

Knowledge on Adaptation Process of Users of Hearing Aid

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SUMMARY

- Introduction:** Professionals that work in this area know how important the orientation to the use of auditory device is, which involves the care required to handle and use the equipment and aspects aiming at the adaptation.
- Objective:** To compare the knowledge of both long-term and new users about the adaptation process to the use of auditory device, so as to provide speech and language pathologists with a greater knowledge about the aspects that most influence the adaptation process.
- Method:** This research is an observational, descriptive, cross-sectional, contemporary, retrospective study. The new and old users answered a questionnaire with information on the auditory device conservation and the adaptation process. The results were compared quantitatively through statistical review and qualitatively.
- Results:** The age of the individuals in this study varied between 28 and 90 years. In some aspects, old and new users presented the same knowledge level.
- Conclusion:** New users of auditory devices have been looking for hearing (re) habilitation increasingly later. The action of phonoaudiology in the process of selection and adaptation to auditory devices among experienced and new users is extremely important to an effective acclimatization.
- Keywords:** adaptation, hearing loss, deafness.

INTRODUCTION

Hearing is fundamental for human communication and thus ensures life in the society (1). It's by means of hearing that people receive information from the world of sounds and develop their cognitive and psychosocial abilities (2). In the case of hearing impairment, what occurs in most situations, the consequences are social, because the lack of ability in the maintenance of dialog may lead the individual to isolation and diminishes his or her capacity to communicate and interact in the society. The hearing impairment is highly incapacitating when we take into account the effects to communication and the impact caused to the cognitive and psychosocial development and the oral and written language acquisition. It's known that the hearing impairment causes to the children not only changes in the development of language, but also in other aspects and generates secondary implication to be minimized with the early use of amplification (4).

When there is no option for medicine or surgical treatment, one of the possible existing solutions to minimize the auditory difficulties is the hearing aid, also called (AD) auditory device, whose use must be prescribed by otorhinolaryngologist medical doctor (5).

The use of hearing aid is mainly aimed at sound amplification including speech signals, environmental sounds, signals of danger (fire alarms) and alert (door bell or telephone ring), as well as the sounds that improve the individual's life quality (music, birds singing and others) (6). Hence, the rehabilitation and habilitation process has also the function of minimizing the damages relating to the users' social integration (2).

The main factor for the habilitation or rehabilitation of the hearing impaired patient, as in any physical deficiency, is the attention degree that is availed to him or her. Therefore, the phonoaudiologist is responsible for the process of (re)habilitation (6) by preparing auditory rehabilitation programs and making the population aware of their benefits and that the hearing aid use is effective and consider the fitting and guidance process (7). The latter involves information on the hearing aid functioning, benefits and limitations, cares and repairs, manipulation, insertion and expectations pursuant to its use (8).

The guidance is one of the critical steps in the hearing aid fitting process, because where the patient doesn't know the functioning, is not able to manipulate it suitably and doesn't take the necessary cares, he or she will have difficulties to make good use of the benefits it avails and probably won't use it. Therefore, the phonoaudiologist must understand the net of implications of the hearing

impairment, specially the aspects relating to the individual's emotional reaction as to the hearing loss which interfere significantly with the fitting success and the user's performance in the several communication scenarios (9).

The phonoaudiologist who performs selection, indication and fitting of hearing aids recognizes the importance of the guidance necessary for hearing aid users. First, it's crucial to help the patient in the hearing impairment awareness and that his or her prosthesis won't be able to restore his or her hearing ability, but will surely help him or her listen better (10).

The fitting process depends mainly on the patient's participation and the possible difficulties he or she may find in the initial period. Such process is gradual and aims at the familiarization with the sounds so that there is no discomfort. Therefore, it's initially advisable that the patient uses his or her hearing aid in calm and quiet environments for only some hours a day. After that, he or she may use it for long periods of time with variable sound complexity taking into account the effects of acclimatization and hearing privation in this process (8).

In group conversation the user may find difficulties understanding all the words. However, this complaint will be superseded as the patient attends the returns scheduled during the fitting process. In this process, another important aspect concerns the auditory training, which must be centralized in what the user actually wants to hear (11).

