

Hearing Aid Handling Skills: Comparison Across the Duration of Hearing Aid Use

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Abstract

Hearing aid orientation is a very important part of the rehabilitation process for a person with hearing impairment, who use hearing aids. Negative impact of poor handling skills can lead to dissatisfaction, poor outcome related to hearing aid use and rejection of hearing aid. Only few objective tests have been reported in literature which quantify the performance of hearing aid users. The present study focused on development, validation and finding out differences in performance related to hearing aid handling skills among new and experienced hearing aid users. An objective test namely hearing aid handling skill test (HAHST) was developed and administered on 200 participants. Participants were divided into four groups with each group comprising of 50 participants with no experience, 3 months' experience, 6 months' experience and >1-year experience respectively. The results of HAHST revealed that hearing aid users with experience of more than 1 year performed significantly better than those with new and less experienced hearing aid users. Overall performance remained low in all groups of participants as compared with the results of previous studies. Other findings reveal that participants performed excellently for basic tasks and performance remained poor for those tasks which required more practice and also reveals that there is a requirement to give more importance on some tasks information related to memory. This can be attributed to more number of tasks included in this study and some tasks which contains memory related information, which new hearing aid users tend to forget with time. the performance was poor for those tasks those were infrequently used by them.

Key words: Handling Skills, outcome, objective test, Tasks

Introduction

Hearing forms an integral part of effective communication. The physical process of hearing is ability of auditory system to detect/perceive a sound by sensing the vibrations in environment. Interference in this process due to any abnormalities along the auditory pathway leads to loss of audibility and perception of sound and commonly referred as hearing loss. It is a significant contributor to the global burden of disease in individuals, families, communities and countries.

The World Health Organization (2005) estimates indicated that 278 million people are affected by disabling hearing loss, two-thirds of whom live in developing countries. The prevalence of hearing loss in Southeast Asia ranges from 4.6% to 8.8%. In India, 63 million people (6.3%) suffer from significant hearing loss. Hearing loss can occur at any age due to various causes such as middle ear pathology, medicines, genetic etc. The extent of auditory disability totally depends upon the degree (mild, moderate, moderately severe, severe and profound) and type of loss like conductive, mixed or sensorineural hearing loss.

There are different types of management based on degree and types of hearing loss. This includes mostly medical management like medication and surgery and amplification devices. However, hearing aids are most common intervention for people diagnosed with hearing loss specially in case of sensorineural hearing loss which is most common type of hearing loss in adults (Gatehouse, 2002). Hearing aid prescriptive

recommendations for hearing losses having a conductive component have received less clinical and research interest than for losses of a sensorineural nature; as a result, much variation remains among current prescriptive methods in their recommendations for conductive and mixed hearing losses (Johnson & Dillon, 2011).

According to the recommendations, policies and ethical criteria of different countries and institutes, usually it is recommended to give a trial period of 30 to 45 days to new hearing aid users. During this period the new hearing aid users usually are counselled over a number of sessions on hearing aid use, maintenance and ways of how to use hearing aid to make communication effective. According to results from the MarkeTrak VII survey, audiologists spent on average a total of 45 minutes during the hearing aid trial period instructing individuals on how to use and care for their hearing aids (Kochkin, 2005). Thus, a new hearing aid user is likely to understand a reasonable amount of new information about their hearing aid in a relatively very less time.

While this may be a difficult task for a new hearing aid user, it could be especially problematic for elderly hearing aid users who may have age-related deficiencies in working memory. elderly hearing aid users may be unable to process and store all of the new hearing aid information, or they may forget critical hearing aid information (Salthouse, 1990). In either case, these individuals could become dissatisfied with their hearing aids.

Inadequate management or rehabilitation can add on to the underlying pathology and would increase frustration

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because of missed communication. As a result of which person with hearing impairment tries to avoid social activities, spend less time with family and significant others, have personal and social problems, and feel isolated and depressed. Owing to these issues, a proper management of the disorder becomes a crucial part to improve the overall quality of living. In addition to hearing aid prescription, counselling plays an important role in aural rehabilitation. Audiologists need to provide services more than the basics, including the type and degree of hearing loss, understanding the limitations of amplification, and determining what they can do better to make living with hearing loss easier. Orientation about the use and care leads to increase in acceptance of their amplification device (Stephens, 1977).

