Development of Hearing Aid Benefit Questionnaire for Adults

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Abstract

The objective of the present study was to develop a questionnaire for evaluating hearing aid benefit in adults and also to compare the benefit perceived by family members and hearing aid users. Thirty adults diagnosed as having mild to moderately severe sensori-neural hearing loss in the age range of 18 to 50 years participated in the study. All the subjects were fitted with monaural hearing aid with the speech identification scores greater than 60%. Totally 84 questions were chosen under eight subscales in terms of communication in favorable condition, communication in unfavorable condition, listening over telephone, listening to music, annoyance, social and emotional behavior, care, usage and knowledge about hearing aids and perceived benefits by family members of the hearing aid users. Results showed that there was a significant difference between unaided and aided conditions in both analog and digital hearing aid users. But the findings were not significant in terms of perceived benefit between analog and digital hearing aid users. The study showed that there is no significant difference between the benefit perceived by hearing aid users and their family members. The study also revealed that hearing aid benefit questionnaire is an efficient tool in quantifying hearing aid benefit in adults.

Key words: Q*uestionnaire, listening conditions, hearing aid*

Introduction

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. Hearing loss is a significant contributor to the global burden of disease in individuals, families, communities and countries.

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 sensori-neural hearing loss. Among all the types, sensori-neural hearing loss has grave consequences of hearing impaired individuals especially in adults. The ability to understand speech deteriorates and the distortion is another factor that causes the greatest difficulty. Northern and Downs (2002) stated that hearing loss affects social participation, emotional and behavioural well-being, employment status and quality of life. Fortunately, the effects of hearing loss can be limited by effective amplification and aural rehabilitation.

The first and fundamental step in the aural rehabilitation process involves amplification. A hearing aid is the primary tool in the rehabilitation process (Alpiner & McCarthy, 2000). Providing just amplification is not enough. The benefit through the hearing aid has to be measured for the overall outcome. A wide variety of hearing aid outcome measures have been developed over the past couple of decades. Most of these measures can be categorized as measures of aided performance, benefit, satisfaction, or use. In contrast to measures of aided performance, hearing aid benefit is established by comparing aided performance to unaided performance within the same wearer or group of wearers.

According to Humes (1999), objective measures of benefit include real-ear insertion gain (REIG= REAR-REUR) and changes in speech recognition scores associated with hearing aid use. Subjective measures of benefit can also be obtained as well. Hearing aid wearers can provide sound-quality judgments, for example, for a variety of stimuli with and without their hearing aids with the goal of improving sound quality in the aided condition. Hearing aid wearers can also be asked to establish subjectively their aided and unaided performance in a variety of specified listening situations with the difference providing a subjective measure of benefit. The Profile of Hearing Aid Benefit (PHAB; Cox, Gilmore & Alexander, 1991) and, more recently, the abbreviated version of this instrument, the APHAB (Cox & Alexander, 1995), have both proven useful in this regard.

One of the first published self-reports of hearing aid outcome was the Scale of Self-Assessment of Hearing Handicap (High, Fairbanks & Glorig, 1964). Self-report outcome measures with known psychometric properties are useful for determining the effectiveness of hearing aids. Effectiveness with amplification can be

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measured across several dimensions, including handicap reduction, acceptance, benefit, and satisfaction. Several different self-report measures of hearing aid outcome have been developed over the past two decades addressing each one of these dimensions.

According to Cox (2003) there are at least three reasons to use self-report measures of benefit and satisfaction. First, for largely economic reasons, health care, it is critical to measure the real-world benefit and satisfaction of hearing aid use. A second reason is related to the fact that many of these real-world experiences simply cannot be measured effectively in laboratory conditions. Third, even when laboratory conditions are used to simulate real-world listening situations they do not always resemble the patient's impression of the actual real-life situation.

Several questionnaires were developed to assess hearing aid satisfaction and benefit for the adult hearing users. These included Hearing Aid Performance Inventory (HAPI), (Walden, Demorest & Hepler, 1984), the profile of hearing aid performance (Cox & Glimore, 1990), the profile of hearing aid benefit (Cox et al., 1991), the abbreviated profile of hearing aid benefit (APHAB) (Cox & Alexander, 1995), Client-Oriented Scale of Improvement (COSI), (Dillon, James & Ginnis, 1997), Glasgow hearing aid benefit profile (Gatehouse, 1999).

