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

Spend2Save: Investing in hearing technology improves lives and saves society money Spend2Save/Gastar para ahorrar: La inversión en tecnología auditiva mejora la vida de las personas y learing loss is one of the most chi ssues facing Europe. Globally, the Organisation (2016a, May 2017) called ahorra dinero a la sociedad or hearing care into health care sy nd underlies our ability to function learing loss robs us of the ability to mpacts on every facet of life. Yet its 52 million people across Europe nérdida auditiva es una de las cuestione is growing, JEFHOH 2016, 2018, AFA 201 antes a las que se enfrenta Europa. A nivel globa Organización Mundial de la Salud (2016a, de May amada a los países para que integraran estrategia Spend2Save: Investering i hörselteknik Hearing Loss is the number one ca those over 70 in Western Europe. ger bättre livskvalitet och är en a tecnologías de audición y comunicación. La co Those with severe hearing loss are developing dementia as those with o: para relacionarnos con la familia, amigos y Mid-life bearing loss may account f Ardida auditiva restrince la capa (Livingston et al 2018) to, en todas las facetas de la vida. Sin embargo, est asapercibida y no se aborda. In older age people with hearing isolation and reduced mental well 52 milliones de personas en toda Europa padecen pérdida Pichora-Fuller et al 2015 una cantidad que sigue aumentando. (EFHOH 2016, 2018, AEA 2 Older people with hearing loss are tw La pérdida auditiva es la principal problemática de Años l sperience depression than those wi ausa de la Discapacidad en los mayores de 70 años d re also at increased risk of major de Occidental. (Davis 2016) El riesco de contraer demencia es cinco veces mayor en la Social isolation has an effect on h pérdida auditiva severa que en aquellas cuya audición es nom people there is a strong correlation oblem med långtgående s #Jin & Femucci 2012) conitive decline (Lin 2013), mental ill La pérdida de audición en la mediana edad puede repres Lie 2011 2012 and premature death stocier för hörselvård i hälso- och si el 9.1% de los casos de demencia prevenibles en todo el Hearing loss is associated with gre cialmente un factor de riesgo modificable. (Livingston and social services (Xao 2018, ON as personas de edad avanzada con pérdida auditiva corre kolleger, ha ett jobb, leva ett rikt liv so riesgo de aislamiento social y declive del bienestar men ciala kontakter och nätverk Those with hearing loss have high inemployment and underemplo (Shield 2006, Shield 2018, Pichora-Fuller et al 2015) La probabilidad de sufrir depresión es dos veces y media erkar därför alla delar av vårt liv. Trots detta las personas mayores con pérdida auditiva que en aquella padecen (Memore 2013), siendo también mayor el riesgo de depresión grave. (Amiera et al 2015, Davis 2011) 52 miljoner människor i Europa har hör ÖKAT (EFHCH 2016, 2018, AEA 2017, EHMA 2017) El aislamiento social afecta la salud (Conen 1995) existi Hörselnedsättning är den främsta orsaken till personas mayores una fuerte correlación entre la pérdida. deterioro cognitivo (Lis 2013). la enfermedad mental y la de (Lin 2011, 2012) y la muerte prematura. (Friburg 2014, Contrara 2 La pérdida auditiva se asocia con un mayor uso de los s

médicos y sociales. (Xao 2018, O'Nell 2016

con pérdida auditiva, Kochen 2007

hos personer over 70 i Västeurona invis 2014 Personer med grav hörselnedsättning löper fem utveckla demenssjukdomar än personer med (Lin & Femucci 2012) redslittning has medel/liders o Las tasas de desempleo e infraempleo son mayores e 9,1% av förebyggbara demenssjukdomar över h notentiellt en modifierbar riskfaktor Ewoor Äldre personer med hörselpedsättning löger s isolering och ökad psykisk ohälsa (Shield 2006, Shield 2018, Pichara-Fuller et al 2015) Äldre personer med hörselnedsättning löper två oc risk att drabbas av depression än personer utan hö Martews 2013) och även ökad risk att drabbas av svå Preieva et al 2015, Davis 2011) Social isolering påverkar hälsan (Cohen 199

finns en stark korrelation mellan hörselnedsättnir ofôrmåna (w 2013), nevkisk obälsa, demens (w 2 och att dö i förtid (Friburg 2014, Contreta Hörselnedsättning kan sättas i samband med ö sjukvård och socialtjänst plao 2018, 074alf 2076) I gruppen personer med hörselnedsättning återfi arbetslöshet och undersysselsättning (Koch

modificabile. (Livingston et al 2018) In età avanzata, le persone con una perdita dell'udito sono più a rischio di isolamento sociale e di un minore benessere mentale. (Shield 2006, Shield 2018, Pichora-Fuller et al 2015)

ultrasettantenni in Europa Occidentale, (Davis 2016)

Per le persone anziane con una perdita dell'udito, il rischio di cadere in depressione è due volte e mezzo più alto rispetto a quello del persone con udito sano, Mathews 2013) e corrono anche il rischio di una

a perdita dell'udito è una delle sfide più importanti che l'Europa al

ell'ambito sociale e sanitario. Translation: In tutto il mondo la risoluzio

ssi di integrare le strategie di cura della sordità nei piani del sistema

ell'Organizzazione Mondiale della Sanità conse Mageo 2017) chiede ai

anitario e di dare maggior accesso alle tecnologie che permettono d

nostra capacità di interagire con il mondo: relazionarci con i parenti, amici e colleghi, avere un lavoro, avere uno stile di vita produttivo e

a perdita dell'udito ci toglie la capacità di comunicare, influenzando così ogni aspetto della nostra vita. Eppure il suo impatto spesso passi

