better provision of Ear and Hearing Care and improved take up of CIs is the solution to improve health and save money.
- But we also need to ensure that the support is in place for the lifetime of the user
- Therefore we need to continue to advocate for the benefits of fully funding access and support for CI. CIICA is there to help support those efforts.
- Find more resources for advocacy at <https://ciicanet.org/>.