As far as the cares with the equipment is concerned, where the hearing aid has external volume control it's advisable it should never be used at maximum position for it may distort the sound and generate battery wearing. The moisture also causes important damages to the hearing aid and therefore the patient must be guided not to wet it and remove it for taking shower or getting out in the rain. Thus when it's not being used the hearing aid must be kept away in its proper box, in a dry and airy place, away from the heat and risky places. At night, it must be kept in the silica. The mould (or capsule) must be replaced annually, specially in the case of children and the old aged, for the children are in growing phase and the ear's anatomy changes every year. In the case of the old aged, a change in the cartilage may occur as from the individual's anatomic characteristics; it must be clear for the patient that the auricular mould or the capsule should not be lent or donated to other people, as well as the very hearing aid, which must be adjusted by the phonoaudiologist for each person according to the audiologic table characteristics taking into account his or her specific needs. Another point to consider regards the importance of periodic reviews and the request of technical assistance service. The periodic reviews must be carried out in order to prevent possible damages caused by

eventual falls and moisture. In the cases where the equipment is wet or with excess of wax on the point of obstructing the mould or capsule receptor, the technical assistance must be informed. In this case the patient must be advised by the ORL doctor, for such excess of wax, in the external acoustic meatus, prevent the passage of amplified sound to the internal ear.

Such guidance and advise are intended to enable the individuals to find solution for their difficulties interfering and influencing from the acceptance of the hearing loss up to the compliance with rehabilitation guidance. This explains the value of the researches that help in the acclimatization understanding. Considering the existence of a necessary period of sound amplification use to reestablish the speaking abilities and evaluate the benefits obtained with amplification, there is the need for studies that follow up the hearing aid new user auditory function development in order to verify how and when the sound acclimatization occurs, by taking into account the user's abilities of speech, use benefit and satisfaction (13).

This work compares the knowledge of old and new users of hearing aid under fitting process to offer a greater knowledge on the aspects that mostly influence in the fitting process.

METHOD

This research consists of an observational, descriptive, transversal, contemporary and retrospective study. It was approved by the Ethics Committee in Research under the number 342/2007 on 03/03/2008

This research's population comprised adult and old aged, new and old users of hearing aid from the city of Porto Alegre and the metropolitan region of Rio Grande do Sul.

The sample was composed by 51 individuals of both sexes (24 women and 27 men) from 28 to 91 years of age divided into two groups: 28 old users and 23 new users of hearing aid. The old users group contain 12 women and 16 men and the new users group contain 12 women and 11 men.

To take part in this research we included all customers who signed the (TCLE) Free and Clear Authorization Term, had acquired a hearing aid in a period longer than six months, and were considered as old users and all customers who had acquired the hearing aid as from the date of this project approval in the Ethics Committee in Research, and were deemed to be the new users.

This study exclusion criteria were: diagnosed disease

or symptom that harmed the individual's mental, intellectual and speaking abilities, prevented the performance of the interview and those who purchased the hearing aid in a period lower than six months, for these couldn't be considered neither as old nor as new users.

This research was composed by the following steps: sample selection by the researcher taking into account the exclusion factors according to the individuals' group (hearing aid old and new users); accomplishment by the researcher of individual interview with the sample's participants; tabulation of data obtained in the interview, according to the individuals' group; quantitative and qualitative results review, by meeting the abovementioned objectives .

The abovementioned study steps were carried out in an auditory center in the city of Porto Alegre, that allowed the research performance through the Institutional Consent Term.

Both groups of old and new hearing aid users responded to a questionnaire prepared by this study's authors, with 25 closed questions applied by the Auditory Center technical responsible phonoaudiologist, in the same sequence.

This questionnaire was prepared with focus on the interviewed individuals identification data (age, sex, education, type and time of use of the hearing aid, technology, monoaural or binaural use) and the questions pursuant to general knowledge required for the fitting, cares, decision and external influence. The participants should answer if they had to use the hearing aid all day in the first week, if there is the need for removing the battery when it's not in use, if they should know and handle the several types of hearing aids before choosing the one they were to buy or which they bought, if they need to care for the use in case of sweating or if they got out in the rain, the hearing aid may remain in hot and moist places, if there is need to remove the hearing aid to take shower, to search for technical assistance in case of fall, wet hearing aid or with excess of wax, if they should take care to prevent it from falling, if they thought it necessary to take advice with the ORL doctor in case of excess of wax in the MAE, if the mould or capsule could be lent to somebody else, what is the time for fitting the user thinks to be necessary for the use of the hearing aid, if the customer feels ashamed to use the hearing aid in public, if the decision and initiative for use was of the very user, if he or she knows someone who uses hearing aid, if this person is satisfied, if it's necessary to remake the mould or the capsule every year, if upon purchasing the hearing aid the customer will need to return to the auditory center and if he or she considers important the presence of a relative at the moment of receiving guidance

to further help him or her in the handling and cares of the hearing aid.

