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# HEARING IN OLDER ADULTS

SPECIAL REPORT Why good hearing is important at any age



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## Special Report No. 2

Hearing in Older Adults – Why good hearing is important at any age

Second, revised edition 2018

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## Foreword: Ingeborg Hochmair

“Growing old is still the only option for living a long time,” the Austrian writer Hugo von Hoffmannsthal once said and, so far, that’s still true. And, just as growing old means a long life, so are the changes the years bring with them. Muscle strength wanes, concentration fades and, in many people, so do vision and hearing abilities.

Notes and tones that were once crisp and clear begin to soften, alongside images that become blurry. As far as poor vision is concerned, glasses and eye surgery are considered necessary solutions. Hearing loss can also be corrected in most cases, even in one’s later years. Unfortunately, many people with hearing loss make do without hearing aids or implants. Yet, good hearing contributes to a good quality of life.

Hearing implants have been used successfully for over 40 years. Research shows how effective they are, but this pales in comparison to the experience of thousands of patients worldwide who can now hear life more fully. The technology is sophisticated and is continually improving. In the past few decades systems have become appreciably smaller, yet more powerful. The surgery has become routine and, today, experts recommend it even for the oldest of older adults.

The ability to hear can make it easier to get involved in social activities and be independent. Activities that many of us take for granted, like watching TV, talking on the phone or simple conversations can be frustrating and even overwhelming for people with hearing loss. Over time, avoiding these “every day” situations can lead to isolation. Today, older adults are more active than ever before and deserve to live life to the fullest. We have the technology to help make that happen. Let’s get started.

Sincerely yours,

Ingeborg Hochmair  
CEO MED-EL Medical Electronics

## Introduction

Currently more than 465 million people in the world live with a disabling hearing loss, a third of whom are over 65 years. Projections estimate that by 2050 more than 900 million people will have disabling hearing loss<sup>1</sup>

This presents major challenges for society and individuals alike: hearing loss can lead to social isolation, depression as well as other comorbidities.<sup>2</sup> Studies have also shown a relationship between hearing loss and cognitive decline in older adults.<sup>3</sup>

More research is needed to determine whether hearing loss treatment could postpone the onset of mental decline in the elderly. Hearing aids and hearing implants can alleviate the negative effects of hearing loss – especially if they are used early enough.<sup>4</sup>

As for hearing implants, the surgical procedure is now considered routine in larger Ear, Nose and Throat (ENT) clinics. Research has shown that the surgery is safe even for older patients.<sup>5</sup> On the following pages, you will read about the effects of hearing loss on the health and wellbeing of older people, the prevalence of hearing loss among seniors and the benefits hearing implants bring even to the very old.

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"Hearing implants dramatically improve the quality of life of older patients. Therefore, it is vital to convince those affected that going to an ENT specialist is extremely worthwhile."

Prof. Dr. Arneborg Ernst,  
Director, ENT Clinic, Trauma  
Hospital Berlin, Germany

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- 1 WHO: Deafness and Hearing Loss Factsheet March 2018 <http://www.who.int/mediacentre/factsheets/fs300/en/> Accessed 9 Mar 2018
  - 2 Amieva H et al. Death, Depression, Disability, and Dementia Associated with Self-Reported Hearing Problems: A 25-Year Study. *J Gerontol A Biol Sci Med Sci*, 2018 Jan 3. doi: 10.1093/gerona/glx250. [Epub ahead of print]
  - 3 Deal JA et al. Hearing Impairment and Incident Dementia and Cognitive Decline in Older Adults: The Health ABC Study. *J Gerontol A Biol Sci Med Sci*. 2017 May 1;72(5):703-709.
  - 4 Dowell RC. The case for earlier cochlear implantation in postlingually deaf adults. *Int J Audiol*. 2016;55 Suppl 2:S51-6
  - 5 Chen DS et al. Cochlear implantation in older adults: long-term analysis of complications and device survival in a consecutive series. *Otol Neurotol*. 2013 Sep;34(7):1272-7

## Age-related hearing loss: associated with a variety of conditions

Hearing loss is associated with a number of comorbidities and should be taken seriously. Treating hearing loss brings many advantages.

### Social Isolation, loneliness and depression

When the world around you slowly falls silent, other aspects of life are affected as well: social contacts, self-esteem, independence, quality of life. Many studies have shown that age-related hearing loss is associated with social isolation, depression and more.<sup>6, 7</sup>

### Effects on relationships

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"When considering social isolation, it's about the quality of relationships, not about the number of people in someone's life."

Barbara Weinstein, Professor of Audiology, City University of New York

"We've long seen that family, particularly spouses and partners, play a role in facilitating connection and communication for the person with hearing loss. Over time, that role can become burdensome without people even being aware."

Dr. Vincent Lin, Department of Otolaryngology - Head and Neck Surgery, Sunnybrook Health Sciences Centre, University of Toronto, Canada  
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Hearing loss is a condition that affects the whole family. Whether it is answering the phone for the person who cannot hear, bearing the high volume of the TV or attending social events alone because the partner can't communicate in noisy surroundings any more, all this reduces the quality of life for the whole family. Communicating with a hearing-impaired spouse adds strain on a partnership. The effect of deafness on partners is well established, and includes physical fatigue, loss of ability to enjoy a social life, negative impact on mental health, and loss of social supports and interpersonal relationships.<sup>8</sup>

Hearing intervention can alleviate these negative effects. A study investigating the psychosocial impacts of cochlear implantation on recipients and their spouses showed that not only Cochlear Implant (CI) recipients demonstrated substantial psychosocial benefits, but their spouses experienced the same benefits. Caregiver burden of the partner was reduced because they had to interpret less, felt less stress taking care of the CI recipient, worried less about the CI recipient's safety, and were less bothered by TV volume. Furthermore, partners noted a positive change in their social life. The study authors were surprised at the degree to which respondents credited the CIs for improving relationships and saving marriages.<sup>8</sup>

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6 Amieva H et al. Death, Depression, Disability, and Dementia Associated with Self-Reported Hearing Problems: A 25-Year Study. *J Gerontol A Biol Sci Med Sci*, 2018 Jan 3. doi: 10.1093/gerona/glx250. [Epub ahead of print]

7 Contrera KJ et al. Association of Hearing Impairment and Emotional Vitality in Older Adults. *J Gerontol B Psychol Sci Soc Sci*. 2016 May;71(3):400-4

8 Chen S et al. Assessment of the psychosocial impacts of cochlear implants on adult recipients and their partners. *Cochlear Implants Int*. 2016;17(2):90-7

## Cognition

Age-related hearing changes make it difficult to distinguish speech from background noise and understanding speech in noisy backgrounds like in a restaurant. Therefore, people with hearing problems have to concentrate a great deal in complex hearing situations to be able to understand speech properly. This leaves less energy to comprehend the meaning of a sentence or to take note of who said what.<sup>9</sup> The relationship between hearing loss and cognitive decline has increasingly been in the spotlight in recent years. Several studies have shown that there is an independent association between untreated hearing loss and incident dementia.<sup>10, 11</sup> However, researchers have not yet discovered the reason for the link between hearing status and cognitive decline, nor do they know whether hearing treatment could delay or prevent its onset. This will be a subject of research in the upcoming years. So far, research suggests that hearing loss treatment may attenuate cognitive decline.<sup>12</sup> For the Lancet Commission on Dementia “the management of hearing loss, depression, diabetes, and obesity might have the potential to delay or prevent a third of dementia cases.”<sup>13</sup>

## Mobility

Hearing loss may also affect mobility. Older adults with hearing loss who withdraw from society and don't go out a lot are physically less active. This may impact their gait and increase the risk for falls. USA researchers came to the conclusion that hearing loss is independently associated with the risk of frailty in older adults and with greater odds of falling over time.<sup>14</sup>

“Early evidence suggests that patients with mild cognitive impairment progress less when all their sensory modalities are intact. We know that dementia will be a huge burden on our social systems and if something as straightforward as cochlear implantation can be done to stabilize patients with mild cognitive impairment, this could potentially be a significant cost saving.”