Verification of hearing aid orientation is recommended as part of the best practice for fitting hearing aids (Valente, Abrams, Benson, Chisolm, Citron, Hampton, & Sweetow, 2006). Hearing aid orientation refers to effectively instructing and orienting clients about the use and care of their hearing aids.

Individuals with greater difficulties managing and manipulating their hearing aids were not as satisfied, perceived less benefit, and reported lower use of their hearing aids compared with individuals who had less difficulty manipulating their hearing aids (Humes, Ahlstrom, Bratt & Peek, 2009).

Any difficulty in manipulation of hearing aids by the users would make it unlikely to use it. Various authors quoted those six months after the adaptation to a hearing aid device, about 40% of the individuals did not use it regularly, 30% could not insert it in the ear, and 80% could not handle it for telephone usage (Vuorialho, Karinen & Sorri, 2006). Another study showed that among 96% of experienced hearing aid users who reported the proper use of the devices, only 48% performed such tasks adequately (Desjardins & Doherty KA., 2009).

Need for the study

The main goals of audiological counselling in general involve giving the individuals information about their hearing loss, developing skills needed to operate and care their new hearing aids and changing patients' belief and behaviour relating to communication (Boothroyd, 2007; Dillon, 2001). So, appropriate knowledge about handling of a hearing aid device is important to ensure the good adaptation and functioning of device, therefore avoiding the need of repairs and replacements, and especially making sure that the hearing aid users get best benefits from their amplification device.

These requirements bring to the need of a tool, which has the potential to be used clinically as an objective measure to assess the individual's ability to use and care for his or her hearing aids, which should be fast and

easy to administer and yield consistent results across different health care providers.

Aim

The purpose of the present study was to compare whether naive hearing aid users know how to correctly use their hearing aids as against the experienced hearing aid users.

Methods

The present study attempted to investigate the hearing aid handling skills/abilities of persons with hearing impairment. The main objectives were: 1) To check how efficiently hearing aid users are using their hearing aids. 2) Investigate the efficacy of the counseling just after the post fitting hearing aid orientation. 3) To find out which hearing aid manipulation or task is more problematic as faced by hearing aid users. These were assessed across different duration of experience of hearing aid usage.

a. Participants

200 participants divided in equal numbers in 4 groups based on their duration of hearing aid use i.e. Group 1 (new hearing aid users), G2 (3 months of hearing aid use), G3 (6 months of hearing aid use) and G4 (>1 year of hearing aid use) in the age range of 18 to 70 years (mean age of 57.67 years) diagnosed as having acquired hearing loss with each group having 50 participants. Prior to testing the participants, informed consent was obtained from them as detailed in the ethical guidelines of AIISH. Participants having any types and degree of hearing loss were included in the study. The aided pure-tone threshold was within the speech spectrum (in frequencies between 500 Hz to 4000 Hz). The speech identification scores were in proportion to pure-tone hearing thresholds. However, the aided speech identification scores were more than 60%. Participants were using digital behind the ear hearing aids. All the participants in the study had undergone a post fitting hearing aid orientation program for minimum of 20 minutes. Some participants were counselled again about the hearing aid use during their follow up visit after six months of hearing aid fitting. None of the participants were trained by the investigator of this study about using their hearing aids and history and complain of psychological, neurological, dexterity problems, tremors and restricted limbs movements.

b. Procedure

Phase I: Developing hearing aid handling skill test

The test was developed in English language with 14 tasks with respect to 4 parameters which were: 1) Recognizing different parts of hearing aid(s). 2) Handling regular operation. 3) Trouble shooting of hearing aid(s). 4) Others

These were representative of most basic skills an individual with hearing loss need to know to use his or her hearing aids correctly mentioned in different tests like (Practical Hearing Aid Skills Test, Doherty & Desjardins, 2009), hearing aid instruction manuals of several hearing aid manufactures (GN Resound, 2005; Oticon, 2003; Siemens, 2005) and the input from the practicing audiologists were used. These are typically taught to a new hearing aid user after the hearing aid fitting. Task covers the following skills:

Remove your hearing aid: This skill consists of two tasks i.e. a) Grasping aid/dexterity and b) removal of hearing aid from ear(s).

Open the battery door: This skill consists of two tasks which includes locating and opening of battery door/compartment.

Changing your hearing aid battery: Under this skill there were two tasks which include removal of old battery and insertion of new battery.