After accomplishment of the 51 interviews, the database was prepared for further performance of statistical analysis. The data were structured in two spreadsheets according to the group researched.

For statistical analysis we used the computer program: The (SAS) Statistical Analysis System for Windows, version 8.02 SAS Institute Inc., 19992001, Cary, NC, USA, in which we performed the exact chi-square tests by Fisher and MannWhitney and adopted a significance level of 5%, that is $p < 0.05$.

RESULTS

The individuals studied varied between 28 and 90 years of age and the sample average is of 69.20 years of age. As for the sex, 27 are individuals of the male sex (52.94%) and 24 of the female sex (47.06%). Considering the full sample, two individuals are younger than 50 years old (3.92%), 11 individuals between 50 and 59 years of age (21.57%), 6 between 60 and 69 years (11.76%), 23 between 70 and 79 years (45.10%) and 9 individuals are older than 80 years of age (17.65%).

As for the old users, out of a total of 28, the time of hearing aid use was: 1 participant (3.57%) has used it for less than one year, 6 individuals (21.43%) have used for more than 1 year, 8 (28.57%) for more than 2 years, 4 (14.29%) for more than 3 years, 1 (3.57%) for more than

4 years and 8 individuals (28.57%) have used it for more than 5 years. As for the monoaural or binaural use, 22 individuals (78.57%) use 1 device and 6 individuals (21.43%) use two devices. As for the type of device, 13 individuals (46.43%) use intra-aural type device and 15 (53.57%) use the retroauricular type. As for the technology, 5 individuals (17.86%) use digital device and 23 (82.14%) use analog technology device.

Table 1 composes the questions concerning general aspects the hearing aid new and old users need to know.

Table 2 shows who is the competent professional to perform the hearing aid selection process in the opinion of new and old users.

Table 3 describes the new and old users answers to the questions pursuant to the equipment cares.

Table 4 composes the new and old users answers to the questions pursuant to the decision for using hearing aid and external influence.

Table 5 describes the new and old users answers as for the fitting process.

Chart 1 composes the new and old users answers as for the hearing aid fitting time.

Upon comparison of the numeric variables between new and old users we observed a significant statistical relationship as for age ($p=0.034$), as shown in Picture 1.

Table 1. Answers of new and old users to questions relating to the general aspects.

Questionnaire	Old users			New users			Value P
	Yes	No	Don't know	Yes	No	Don't know	
Need to know and handle the hearing aids before choosing the one to be bought	13	10	5	12	7	4	0.931
Interference of retroauricular hearing aid with the use of glasses	9	13	6	10	11	2	0.418
Interference with the use of pacemaker	2	7	19	1	8	14	0.809

Table 2. Competent professional to perform the hearing aid selection process in the opinion of new and old users.

Question	Profession	Old users		New users		Value P
		Frequency	Percentage	Frequency	Percentage	
The hearing aid selection must be done by which professional?	Others	4	14.29	4	17.39	1.000
	Doctor	6	21.43	4	17.39	1.000
	Phonoaudiologist	18	64.29	15	65.22	1.000

Table 3. New and old users answers to the questions pursuant to the equipment cares.

Question	Old users			New users			Value P
	Yes	no	Don't know	Yes	no	Don't know	
Is it necessary to remove the battery when it's not in use?	20	6	2	16	5	2	1.000
In case of wax accumulation in the hearing aid, does it interfere with the hearing aid use?	26	1	1	19	1	3	0.538
Can the hearing aid remain at hot and moist places?	3	20	5	1	22	0	0.060
Do you think the hearing aid has an anti-fall protection system?	8	14	6	4	12	7	0.582

Table 4. New and old users answers to the questions pursuant to the decision for using hearing aid and external influence.

Question	Old users			New users			Value P
	Yes	No	Don't know	Yes	no	Don't know	
Were the decision and initiative for using the hearing aid yours?	24	4	0	18	5	0	0.714
Do you know anyone who uses hearing aid?	26	2	0	16	7	0	0.061
Is he/she satisfied?	20	3	3	13	2	1	1.000

Table 5. Answers of new and old users to questions relating to the fitting process.

