

RESEARCH ARTICLE

First Study of the Prosthesis Indication Deafnesses in Mureş County

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Objective: The aim of this study was to assess the frequency of the deafness pathology in the Ear, Nose and Throat Clinic of the Emergency County Hospital in Tîrgu Mureş and two other private institutions that have an ear linked profile, with a special interest on those with indication for prosthesis. This is a pilot study, being conceived as a part of a larger one used to measure the number of possible cochlear implant recipients nationwide.

Methods: We gathered data from the interval 2011-2013, including in the study all the patients for which an audiometry testing was performed in this time interval. This was followed by a process of selection/exclusion applied to the original group in order to obtain significant statistical data.

Results: The most important part of the study was to quantify the different types of hypoacusia and the relative number of candidates for various prostheses available these days.

Conclusions: This study quantifies the rising need for hearing prosthesis and triggers a signal.

Keywords: deafness, prosthesis, cochlear implant, sensorial hearing loss, rehabilitation

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Introduction

As the years passed and medicine evolved, the pattern of dangerous diseases for mankind changed. Life expectancy was modified, the number of Earth inhabitants bursted and epidemiologic and demographic data is quite different nowadays. The survival rates are more strongly influenced lately by the capacity of treating chronic diseases, as infections and wounds healing are much better managed with the help of diagnostic tools and pharmaceutical drugs.

On the other hand the impact of chronic diseases is of high importance from two points of view: the quality of life for the elderly ones and the costs for long term treatments or prosthetic devices such as hip/knee prosthesis, hearing aids, or cochlear implants [1-4].

Besides the locomotion inability that is important for both professional and personal life of the human being but still gives the individual the long term chance to reinsert social and economic, the lack of equilibrium, hearing, sight, smell or any other sense cuts more drastical the connection of the patient with the surrounding world. Particularly for hearing, the impact might be considered double as a person that does not hear also loses the capacity of speaking or does not develop it.

As the demographic data shows a higher percentage of elderly population in Romania, we consider important to quantify the prosthesis indication deafnesses because of their economic impact, starting from the usual hearing aids and ending up to high-end devices such as cochlear

implants and auditory brainstem implants, considered these days the most successful neural prosthesis.

Material and methods

Through our work we wanted to first gather data regarding the incidence of prosthesis indication deafnesses over a three year time interval, for the Mures County. For reaching our result we consulted the audiometry register at the Tîrgu Mureş ENT Clinic for the 2011 – 2013 time interval. The relevance of our choice is given by the high number of audiometric tests performed here as the other national health system ENT services in the county and in the capital city of the county do not have the equipment for hearing testing, therefore most of the patients reach this place for clarifying the hearing impairment diagnosis.

The criteria used were the total number of audiometric tests, the number of control tests, the affected ear, the type of hypoacusia, the number of patients with normal hearing, the rural or urban provenience, sex ratio and not at last the year decades prevalence. All of these were compared with the specialty literature data and a possible pattern of evolution was searched.

As strong as our data might have seemed, we also felt necessary to include the numbers from two private hearing aids providers (with different market shares) as this helped us both for comparison and quantification of economic impact of prosthesis indication deafnesses. The time interval was the same with the above described part of the study, as well as the basic criteria, and supplementary we asked for data about the prices for different types of hearing aids.

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We also searched for patients with cochlear implant indication as in Romania there is a special national health program for this indication and the quite high costs are strictly quantified. The patients with indication for surgical insertion of prosthesis or with simply surgical indication for hearing rehabilitation were also separately counted. Again all of the data was compared with specialty literature numbers and we looked for a cost pattern for quantifying the future economic impact of this pathology.

Results

In 2011 there were a total of 3456 audiometric tests conducted, in 2012 we counted 3680 and in 2013, 4128. Out of this numbers we tried to find a true value by subtracting the follow up tests which represented approximately one third of the total. In 2011 there were 924 tests for this indication (26.73%), in 2012 the number of tests was 1218 (33.12%) and finally in 2013 it was 1215 (29,45%). The total number of unique tests was 7907.

The division of patients in our statistics as it concerns the urban/non-urban site of living and the sex ratio was maintained quite simetrical during our years of study. For 2011 we counted 1682 women and 850 men (66.32% women), for 2012 the percent for women dropped to 62.05% and in 2013 this was 63.44%. The cases tested were in a higher number from the city area – 1876 (74.09 %) in 2011, 1728 (70.22 %) in 2012 and 2187 (75.10 %) in 2013.

The age distribution pattern during the three years of study is represented in Figure 1, subsequent to each decade from 0 to 100 years old. The main visible mark is certain raise in total number of tests and in almost all decades, except the extremes where there is a slight decrease.