Show me how you clean your hearing aid/Parts of hearing aid: This skill includes three tasks which includes cleaning sound bore of ear mould, microphone and acoustical vent (This explains better maintained, better speech quality and comfort).

Put your hearing aid(s) back into the ear(s): This skill includes two basic tasks which were grasping skills and placement of hearing aid back into the ear.

Manipulation of volume control: This skill consists of two tasks i.e. turn up and turn down the volume.

Show me how you use the telephone with your hearing aid(s): This includes two tasks which includes correct use of t-coil switch or program and placement of phone in relation to hearing aid.

Show me how to use different programs: This skill includes using of program switch properly and information regarding when to change programs.

Handling the ear mould/ ear tip: This skill is also subdivided into 2 tasks which were connecting the mould to ear hook of hearing aid and identifying right/left ear mould.

Switch off/ Switch on the hearing aid: This skill includes tasks of switch on or off the hearing aid.

Knowledge about the hearing aid battery: This is a knowledge or memory based skill which included four tasks like information about life of battery, size of battery, battery cover removal for insertion into battery compartment and voltage of battery.

Simple troubleshooting: This skill includes three tasks, the client was given blocked ear mould, old batteries and non-functional hearing aid and hearing aid users were asked to identify and troubleshoot the problems.

When will you not use your hearing aid: It included question based tasks wherein the hearing aid user had to point out the situation where they were not supposed to use their hearing aids like while bathing, sleeping, during active discharge and also as advised by an Audiologist.

Knowledge about serial number: This skill includes 3 tasks which includes knowledge about presence of serial number, if yes identify and tell the significance of it on hearing aids.

Phase II: Validation of developed test

For development of the test, feedback from 5 audiologists with more than 10 years of experience, who were effectively working in audiological set-up (regarding the appropriateness of the skills) were taken. The consideration for including items was based on 4-point rating scale which was as follows, 3= Most appropriate, 2= Appropriate, 1= Less appropriate, 0= Not appropriate.

Additionally, an option for suggestion was given which was considered for the final construction of the test. Most appropriate and appropriate skills marked only by at least 3 audiologists were included in the test. The final test after including the suggestion and feedback is given in Appendix 1.

Phase III: Administration of the test on hearing aid users

This test was administered just after the counselling for new hearing aid users and for experienced users it was administered in one of the return appointments to the Audiology Clinic. Participants were asked to conduct each task and the level of skills was scored according to five-point rating scale starting from 4 to 0. The criteria of scoring are given in table 1.

Phase VI: Scoring

The total score obtained for each task was noted and this score was used to compare the overall performance of the four groups.

c. Analysis

The data obtained was subjected to different statistical procedures using SPSS software (version 21). Descriptive statistics was carried out on the various tasks of hearing aid handling skills test (HAHST) to obtain the Median. The groups would be subjected to check if there is a significant difference or not. If significant difference across groups would be obtained than pairwise comparison for those pairs would be done.

Results and Discussion

The present study aimed to investigate the hearing aid handling skills of new hearing aid users, by comparing them with a matched group of experienced hearing aid

users and also to check for overall variations in the hearing aid handling abilities according to the tasks. A total of 200 participants were included in the four groups. The participants were divided into four groups based on their experience of hearing aid use. The adapted and standardized version of hearing aid handling skills was administered on all four groups. The responses were scored as per the scoring instructions provided in the method section. The scores for each task in hearing aid handling skills test (HAHST), totalled and tabulated for each group were tabulated and the data obtained from all the groups was analysed using the SPSS software version 21. The following statistical procedures were used:

Descriptive statistics was carried out for the various tasks included under hearing aid handling skills test (HAHST) to obtain the mean, median and standard deviation. Non-parametric tests- Kruskal Wallis test was employed to find the difference, if any, between the groups for overall performance as well as for the performance for each task.

Mann Whitney U test was employed to find the difference, if any, across the different pairs of groups only for those tasks which had overall difference in Kruskal Wallis test.

The results obtained for each group for each task has been presented and discussed in this chapter under different sections: 1. Comparison of all four groups i.e. G1- New hearing aid users (NHAU), G2- 3 months experienced users (3MEU), G3- 6 months experienced users (6MEU) and G4->1 year experienced users (>1YEU), as a whole included under HAHST. 2. Comparison of all four groups on various tasks i.e. from T1 to T33 under HAHST.