Question	Old users				New users				Value P
	Yes	No	Don't know	Depends	Yes	No	Don't know	Depends	
Should the hearing aid be used all day in the first week?	17	8	3	0	7	13	3	0	0.076
May the hearing aid be lent or donated without the performance of exams and specific adjustments?	0	26	2	0	0	22	1	0	1.000
Would you feel ashamed to use the hearing aid in public?	1	27	0	0	3	19	1	0	0.202
Is it necessary to remake the mould/capsule annually?	11	11	6	0	5	6	12	0	0.071
After purchase of the hearing aid should I return to the auditory center?	20	7	1	0	13	8	2	0	0.570
Would you consider important the presence of a relative upon receiving guidance for further help in the handling and care of the hearing aid?	9	2	0	2	7	1	1	3	0.608

As for categorical variables between new and old users we observed a significant statistical relationship as for age range ($p=0.033$), as shown in Picture 2.

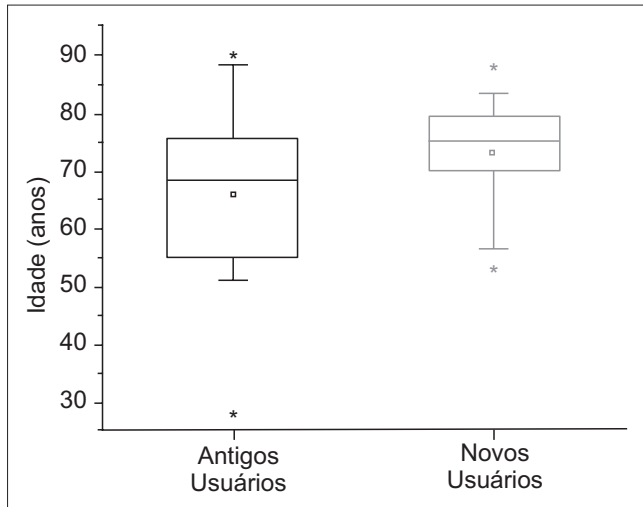
In terms of education, as shown in Picture 3, we confirmed significant statistical relationship among new and old users standing out that old users have a higher education level ($p=0.027$).

DISCUSSION

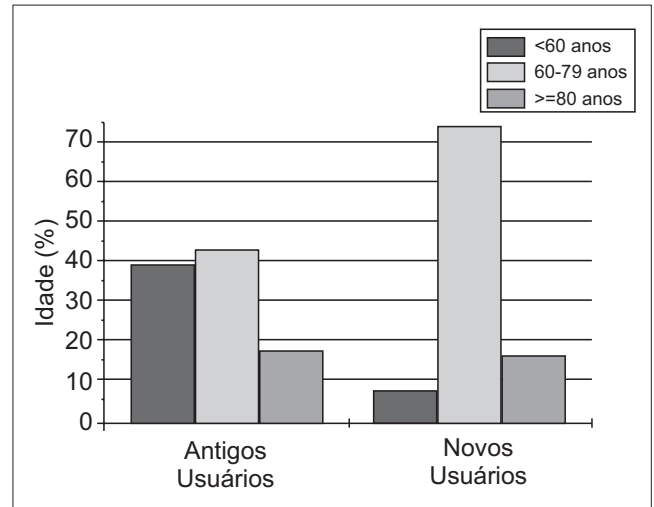
In this study, we confirm that most hearing aid users (38 individuals) are older than 60 years. This suggests presbiacusis, a common pathology that affects the old aged hearing characterized by the hearing loss of neurosensorial, bilateral type, increased in the high frequencies, whose

Board 1. Old and new users' answers pursuant to the fitting time with the hearing aid.

Question	Old users					New users				
	1 st week	2-3 weeks	1 month	Depends	Don't know	1 st week	2-3 weeks	1 month	Depends	Don't know
What is the fitting time you would consider necessary for the use of the hearing aid?	10	5	2	7	4	8	3	4	4	4



Picture 1. Comparison between the new and old users in years.

