

MANIPULATION SKILLS OF HEARING AIDS OPEN FIT HEARING AIDS FOR HEARING IMPAIRED ELDERLY

Habilidades de manipulação do aparelho de amplificação sonora open fit por deficientes auditivos idosos

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ABSTRACT

Purpose: to evaluate the skills of handling the type of hearing aids in open fit hearing impaired elderly people, using the instrument called Practical Hearing Aid Skills Test (PHAST). **Methods:** in the study, developed in Auditory Health Division, including 18 elderly (aged 60 to 87 years) hearing impaired, 7 men and 11 women, new users of open fit hearing aid type. For the methodology, the first step the researcher carried out the guidance on hearing aids for the hearing impaired and the second, after approximately 1 month of use of the device, applied the instrument PHAST, which contains eight questions in the form of practical tasks regarding the handling of hearing aids to classify the resourcefulness of the individual. **Results:** we found that the tasks related to cleaning the hearing aid and the use of telephone, the subjects experienced greater difficulty in exposing them to run with lower scores, however the tasks related to the removal of HA and opening the battery compartment, subjects performed with greater ease. As for the overall performance of the participants, the results were 33,33% excellent, 22,22% good, 27,78% satisfactory and 16,67% poor. **Conclusion:** 55,55% of hearing impaired elderly performed the tasks for properly handling the open fit hearing aids, obtaining the final ranking instrument PHAST excellent or good.

KEYWORDS: Hearing Loss; Aged; Hearing Aids

■ INTRODUCTION

The increase in the number of elders in the world population caused an increase in the number of people suffering from hearing loss and parallelly, it was observed a technological evolution of Hearing Aids, from changes of hearing aids indication to people with hearing loss. Previously, In The Ear Aids (ITE) type was presented as an option to the professionals in answer to the non-adaptation of the user to the Behind The Ear (BTE) type or to fulfill

an aesthetical need. Nowadays, the tendency is the indication of the open fit type, applied to both aesthetical and acoustic need¹.

The open fit hearing aids are Mini-BTE devices, discreet, comfortable and aesthetically attractive thanks to the innovative form, inserted in the Ear Canal through a microtube and a silicon olive.

This kind of hearing aid was designed to meet the needs of audiologic profiles with a decreasing audiometric configuration, within the normality of low frequencies and the lowering of these in the high frequencies. These are cases in which the adaptation to the BTE and ITE hearing aid can be problematic, for; generally, there is difficulty of speech comprehension in noisy environments and complaints of the effects of occlusion for instance. These devices aim to solve such problems².

Within this context, the elderly individual is a potential candidate to the open fit hearing aid, since, routinely, shows hearing loss with a decreasing audiometric configuration and by using this device,

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it is possible to contemplate the audiometric profile and consequently, eliminate or minimize the acoustic barriers.

In another point, clinical experiences reveal that elders find it hard to manipulate hearing aids, regardless of its type, causing the demotivation and non-use of the device. Such fact is also based on scientific evidence, for a lot of researchers by studying the motives to the rejection of the use of hearing aids, mention the difficulty factor of manipulating the device³⁻⁵.

Considering the innumerable sensorial difficulties predicted in the elder individual through the global sensorial degeneration it is important that the audiometric profile is not the only criterion of eligibility to the indication of the open fit hearing aid, it is up to the professional to verify the matters related to the sensorial skills, with the goal that the user gets the most benefit possible with the device, and avoid rejection and/or demotivation.

In the consulted literature to the moment, no study concerned itself in evaluate the related aspects of the open fit hearing aid manipulation skills. The current study had as objective to evaluate the open fit hearing aid manipulation skills of elders suffering from hearing loss through an instrument named Practical Hearing Aid Skills Test (PHAST).

■ METHODS

This study of prospective character, not randomized but quali-quantitative was approved by CEP under the number 369/2011 and developed from the period of October of 2011 to January of 2012 in the Ear Health Division, a unit in *Hospital de Reabilitação de Anomalias Craniofaciais* (HRAC) from the University of São Paulo (USP), Bauru/SP campus.