Dr. Vincent Lin, Department of Otolaryngology - Head and Neck Surgery, Sunnybrook Health Sciences Centre, University of Toronto, Canada

## The bigger picture

Even early signs of hearing problems should be taken seriously. The first point of contact for people with hearing loss depends on country specific guidelines. In the United Kingdom, for example, it is mandatory to consult a General Practitioner (GP) before going to see an ENT specialist. In Germany and Austria, people with hearing issues would usually visit an ENT specialist and then a hearing aid acoustician. In France and Sweden, the common path is to first visit the ENT specialist followed by the GP and third a hearing aid acoustician.<sup>15</sup>

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- 9 Schneider BA. How age affects auditory-cognitive interactions in speech comprehension. *Audiol Res*. 2011 Mar 7;1(1)
  - 10 Lin FR et al. Hearing loss and incident dementia. *Arch Neurol*. 2011 Feb;68(2):214-20
  - 11 Fritze T et al. Hearing impairment affects dementia incidence. An analysis based on longitudinal health claims data in Germany. *PLoS ONE*. 2016;11(7):e0156876
  - 12 Amieva H et al. Death, Depression, Disability and Dementia Associated with Self-Reported Hearing Problems: a 25-Year Study. *J Gerontol A Biol Sci Med Sci*. 2018 Jan 3. doi: 10.1093/gerona/glx250. [Epub ahead of print]
  - 13 Livingston G et al. Dementia prevention, intervention, and care. *Lancet*. 2017 Dec 16;390(10113):2673-2734
  - 14 Kamil RJ et al. Association of Hearing Impairment With Incident Frailty and Falls in Older Adults. *J Aging Health*. 2016 Jun;28(4):644-60
  - 15 D'Haese PSC et al. Awareness of Hearing Loss in Older Adults: Results of a Survey Conducted in 500 Subjects Across 5 European Countries as a Basis for an Online Awareness Campaign. *Inquiry*. 2018 Jan-Dec;55:46958018759421

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"It is important for older adults to hear well to avoid social isolation and depression."

Prof. Dr. Lorne Parnes,  
Department of  
Otolaryngology – Head and  
Neck Surgery, London Health  
Sciences Centre, Canada

"Particularly in view of consequential costs from dementia, depression and falls, there is a call for the identification and provision of appropriate care of hearing loss in the elderly."

Dr. Michael Lerch, Senior  
Consultant for the  
Department of Acute  
Geriatrics and Early  
Rehabilitation, Helios Kliniken  
Schwerin, Germany

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In research looking at hearing aid uptake in the moderate to severely hearing impaired group, the GP's management of age-related hearing impairment was found to be a barrier to seeking help for hearing impairment, and this would be a factor against initially consulting a GP.<sup>16</sup> However, statistics from the United Kingdom show that only 55% of patients who mention hearing problems to their doctor get a referral for a hearing test or for a hearing aid.<sup>17</sup> And yet, hearing aids have a positive effect on the cognitive performance of older people. Health care professionals as well as those outside of the hearing profession can play a major role in screening for hearing loss and referring patients to specialists for follow-up care.

The World Health Organization (WHO) has acknowledged the growing importance of hearing. In 2017, the World Health Assembly adopted a new resolution to tackle the devastating impact of hearing loss worldwide and prevent hearing loss. The resolution urges national governments and stakeholders in the field to take action against hearing loss and its negative impacts. This resolution constitutes a major step towards raising awareness for and taking actions against hearing loss on an international political level.<sup>18</sup>

## Costs not to treat

Health policy decision makers also need to consider that the better a person hears, the more likely they are to retain independence and be less reliant on costly social services. That independence may lengthen the time that an individual is able to care for his or herself and remain at home. Delaying the move to a nursing home can bring significant cost savings for families and society.

Studies have shown that spending money on hearing technology will save society money in the end.<sup>19</sup> The WHO estimates that unaddressed hearing loss at any age poses an annual global cost of 750 billion International Dollars. This is due to poorer education opportunities, higher unemployment rates and lower grades of employment.<sup>20</sup>

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16 Meyer C et al. What factors influence help-seeking for hearing impairment and hearing aid adoption in older adults? *Int J Audiol.* 2012;51(2):66-74

17 Action on Hearing Loss (2011): "Hearing Matters: Taking action on hearing loss in the 21st century."

18 [http://apps.who.int/gb/ebwha/pdf\\_files/WHA70/A70\\_R13-en.pdf?ua=1](http://apps.who.int/gb/ebwha/pdf_files/WHA70/A70_R13-en.pdf?ua=1) Accessed 16 Mar 2018

19 O'Neill C et al. Cost implications for changing candidacy or access to service within a publicly funded healthcare system? *Cochlear Implants Int.* 2016 Apr;17 Suppl 1:31-5

20 <http://www.who.int/mediacentre/factsheets/fs300/en/> Accessed 16 Mar 2018



## Prevalence of hearing loss in older adults: an overview

Over 465 million people – more than 5% of the world's population – has disabling hearing loss, which for adults (>15 years) is defined as being greater than 40 dB in the better hearing ear. Prevalence rises with age, rapidly increasing to around 1 in 3 adults over 65 years.