Comparison of all four groups as a whole included under hearing aid handling skills test (HAHST).

The performance of all the groups as a whole on all the 33 tasks of hearing aid handling skills were analysed. The data was subjected to descriptive statistical methods to obtain Median. Table 2 depicts overall median values of raw scores of different groups included into HAHST.

On comparison of the overall median values on HAHST it was seen that the median value of total score of the new hearing aid users (G1) M= 65.50, 3 months experienced users (G2) M= 63.50, 6 months experienced users (G3) M= 65.00 and >1 year experienced users was M=72, which was significantly different compared to other three groups. This indicates better performance of individuals of G4 (users with an experience of more than 1 year) in comparison to the individuals in other three groups.

To check if this difference was statistically significant, non-Parametric Kruskal-Wallis test was administered. The results of Kruskal Wallis test revealed a statistically significant difference of $\chi^2(3) = 47.138, p = 0.000$ between the overall values of the four groups. Comparison of the performance of the four groups are graphically represented in figure 1.

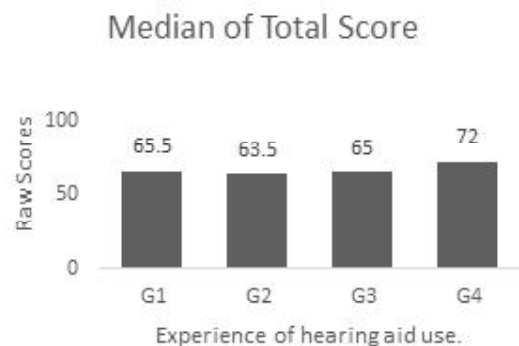


Figure 1: Performance of four groups

Table 1 Performance of the four groups across the overall score included under hearing aid handling skills test (HAHST)

	Groups	N	Median	χ^2
Total scores	New hearing aid users	50	65.5000	.000*
	3months of experience	50	63.5000	
	6months of experience	50	65.0000	
	>1 year of experience	50	72.0000	
<i>*p ≤ 0.05</i>				

Pairwise comparison of groups for overall performance

After observing significant difference in Kruskal-Wallis test, pairwise comparison was done using Mann Whitney U test which is depicted in table 2. This shows significant difference in G1 and G4 ($z = 5.286, p = 0.000$); G2 and G4 ($z = 6.139, p = 0.000$); G3 and G4 ($z = 5.122, p = 0.000$) with respect to their overall

performance.

No statistically significant difference was found when other pairs such as G1-G2, G1-G3, G2-G3 were compared. From the table 2 it is evident that G4 i.e. hearing aid users with experience of >1 year is significantly different from G1, G2 and G3 and these results are comparable with the median which showed

a better performance of G4 when compared with other groups i.e. new hearing aid users, 3 months and 6 months experienced users performed similarly.

Table 2. Pair wise comparison of groups using Mann Whitney U test

Pairs	/Z/	p value
G1-G2	1.08	0.278
G1-G3	0.10	0.91
G1-G4	5.28	0.00*
G2-G3	0.91	0.36
G2-G4	6.13	0.00*
G3-G4	5.12	0.00*

* $p < 0.05$ G1-new hearing aid users, G2- 3 months experienced users, G3- 6 months experienced users and G4-> 1 year experienced users

This improvement in the experienced hearing aid users mainly in G4 can be attributed to the progress in the competency level of the complex task which were difficult for new hearing aid users to perform like cleaning the mould, grasping the hearing aid mould/tip while inserting it into ear canal and turn up and down the volume etc. This can be attributed to practice and more duration of hearing aid use. The finding of this study are in agreement with previous study (Desjardins & Doherty, 2009) who found considerable improvement in the scores of the participants who had at least 1 year experience in comparison with new hearing aid users. Similar findings which shows better performance of experienced users had been found by several authors (Doherty & Desjardins, 2012; Campos, Bozza, and Ferrari, 2014).

The lower scores of handling skills can be because of less duration of hearing aid use compared to participants of group 4 on other side even when the hearing aid users were provided training about hearing aid use, still the skills demonstrated by hearing aid users remained low (Bertoli, Staehelin, Zemp, Schindler, Bodmer & Probst 2009; Desjardins & Doherty, 2009; Doherty & Desjardins, 2012). Desjardins & Doherty, (2009) reported that more than 90% of the new hearing aid users face at least one difficulty in handling skills. The new hearing aid users perform basic tasks like opening the battery compartment or placing or removing the hearing aid from the ear properly but they tend to fail in demonstration of complex tasks (Desjardins & Doherty, 2009).