Hearing Aid Performance Inventory (HAPI), (Walden et al., 1984), it consists of 64 items and uses five point rating ranging from no help to very helpful. The goal of the HAPI is to assess the effectiveness of amplification on a variety of everyday listening situation. The HAPI has been normed on 128 hearing aids users.

The profile of hearing aid performance (Cox & Gilmore, 1990), consists of 66 items measuring two aspects of hearing aid performance: Speech and communication in a variety of everyday listening situations, and reaction to loudness or quality of environmental sounds.

The profile of hearing aid benefit (Cox et al., 1991) consists of 66 items under seven subscales. It uses seven point rating scale which includes: Always, almost always, generally, half of the time, occasionally, seldom and never. PHAB compares the unaided and aided scores to provide information about hearing aid benefit. Five subscales address speech understanding, which includes ease of communication, familiar talkers, reverberation, reduced cues, and background noise. And two subscales address problem related to environmental sounds and distorted sounds.

The abbreviated profile of hearing aid benefit (APHAB) given by Cox & Alexander, (1995), is a shorthand version of the PHAB. It consisted of four subscales with 24 items in four areas: ease of communication, reverberation, background noise, and aversiveness to sounds. Patient is asked to mark one of the following: 99%-always, 87%-almost always, 75%-generally, 50%- half of the time, 25%- occasionally, 12%-seldom and 1%-never.

Client-Oriented Scale of Improvement (COSI), (Dillon et al., 1997), it is an individualized questionnaire that directly assess benefit. It uses five point rating scale and contains questions related to different listening situations.

Glasgow hearing aid benefit profile (Gatehouse, 1999), is a client-centered questionnaire aimed at assessing aspects of auditory disability, handicap, and hearing-aid benefit. This questionnaire initially accesses four pre-specified listening circumstances which commonly occur in the lives of hearing-impaired clients and up to four client-specified listening situations. Each of these are evaluated on two scales prior to fit with hearing aid (initial disability and handicap) and four subscale regarding use, benefit, residual disability and satisfaction after being fit with hearing aid. A Similar questionnaire has been developed by Vanaja (2000), which primarily assess the hearing handicap more directly and systematically. This assess based on certain parameters such as communication in quiet and noise situation, Aversiveness, Psychological and for different environmental sounds such as telephone ringing, door knock etc.

Method

Participants

Thirty adults (19 males and 11 females) in the age range of 18-50 years, with a mean age of 40 years consented to participate in the study. All the subjects had pure-tone unaided thresholds in the range from mild to moderately-severe sensori-neural hearing loss (in frequencies between 250 Hz and 8000 Hz) and the aided pure-tone threshold within the speech spectrum (in frequencies between 500 Hz to 4000 Hz). The speech identification scores would be in proportion to the pure-tone hearing thresholds. However, the aided speech identification scores should be more than 60%. All the participants were fitted with hearing aid (*monaural*) for at least 6 weeks and with the usage minimum 6 hours per day in most of the listening situation like home environment and outside environment. There was no otologic and neurological history.

Instrumentation

A calibrated (ANSI S 3.6-1996), dual channel diagnostic clinical audiometer OB-922 with TDH-39 headphone housed in MX-41/AR cushion with audio cups was used for pure tone audiometry and for measuring speech identification scores (using a calibrated microphone). Calibrated sound field audiometer (Madsen OB922 Version 2) was used for measuring functional performance of hearing aid. A calibrated Grason Stadler Tympstar (GSI-TS Version 2) was used to ensure the presence of normal middle ear function. A computer with Hi-PRO hardware and NOAH 3 software was used for programming the digital hearing aids.

Test environment

All the audiological tests were carried out in an acoustically sound treated room. The ambient noise levels would be within permissible limits (ANSI S3.1, 1991).