As for the question which ear was found affected, the model was respected each year, meaning that the difference between the percentage for the left or right one was little and in most cases both sides were damaged. In 2011 425 audiometry tests showed hearing problems only in the left ear, 513 in the right one and in 1594 cases both ears were damaged. In 2012, the percentages were 20% for single left ear hearing impairment, 25% for single right one and in 2013 18% for the left and 27% for the right one.

Normal hearing was met in only 2.5% of the tests in 2011, 3.4% in 2012 and 1.9% in 2013.

The most important part of the study was to quantify the different types of hypoacusia and the relative number of candidates for various prosthesys available these days.

Sensory-neural hearing loss was the most common diagnosis for all three years. In 2011 we found 51 moderate cases, 615 profound ones and 324 with slight hearing impairment. The 2012 count brought up 608 profound deafness cases and 2013 a percentage of almost 25% (719 cases) appeared. Full results for the three years are visible in Figure 2.

Transmission hearing loss affected 678 patients, presbiacusia was found in 276 of them and 342 of them had a mixed form of deafness for the year 2011. During 2012

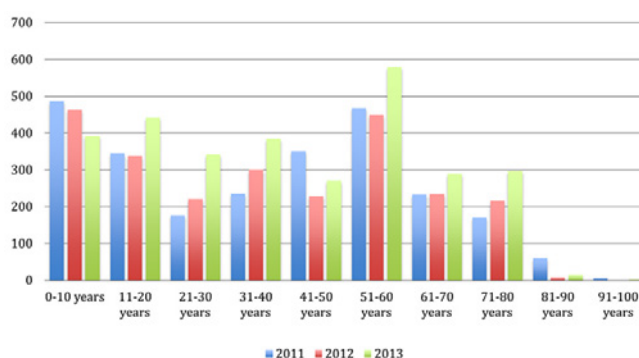


Fig. 1. Number of audiometric tests in relation with age decades and years included in study

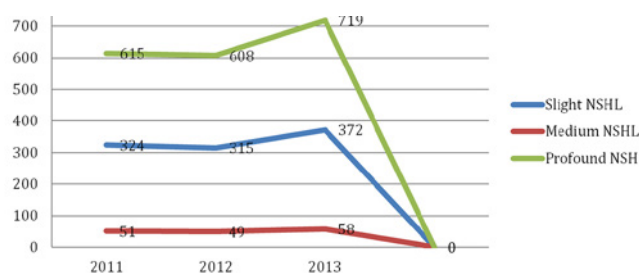


Fig. 2. Slight, Medium and Profound Sensory-neural Hearing Loss (NSHL) evolution by years of study

we counted 659 patients with transmission loss, 288 with presbiacusia and 340 with a mixed one. Data for 2013 showed 780 patients with transmission deafness, 340 with presbiacusia and 402 having a mixed hearing loss (see Figure 3 and 4).

The number of sound traumas was 131, auditory left-overs were found 19 times while cophotic patients were discovered in 34 cases. For 2012 and 2013 the percentages and absolute numbers were higher as the Chart No 4 shows.

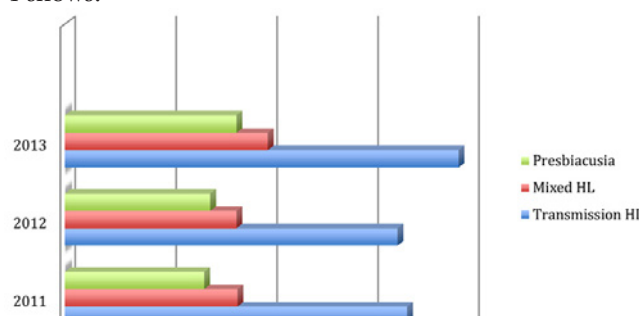


Fig. 3. Presbiacusia, Mixed and Transmission Hearing Loss Incidence

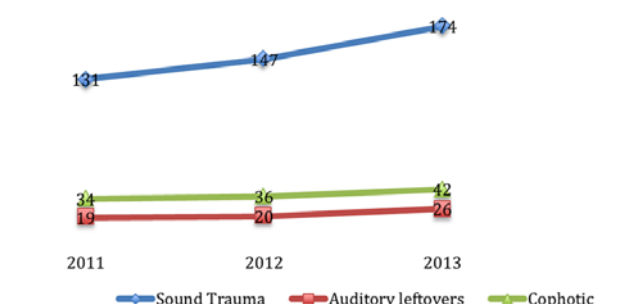


Fig. 4. Number of prosthesys indication deafnesses

For the second part of our study we gathered data from two private hearing aid providers.