To compose the sample, were selected elders with hearing impairment with the following criteria: bilateral or unilateral sensorineural hearing loss, with a configuration of tonal threshold up to 30 dB HL (decibel hearing level) in the 250 Hz (Hertz), 500 Hz and 1000 Hz frequencies and up to 70 dB HL in the other frequencies, little to moderate hearing loss level, single of both ears indication of open fit hearing aid with digital technology of many models, no previous experience with hearing aids, both genders, age equal or superior to 60 years old to be considered elders according to the principles from the World Health Organization -WHO- (2007)⁷ e no significant health alterations like strokes, diabetes mellitus, mental disorders from the likes of forgetfulness or confusion. The absence of such health problems were verified by consulting the patients' records.

First, in the adaptation moment, the participants were oriented about the aspects regarding the open fit hearing aid, as a script previously prepared by the author, for approximately 20 minutes. The vocabulary utilized proposes easy assimilation, no application of technical terminology, being supported by the device manual made available by the company, in order to make the understanding and learning of the instructions easy.

A month after the use of the hearing aid, in the moment of the speech therapist survey, the Practical Hearing Aid Skills Test (PHAST)⁶, was applied translated as *Teste de Habilidades Práticas com Aparelho Auditivo* (figure 1). The translation of the test occurred in the following way, firstly, two speech therapists native speakers of Brazilian Portuguese and fluent in English performed two translations and cultural adaptations of the PHAST to Brazilian Portuguese, after that, a unified version of the test was created by both speech therapists after the comparison of both translations.

This test wants to verify the manipulation skills regarding your first hearing aid by means of eight questions that are practical tasks performed in the presence of the evaluator, who verifies and classifies the individual's performance, with each classification matching a determined score that will be summed in the end of the application and changed to a percentage. Here's the detail of such classification.

- **Excellent (four points):** The participant accomplished the task without failures.
- **Better than satisfactory (three points):** Participant shows one mistake but successfully accomplishes the task.
- **Satisfactory (two points):** Participant shows more than one mistake but successfully accomplishes the task.
- **Less than satisfactory (one point):** Participant tries but is unable of successfully accomplishing the task or utilizes deviant ways of accomplishing the task.
- **Unable to execute (zero points):** Participant was unable to execute the task.

The maximum score for this test is of 32 (8 x 4) and the minimum is 0, however for this study, the maximum score was 24 (6 x 4), since the questions were referent to the volume control manipulation (question 6) and to the noise reduction program or the directional microphone (question 8) are applicable to the selected open fit hearing aids. Regarding the questions composed by two sub-items, a weighted average was utilized to calculate the score. Besides that, the "microphone cleaning" and the "ventilation" sub-items of question 4, referent to the cleaning

1. Remove your hearing aid(s).
 - a) grasp aid/dexterity
 - b) remove aid from ear
2. Open the battery door.
 - a) locate the door
 - b) open the door
3. Change your hearing aid battery.
 - a) remove old battery
 - b) choose correct battery size
 - c) remove battery tab
 - d) insert new battery
4. Show me how you clean your aid.
 - a) sound bore
 - b) microphone
 - c) vent
 - d) open fit mold
5. Put your hearing aid(s) back in your ear(s).
 - a) grasp aid/dexterity
 - b) placement in ear
6. Turn up the volume of your hearing aid(s).
7. Show me how you use the telephone with your hearing aid(s) (hand phone to client).
 - a) correct use of program/t-coil switch
 - b) placement of phone in relation to hearing aid
8. Show me how you use your hearing aid in a noisy situation.

Figure 1 - Practical Hearing Aid Skills Test (PHAST)

skills of the hearing aids and the “telephone use” sub-item of question 7, didn’t apply to the participants, because of that, these were disregarded in the score of the test. Because of that matter, in question 4, only the general performance of cleaning the open fit hearing aid was evaluated, from the cleaning of the device itself, the olive and the microtube. In question 7, the placement of the telephone in relation to the hearing aid was evaluated. These adaptations were recommended by the conceivers of the PHAST.