In this study the poor scores in new and less experienced hearing aid users (up to 6 months) can be attributed to the number of the tasks included into the study which not only targets the handling skills but some information related to their memory like size of battery and life of battery, which is important for a hearing aid user but some time difficult for them to remember.

Among G1, G2 and G3 i.e. new hearing aid users 1 month and 3 month of experienced users there is a slight decrement in the overall score but it is not significant. This shows that new hearing aid users tend to retain the most of the skills which they developed during hearing aid orientation. But it is possible that some amount of participants had forgotten some important information which can lead to small amount of decrement in the scores. Similar findings which shows maintenance of information until the follow up visit has been found previously (Reese & Smith, 2006).

Comparison of groups under HAHST based on different tasks.

The performance of all the groups as a whole on all the 33 tasks of hearing aid handling skills was analysed. The tasks included T1-Grasping aid/dexterity while removing hearing aid, T2-Removal of aid from ear, T3-Locate the door, T4-Open the door, T5-Remove old battery, T6-Insert new battery, T7-Sound bore of ear mould, T8-Microphone, T9-Vent, T10-Grasping aid/dexterity while inserting the hearing aid, T11-Placement in ear, T12-Turn up volume, T13-Turn down volume, T14-Correct use of T-program/Switch, T15-Placement of phone in relation to hearing aid, T16-How to use different programs T17-Insertion to the ear hook, T18-identify right/left ear mould, T19-Switch on/off the hearing aid, T20-Life of battery, T21-Size of battery, T22-Battery cover removal for insertion of new battery, T23-Voltage of battery, T24- Detecting blocked ear mould, T25- Detecting old battery, T26-detecting hearing aid is not working, T27- Don't use while bathing, T28-While sleeping, T29-During active discharge, T30-As advised by Audiologists, T31-Do they know there is serial no. on hearing aids, T32-Where serial no. is located on their hearing aids, T33-Do they know significance of the serial no. on hearing aids. The data was subjected to descriptive statistical methods to obtain Median values.

On comparison of the median values of different tasks of HAHST, it was found that for tasks T1, T3, T4, T6, T19, T27 and T28 the median value is higher (M=4) as compared to other tasks i.e. T2, T5, T12, T13, T16, T22 and T25 (M= 3), T7, T10, T11, T17, T24 and T26 (M=2), T14 and T20 (M=1) and T8, T15, T21, T23, T29, T30, T31. T32 and T33 (M=0). This indicated a difference of the performance in T1, T3, T4, T6, T19, T22, T27 and T28 task in comparison to the other tasks whereas task T9 was not carried out by any group of participants because no acoustical modification (Vent) has been provided to them.

From the table 3, it is attributed that participants in all the groups have performed excellent and above satisfaction for most of the basic tasks like locating and opening battery door, switch on/off the hearing aid, inserting/removing a new battery, turn up and down the

volume, change the program of the hearing aid and some information about care of hearing aid like not to use hearing aid while sleeping and bathing. All above mentioned tasks are very important for a hearing aid user to perform independently in daily life situations. The finding of the present study is in agreement with other authors who shows excellent performance in removal/insertion of hearing aid, battery door opening, insertion of a new battery and manipulation of volume switch tasks (Desjardins & Doherty, 2009; Doherty & Desjardins, 2012; Campos, Bozza, and Ferrari, 2014).

All the participants performed less than satisfactory and poor performance of some tasks like using the t-coil switch/programme, placing of telephone with respect to hearing aid, cleaning the part of mould and hearing aid, size of battery and connecting the mould to the hearing aid. These all finding are in agreement of previous studies, which says that the hearing aid users tends to fail to perform all these tasks and forgets the maintenance related information (Desjardins & Doherty, 2009; Campos, Bozza, and Ferrari, 2014) The reasons behind these findings can be less frequency of manipulation of these tasks regularly.

This study found very poor scores for information related to care and maintenance like cleaning of microphone, serial number related information, voltage of battery and other advises by audiologist like not to use hearing aid during active discharge. The reason behind poor performance can be because most of these tasks are memory related and hearing aid users are tending to forget with span of use or they were not oriented for some tasks or information.