Procedure

The study was carried out in two phases:

Phase I - Development of the questionnaire: The questionnaire (APPENDIX) was developed in English language and questions were chosen based on different listening situations (communication in quiet, in noise, listening over telephone, listening music) faced by normal hearing individual, according to the Indian scenario and from few exiting questionnaire like the Abbreviated profile of hearing aid benefit, (Cox & Alexander, 1995), Client-Oriented Scale of Improvement (COSI), (Dillon et al., 1997), Glasgow Hearing Aid Benefit Profile (GHABP), (Gatehouse, 1999), Self assessment of hearing handicapped, (Vanaja, 2000). For the selection of questions appropriate suggestions were considered from the twenty professionals (audiologists and speech &language pathologists).

Total 84 questions chosen were further divided into eight subscales in-terms of communication in favorable condition (quiet), communication in unfavorable condition (noisy condition & reverberation), listening over telephone, listening music, annoyance, social and emotional behavior, also care, usage and knowledge about hearing aids. The last subscale was based on the perceived benefits by family members of the hearing aid user.

The selected questions were evaluated by 20 speech and hearing professionals and 20 laymen for the validation of the questionnaire. Based on their suggestions, appropriate modifications were incorporated in the questionnaire. Prior to the administration of the questionnaire, pure tone audiometry was done from 250 Hz to 8 kHz at octaves for air conduction stimuli and from 250 Hz to 4 kHz for bone conduction stimuli using modified Hughson-Westlake method (Carhart & Jerger, 1959). Speech audiometry was done using modified Tillman-Olsen method (1973); inbuilt talk back system was used for speech audiometry.

Functional gain measurement was done to evaluate the hearing aid performance. Based on the results of above mentioned test, suitable subjects who fulfilled our subject selection criteria were taken for the study.

Phase II - Administration of the questionnaire on the hearing aid users: Once the participants fulfill the selection criteria, the aim, objective and the need for the study was explained to the patients. Consent form was filled once the client approves his/her participation in the study. Clients were advised to read the questionnaire before filling. The questionnaire is self administered, however, if the client requires assistance, the questionnaire can be interviewed assisted.

The first seven subscale of the questionnaire were administered to the subjects who are using their hearing aids (analog or digital) with the experience of at least 6 weeks. The last subscale of same questionnaire was administered on family members of the hearing aid users. The rating and scoring would be similar to that used for the hearing aid users.

For each questions, participants were asked to make the judgment as to the percent of time. They were asked to rate each question on five point rating scale (**A**, **B**, **C**, **D** & **E**). There are five possible choices given: **A**-never, **B**-Occasionally, **C**-half of the time, **D**-Generally and **E**-Always. Scoring for each point was 0% for response '**A**', 25% for '**B**', 50% for '**C**', 75% for '**D**' and 100% for '**E**'.

For the first five [communication in favorable condition (quiet), communication in unfavorable condition (noisy & reverberation), listening telephone, listening music, annoyance] and for the last two subscale [usage & knowledge about hearing aids and perceived benefit by family members of the hearing aid user], higher scores indicates more perceived benefit in particular situation and lower scores indicates less perceived benefit.

For the sixth subscale (social and emotional behavior), higher scores indicate poor social and emotional behavior and less score indicates a good social and emotional behavior. Again the same questionnaire was

administered to the randomly selected participants after two weeks, for the test-retest reliability of the questionnaire.

Scoring of questionnaire was carried out and initially values were assigned to each answer from the index. The values were denoted in percentage from 1% to 100%. For each subscale, average unaided score and average aided scores were calculated in percentage. The global score is the mean of the scores for all items in the subscales i.e. communication in favorable condition (quiet), communication in unfavorable condition (noisy condition & reverberation), aversiveness of different sounds, listening over telephone, listening music, annoyance, social and emotional behavior, care, usage & knowledge about hearing aids and perceived benefit by family member of the hearing aid user.

In order to compare perceived benefit by family members and hearing aid users, scoring was differed. For comparison, same questions were selected from user's responses and then values were averaged for unaided and aided responses, and then compared with the value obtained from family members.

Results

The data obtained after administration of hearing aid benefit questionnaire developed in phase I was subjected to statistical analysis, to check if the developed questionnaire is psychometrically robust, demonstrating adequate reliability and validity.

