
Hearing Impairment in Old Age

Gro Gade Haanes

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Abstract

Background

Age related hearing impairment is a risk factor for functional decline, reduced social participation and accidents.

Aims

To obtain knowledge about the characteristics of age related hearing impairments and to help elderly optimize their hearing function.

Design and method

Study 1; Baseline description of data on hearing impairments. Study 2; ROC curve to compare self-assessments with a gold standard test. Study 3; RCT to test whether removal of earwax, and referral to a specialist can improve functional hearing.

Results

More than 90% had hearing impairments. Mean PTAV was 40,4 dB. Self-assessment of hearing function with a single global question correlated only weakly with the PTAV measurements. Comparison yielded 18 false negatives, indicating many reported their hearing as good when the standardized test indicated that it was not.

Conclusion

Elderly people live with hearing impairments not sufficiently attended to. Asking about their hearing with a single global question will not provide accurate information. It is necessary to use standardized tests in addition. When asking more detailed questions about communication abilities, the elderly reported having difficulties. Many elderly could not be expected to do all the self-care activities necessary to improve their functional hearing. Close monitoring and assistance is recommended.

Keywords: hearing loss, hearing impairment, sensory impairment, old age, elderly

1. Introduction

The proportion of elderly aged ≥ 80 years of age (the 80+) is expected to increase dramatically over the next few decades and is projected to triple in Europe by 2060 [1]. Both the World Health Organization (WHO) and the European Union (EU) are concerned with programs on successful aging [2], and since hearing impairment is a known risk factor for functional decline, reduced social participation, withdrawal, and accidents [3–6], good functional hearing is therefore crucially important for elderly to be able to manage themselves and take care of their own lives and maybe also help their partner or spouse [7–10]. For patients in a home-care setting, hearing impairment can cause additional stress along with reduced capacity and other health challenges [11].

Hearing impairment is however a natural part of old age, and most people will experience increasingly impaired hearing as they grow older, but because this impairment can threaten functioning and well-being, communication, and quality of life, it is important to shed light on this issue and to help the elderly with this problem [7, 11, 12]. Age-related hearing impairments are sometimes possible to remedy or improve, but it is important to discover and tend to this issue as early as possible [6, 13].

Traditionally, hearing impairments have to a large extent been an area for the elderly themselves or their relatives have been responsible for, but it seems that there is a lack of information because many elderly never check their hearing, apply for hearing aids, or seek any other professional help for their hearing impairment [13, 14].

Hearing is connected to the memory function and there is evidence that hearing impairment can have an impact on the mental functioning [15–17]. Age-related hearing impairment is correlated with Alzheimer disease, and reduced hearing can contribute to falls and fractures [18], greater dependence on others, and loneliness [19–21]. For those who have ailments and chronic diseases, hearing impairments constitute an additional negative factor to the other problems and perhaps an unnecessary burden, which may lead to the latter part of life being more troublesome than necessary [11, 22]. Since age-related sensory impairments in general have been taken care by the elderly themselves, it has largely been overlooked by nurses in the home-care service and by health authorities in general [4, 23]. Knowledge and understanding about how to maintain the hearing function in old age seem to be crucial in order to manage every day activities, daily living, and participation in social activities, even if one has other health challenges and is receiving home care [24].

Decline in sensory abilities and their effects on physical and psychosocial capacities in older individuals have been discussed in previous studies [15–17], however, most prevalence studies of hearing impairments involve population from the general community and include people from younger age groups, so studies among older people over 80 years receiving home care are few.

Grue [11] has discussed the burden of dual sensory impairment in the elderly and also the risk of falling when hearing is impaired.

One would think that it is in the elderly's own interest to maintain the function of the hearing sense throughout the life course, but our randomized, controlled trial indicated that many elderly could not be expected to do all the self-care activities necessary to improve their hearing function themselves. Close monitoring and assistance is necessary.

2. Presbycusis and hearing impairment

Age-related hearing impairment (presbycusis) is characterized by reduced hearing sensitivity and speech understanding in noisy environments, and an impaired ability to localize sound sources [13, 25]. Our study indicated that more than 90% of the elderly participants 80+ were living with hearing impairments that had not been checked by specialists.

The auditory system is restricted to the outer ear, middle ear, and the inner ear and is associated with the hearing center in the brain via the hearing nerve. Sound perceived by humans range from 20 to 20,000 Hz. Common speech is often in the range of 200–800 Hz and the volumes of speech vary between 30 dB (whisper) and 80 dB (shouting).

Age-related hearing loss starts from about 40 years of age when the high tones disappear. However, for many elderly it is usually not a real problem before reaching the age of maybe 75–80 years when consonants such as s, sh, f, v, t, p, and b disappear because their energy is concentrated around the frequencies 2000–8000 Hz. Thus, with increasing age, hearing ability progressively weakens, especially the ability to hear high-frequency sounds and to distinguish one sound from another.

Hearing changes for an elderly person is related to anatomical and physiological changes in the ear, in addition to elements in the surroundings and inherited factors [25–28].