To check which all tasks are statistically significant among four groups of participants, a non-Parametric Kruskal-Wallis test was administered and the results are depicted in table 3. The results of Kruskal Wallis test revealed a statistically significant difference in task T7 of $\chi^2(3) = 8.50$, $p = 0.037$; T10 of $\chi^2(3) = 29.676$, $p = 0.000$; T11 of $\chi^2(3) = 28.69$, $p = 0.000$; T12 of $\chi^2(3) = 15.46$, $p = 0.001$; T13 of $\chi^2(3) = 8.36$, $p = 0.039$; T17 of $\chi^2(3) = 12.43$, $p = 0.006$; T18 of $\chi^2(3) = 8.91$, $p = 0.030$; T23 of $\chi^2(3) = 10.48$, $p = 0.015$ and T24 of $\chi^2(3) = 10.24$, $p = 0.017$ between the four groups.

Table 3: Task wise performance of the hearing aid users of all the groups

Tasks	Performance
T1, T3, T4, T6, T19, T27, T28	Excellent
T2, T5, T12, T13, T16, T22, T25	More than satisfactory
T7, T10, T11, T17, T24, T26	Satisfactory
T14, T20	Less than satisfactory
T8, T15, T21, T23, T29, T30, T31, T32, T33	Poor

T1-Grasping aid/dexterity while removing hearing aid, T2-Removal of aid from ear, T3-Locate the door, T4-Open the door, T5-Remove old battery, T6-Insert new battery, T7-Sound bore of ear mould, T8-Microphone, T9-Vent, T10-Grasping aid/dexterity while inserting the hearing aid, T11-Placement in ear, T12-Turn up volume, T13-Turn down volume, T14-Correct use of T-program/Switch, T15-Placement of phone in relation to hearing aid, T16-How to use different programs T17-Insertion to the ear hook, T18-identify right/left ear mould, T19-Switch on/off the hearing aid, T20-Life of battery, T21-Size of battery, T22-Battery cover removal for insertion of new battery, T23-Voltage of battery, T24- Detecting blocked ear mould, T25- Detecting old battery, T26-detecting hearing aid is not working, T27- Don't use while bathing, T28-While sleeping, T29-During active discharge, T30-As advised by Audiologists, T31-Do they know there is serial no. on hearing aids, T32-Where serial no. is located on their hearing aids, T33-Do they know significance of the serial no. on hearing aids

Pairwise comparison of groups across tasks.

After observing significant difference in Kruskal-Wallis test, pairwise comparison was done using Mann Whitney U test only for those tasks which were significant.

The results showed that there was a significant difference between the participants of G1 and G2 for the task T10 ($z = -4.011$, $p = 0.000$) and task T11 ($z = -2.065$, $p = 0.039$). When participants of G1 and G3 were compared there was no significant difference on any of the tasks.

However, when G1 and G4 were compared, there was significant difference between the participants for task T7 ($z = -2.447$, $p = 0.014$); T11 ($z = -2.527$, $p = 0.012$); T12 ($z = -3.163$, $p = 0.002$); T13 ($z = -2.359$, $p = 0.018$); T17 ($z = -2.694$, $p = 0.007$); T23 ($z = -1.986$, $p = 0.047$) and T24 ($z = -2.574$, $p = 0.010$). When G2 and G3 were compared there was a significant difference in task T10 ($z = -2.432$, $p = 0.015$) and T11 ($z = -2.031$, $p = 0.042$).

When G2 and G4 were compared, there was significant difference between the participants with respect to significant tasks T7 ($z = -2.447$, $p = 0.014$); T10 ($z = -5.271$, $p = 0.000$); T11 ($z = -4.944$, $p = 0.000$); T12 ($z = -3.163$, $p = 0.002$); T13 ($z = -2.359$, $p = 0.018$); T17 ($z = -2.826$, $p = 0.005$); T18 ($z = -2.659$, $p = 0.008$); T23 ($z = -2.553$, $p = 0.011$) and T24 ($z = -2.719$, $p = 0.007$).

When G3 and group G4 were compared there was a significant difference between the participants with respect to only those tasks which were significant T7 ($z = -2.096$, $p = 0.036$); T10 ($z = -3.082$, $p = 0.002$); T11 ($z = -3.693$, $p = 0.000$); T12 ($z = -3.163$, $p = 0.002$); T13 ($z = -2.359$, $p = 0.018$); T17 ($z = -2.826$, $p = 0.005$); T18 ($z = -2.346$, $p = 0.019$); T23 ($z = -2.553$,

$p=0.011$) and T24 ($z=-2.251$, $p=0.024$).