Disabling hearing loss affects 432 million adults, 165 million of whom are over 65 years of age. South Asia, Asia Pacific and sub-Saharan Africa have the highest prevalence in this age group.<sup>21, 22</sup> In general, the lower the income and the literacy of a region's population, the higher is the prevalence of hearing loss. While in high-income countries, about 18% of adults over 65 years suffer from disabling hearing loss, it affects more than 44% in sub-Saharan Africa and over 48% in South Asia for this age bracket.<sup>23</sup>

In Germany, while 1% of 14 to 19 year olds live with hearing loss, 54% of those over age 70 do.<sup>24</sup> In Australia, 2.8% of 15-50 year olds have hearing loss, while almost 63% of people over the age of 71 do.<sup>25</sup> The figures are similar in other industrial countries. The prevalence of hearing loss increases significantly with age and is greater in men than in women.<sup>26</sup>

Age-related hearing loss will present a great challenge to society in the coming decades because life expectancy is increasing and with it the number of older adults with hearing loss. In Austria, for example, an estimated 3.2 million people (34.5% of the population) will be 60 or older in 2050 – a 66% increase from 2010. Experts estimate that the number of people with hearing loss will grow from the current 460 million worldwide to around 900 million by 2050.<sup>27</sup>

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\* **Adults (aged 15 or older):**  
hearing loss greater than  
40dB in the better ear

**Children (aged 0 to 14):**  
hearing loss greater than  
30dB in the better ear

30dB corresponds to the  
volume of whispering, 40dB  
to fridge buzzing

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21 [http://www.who.int/pbd/deafness/news/GE\\_65years.pdf](http://www.who.int/pbd/deafness/news/GE_65years.pdf) Accessed 22 Mar 2018

22 [www.who.int/mediacentre/factsheets/fs300/en](http://www.who.int/mediacentre/factsheets/fs300/en) Accessed 09 Mar 2018

23 [http://www.who.int/pbd/deafness/news/GE\\_65years.pdf](http://www.who.int/pbd/deafness/news/GE_65years.pdf) Accessed 22 Mar 2018

24 Heger D et al. Wie viele Menschen sind schwerhörig? Z Audiol. 2010; 49 (2) 61–70

25 Wilson DH et al.: "The epidemiology of hearing impairment in an Australian adult population". Int J Epidemiol. 1999;28:247-252

26 Gopinath B et al. Prevalence of Age-Related Hearing Loss in Older Adults: Blue Mountains Study. Arch Intern Med. 2009;169(4):415-418

27 [www.who.int/mediacentre/factsheets/fs300/en](http://www.who.int/mediacentre/factsheets/fs300/en) Accessed 09 Mar 2018

## Degrees of hearing loss

The degrees of hearing loss, as defined by the World Health Organisation (WHO), are listed below.<sup>28</sup>

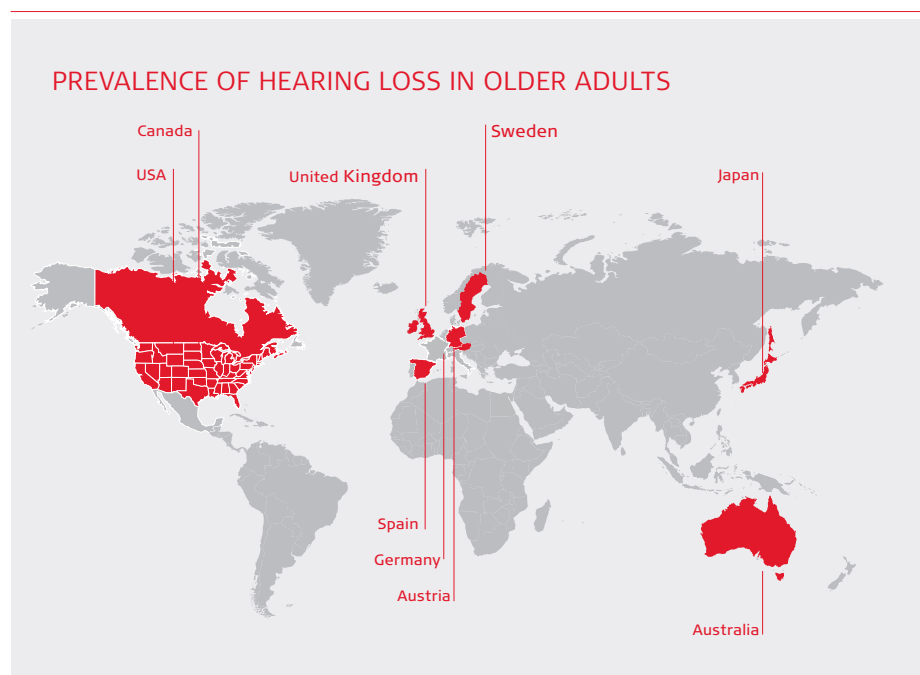
| No impairment | Mild impairment | Moderate impairment  | Severe impairment | Profound impairment including deafness |       |
|---------------|-----------------|----------------------|-------------------|--|-------|
| ≤ 25 dB       | 26–40 dB        | 41–60 dB             | 61–80 dB          | ≥ 81 dB                                | BEHL* |
|               |                 | in children 31–60 dB |                   |  |       |

There are also other hearing loss definitions, which complicates comparisons across studies.

### Comparing studies: a difficult task

The prevalence of hearing loss can be determined in a variety of ways, such as by surveying people with questionnaires, by using different methods to measure hearing and by extrapolating population data. Questionnaire wording can change the results considerably. The term "hearing loss" is not defined the same way in each study and can vary from country to country. Therefore, these estimates should be viewed as country specific, and are not intended to be compared to one another.

\* BEHL=Better Ear Hearing Loss. The BEHL is calculated from the average value of hearing thresholds at frequencies 500, 1000, 2000 and 4000 Hz for the better ear.



28 WHO. Prevention of blindness and deafness. Grades of Hearing Impairment. [http://www.who.int/pbd/deafness/hearing\\_impairment\\_grades/en/](http://www.who.int/pbd/deafness/hearing_impairment_grades/en/) Accessed 21 Mar 2018

# Prevalence of hearing loss in older adults: selected countries

## Prevalence of hearing loss in older adults around the world: select profiles from Europe, the Pacific Rim, and North America.

Societies are aging with an increased attention to better quality of life thanks to modern medicine and integrated care. The goal of many older adults is to live independently. They want to be able to care for themselves, communicate independently and remain active.

Hearing is an essential part of staying independent. Once hearing is lost, communication becomes fragmented. This often leads to feelings of isolation and depression.

An Australian study showed that the majority of people (66%) age 80 and older who wore a hearing aid still had some degree of hearing loss even when using their hearing aid. Men in the study reported significantly more difficulties in their social lives due to hearing loss than women.<sup>29</sup>

## Europe

### Austria

#### Number of people with hearing loss in Austria

Official statistics report 456,000 hearing impaired individuals in Austria.

This is distributed as follows: 50-59 years old: 75,400 individuals; 60-69 years old: 91,800 individuals; 70-79 years old: 113,300 individuals; 80+: 101,200 individuals.<sup>30, 31</sup>

The most recent official survey on Austrians' hearing status showed that 2.5% of the population have permanent hearing problems.<sup>32</sup> This figure is relatively low compared to international data. This may be attributed to the fact that it only contains severe to profound hearing losses. Possibly, older people are unwilling to talk about their hearing impairment, which distorts statistics.