It is common in Norway and other countries to simply ask elderly patients in the home-care setting about their hearing with a global question and not use any further examinations if the elderly states that the hearing is good. Our ROC curve analysis revealed that there was a discrepancy between patient self-assessments and results obtained from standardized instruments when they answered the global question, "Do you consider your hearing to be good, not so good, poor, or very poor/deaf".

The elderly often adapt to the situation so that they do not notice themselves that the hearing has been deteriorated [9, 29]. Some elderly people may also have difficulties in admitting that they have reduced hearing. It is however more common to wear glasses than a hearing aid and many elderly people are loath to admit that they have a hearing problem in fear of the social stigma it signifies [13]. Some elderly people also underestimate their hearing loss and think that they have better hearing than they actually do.

It seems however that the elderly admit having problems when they are asked more detailed questions about their hearing and communication abilities. Results from assessing hearing and communication abilities on more detailed questions indicate, for example, that the

elderly find it difficult to understand speech when several other people speak simultaneously, and that they find it difficult to understand dialects or foreign accents.

Hearing impairment can also lead to misunderstandings and suspicion in addition to the social isolation [9, 30]. The sound may be difficult to locate, especially for one who has combined visual impairment and hearing loss, who has different hearing aids in the right and left ear, or one who just uses a hearing aid in one ear [31].

3. Hearing impairment in community health care

The 80+ often have serious health issues in addition to hearing impairments that may significantly impact their independence and functioning in daily life. It is therefore necessary to have accurate information about sensory functioning in this population. Researchers in a Norwegian study initially used a checklist method to ask the participants about their hearing [32] and then used the obtained results to apply further tests and follow-up to those who described their hearing as impaired. A major problem with that study is that it did not determine objectively whether the subjects who did not rate their hearing as impaired actually had normal hearing.

We know that there is a discrepancy between patient self-assessment and results obtained from standardized tests such as pure-tone audiometry test in the 80+ [33]. In addition, there seems to be little knowledge about whether the 80+ have sufficient information to even seek help in the first place, and whether they do receive the help that is available to compensate for their impairments [34]. Communication and access to information are considered to be especially important for the 80+, since many remain at home most of the time and have limited contact with others [35]. Therefore, we cannot just hand over this responsibility to the elderly.

Studies have shown that home-care nurses appear to pay limited attention to hearing losses [11, 13], possibly resulting in the problems and difficulties related to age-related hearing loss being overlooked and underestimated. The everyday life of a nurse is busy and involves many tasks, and focusing on the senses require a little more time and consideration for the nurses than they usually spend with the patient. The nursing procedures used in home care for identifying hearing impairment among the 80+ appear to be deficient, or at best, variable so developing good procedures for detecting and tending to the elderly's hearing impairments is crucial.

In addition to risk factors for social withdrawal that can have a serious impact on a person's quality of life and result in many elderly living at home feeling lonely [35], several studies have demonstrated that hearing impairments significantly influence especially the instrumental activities of daily living (IADL), referring to activities such as using the phone, managing money, housework, and shopping [6].

Since a majority of the 80+ have severe sensory impairments [11, 13, 36], but seem to not notice it themselves [33], the most likely interpretation of this inconsistency could be that they have adapted to the situation and do not find it worth mentioning as causing difficulties in their daily life. Alternatively, they may simply be resigned to and have accepted their impairments as part

of the aging process, or they may think, due to a lack of appropriate knowledge, that it is not possible to correct their hearing [36]. The acceptance of an impairment situation and the willingness to report a hearing loss are associated with greater knowledge, education, and income [13].

Multimorbidity, increased risk of diseases in the sensory organs, and age-related changes in the eyes and ears not only lead to reduced hearing and vision but also make the 80+ living in a home-care setting a vulnerable group [34].

The 80+ may not have adequate information about sensory loss in old age and where to get help, treatment, and rehabilitation. It is therefore vital that health-care providers offer this information and help, particularly when the elderly person is already receiving home care. Such information may encourage the elderly to take actions to improve their situation or ask for help and support. It is likely that practical and emotional support can help the 80+ in dealing with sensory impairments.

From both preventive and health-promoting perspectives, home-care nurses can play a particularly important role by incorporating simple hearing tests in their regular procedures [34]. Examination with an otoscope to detect ear wax and check the eardrum and an examination with a portable audiometer are simple procedures that can be done by the home-care nurse.

Elderly people today might have experienced economic hardship during their childhood and upbringing, since they grew up during the recession in the 1930s and during the World War II. If they have to spend money to improve their hearing, this might affect their budget, and therefore they may not prioritize it [34]. Thus, recommendations would be to set clear goals and to closely and carefully help the elderly in every way possible to optimize their hearing function until the goals are reached [14].