Thus, we can conclude that the overall performance of G4 was significantly better with respect to group G1, G2 and G3 but there was no significant difference in overall performance between G1, G2 and G3 groups. But when the median of these significant tasks across the groups, it was found to have no comparable differences across the groups, so the mean rank was considered to compare all the groups.

From the above results it is found that there was significant difference in the tasks like Sound bore cleaning, grasping skills while inserting the hearing aid, volume control manipulation, connecting tip/mould to the ear hook, identify left/right ear mould, voltage of matter and troubleshooting the hearing aid like detecting blocked ear mould. But if we observe results there is significant difference for all above tasks only with respect to G4(>1 year experienced users) with respect to all 3 groups except T10 and T11 which shows an improvement in the performance of 3 months and 6 months of hearing aid users with respect to New hearing aid user.

As already mentioned initially this improvement in the experienced hearing aid users mainly in group 4 can be attributed to the progress in the competency level of the task which were difficult for new hearing aid users to perform like cleaning the mould, grasping the hearing aid mould/tip while inserting it into ear canal and turn up and down the volume etc. This can be attributed to practice and more duration of hearing aid use.

The finding of this study are in agreement with Desjardins and Doherty (2009) who found considerable improvement in the scores of the participants who had at least 1 year experience in comparison with new hearing aid users. For task T10 and T11 i.e. grasping/dexterity of mould/tip while insertion and proper placement of hearing aid, it was found to be a continuous improvement in the performance which can be attributed to the practice and duration of the use of the hearing aid.

Conclusion

The World Health Organization (2005) estimates indicated that 278 million people are affected by disabling hearing loss, two-thirds of whom live in developing countries. The prevalence of hearing loss in Southeast Asia ranges from 4.6% to 8.8%. In India, 63 million people (6.3%) suffer from significant hearing loss. Hearing loss can occur at any age due to various causes such as middle ear pathology, medicines, genetic etc.

There are different types of management based on degree and types of hearing loss. This includes mostly medical management like medication and surgery and amplification devices. However, hearing aids are most

common intervention for people diagnosed with hearing loss specially in case of sensorineural hearing loss which is most common type of hearing loss in adults (Gatehouse, 2002).

A new hearing aid user is likely to understand a reasonable amount of new information about their hearing aid in a relatively very less time. While this may be a difficult task for a new hearing aid user, it could be especially problematic for elderly hearing aid users who may have age-related deficiencies in working memory. Elderly hearing aid users may be unable to process and store all of the new hearing aid information, or they may forget critical hearing aid information (Salthouse, 1990). In either case, these individuals could become dissatisfied with their hearing aids.

Verification of hearing aid orientation is recommended as part of the best practice for fitting hearing aids (Valente, Abrams, Benson, Chisolm, Citron, Hampton, & Sweetow, 2006). Hearing aid orientation refers to effectively instructing and orienting clients about the use and care of their hearing aids.

Individuals with greater difficulties managing and manipulating their hearing aids were not as satisfied, perceived less benefit, and reported lower use of their hearing aids compared with individuals who had less difficulty manipulating their hearing aids (Humes, Ahlstrom, Bratt, and Peek, 2009).

The present study aimed to investigate the efficacy of hearing aid use in experienced hearing aid users as compared with new hearing aid users. 200 participants with behind the ear hearing aid were divided into four groups based on their experience of hearing aid use. Each group included 50 participants having no experience, 3 months, 6 months and > 1 year of experience respectively. A new hearing aid handling skill test (HAHST) was developed, validated and administered on all the participants to find out their proficiency to carry out 33 tasks included under HAHST.

Descriptive statistics was carried out on the various tasks of hearing aid handling skills test (HAHST) to obtain the mean and standard deviation. Kruskal Wallis test was employed to find out the significant difference between the groups. Mann Whitney U test was employed to find out the significant difference across the different groups (pairwise) only in those tasks which had over all significant difference.

Overall performance of the participants having experience of more than one year was significantly better than other three groups i.e. new hearing aid users, 3 month experienced users and 6 months experienced users. This improvement in the experienced hearing aid users mainly in group 4 can be attributed to the progress in the competency level of the complex task which were

difficult for new hearing aid users. This can be attributed to practice and more duration of hearing aid use. The finding of this study are in agreement with previous study (Desjardins and Doherty, 2009).