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29 Sanchez L et al.: "A 16-year longitudinal study of hearing in very old Australians". Audiology Research. 2011; volume 1:e10

30 Statistik Austria: Mikrozensus 1995. Statistics from 1995

31 More current data available, but these only include a proportion of people with impaired hearing because hearing loss is defined in these surveys as "problems with hearing" (despite a hearing aid or cochlear implant)"

32 Statistik Austria: Menschen mit Beeinträchtigungen – Ergebnisse der Mikrozensus-Zusatzfragen im 4. Quartal 2007. p. 1133, Tabelle 1

In real terms, the prevalence is likely to be much higher: It is estimated that 30% of adults aged 60 years and 50% of Austrians aged 65 are affected by hearing loss.<sup>33</sup> We can assume that roughly 20% of the Austrian population have some degree of hearing impairment, i.e. around 1.7 million people.<sup>34</sup>

## Germany

### Hearing loss: prevalence and age distribution in Germany

In Germany, 19% of individuals older than 14 years have some form of hearing loss.

The percentage rises with age: 25% of those 50-59 years old and 54% of those 70 and older report having impaired hearing.<sup>35</sup>

## Sweden

### Hearing loss: prevalence and age distribution in Sweden

16.3% of the Swedish population between 16 and 84 years live with some degree of hearing loss. In the group of 55 to 64 years, 23.2% are hearing impaired with an estimated 47.3% of those being 85 years and older.<sup>36</sup>

## Spain

### Hearing loss: prevalence and age distribution in Spain<sup>37</sup>

According to official statistics from Spain, an overall figure of 2.5% of the population is reported to suffer from some degree of hearing loss. Among those 45 to 64 years of age, 21.4% are hard of hearing; among the 65 to 79 years age group, this number is 29.7% and for people older than 80 years the percentage rises to 39.4%.<sup>38</sup>

### Survey methods

One reason why the figures for Spain are relatively low compared with the rest of Europe is the survey method. According to information provided by the Spanish statistics institute INE (Instituto Nacional de Estadística), the survey was conducted using qualitative criteria, in which INE asks people to subjectively rate their level of impairment. Unlike qualitative surveys, quantitative surveys show greater prevalence estimates because they show how many people have poor hearing irrespective of whether or not survey participants feel impaired by their hearing loss.<sup>39</sup>

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33 <https://www.gesundheit.gv.at/krankheiten/hno/schwerhoerigkeit/formen-symptome>. Accessed 22 Mar 2018

34 Own calculations based on population of 8.7 mio in Austria (2016)

35 Heger D et al. "Wie viele Menschen sind schwerhörig?" Z Audiol. 2010; 49 (2) 61-70

36 Statistics Sweden: Living Conditions Surveys. Disabilities. Proportion of persons in percent by indicator, age, sex and period." 2010-11 <http://www.ssd.scb.se>

37 Instituto Nacional de Estadística (National Statistics Institute): E-mail correspondence (16.05.2012)

38 Instituto Nacional de Estadística (National Statistics Institute): "Survey on Disability, Independence and Dependence situations 2008, Disabilities, Impairments and State of Health. National results: Relative figures". (2013-01-09)

39 Instituto Nacional de Estadística (National Statistics Institute): E-mail correspondence (16.05.2012)

## United Kingdom

### Hearing loss: prevalence and age distribution in the United Kingdom

The UK charity "Action on Hearing Loss" states that there are 11 million people with hearing loss across the UK, that's around one in six of the Brits. This number is estimated to rise to one in five by 2035. There are 50,000 children with hearing loss in the UK. More than 40% of people over 50 years old have hearing loss, rising to 71% of people over the age of 70.<sup>40</sup>

## Pacific rim

### Australia

Based on self-reported data from the Australian bureau of statistics 2014–15 nhs, over 3 million Australians (14%) had at least one long-term hearing disorder.

This proportion increased with age, from 3% of children aged 0–14, to 49% of people aged 75 and over. After adjusting for differences in the age structure of the population, it showed that hearing disorders were more common among males (18%) than females (11%).<sup>41</sup>

### Japan

#### Age-related hearing loss is an issue of national importance

This was the conclusion of a study based on the national institute for longevity sciences-longitudinal study of aging (2008–2010) that looked at the prevalence of hearing loss in elderly Japanese.

It showed that it increased greatly after the age of 65 years, with notable differences between men and women. The prevalence observed from crude calculations was:

- 43.7%, for men aged 65–69 and 27.7% for women in the same age group;
- 51.1%, for men aged 70–74 and 41.8% for women in the same age group;
- 71.4% in men aged 75–79 and 67.3% for women in the same age group and
- 84.3% in men over 80 years and 73.3% for women in the same age group.

When looking at the 10-year-incidence rates (number of newly diagnosed cases), the study authors noted 32.5% of the 60–64 year olds and 62.5% of 70–74 year old Japanese.<sup>42</sup>

40 <https://www.actiononhearingloss.org.uk/about-us/our-research-and-evidence/facts-and-figures>. Accessed 23 Mar 2018

41 <https://www.aihw.gov.au/getmedia/48ee92a8-d373-4354-8df2-d664a974034f/ah16-3-15-vision-hearing-disorders.pdf.aspx>. Accessed 23 Mar 2018

42 Uchida Y et al. Nihon Ronen Igakkai Zasshi. 2012;49(2):222–7. [Estimates of the size of the hearing-impaired elderly population in Japan and 10-year incidence of hearing loss by age, based on data from the National Institute for Longevity Sciences-Longitudinal Study of Aging (NILS-LSA)]

## North America

### Canada

#### Hearing loss in adults

In Canada, the prevalence of hearing loss has typically been estimated through self-reports. However, self-reports may result in underestimates, especially among older adults and among people with mild hearing loss. The Canadian health measures survey (chms), a population-based survey designed to provide national estimates of health indicators, included both audiometric evaluation and self-reports.

Audiometry results from the 2012 to 2015 chms indicate that 40% of adults aged 20 to 79 had at least slight hearing loss in one or both ears. Hearing loss was more prevalent in older age groups. Adults aged 60 to 79 were significantly more likely to have hearing loss (78%) compared with younger adults aged 40 to 59 (40%) and 20 to 39 (15%). Men (47%) were significantly more likely to have hearing loss compared with women (32%).<sup>43</sup>

### USA

#### Hearing loss: prevalence and age distribution in the USA

Approximately 15% of American adults (37.5 million) aged 18 and over report some trouble hearing. Age is the strongest predictor of hearing loss among adults aged 20-69, with the greatest amount of hearing loss in the 60 to 69 age group.

About 2% of adults aged 45 to 54 have disabling hearing loss. The rate increases to 8.5% for adults aged 55 to 64. Nearly 25% of those aged 65 to 74 and 50% of those who are 75 and older have disabling hearing loss. Hearing aids and cochlear implants are still widely underused in the USA.<sup>44</sup>

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Please also read our Special Report No. 1: "About Hearing and Telling".

Visit [www.medel.com/press](http://www.medel.com/press) to download the report.

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43 Health Fact Sheets. Hearing Loss of Canadians, 2012 to 2015. <http://www.statcan.gc.ca/pub/82-625-x/2016001/article/14658-eng.htm> Accessed 27 Mar 2018

44 National Institute on Deafness and Other Communication Disorders (NIDCD). Quick Statistics about Hearing. <https://www.nidcd.nih.gov/health/statistics/quick-statistics-hearing#10>. Accessed 28 Mar 2018

## Hearing implants for older adults

### Cochlear implants – Electric Acoustic Stimulation (EAS)– Middle ear implants

There is no upper age limit to receiving a hearing implant. However, there are other criteria that should be considered, and experts recommend an implant when hearing aids provide only limited benefit, or, for some implant types, if those affected cannot or do not want to use a hearing aid.