It is important that nurses who work with the elderly have knowledge of age-related changes, and most importantly understand the consequences of hearing loss on certain factors of daily life: ADL/IADL, falls, loneliness, and the quality of life. It is also important that healthcare providers are aware of what can be improved, with regard to hearing impairments and are able to explain this to the elderly. When using a hearing aid, it is not the same hearing as the hearing of a 20-year-old, but it is after all much better than not hearing.

When we talk to someone who is not hearing, it is important to consider the following:

- Lowering or removing background noise such as music, radio, TV, talk, traffic, and so on.
- Have good lighting so the hearing impaired person can see the face of the person who is speaking and read the lips and facial expression.
- Ensure that the person who is listening does not see the face of the speaker “in backlight.”
- Provide good information both to the elderly and to his/her family and friends.
- Do not speak until the person who is hearing is aware that you want to say something.
- Be close to the person who is hearing, but not too close and do not turn the face away from the person you are talking to.
- Speak quiet and a little slower than normal.

- Speak clearly and use the lips, but do not exaggerate.
- Use normal strength of the voice. Do not shout and certainly not against the hearing aid if the person is using one.
- Be aware of the body language of the hearing impaired person who you are talking to. There is no guaranty that the person admits he/she is not hearing.
- Do not cover the mouth with your hand when you speak.
- Do not have anything in your mouth when speaking.
- Give key words for the topics of the conversation when there are many present.
- If someone laughs, it might be good to explain what the laughing subject is.
- Hearing impaired people have difficulties to tell the difference between consonants like f and s and p or t. It is therefore important sometimes to spell out the words to avoid misunderstandings.

4. Hearing aids and advice when talking to a hearing impaired person

In addition to hearing aids, there is also optional equipment (blue tooth) that allows sound to be streamed from the TV, radio, telephone, doorbell, etc. directly into the ear through the hearing aid. This requires however some training and help to use.

One aspect that is perhaps somewhat underestimated is that some elderly who owns a hearing aid do not use them because they think that it is unattractive or a sign of old age. When this is the case, the nurses need to have enough knowledge to provide information to the elderly and explain that it is not a good idea to ignore the usage of the hearing aid. The nurse should rather find out what is the problem and help the elderly to overcome it.

Other types of hearing equipment including “flashing and vibrating lights” connected to the doorbell and alarm, inductive loop, and voice amplifier are other options.

5. Glossary

Age-related hearing impairment	Refers to the hearing progressively weakens with age, also referred to as presbycusis.
ADL	Activities of daily living (eating, bathing, dressing, toileting, etc).
Portable audiometer	Referring to a portable machine used for evaluating hearing acuity.
Baseline description	Description of the existing picture.
dB	The decibel scale measuring sound based on human hearing. Decibel provides a relative measure of sound intensity.
Cutoff points	Referring to the limit for having a hearing problem. Here it is at PTAV <35 dB.
Dual sensory impairment	Refers to both hearing and vision impairment.

Exploratory, randomized, controlled trial	Referring to a study in which participants are allocated at random to receive a clinical intervention.
False negative	Indicate a failed test. False negative is the proportion of positives which yield negative test outcomes with the gold standard test.
Functional hearing	Age-related hearing impairment is common in old age and improved functional hearing refers to an optimization of the hearing function.
Hearing function	The hearing process. How the hearing works.
Hearing impairment (hearing loss)	Occurs when you lose part or all of your ability to hear. Hearing impairment can be mild, moderate, severe, or profound.
Global question	Asking a global question as opposed to specific questions means asking one question here "Do you consider your hearing to be good, not so good, poor or very poor/deaf?"
Global self-assessments	The person is evaluating his/her hearing by one question: "Do you consider your hearing to be good, not so good, poor or very poor/deaf?"
Gold-standard	Refers to a diagnostic test or benchmark that is the best available under reasonable conditions.
Hz	Hertz, referring to the unit of frequencies in the International System of Units (SI).
Otoscope	Referring to an auroscope which is a medical device used to look into the ears.
IADL	Instrumental activities of daily living (using the phone, managing money, etc).
Multimorbidity	Referring to the co-occurrence of two or more chronic medical conditions in one person.
ROC curve analysis	Receiver operating characteristic is a diagnostic test in statistics – used for decision making in medicine.
Presbycusis	Age-related hearing impairment.
Pure-tone average (PTAV)	Refers to audiology pure-tone testing and the average of hearing threshold levels at a set of specified frequencies, here 500, 1000, 2000, and 4000 Hz which is the frequencies recommended by the World Health Organization (WHO) to check the hearing of the elderly.
Pure-tone audiometry test	Referring to a standardized hearing test which is used to determine the presence or absence of hearing loss.
Self-care activities	Referring to the tasks or actions that a person with age-related hearing impairment must perform to safeguard his/her hearing function.
Standardized test	A test that is administered and scored in a consistent or standard manner. Here it refers to pure tone audiometry.

Author details

Gro Gade Haanes

*Address all correspondence to: groh@setur.fo

Department of Nursing, Faculty of Natural and Health Sciences, University of The Faroe Islands, Tórshavn, Faroe Islands

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