In the first one we counted a total of 857 tests over our 3 years interval, that gave us the following data: 29,78% were men, almost 94% were retired workers and 2,12% were children. The types of hypoacusia and their percentages are presented in Table I.

In the second private praxis, a larger company that numbered a total of 2007 hearing tests between 2011 and 2013, 39,81% of them were men and the types of hypoacusia are presented in Table II.

Discussions

Hypoacusia is one of the illnesses that has a strong social and economic impact as it puts a big distance between the person and the society, because hearing is one of the most important integration senses and at the same time treating these kind of problems involves great material resources.

Helping the hearing impaired patients starts from detecting this diseases, screening which many times means a future investment for the hearing aids providers as they usually do the tests for free [5-8]. The other steps may include surgery, indication for hearing aids that could be wearable or implantable, going up to the peak surgery for cochlear implantation and auditory brainstem implant. Again the unseen part of a disease is also very important in these cases as before undergoing high precision surgery such as cochlear implantation high resources are to be invested in performance prosthetic devices and after surgery an intensive verbal and social rehabilitation and reinsertion programme is followed [9-13].

Medium and severe hearing loss cases are advised to start using hearing aids that may range a price from 200 to 2500 euro. Transmission hearing loss patients usually undergo surgery for costs between 1500 and 3500 euro. A medium price paid for a cochlear implant is 25 000 euro (for the device alone without surgery) and other middle ear prosthesis do not overcome this price. Apart from this, there finally comes the price for maintenance and rehabilitation-reeducation programme, rarely quantified but probably one of the most important parts [14-18].

Conclusions

The prosthesis indication deafnesses are a rising illness and represent a problem for the modern society as the living hope for most populations has also grown. So the raise is mainly on behalf of the elder patients. Still, as the number of children quickly discovered and treated by cochlear implantation is growing, the indication and possibilities to widely spread the most performant types of prosthesis is higher and goes back to the elderly population as a boomerang.

This study quantifies the rising need for hearing prosthesis and triggers a signal. Either until now the screening was not good or we are facing an absolute rise in number of cophotic patients.

The authors think that a better screening was achieved by competition between the hearing aids providers who could not develop without a working base for their companies.

The authorities in Romania should have a correct and complete picture of the problem. While the screening is mostly done by private providers, patients wait for the financial help from the state as the waiting lists grow longer.

It is an absolute necessity to have performant screening centers for hearing impaired persons in every capital city of a county.

The smaller number of patients with normal hearing that reach the testing centers show a greater attention and concern of the medical staff in order to correctly diagnose and treat this hearing problems.

Surprisingly, even if the state clinic and the two private hearing aids providers and screening agents were referring patients for surgery through the National Programme for Cochlear Implantation or other kind of surgical rehabilitation, only one (a private one) could provide support for further verbal and social reinsertion and education of the prosthesis recipients.

The higher life expectancy and rising number of children and adolescents found with prosthesis indication hearing loss should withdraw the attention to everyone involved in the screening and treatment of these diseases.

Our study shows a good correlation with the growing number of implantable devices that were implanted in this university center and also with the growing pattern of hearing aids. We consider important to have an electronic

Table I. Statistical data for the Clarfon hearing aids provider

	Total	Medium NSHL	Severe NSHL	Profound	Mixed HL	Transmission HL	Presbiacusia	Normal Hearing
2011	282	105	116	4	49	3	3	2
2012	305	98	133	5	57	6	1	5
2013	270	97	111	2	32	22	4	2

Table II. Statistical data for Romsound hearing aids provider

	Total	Medium NSHL	Severe NSHL	Profound	Mixed HL	Transmission HL	Presbiacusia	Normal Hearing
2011	282	105	116	4	49	3	3	2
2012	305	98	133	5	57	6	1	5
2013	270	97	111	2	32	22	4	2

register for these patients in order to be able to better quantify the importance of the hearing loss in our country.

As a final conclusion we think that everyone should show equal concern for the three milestones to be achieved by patients with prosthesis indication deafnesses: correct diagnosis by extensive quality screening, surgery or prosthesis fitting and last but not least good rehabilitation system for maximal use of the device.

Acknowledgements and disclaimers

The data for this study was gathered from the Tirgu Mures ENT Clinic audiometry registers by the author and was included in an excel table. The data from the other two centers was received directly as excel tables.

This article contains data from a study included in the PhD thesis of the author Gabriel Lostun with the title Anatomic, clinical and radiologic study of the inner ear with implications to cochlear implantation.

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