An implant system consists of an external and internal component. The external component (audio processor) sits on the outside of the head behind the ear and can be worn discretely and comfortably under the hair. The internal component is implanted under the skin in the same location.

MED-EL has developed a range of technologies for all types of hearing loss. These include the very latest Cochlear Implants (CI), Electric Acoustic Stimulation (EAS) systems, middle ear, bone conduction and auditory brainstem implants. Auditory training exercises following implantation can help the implant user obtain maximum benefit from the implant.

The following hearing implant systems are most commonly used for treating age-related hearing loss:

### Cochlear implant system

A cochlear implant system is used for people with severe to profound sensorineural hearing loss who do no longer benefit from hearing aids. Cochlear implant systems directly stimulate the auditory nerve. The auditory nerve then relays the signals to the brain, where they are perceived as sounds.

### EAS™ hearing implant system

The EAS™ hearing implant system for electric acoustic stimulation is a hearing implant solution specifically for people with mild to moderate sensorineural hearing loss in the low frequency range and severe to profound hearing loss in the higher frequency range. It combines cochlear implant and digital hearing aid technology by stimulating the inner ear both acoustically and electrically at the same time.

### Middle ear implant system

A middle ear implant system is an alternative to traditional hearing aids for people who cannot use conventional hearing aids and do not benefit sufficiently. The system converts sound into mechanical vibrations, which directly stimulate the middle ear structures. Middle ear implant systems are suitable for people with sensorineural hearing loss, conductive hearing loss and mixed hearing loss.

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Please refer to [www.medel.com](http://www.medel.com) for detailed product information on all implants

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## A look at the future

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"In the hearing device industry, the number one technical challenge for the future is improving hearing in challenging (noisy, echoic) environments."

Prof. David R. Moore, Director,  
Communication Sciences  
Research Centre, Cincinnati  
Children's Hospital, USA

"The need for ongoing care and support, at least in the early post-implant interval, is imperative."

Prof. Dr. Julian Nedzelski,  
Department of  
Otolaryngology - Head and  
Neck Surgery, Sunnybrook  
Health Sciences Centre,  
University of Toronto, Canada

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Researchers and engineers are continuing to make tremendous strides in hearing implant development. Audio processors and implants are designed to be even smaller and more technically refined. Manufacturers are tailoring wearing options, including connectivity (Bluetooth), more sport-friendly devices and waterproof accessories. Developers are also researching fully implantable cochlear implants.

## No age limit for implantation

Even seniors in their 80s and 90s can benefit from hearing implants.<sup>45, 46</sup> Numerous scientific studies have shown that hearing implants positively affect many factors. Older adults benefit from better speech understanding, increased social contacts, improved self-confidence, and overall greater quality of life after implantation.<sup>47, 48, 49, 50, 51</sup> Many improvements are evident not only for 60 and 70 year olds but also for those aged well over 70.

Hearing implants can clearly improve the hearing abilities and communication skills in the elderly. Speech understanding improved significantly following cochlear implantation, both in objective hearing tests and in subjective audiological assessments.<sup>52</sup>

Studies on CI users show that older adults fare almost as well as younger people. In terms of speech comprehension in a quiet environment, older adults hear just as well with a hearing implant as younger people. There are slight differences in complex hearing situations, for instance if several people speak at the same time.<sup>53</sup> In such cases, older adults may have more difficulties than younger people. This is because human hearing in old age cannot distinguish speech from background noise as well as in younger years.

Implants are easy to use and are customized to each individual. After implantation, the audiologist, or other trained professional, tailors the device to the needs of the individual. Similar to hearing aids, the user can also adjust the settings on their audio processor to their individual hearing situation by pressing a button.

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45 Cloutier et al., OCTO "Outcomes of cochlear implant for the octogenarians: audiologic and quality-of-life. *Otol. Neurotol.*, 35 (2014), pp. 22-28

46 Carlson ML et al.: Cochlear Implantation in the Octogenarian and Nonagenarian. *Otol Neurotol*, 2010 Oct; 31(8):1343-9

47 Lenarz T et al. Patient-Related Benefits for Adults with Cochlear Implantation: A Multicultural Longitudinal Observational Study. *Audiol Neurotol* 2017;22:61-73

48 Knopke S et al. Impact of cochlear implantation on quality of life and mental comorbidity in patients aged 80 years. *Laryngoscope*. 2016 Dec;126(12):2811-2816

49 Choi JS. Association of Using Hearing Aids or Cochlear Implants With Changes in Depressive Symptoms in Older Adults. *JAMA Otolaryngol Head Neck Surg*. 2016 Jul 1;142(7):652-7

50 Olze H et al. Rapid Positive Influence of Cochlear Implantation on the Quality of Life in Adults 70 Years and Older. *Audiol Neurotol*. 2016;21 Suppl 1:43-47

51 Wong, DJ et al. 2016. Outcomes after cochlear implantation in the very elderly. *Otol. Neurotol*. 37, 46-51

52 Knopke S et al. Impact of cochlear implantation on quality of life and mental comorbidity in patients aged 80 years. *Laryngoscope*. 2016 Dec;126(12):2811-2816

53 Rohloff K et al. Cochlear Implantation in the Elderly: Does Age Matter? *Otol Neurotol*. 2017 Jan;38(1):54-59



Results following implantation vary from person to person. Duration of hearing loss is an important factor – the sooner the hearing loss is addressed, the better the chance for a good hearing outcome.<sup>54</sup>

## Can implants be considered even for mild to moderate hearing loss?

Hearing aids are excellent at compensating mild to moderate hearing loss. For severe to profound hearing loss caused by a problem in the cochlear, however, experts recommend an implant. For people who cannot use a conventional hearing aid due to medical reasons, e.g. because of atresia or ear malformations, a middle ear implant may be an excellent solution, even with a mild or moderate hearing loss.<sup>55</sup>

## Hearing implant surgery: safe for older adults

Several independent studies have shown that hearing implant surgery is safe and reliable for both younger and older adults.<sup>56, 57</sup> The complication rate, even for older adults, is low if the patient's general state of health is good.<sup>58</sup>

The most frequent side effect is a brief period of dizziness. If complications occur, they are usually temporary and easily treatable.

### Recognising underlying diseases

Hearing implant surgery usually takes place under general anaesthesia and is routine. As with all surgeries, it is important to prepare for the procedure in order to keep the risk of complications low. Before the surgery, the medical team examines not only the auditory system, but also the patient's general state of health. Underlying conditions that are more prevalent with age, such as heart or lung disease and diabetes, can increase the risk of complications during and after surgery. A patient's medical and surgical team will work with patients to minimize these risks prior to surgery.

It is also helpful for patients to prepare mentally for the procedure and for the recovery, when there may be some discomfort. The members of the implant team and other implant recipients can help patients and families to understand what to expect.