To obtain the final score, all the obtained points must be summed and the total score will be achieved. To obtain it in percentage, you must split the number obtained by the maximum number that can be achieved, taking into consideration the number of tasks available and then multiplying it by 100. After that, this percentage is qualitatively classified in performance. Excellent when the percentage is from 90% to 100%; good, when the score is from 80% to 89%; satisfactory, to scores between 65% and 79% and poor when the score is lower than 65%.

■ RESULTS

The PHAST was applied to 18 people suffering from hearing loss, of that seven being males and 11 being females with ages ranging from 60 to 87 years old.

Table 1 shows the results of the open fit hearing aid user’s performance, regarding question 1: hearing aid removal; question 2: opening the battery door and question 3: changing the hearing aid battery.

Regarding PHAST’s question 1, the hearing aid removal, it was observed that most individuals showed excellent execution in the sub-item “help to hold the hearing aid/dexterity” and all individuals obtained excellent in the “removal” sub-item.

Concerning question 2, the opening of the battery door, it was observed that most participants performed excellently in “finding the opening” and “opening the door”. Only one participant didn’t find the opening and other two were not able to open it.

Question 3 is about changing the hearing aid battery, and the results were diversified, but most participants were able to achieve “excellent”, as much as “removing the old battery” as “inserting the new battery”.

Table 1 - The results of the open fit hearing aid user’s performance, regarding question 1: hearing aid removal; question 2: opening the battery door and question 3: changing the hearing aid battery

Classification	Q. 1				Q. 2				Q. 3			
	A		B		A		B		A		B	
	%	n	%	n	%	n	%	n	%	n	%	n
E	88,89	16	100	18	83,34	15	88,89	16	66,67	12	61,11	11
+S	11,11	2	0	0	11,11	2	0	0	22,22	4	16,67	3
S	0	0	0	0	0	0	0	0	0	0	5,55	1
-S	0	0	0	0	0	0	0	0	0	0	11,11	2
N	0	0	0	0	5,55	1	11,11	2	11,11	2	5,55	1
TOTAL	100	18	100	18	100	18	100	18	100	18	100	18

Legend: Q.: Question; A/B: Sub-item; E: Excellent; +S: Better than satisfactory; S: Satisfactory; -S: Less than satisfactory; N: Unable to execute.

Chart 2 shows the score of the open fit hearing aid user’s performance, regarding question 4:

cleaning the hearing aid; question 5: hearing aid insertion and question 7: telephone use.

Table 2 - The score of the open fit hearing aid user’s performance, regarding question 4: cleaning the hearing aid; question 5: hearing aid insertion and question 7: telephone use

Classification	Q. 4		Q. 5				Q. 7	
			A		B			
	%	n	%	n	%	n	%	n
E	22,22	4	77,78	14	50	9	33,33	4
+S	44,44	8	11,11	2	33,33	6	0	0
S	11,11	2	0	0	0	0	0	0
-S	5,55	1	5,55	1	11,11	2	66,67	8
N	16,67	3	5,55	1	5,55	1	0	0
TOTAL	100	18	100	18	100	18	100	12

Legend: Q.: Question; A/B: Sub-item; E: Excellent; +S: Better than satisfactory; S: Satisfactory; -S: Less than satisfactory; N: Unable to execute.

Question 4, concerning the cleaning of the hearing aid, only the general performance of the open fit hearing aid users was evaluated, including the device itself, the olive and the microtube. In this task, diversified results were obtained.

In Question 5, related to the hearing aid insertion, most participants achieved excellent score in “help the hold/dexterity”, but in the “fit in the ear” sub-item, half the participants obtained excellent score.

Question 7 is about the use of a telephone while using the hearing aid, 12 individuals took part in this task, since the other six used the other ear that had a better audible threshold, to speak on the phone. Regarding the “use of a telephone in relation to the hearing aid” sub-item, most individuals got a less than satisfactory result.