Comparison of the mean benefit scores between unaided and aided condition across different subscales in analog hearing aid users and digital hearing aid users

In order to compare the mean benefit scores between unaided and aided in analog and digital hearing aid users across different subscales (communication in quiet, noise & reverberation, listening to music, annoyance and social & emotional behavior) mixed ANOVA was carried out. Non-parametric test was done for other subscales (listening over telephone, care and usage of hearing aid, perceived benefit by family member and user) because of an unequal number of participants responses. In order to compare the significant difference between both the conditions (unaided & aided) paired t-test and Wilcoxon Signed Rank test was carried out in each group.

Table 1 reveals mean percentage scores of analog and digital hearing aid users for all eight subscales in both unaided and aided condition. The mean percentage scores of the aided condition are higher than the unaided condition except for two subscales i.e. annoyance and social and emotional behavior. Across groups, mean percentage scores are slightly higher for digital hearing aid users than analog hearing aid users.

In order to compare the scores between unaided and aided condition for different subscales, paired t-test was carried out for five subscales (communication in quiet, noise, listening to music, annoyance and social & emotional behavior) and Wilcoxon signed rank test was carried out for other subscales (listening over telephone, usage & care, perceived benefit by family and user)**.** Results showed that the aided condition are significantly higher than the unaided condition in both analog and digital hearing aid users except in one subscale for analog hearing aid users i.e. social and emotional behaviour which showed no significant difference in both the unaided and aided conditions [$t(1,9)=0.344$; $p>0.05$].

The mean percentage scores of unaided condition ranged from 34% to 89%. Lowest score obtained for communication in unfavorable condition (34.57%) which shows participants were having more difficulty in noise to understand speech and higher score obtained for the annoyance subscale (88.67%) which shows participants were more comfortable with environmental sounds in unaided condition. In the unaided condition, standard deviations for scores are in between 19% to 30%. Standard deviation for the subscales are large enough to indicate that at the level of subscales there was considerable variability among the participants in terms of exposure and degree of hearing loss.

The mean percentage scores of aided condition ranged from 39% to 85%. The lowest score in aided condition was obtained for social and emotional behavior sub-scale (39.13%) which shows good social and emotional behavior with the hearing aid and highest scores was obtained for listening in a quiet situation (84.86%). They reported that with the hearing aid they were getting more benefit in quiet situation especially at home as compared to other situation like noise, listening over telephone, listening to music. In the aided condition, standard deviations for scores are in between 10% and 24%. Standard deviation for the subscales are large enough to indicate that at the level of subscales there was considerable variability among the participants in terms of their use of hearing aid and degree of hearing loss.

In order to compare the scores between analog and digital hearing aid users across different subscales, MANOVA test was carried out for 5 subscales

Table 1: Mean and Standard deviation for unaided and aided scores across different conditions (unaided & aided) and subscales in (analog and digital hearing aid uses)

Subscales	Analog hearing aid users					Digital hearing aid users				
	N	UNAIDED		AIDED		N	UNAIDED		AIDED	
		Mean (%)	SD	Mean (%)	SD		Mean (%)	SD	Mean (%)	SD
Communication in quiet situation	10	49.32	21.84	84.86	11.56	20	45.56	20.61	92.47	4.67
Communication in noisy & reverberant situation	10	34.57	24.19	70.57	17.33	20	31.29	19.73	79.21	10.25
Listening over telephone	6	41.89	22.89	63.79	19.52	19	49.62	18.20	81.04	14.98
Listening to music	10	42.96	29.43	77.27	18.93	20	44.73	24.93	86.12	14.03
Annoyance	10	88.67	19.02	62.90	21.83	20	92.08	8.64	56.30	20.88
Social & emotional behaviour	10	41.83	28.07	39.13	23.18	20	53.06	29.64	22.66	18.36
Care and usage of hearing aid	10	-	-	66.67	12.86	20	-	-	73.44	14.32
Perceived benefit by family	5	50.90	27.68	80.92	10.42	5	30.00	17.59	75.83	10.48

(communication in quiet, noise, music, annoyance, and social) and because of the unequal number of participation in other subscales (telephone listening, care & usage of hearing aid, perceived benefit by family members), Mann-Whitney test was carried out to find significant difference. Results of MANOVA and Mann-Whiteny test are given in Table 2 and 3.