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"As long as the older individual is in reasonable health, the risks of anesthesia are very low. The significant improvements afforded from cochlear implantation far outweigh the small medical and surgical risks."

Dr. Vincent Lin, Department of Otolaryngology - Head and Neck Surgery, Sunnybrook Health Sciences Centre, University of Toronto, Canada

"Hip or knee replacement can be compared with cochlear implantation, but the risk, pain and hospital stay is much less with a cochlear implant."

Prof Dr Lorne Parnes, Department of Otolaryngology – Head and Neck Surgery, London Health Sciences Centre, Canada

"CI surgeries have become routine and take considerably shorter than many other ENT surgeries."

Prof. Dr. Mark Praetorius, Head of Otolaryngology and Neurotology, ENT Department, Heidelberg University Hospital, Germany

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54 Garcia-Iza L, et al. Cochlear implantation in the elderly: outcomes, long-term evolution, and predictive factors. *Eur Arch Otorhinolaryngol.* 2018 Apr;275(4):913-922

55 Wolf-Magele A. Active middle ear implantation in elderly people: a retrospective study. *Otol Neurotol.* 2011 Jul;32(5):805-11

56 Chen DS. Cochlear implantation in older adults: long-term analysis of complications and device survival in a consecutive series. *Otol Neurotol.* 2013 Sep;34(7):1272-7

57 Migirov L. Cochlear implantation in elderly patients: surgical and audiological outcome. *Gerontology.* 2010;56(2):123-8

58 Yang Z et al. Safety and outcomes of cochlear implantation in the elderly: A review of recent literature. *Journal of Otology* 11 (2016) 1-17

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"Cochlear implantation is the safest surgery in ENT. It is done by specialist surgeons, complications are extremely rare."

Prof. Dr. Wolf-Dieter Baumgartner, Department of Otorhinolaryngology at the Medical University of Vienna

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### Routine surgery is well tolerated

Hearing implant surgery has become routine for experienced ENT surgeons. Surgery typically lasts one to three hours and is done under general anaesthesia. For any surgery under general anaesthesia, shorter duration translates to fewer side effects. The minimally invasive method, which uses just a small skin incision, also ensures that the implantation is well tolerated even by older adults. Usually, the patient can leave the hospital after just a few days.

## Realistic expectations

Before the procedure, the implant team works with patients to ensure that expectations are realistic. While glasses can generally correct imperfect vision, hearing devices, whether hearing aids or implants, are not designed to restore hearing completely. Additionally, people who receive hearing aids or implants may still have challenges in certain situations, such as noisy environments.

## Low risk, high reward

The experts are clear on the risks and benefits of hearing implants for older adults: Surgical complications are low, anaesthetic is well-tolerated, speech comprehension clearly improves and device users enjoy an increased quality of life.<sup>59</sup>

## Hearing training: the key to success

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"Many studies in the neuroscience literature now provide overwhelming evidence that training works."

Prof. David R. Moore, Director, Communication Sciences Research Centre, Cincinnati Children's Hospital, USA

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If a person has a hearing implant, time and daily use are the most common form of "training" to achieve good performance. In addition, individually designed exercises can help ensure optimum hearing. These exercises are easy to complete at home, sometimes with audio books, with the family, when watching television or with a computer. People who need more extensive rehabilitation receive support from rehabilitation therapists. No matter whether hearing training is done in a formal or informal way, practicing one's hearing and communication skills is good brain training. Investment in rehabilitation leads to better hearing with the cochlear implant as well as to an improved quality of life.<sup>60</sup>

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59 Wong, DJ et al. 2016. Outcomes after cochlear implantation in the very elderly. *Otol. Neurotol.* 37, 46-51

60 Tang L. Rehabilitation and Psychosocial Determinants of Cochlear Implant Outcomes in Older Adults. *Ear Hear.* 2017 Nov/Dec;38(6):663-671

## Reimbursement by health insurers

Although the number of people worldwide receiving a hearing implant is increasing, not everybody who could benefit from an implant receives one. Candidacy criteria vary from country to country.

In Europe, the costs for hearing implants are generally borne by health insurance agencies provided medical and audiological indication criteria are met. Guidelines are changing from time to time to take into account medical and technological advances. Many European countries have no upper age limit for hearing implantation.

By comparison, in the USA, the level of coverage for hearing implants can vary between private insurance companies, the Veterans Health Administration and government programs. Medicare, an insurance program for people over 65 and individuals with disabilities, typically covers the cost of cochlear implants. Medicaid, which provides free or low-cost health care based on financial need, may or may not cover the cost of cochlear implants, depending on the candidate's state of residence. Up-to-date information on country-specific candidacy criteria can be obtained from the websites of national health authorities.

The following table on page 20 provides an overview of reimbursement by health insurance agencies for adult implant candidates in individual countries. Most countries have guidelines or fixed figures for the maximum speech comprehension a candidate may have in order to be considered for a cochlear implant. The ENT specialist normally decides each case on an individual basis.

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"There is no age limit for CI surgery. It does not matter how many calendar sheets have been torn off, but how fit the person is."

Prof. Dr. Mark Praetorius,  
Head of Otology and  
Neurotology, ENT  
Department, Heidelberg  
University Hospital, Germany

"Considering the benefits derived, cochlear implantation is a safe and effective intervention for the elderly population and confers a significant functional improvement in quality of life."

Prof. Dr. Shakeel R. Saeed,  
University College London Ear,  
Institute, UK

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## Cochlear implants: criteria and reimbursement by health insurance agencies

| Country        | OP/i* paid for? | Fitting** paid for? | Rehab paid for? | Criteria   | Upper age limit |
|----------------|-----------------|---------------------|-----------------|--|-----------------|
| Australia      | yes             | yes                 | yes             | No official national guidelines. General recommendations from Australian CI clinics (not obligatory): understands a maximum of 60% of words in sentences with the poorer ear   | none            |
| Canada         | yes             | yes                 | yes             | No official national guidelines.<br><br>The Canadian Ministry of Health recommends a CI in case of moderate to severe/profound sensorineural hearing loss and limited benefit from optimally fitted amplification. Limited benefit is defined as a score in the best aided condition on the HINT (Hearing in Noise Test) sentence test of less than 60%. (Source: sunnybrook.ca) | none            |
| Germany        | yes             | yes                 | yes             | No official national guidelines. The Guideline of the German Society of Oto-Rhino-Laryngology, Head and Neck Surgery recommends a CI for individuals with profound sensorineural hearing loss who are likely to achieve better hearing and speech understanding with a cochlear implant than with a hearing aid. (Source: AWMF-Register no.: 017-071)                            | none            |
| United Kingdom | yes             | yes                 | yes             | The Guidelines of the National Institute for Health and Clinical Excellence (NICE) recommend a CI as an option for children and adults with severe to profound deafness who do not receive adequate benefit from acoustic hearing aids. (Source: nice.org.uk/TA166)  | none            |
| Japan          | yes             | yes                 | yes             | The 1998 guidelines on CI indication criteria state that individuals must have severe to profound sensorineural hearing loss in order to be eligible for a CI.   | none            |