To achieve the total PHAST score, in percentage, it is necessary to split the number obtained by

the maximum number of points possible, while considering the number of evaluated tasks and then, multiply it by 100. This was how the results for each participant were obtained. The average score of the PHAST participants was 78,7%, while the lowest score was of 35% and the top was of 100%. In sequence, this percentage was qualitatively classified in excellent, good, satisfactory or poor performance, this being the final classification.

Chart 3 shows the score distribution obtained by the deaf participants for each question, total, percentage and final classification on PHAST.

In Figure 2, the final classification of participant is shown in which 33,33% of the participants had an excellent performance, 22,22% good, 27,78% satisfactory and 16,67% poor.

Table 3 - The score distribution obtained by the deaf participants for each question, total, percentage and final classification on PHAST

I	Q.1A	Q.1B	Q.2A	Q. 2B	Q. 3A	Q. 3B	Q.4	Q.5A	Q.5B	Q.7	TOTAL	PERC (%)	CLAS
P1	4	4	4	4	3	4	3	4	3	N	18	90	EXC
P2	4	4	4	4	3	4	1	4	4	N	16,5	82,5	GOO
P3	4	4	1	1	1	1	0	1	1	N	7	35	POO
P4	3	4	4	4	4	4	3	4	4	1	19,1	81,2	GOO
P5	3	4	4	4	1	0	0	0	0	N	8	40	POO
P6	4	4	4	4	4	2	3	4	4	1	19	79,16	SAT
P7	4	4	4	4	4	4	3	3	3	1	19	79,16	SAT
P8	4	4	4	4	4	3	3	4	3	4	22	91,6	EXC
P9	4	4	4	4	4	4	3	4	4	4	23	95,8	EXC
P10	4	4	4	4	4	3	4	4	3	1	20	83,3	GOO
P11	4	4	1	1	3	1	0	3	1	4	13	54,16	POO
P12	4	4	3	4	4	4	3	4	4	N	18,5	92,5	EXC
P13	4	4	4	4	4	3	4	4	3	1	20	83,3	GOO
P14	4	4	4	4	4	4	2	4	4	1	19,3	79,16	SAT
P15	4	4	4	4	3	4	3	4	4	1	18,5	77	SAT
P16	4	4	4	4	4	4	2	4	4	1	17	70,8	SAT
P17	4	4	4	4	4	4	4	4	4	4	24	100	EXC
P18	4	4	4	4	4	4	4	4	3	N	19,5	97,5	EXC

Legend: P: Participant; Q.: Question; A/B: Sub-item; PERC: Percentage; N: Not applied; CLAS: Classification; EXC: Excellent; GOO: Good; SAT: Satisfactory; POO: Poor.

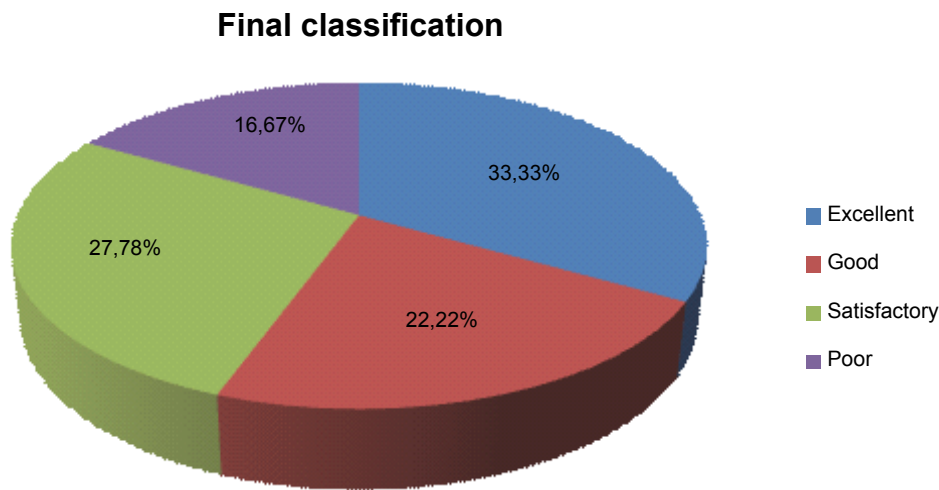


Figure 2 - Distribution of the final classification in PHAST hearing impaired individuals open fit hearing aid users