From the Table 2, it can be observed that in unaided condition, for all the five subscales (communication in quiet, noise, listening music, annoyance and social & emotional behavior) there was no significant difference ($p>0.05$) between analog hearing aid users and digital hearing aid users in unaided condition.

In aided condition, two subscales (quiet and social & emotional bahavior) there was a significant difference ($p<0.05$) between the two groups. In quiet situations, digital hearing aid users had got higher scores than analog hearing aid users which shows that there is a more perceived benefit in quiet situations by digital hearing aid users than the analog hearing aid users. In social and emotional behavior subscale, digital hearing aid users had got lesser scores than analog hearing aid users which shows that there is good social interaction with the outside environment by digital hearing aid users than the analog hearing aid users. Wood and Lutman (2004) showed advantages with advanced digital over simple linear analog aids in terms of both objective and subjective outcomes, although average differences are not large.

Result of MANOVA cross checked was with non-parametric Mann-Whitney test because of unequal sample size between the groups. Results of Mann-Whitney test matched with MANOVA.

From Table 3, it is evident that other 3 subscales in both the conditions (unaided and aided) had got $p>0.05$. So, there is a no significant difference between the analog and digital hearing aid users in both the conditions (unaided and aided).

Comparison of the benefit perceived by the family members and the hearing aid users

In order to compare perceived benefit by the family members and hearing aid user, first mean values were calculated and then the Mann-Whitney test was performed.

Table 2: Comparison between analog and digital hearing aid users for unaided condition and aided condition by MANOVA

Subscales	Analog vs Digital hearing aid users			
	UNAIDED		AIDED	
	t(1,28)	p	t(1, 28)	p
Communication in quiet	0.214	0.647	6.679	0.015
Communication in noise & reverberation	0.159	0.693	2.972	0.096
Listening to Music	0.030	0.864	2.103	0.158
Annoyance	0.467	0.500	0.647	0.428
Social & emotional behaviour	0.992	0.328	4.506	0.043

Table 3: Comparison between analog and digital hearing aid users for unaided and aided condition by Mann-Whitney Test

Subscales	Analog vs Digital Hearing aid users			
	UNAIDED		AIDED	
	Z	p	Z	p
Listening over telephone	-0.48	0.63	-2.29	0.22
Care and usage of hearing aid	-	-	-1.524	0.127
Perceived benefit by family	-1.358	0.175	-0.522	0.602

Table 4: Mean scores and standard deviation of perceived benefit by family members and hearing aid users for unaided and aided condition in both analog and digital hearing aid users

Conditions	Analog hearing aid users				Digital hearing aid users			
	UNAIDED		AIDED		UNAIDED		AIDED	
	Mean (%)	SD	Mean (%)	SD	Mean (%)	SD	Mean (%)	SD
Perceived benefit by family	50.90	27.68	80.92	10.42	30.00	17.59	75.83	10.48
Perceived benefit by user	52.99	19.59	74.41	15.68	49.17	11.083	79.17	11.12

Table 4 was obtained for the unaided and aided conditions for perceived benefit by family members of users of analog and digital hearing aid users to show the comparison between the two groups.

From the Table 4, in analog hearing aid users, unaided mean scores for family members and users are 50.9% to 52.99% and for aided condition scores are 80.92% to 74.4%. Family members showed slightly more perceived difficulty in unaided condition for user than the actual hearing aid users but in aided condition hearing aid users reported little benefit in aided condition than the family members.