The lower scores of handling skills in new and less experienced hearing aid users (up to 6 months) can be because of less duration of hearing aid use compared to participants of group 4 on other hand even when the hearing aid users were provided training about hearing aid use, still the skills demonstrated by hearing aid users remained low (Bertoli et al, 2009; Desjardins & Doherty, 2009; Doherty & Desjardins, 2012).

Participants in all the groups have performed excellent and above satisfaction for most of the basic tasks like locating and opening battery door, switch on/off the hearing aid, inserting/removing a new battery, turn up and down the volume, change the program of the hearing aid and some information about care of hearing aid like not to use hearing aid while sleeping and bathing. All above mentioned tasks are very important for a hearing aid user to perform independently in daily life situations. The finding of the present study is in agreement with other authors who show excellent performance in removal/insertion of hearing aid, battery door opening and insertion of a new battery and manipulation of volume switch tasks (Desjardins & Doherty, 2009; Doherty & Desjardins, 2012; Campos, Bozza, and Ferrari, 2014).

Other finding of this study reveals that all the participants performed less than satisfactory and poor performance of some tasks like using the t-coil switch/programme, placing of telephone with respect to hearing aid, cleaning the part of mould and hearing aid, size of battery and connecting the mould to the hearing aid. All these findings are in agreement with the previous studies, which says that the hearing aid users fail to perform all these tasks and forget the maintenance related information (Desjardins & Doherty, 2009; Campos, Bozza, and Ferrari, 2014). The possible reason for this poor performance could be related to less frequent manipulation of these tasks by many hearing aid users on a regular basis.

From the results of the present study, it can be inferred that,

1. The ability to handle the hearing aid improves with the duration of hearing aid use but overall performance remains low.
2. There is a need to give extra concentration on those tasks which requires more personal practice and skill to achieve efficiency like inserting mould/tip into ear canal themselves.
3. Information taught to clients initially remains same for a period of time and there is a tendency that hearing aid users forget some important information.
4. Hearing aid users requires a longer period of time and practice to understand the use of their hearing aid so that they

learn to manipulate their hearing aids adequately and frequent follow up sessions should be provided to new hearing aid users.

Implication

Hearing aid skill test would give us an insight into the efficacy of counseling provided in the audiology clinic.

- It will also give us an idea about the skills, those must be considered important during counseling.
- This study will help us to find out the skills which are difficult to perform and to tackle those difficult tasks while handling the device.
- The study will help us in designing a standard counseling format.
- The study will help us to come up with a video on counseling.

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Appendix-1

HEARING AID HANDLING SKILLS TEST (HAHST)

S.No.	Skills	Tasks	4	3	2	1	0	Remarks
1.	Remove your hearing aid	a) Grasping aid/dexterity						
		b) Removal of 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) Insert new battery						
4.	Show me how you clean your hearing aid/ Parts of hearing aid.	a) Sound bore of ear mould						
		b) Microphone						
		c) Vent						
5.	Put your hearing aid(s) back in your ear(s).	a) Grasping aid/dexterity						
		b) Placement in ear						
6.	Manipulation of volume control	a) Turn up volume						
		b) Turn down volume						
7.	Show me how you use the telephone with your hearing aid(s)	a) Correct use of program/t-coil switch						
		b) Placement of phone in relation to hearing aid						
8	Show me how to use different programs							
9	Handling the ear mould/ Ear tip	a) Connecting to the ear hook						
		b) Identifying right/left ear mould						
10	Switch off/ Switch on the hearing aid							
11	Knowledge about hearing aid battery	a) Life of battery						
		b) Size of battery						
		c) Battery cover removal for insertion into battery compartment						
		d) Voltage of battery						
12.	Simple trouble shooting	a) Detecting Blocked ear mould						
		b) Detecting Old battery						
		c) Detecting Hearing aid is not working						
13.	When will you not use your hearing aid?	a) While bathing						
		b) While sleeping						
		c) During active discharge						
		d) As advised by Audiologists						
14.	Knowledge about serial no.	a) Do you know that, there is serial no. on hearing aids						
		b) Identify serial no. where it is located on your hearing aids?						
		c) Do you know the significance of serial no. on hearing aids						