| Country | OP/i* paid for?                 | Fitting** paid for?             | Rehab paid for?                 | Criteria  | Upper age limit                 |
|---------|---------------------------------|---------------------------------|---------------------------------|---|---------------------------------|
| Austria | yes                             | yes                             | yes                             | No official national guidelines. ENT surgeons and CI manufacturers recommend a cochlear implant for severely to profoundly hearing impaired individuals who obtain little or no benefit from acoustic amplification in the best aided condition. (Source: "Concerto" IFU for CE-marked countries)   |                                 |
| Sweden  | yes                             | yes                             | yes                             | No information  | none                            |
| Spain   | yes                             | yes                             | some-times                      | The Instituto de Salud Carlos III recommends a cochlear implant for people with profound bilateral sensorineural hearing loss, who gain no or insufficient benefit from hearing aids. (Source: Implantes Cocleares: Actualización y revisión de estudios coste- utilidad; Julio 2003)   |                                 |
| USA     | Depends on health insurance *** | Depends on health insurance *** | Depends on health insurance *** | Current US Food and Drug Administration (FDA) guidelines permit implantation in patients whose open-set sentence recognition (e.g., HINT) is 60% or less in the best-aided condition. However, for patients receiving Medicare benefits, the current cutoff for cochlear implant candidacy is a HINT score of 40% or less. (Source: Medscape Reference, May 29, 2012) | Depends on health insurance *** |

\* OP/i: Surgery/implant

\*\* Fitting: post-surgical implant adjustment and settings

\*\*\* Health insurance

# First-hand experience with hearing implants

## Middle ear implant

Walter, 63

### A true musician rediscovers hearing

I worked in Sales for 40 years, travelled the country giving presentations, but in my heart and soul I've always been a musician first. Gradually, however, I began to notice changes which have since influenced my life considerably. I had to ask people more and more to repeat their questions during a presentation.

My hearing aid professional recommended increasingly powerful hearing aids, and I was devastated when I realized that there were no better hearing aids for my condition. The fear of losing my hearing was overwhelming. I was lucky, though, to have my family's support. People suffering from hearing loss need understanding and patience, otherwise they will soon succumb to social isolation.

And then coincidence came to my aid. I met a man wearing a small disc on his head which made me curious. We started talking and the man told me: "This is my new ear. I can hear like a youngster again!" The "new ear" turned out to be the middle ear implant system, the Vibrant Soundbridge®. I was fascinated. This man also recommended an ENT surgeon and I immediately made an appointment. The surgeon described how the Vibrant Soundbridge works in detail and explained the next steps, surgery and fitting. I had no problem with the surgery. If you really want something, you tend to forget your fears.

Hearing with the Vibrant Soundbridge is a natural process. There is no uncomfortable background noise, no disturbing feedback. Even my voice sounds natural to me. Also, the Vibrant Soundbridge is easier to handle than a hearing aid. I had high expectations, and was not disappointed. After the activation, I could hear again like when I was younger. It was indescribable. It was like having Christmas, Easter and my birthday in one day.

I can only advise others who suffer from similar problems not to give up. Bad hearing does not end with hearing aids. Contact an ENT surgeon who is informed about new developments and knows a lot about hearing implants. The Vibrant Soundbridge has changed my life. It made me the happiest person in the world.

## Cochlear implant

Barbara, 80

Being part of life again thanks to cochlear implants

I am a retired special education co-teacher in an elementary school from the USA, and have three children, five grandchildren, a dog and two cochlear implants. My hearing loss was gradual over a number of years. I wore hearing aids on both ears for roughly 40 years, until even the strongest of them did not help me anymore. After testing from ENT specialists, my medical professional said that cochlear implants were in order.

Because of my hearing loss, I had begun to withdraw from family conversations and make myself less noticeable all the time. I resorted more and more to writing articles and reading, rather than involving myself in conversation. I had lost the ability to hear music at all and that was a tremendous loss of enjoyment for me. I had learned to lip read several years ago and could "sign" well enough to get along, but to no great avail. Overall, I was falling further and further behind in socially-connected things, from attending church, to being with family. I had to stop driving, and talking on the phone with my family, because hearing was mandatory for these things. Hearing loss was affecting so many areas of my life that I finally decided to go ahead with getting cochlear implants.

The activation of my cochlear implant was an awesome experience. The first words I heard with my first implant were "Why are you crying, Barbara?" My answer to that was, "What a wonderful sound I am receiving!" I heard good sound from the first minute of connection. Learning to use the cochlear implants was a very gratifying and enjoyable experience. Life has improved for me in that I can now hear things so clearly and loudly. When I think back, I'm truly surprised how I went without hearing at all for the two years before getting my cochlear implants. They have been one of the best things that have ever happened to my family and me.

There are so many new sounds for me that I had not heard for many years. Now, I can hear the ticking of clocks in the house—sometimes I even have to double check myself to be sure that is what I hear! Music is once again a great part of my world of enjoyment — I acquired a violin and intend to try to learn to play, at least for my enjoyment. When I tucked it beneath my chin last night, it was like a new world opening for me.

I am able to drive again. What a great feeling and sense of independence this is. I have always tended to be somewhat of an extrovert—I want to be around people and go places and do things. This had stopped because of my hearing loss. Now, with cochlear implants, I enjoy all of these much-wanted parts of life. I am totally involved in conversations with family and friends when I see them, and feel as if I am part of life again.

I firmly believe that if one wants to enjoy all aspects of life, an implant is the epitome of offering that pleasure—whether you're young or old. I would strongly encourage anyone to "have a go at it" if cochlear implants were an option for them to hear.

## Summary

Life expectancy is rising steadily, with people wanting to stay active and independent. Hearing loss also increases with age. Around 20% of 50 year olds have poor hearing in people over 60 this figure is around 50%.

At 60, many people are living life to the fullest; they work and maintain active social connections with friends and families. When hearing gradually becomes poorer over time, people can adapt up to a certain point. At some point, though, their world may fall silent.

Hearing aids are an excellent choice. They are getting smaller and better. If a hearing aid does not help anymore, hearing implants are a safe and effective alternative. After more than 30 years on the market, hearing implants are a proven solution. ENTs around the world have gained years of experience in refining the sophisticated surgical methods for hearing implants. When it comes to safety and device acceptance, surgeons today compare hearing implantation to hip or knee replacement, and complication rates remain low. Based on research, experts now recommend hearing implants for people well over 70.

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"Older adults who hear are hugely better off than those who cannot for a host of reasons. The issue of socialisation, less frustration for the individual and caregivers, safety, lessened anxiety and therefore less confusion are but a few."

Prof. Dr. Julian Nedzelski,  
Department of  
Otolaryngology - Head and  
Neck Surgery, Sunnybrook  
Health Sciences Centre,  
University of Toronto,  
Canada

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Hearing allows older adults to lead an active life, to spend time with their family and friends and to share their wisdom, experiences and life lessons.