■ DISCUSSION

For a long time the concern of the effectiveness of the hearing aid use existed and until today, this topic is being researched by the scientific community. The pioneer authors to research the factors that make people suffering from hearing loss not to properly use or reject the hearing aids, observed that one of the key factors to this problem is the difficulty in manipulating the device³.

The difficulty in the use is related to all the different kinds of hearing aids and it involves all population, but, specifically, in elderly individuals and users of the open fit hearing aid, this difficulty can be a lot more evident since it requires both satisfactory manual dexterity and visual acuity in order to properly operate it as the open fit hearing aid components are very small. The elders suffer from sensorial degeneration, which can cause hand shaking and sight deterioration⁸. To verify the manipulation of the hearing aid by the elders is very opportune.

Several times, the speech therapist questions the individual if there is any question or difficulties about the use and frequently, the answer is negative. However, the individual often performs the task mistaken or is not able to perform it at all. This way, only the questioning made by the therapist sometimes is not enough to guarantee a satisfactory manipulation of the device.

Besides that, the works done with people suffering from hearing loss must present programs focusing on the concept of hearing loss and its implications on the individual, workings e care of the hearing aid, practical exercises on insertion, removal and manipulation of the device⁹. Parallel to that, there are studies that affirm the need of strategies that help the users with the learning of this information¹⁰.

Within this context, it has emerged the preoccupation to investigate the skills in open fit manipulation of elderly people, since public services towards hearing health, recently, show a significant percentage of elders using the open fit hearing aid, for it is highly recommended for fulfilling the needs of this specific population and by the fact that during the adaptation process, the orientation regarding the use of the open fit hearing aid usually happen in a reduced time, since the time open to the public is often limited. The elders need more time for orientation because if it does not happen or it is not enough for the user to assimilate all the information, this can culminate in the abandon of the hearing aid device⁴.

In the hearing health service, in which this research happened, the demand is large covering

7.795 elders adapted to the hearing aids and 625 of these are using the open fit kind. On top of that, it is known by demographic data, the tendency is that an increase will happen on the population that is above 60 years old, as the world population is in process of getting old¹¹.

In the question regarding the “hearing aid removal”, it was observed that it was one of the tasks that a great deal of the participants obtained excellent performance, results already described in previous studies^{6,12}. This task is imperative to the hearing aid user, for it will be done several times during the day. Practical exercises regarding hearing aid insertion, removal and manipulation towards elderly users should always be reinforced⁹. The sub-item “help to hold the hearing aid/dexterity” obtained lower percentage than the “hearing aid removal” sub-item, thanks to the fact that this task demands more manual skills, for the user must have steady hands to hold the device and as a lot of participants presented shaking in their hands; this compromised their performance of the task.

About the question “opening the battery door” it was found that these results corroborate with the literature, in which task the participants show no difficulty^{6,12}. The fact that calls our attention is that one of the individuals was not able to find the battery door opening and other two were not able to open it, easily justified by the characteristics of that specific population, since this task not only demands manual skills but sight acuity as well as tactile sensibility, for getting old generates some alterations in general health⁸.

For “changing the hearing aid battery”, the results were much diversified and the participants had more trouble in the “inserting the new battery” sub-item. It’s important to note that all open fit hearing aids utilize batteries of number 312 or 10, which are the smallest batteries available, making the manipulation even harder. In another study, 5% of the participants showed classification less than satisfactory or was not able to perform⁶. The hearing aid elderly users with problems of manual dexterity, sight difficulties and/or altered tactile sensibility, will have trouble whenever changing the batteries, fitting the speech therapist to select the most appropriate hearing aid for each user⁴.