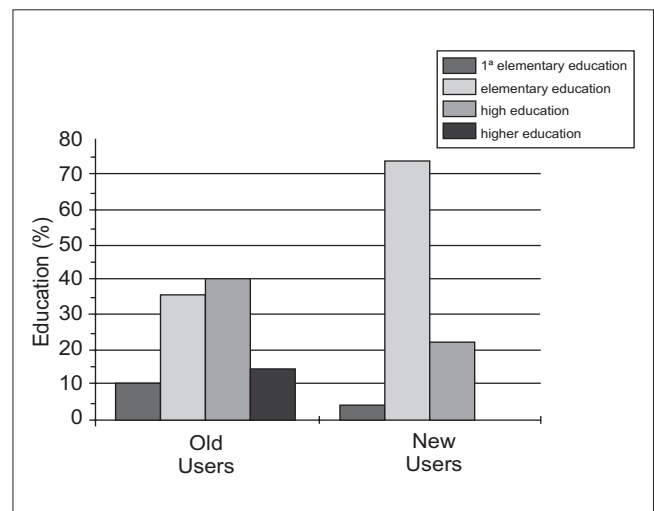


Picture 2. Comparison between the new and old users by age range.

beginning may occur at about 30 years of age and increases gradually in time. (14,15).

Among the old users 22 participants used monoaural hearing aid and only 6 individuals use binaural device. The binaural hearing aid use offers the following advantages: better perception of the sound, better speech recognition at the presence of noise and better binaural addition (16). Even knowing the binaural fitting objectives, the individuals have been opting for the use of only 1 device due to socio-economical aspects.

Likewise, only 5 individuals use digital technology hearing aid as 23 individuals use analog technology. One of the factors that mostly influence the choice of analog hearing aid is the difference of cost between the technologies and the digital one is from 2 to 4 times more expensive, in the auditory center researched, depending upon the manufacturer. The digital hearing aid offers a greater acoustic comfort, more versatility, facility and precision in the adjustments for many digital hearing aids have more than one programming channel and a better understanding of the speech at noise. Out of 28 old users, only 8 have used hearing aid for more than 5 years; the digital technology has been in the national market for more than 13 years (17). In addition, the type, level and



Picture 3. Comparison between the old and new users according to education.

configuration of the hearing loss must be taken into account. Such aspects are extremely important for the choice of technology, although individual characteristics must also be considered.

Table 1 describes the new and old users' answers to the questions pursuant to the general aspects: need to know and handle the hearing aids before choosing the one to be purchased, the interference of the retroauricular hearing aid with the use of glasses and interference with the use of pacemaker. Such issues were included in the questionnaire due to the most frequent doubts of hearing aid users at the Auditory Center where the research was carried out. The comparison between the hearing aid old and new users was significant, contrary to what we expected, and showed the knowledge between old and new users is practically the same, considering the questions described in the Table. Such questions indicate the confirmation that old and new users have similar knowledge and both groups need further guidance pursuant to the use hearing aid with glasses and/or pacemaker. Many hearing aid users answered the hearing aid confuses with the use of glasses, regarding aesthetics, and it becomes prominent with the retroauricular use.

Table 2 shows the competent professional to perform the hearing aid selection process in the opinion of new and old users. Such comparison wasn't either significant because 4 of the old users answered "others" (any person, the salesperson and don't know), 6 answered "the doctor" and 18 "the phonoaudiologist" and 4 new users answered "others", 4 answered "the doctor" and 15 answered "the phonoaudiologist". In spite the phonoaudiologist and the doctor are the most mentioned professionals, they were not recalled by 4 old users and other 4 new users, who indicated another professional was able to perform the hearing aid selection and fitting process. Therefore, we still realize the need to clarify for the patient the phonoaudiologist and the doctor's functions.

Table 3 regards the new and old users' answers to the questions pursuant to the equipment cares. Such comparison didn't either show the significant difference between the old and new users' answers concerning the need to remove the battery when the hearing aid is not in use, in case of wax accumulation in the hearing aid, if it interferes with the equipment use and if the hearing aid may remain at hot and moist places. In these questions both the majority of old and the new users answered correctly. But in the question in which the user believes the hearing aid has an anti-fall protection system, old and new users answered differently, and both groups need more clarification about these matters.

Some questions were not listed in the tables because there were no differences in the old and new users groups answers, and more than 90% of the answers comply with the correct answer; and these are: is there the need to care for the use in case of sweating and getting out in the rain? is it necessary to remove the

hearing aid to take shower? is technical assistance required in case of fall, wet hearing aid, excess of wax in the hearing aid? Is care required not to drop the hearing aid? Do you think it's necessary to take advice with the ORL in case of excess of wax in the (MAE) auditory meatus? Can you lend the mould and the capsule to another person? Does the (MAE) auditory meatus' wax interfere with the use of the hearing aid? Such fact appoints the aspects questioned were projected efficiently by the phonoaudiologist, technical responsible for the Auditory Center where the data were collected.