## Appendix

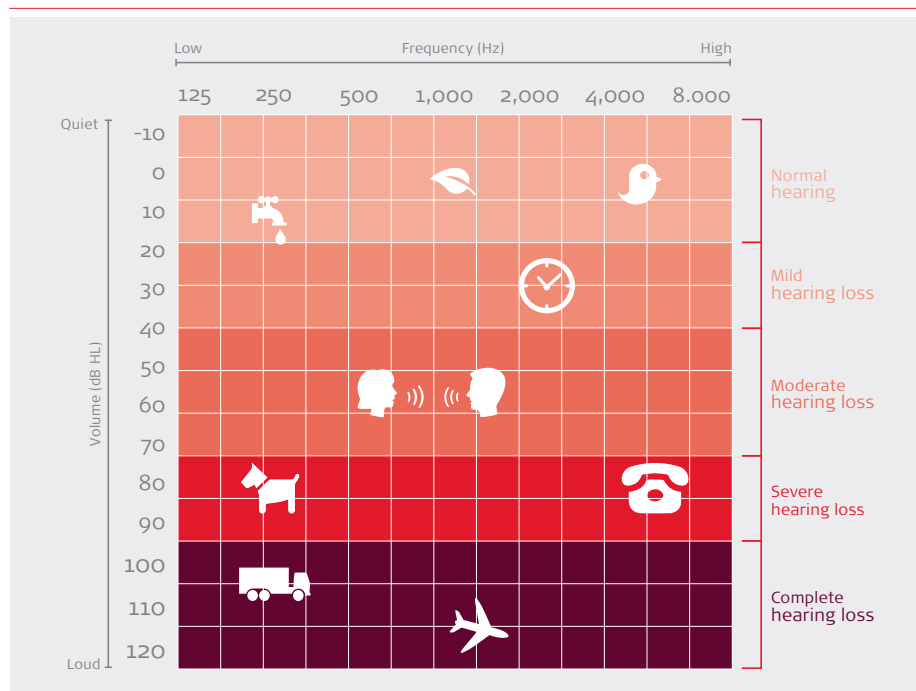
### The audiogram

An audiogram is a graphic representation of a person's hearing ability – an “image” of their hearing. It shows how much the hearing in each ear deviates from normal hearing and gives the degree of hearing loss. It also indicates where the problem could lie, i.e. it is an indicator of the type of hearing loss.

The numbers 125 to 8000 on the upper axis show the frequency range, which corresponds to pitch. Frequency is measured in Hertz (Hz). The higher the frequency, the higher the pitch is. For example: the dripping of a water tap has a frequency of around 250 Hertz, it therefore has a low pitch; in contrast, most bird songs have a frequency of about 4000 Hz, which is a high pitch.

Loudness is measured in decibels. Zero decibels (0 dB) does not mean that there is no sound, but that the sound is very soft – for a person with normal hearing. In general, conversation takes place around 65 decibels. 120 decibels is extremely loud – a jet plane 25 meters away produces that loud volume. The numbers on the side of the graph are the volume in decibels.

During a hearing test the audiologist plays sounds of various pitches. The softest volume of a sound, but that the patient can just hear at each frequency is entered on the audiogram for the respective frequency. This is called the hearing threshold. The hearing thresholds at 500, 1000 and 2000 Hertz are averaged into a pure-tone average. This value is a general indicator of the degree of hearing loss.



## Types of hearing loss

Our ears capture sound waves and send the signal to the brain in a complex process. Each part of the ear plays an important role in supplying the brain with sound information. Hearing loss is the result of damage to one or multiple parts of the outer, middle or inner ear. There are three types of hearing loss.

### Sensorineural hearing loss

Results from missing or damaged hair cells in the cochlear or – in rare cases – from problems with the hearing nerve. It is usually permanent and can progress over time. Sensorineural hearing loss is the type of hearing loss that most frequently occurs in old age. The degree of hearing loss can range from mild to profound.

The main causes of sensorineural hearing loss are ageing, noise, smoking, Meniere's disease, cardiovascular diseases, high blood pressure, genetic factors and infections. Sometimes certain medications can cause a sensorineural hearing loss.

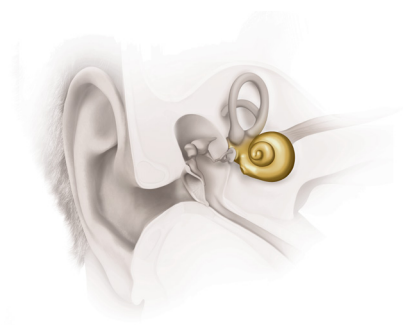
Mild to severe sensorineural hearing loss can be treated with conventional hearing aids or middle ear implants; for people with severe or profound hearing loss a cochlear implant is often an effective solution. Auditory Brainstem Implants are a treatment option in the case of a damaged or absent hearing nerve.

### Conductive hearing loss

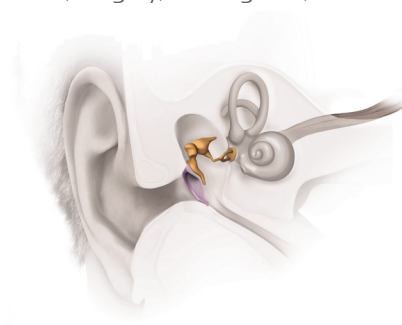
Describes any problem in the outer or middle ear that prevents sound from being conducted properly to the inner ear. It is usually mild to moderate in nature. In some cases, a conductive hearing loss is temporary and can be treated with medication or surgery. If the hearing loss is irreversible, hearing aids, middle ear implants or a Bonebridge bone conduction implant can help.

### Mixed hearing loss

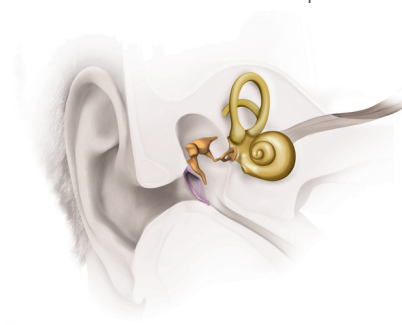
Is a loss of both sensorineural and conductive hearing. Treatment options include medication, surgery, hearing aids, middle ear implants or bone conduction implants.



Sensorineural hearing loss



Conductive hearing loss



Mixed hearing loss

## Age-related hearing loss

Current estimates work on the basis that more than 465 million people are affected by hearing loss worldwide.

The aging process is the main cause of hearing loss in adults. Usually hearing decreases slowly in both ears. Age-related hearing loss initially affects the high pitches. In order to understand speech, it is particularly important to distinguish high pitches because many of the consonants that carry the meaning of speech are relatively high in pitch.

Therefore, even mild hearing loss at high frequencies might mean limited speech comprehension. This is also why people with age-related hearing loss complain that they no longer understand speech properly, but they can still easily hear the low-frequency rumble of a truck passing by.

Because age-related hearing loss develops gradually, those affected often do not notice that their hearing is getting worse. Age-related hearing loss can be accelerated by various factors such as cardiovascular diseases, high blood pressure or nicotine consumption.

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