The questions regarding the cleaning of the device was the task that the participants had more trouble with, which was expected, since it requires finesse. This difficulty is also shown in previous studies^{6,12}.

Referring to the hearing aid insertion in the ear, the task “fit in the ear” require more manual skills, what justifies such findings. Studies also show such results; the “fit in the ear” sub-item is the one that

have the lowest scores¹² and only 2% of the participants showed less than satisfactory classification or was not able to execute the task⁶.

As to the telephone use with the hearing aid, in a study, most of the experimental group showed excellent score, on the other hand, 28,6% of the control group had the same score¹². However, 80% of the participants obtained less than satisfactory or were not able to perform the task, results that corroborate with the ones of the present study⁶. This task should be more trained by the professionals, for it is a task that does not require a lot of manual skills. These results can be justified by the fact that elders have trouble to remember information referent to facts or events, episodic memory¹³, just as the fact that orientation about cares and use of the hearing aid happen in a short period of time¹⁴.

It was verified that in general, the individuals achieved a satisfactory final classification, these found results being similarly described in the literature, in which the average final score was of 78,6%, the control group obtained 77,8% and the experimental group 77,2%¹².

The open fit hearing aid appeared with promising perspectives to attend the audiometric profile by lowering or eliminating the unwanted effect of occlusion and to fulfill aesthetical needs. There is no doubt that this hearing aid kind is effective,

proportionating use satisfaction and improvement on the quality of life as supported by the studies of 1,15,16.

Besides the progress of the quality of life and the satisfaction, the professional by selection the open fit hearing aid, must present as a main goal to minimize the disadvantage and/or the incapacity related to the decrease of the hearing sensitivity that compromises, above all, the process of verbal communication, like recommending the model of easy manipulation. It is also of great importance to be aware that, despite of the sophistication of hearing aids and the improvements reached, the process of adaptation to the device must be individualized, considering the hearing and non-hearing needs of the candidate to the amplification and its real skills towards the use of the device.

■ CONCLUSION

Most elders suffering from hearing loss, users of the open fit hearing aid, participants in the study performed the tasks appropriately regarding the manipulation of the open fit hearing aid, evaluated by means of the Practical Hearing Aid Skills Test (PHAST), obtaining final classifications of excellent and good.

RESUMO

Objetivo: avaliar as habilidades de manipulação do AASI do tipo *open fit* em indivíduos deficientes auditivos idosos, por meio do instrumento denominado *Practical Hearing Aid Skills Test* (PHAST), traduzido como Teste de Habilidades Práticas com Aparelho Auditivo. **Métodos:** no estudo, desenvolvido na Divisão de Saúde Auditiva, participaram 18 idosos (idade entre 60 e 87 anos) deficientes auditivos, sendo 7 homens e 11 mulheres, novos usuários AASI tipo de *open fit*. Para a metodologia, na primeira etapa a pesquisadora realizou a orientação sobre o AASI aos deficientes auditivos e ao seu cuidador e, na segunda, após aproximadamente 1 mês de uso do dispositivo, foi aplicado o instrumento PHAST, o qual contém 8 questões na forma de tarefas práticas referentes ao manipulação do AASI para classificar a desenvoltura do indivíduo. **Resultados:** foi constatado que nas tarefas referentes à limpeza do AASI e ao uso ao telefone, os indivíduos revelaram maior dificuldade de executá-las expondo as menores pontuações, em contrapartida às tarefas referentes à remoção do AASI e à abertura do compartimento de bateria, os indivíduos realizaram com maior facilidade. Quanto aos resultados do desempenho dos participantes a classificação final foi: 33,33% excelente, 22,22% boa, 27,78% satisfatório e 16,67% pobre. **Conclusão:** 55,55% dos idosos deficientes auditivos realizaram adequadamente as tarefas referentes à manipulação do AASI *open fit*, obtendo classificação final no instrumento PHAST excelente e boa.

DESCRITORES: Deficiência Auditiva; Idoso; Auxiliares de Audição

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