Most hearing aid old and new users decided to use a hearing aid on their own discretion as we may verify in Table 4. Such aspects relate to psychosocial factors because most users know someone who uses it and most of these are satisfied with the hearing aid, therefore, we identify the external influence along with the support of relatives and friends interfere with the individual's decision. Despite the studies report that even with the advance of the technology applied to the hearing aids, the reduction of the appliance size and sound quality enhancement, there is a great resistance of the old aged to use an auditory device because they don't recognize they have hearing loss, allege lack of need, the hearing aid won't meet their hearing needs, financial reasons and handling difficulties (18). Such results show the users face factors that help in the hearing aid use resistance.

Table 5 describes the new and old users' answers to the questions pursuant to the fitting process: like the use of hearing aid all day in the first week. this aspect shows the old users answered mistakenly since they had already been submitted to this guidance process. Most new users answered "no", but it shows many of them also answered mistakenly. This issue allows us to consider both groups need guidance as for the hearing aid fitting, as well as the other questions. When asked if it's necessary to remake the mould/capsule yearly, if upon purchasing of the hearing aid you need to return to the hearing center, would you consider important the presence of a relative at the time of receiving guidance to help you afterwards in the hearing aid handling and care; we confirm that many old and new users need guidance concerning the abovementioned aspects. The relatives presence is very important during the phonoaudiologic therapeutic process in the cases of hearing impairment. Likewise, the parents action and understanding on the pathology allow more suitable development conditions and consequently better results in the hearing rehabilitation process (19). The questions: "Can you lend or donate the hearing aid without the performance of specific exams and adjustments?" and "would you feel ashamed to use the hearing aid in public?" show that most users of both groups answered similarly and correctly.

Table 1 concerning the questions relating to the answers of both groups about the hearing aid fitting time and most old and new users believe the fitting time with the hearing aid takes between 1 and 3 weeks, and the studies confirm that the fitting time of each patient depends on several factors such as the support the phonoaudiologist and hearing aid technicians offer to the users in the Auditory Centers, the user's hearing loss degree, difficulties concerning the auricular moulds and capsules and the amplification characteristics, were also mentioned by most of the individuals. The intervention results are directly bound mainly to the communication expectations and needs (3).

The picture 1 and 2 show that the new users are older than the old users, as 73.91% of the new users are between 60 and 79 years old and 42.86% of the old users are between 60 and 79 years and 39.29% of the old users are younger than 60 years of age. With these data, we suggest the new hearing aids users seek increasingly later hearing habilitation and rehabilitation.

Picture 3 indicates the old users' education is between elementary and high-school (75%) and 14.29% hold higher education, as most new users (73.91%) have elementary education and none (0%) has higher education. With such data we confirm, in this research, the highest education degree was not basic for the knowledge on the hearing aid fitting process, because the groups didn't present significant differences in the knowledge on the questions mentioned. In addition the fact the new users have a lower education background than the old users associated with the confirmation that they are also older, may be suggestive of the lack of knowledge of the importance for seeking resources since the diagnosis is made or of the financial difficulties.

CONCLUSION

From the study performed, it's possible to conclude the new hearing aid users seek auditory (re)habilitation increasingly later; after affection in the speech area. It's also possible to confirm the highest education degree was not critical for the knowledge on the hearing aid fitting process, because the groups didn't present significant differences in the knowledge on the questions mentioned.

In addition, we identify that the aspects requiring to be further approached in the fitting process are, within the general knowledge, the need to know and handle the hearing aids before choosing the one to be bought, the fact there is no interference of the retroauricular hearing aid with the use of glasses and pacemaker and that the competent professionals for the hearing aid selection and

fitting process are: the fonoaudiologist and the doctor. As far as the cares are concerned, the patient must know the hearing aid hasn't any anti-fall protection system and in terms of fitting, the user must be aware he or she should not use the hearing aid all day in the first week, he or she needs to remake the mould/capsule annually, that upon purchase of the hearing aid he or she needs to return to the auditory center for fitting, the presence of a relative is critical upon receipt of guidance for further help in the handling and care of the hearing aid and that the hearing aid fitting time depends on each user.

We also emphasize the importance of phonoaudiologic service in the processes of selection, fitting, (new) guidance and permanent follow-up of old and new hearing aid users.

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