In Europa 52 milioni di persone banno perso l'udito e il numero è in crescita. (EFHOH 2016, 2018, AEA 2017, EHMA 2013

La perdita dell'udito è la prima causa degli anni persi per disabilità di

cinque volte più alto di sviluppare demenza in confronto ai soggetti con udito normale. (Lin & Ferrucci 2012)

La perdita dell'udito a metà della vita provoca fino al 9.1% di casi di

demenza evitabili nel mondo ed è un fattore di rischio potenzialmenti

Le persone con una pesante perdita dell'udito hanno un rischio

mantenere la nostra salute e benessere tramite legami sociali.

osservato o ignorato.

forte depressione, (Amieva et al 2015, Davis 2011) L'isolamento sociale influisce sulla salute (Cohen 1995) e ne aziani c'è una forte correlazione tra la perdita dell'udito e il declino cognitivo, d.n.2013, malattie mentali e demenza (.n.2011, 2012) e morte prematura. (Friburg 2014, Contrera 2015)

 La perdita dell'udito è associata ad una maggiore a medica e servizi sociali (Xao 2018, O'Nell 2016

Tra quelli che perdono l'udito c'è una percentuale maggiore d upazione e sottoccupazione. (Kochkin 2007

alia di stare con le person la sordità ti fa questo. liente vita sociale. Un senso n lamento Enistrazione Non o anche rapportarsi con la famiglia Mi ha spaventato parecchio. Rise

, perdi l'autostima, non hai



orare bene. Adulto con perdita dell'udito





RIASSUNTO

Spend2Save: Investire nella tecnologia dell'udito migliora la qualità della vita e fa risparmiare denaro alla società

ekonomisk besparing för samhället

SAMMANFATTNING

RESUMEN

SUMMARY

The issue: the gap in Cl 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 sever 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-Cl providers "weigh in favor of recommending continued HA use over Cls."
- "Despite compelling clinical data, without up-to-date costeffectiveness 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.)

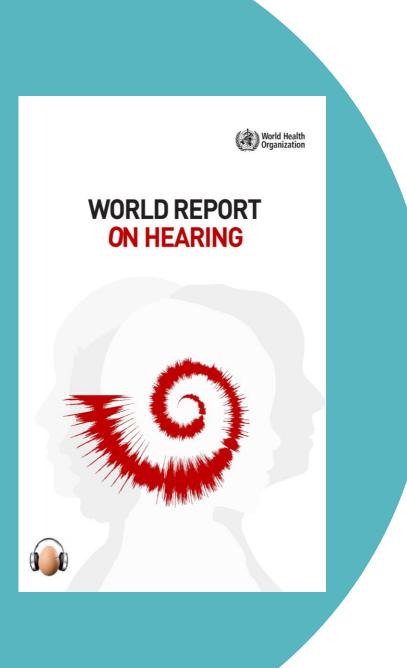
But.....

 "Innovative life-long CIs could achieve significant savings per case that could finance additional implant cost."

(Christin Thum et L., 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 Cl'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 highincome setting showed a return of 2.59 International dollars for every 1 dollar invested, In the example of a lowermiddle-income setting, the return on investment ratio was 1.46 International dollarsFor 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., 2021Cost-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."



Cl'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? ⁴
Shunt surgery for idiopathic normal pressure hydrocephalus ⁵	80 600	Low cost
Unilateral cochlear implant ³	140 474	Moderate cost
Knee replacement ⁶	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

(Gumbieet 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 ≥25DBHL BE	Additional Healthcare cost per person	Additional Health care Cost (£) Millions	
Germany		82162000	10674487	349	3725.40	
Sweden		9861017	1228102	178	217.71	
Netherlands		16979120	2140727	162	346.80	Spend to save:
Spain		46438422	6862386	115	874.17	Investing in hearing technology improves lives
Italy		60665551	7736071	237	1833.45	and saves society money
Denmark		6707264	718867	-93	-86.84	A EUROPE WIDE STRATEGY
Belglum	Providi	ng the best		245	342.99	Bran Lamb ose. Sue Archbold Hu, Claran O'Neil
Ozech Republic		care means	1366089	326	445.86	Bhan Lamb dae, dae Achibid Hb, darah O Nell
Slovenia		s on other care ervices	285637.1	239	63.46	Report and search supported by an educational grant from Contrase. The report is the work of the authors. The Ear

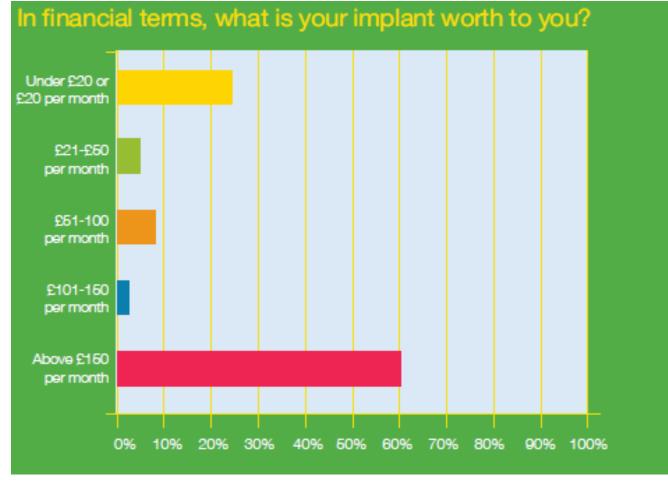


Investing creates value-Hear to Help UK

IN THE HEAR TO HELP PROJECT: EVERY £1 INVESTED INVESTED CREATED A SOCIAL VALUE OF £10.34



Users value their Cl'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%	36%
Replace Processor	39%	26%	1%	26%
Upgrade Processor	55%	31%	1%	16%
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 Cl

Table i: 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 givers 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 Cl'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/