In digital hearing aid users, unaided mean scores for family members and users are 30% and 49.17% and for aided condition scores are 75.83% and 79.17%. In both the condition (unaided and aided) family members showed slight perceived difficulty in unaided condition and less perceived benefit for hearing aid users in aided condition. So as conclusion, family members feels less perceived benefit and more perceived difficulties for the hearing aid users than the actual hearing aid user. Newman and Weinstein (1986) showed that the hearing-impaired individual tended to perceive their hearing loss as more handicap than the spouses. As a measure of hearing aid benefit, Newman and Weinstein (1988) showed reduction in perceived handicap, as measured using the HHIE, was greater for the hearing aid users than for their spouses. In order to compare perceived benefit by family members and hearing aid users across analog and digital hearing aid users, Mann-Whitley Test was performed (Table 5). The value showed that there is no significance difference (p>0.05) between perceived benefit by family members and users in both unaided

Table 5: Comparison between benefit perceived by family members and hearing aid users for unaided and aided condition by Mann-Whitney Test

Conditions	Analog hearing aid users		Digital hearing aid users	
	Z	p	Z	p
Family unaided – user unaided	-0.405	0.686	-2.023	0.043
Family aided – user aided	-1.214	0.225	-1.051	0.500

and aided conditions, except for perceived benefit by family members and users in digital hearing users for unaided condition. This showed that there is a significant difference (p<0.05) in that family members showed more perceived difficulties than the digital hearing aid users.

To evaluate the test-retest reliability of the developed questionnaire

Test retest reliability of questionnaire was assessed by calculating the scores obtained on a retest after 2 weeks using the same questionnaire on a five randomly selected participants.

Test retest reliability for hearing aid benefit questionnaire was assessed by finding reliability coefficient "Cronbach's α" that was not significant (unaided and aided) in all subscale. Results showed that reliability coefficient "Cronbach's α" has got a value (p≥0.05), which indicates that there is good retest reliability for the hearing aid benefit questionnaire for all the subscales for both aided and unaided conditions.

Results showed that there is significant difference in mean percentage scores between unaided and aided conditions in both analog and digital hearing aid user groups. This result indicated that there is a perceived hearing aid benefit in both the groups (analog and digital hearing aid users). There was higher mean percentage scores in the favorable situations (quiet) as compared to unfavorable situations (noise and reverberation), which indicated more perceived hearing aid benefit in quiet listening situations than the more difficult listening situations (noisy & reverberant environment) in both analog and digital hearing aid users. The results are consistent with other studies using subjective measures that suggested decrease in perceived hearing aid benefit in unfavorable condition and also uncomfortable with the hearing aid (Cox & Alexander, 1995).

For the comparison of perceived hearing aid benefit between the groups, results showed that there is no significant difference in scores for communication in noise and reverberation, listening to telephone, listening to music, annoyance, care & usage of hearing aid and perceived benefit by family members, between the analog and digital hearing aid users. But there is a significant difference between in scores for communication in quiet and social & emotional behavior, which was higher for digital hearing aid users. It indicated that digital hearing aid users were getting more perceived benefit in quiet situation than the analog hearing aid users because of the advantage of digital technology over the analog technology. Digital hearing aid users also showed good social and emotional behavior than the analog hearing aid user. This difference might be because of cosmetic appearance of the hearing aid. The highest mean percentage scores for digital hearing aid users in quiet situation may be because of the good processing technology for digital aids than the analog hearing aids. Wood and Lutman (2004) also showed advantages for digital hearing aid over simple linear analog hearing aids in terms of both objective and subjective outcomes. But differences noticed were not large. The questionnaire developed has got a reliability value of greater that 90% for all the subscales in both conditions (aided and unaided) in the present study which indicates high test-retest reliability of the questionnaire as a clinical tool. So, the result of the study described above, proves that the hearing aid benefit questionnaire is an efficient tool in quantifying hearing aid benefit in adults.

Conclusions

The result of the study showed that the aided scores for different listening situations (quiet, noise, telephone, listening phone, listening music) were higher than the unaided scores which indicated observable hearing aid benefit in analog and digital hearing aid users. For annoyance, the aided scores were lower than the unaided scores in both analog and digital hearing aid users which indicated that they are not comfortable in hearing loud environmental sounds. But there is no significant difference between the analog and digital hearing aid users for different subscales except for quiet and social & emotional behaviour, in which digital hearing aid users performed comparatively better.

This study also focused on measuring perceived benefit by hearing aid user and their family members. The

study showed that there is no significant difference between the benefit perceived by hearing aid users and their family members. But this information is very helpful in counselling for the hearing aid user and their family members which may help in increased in perceived benefit for the hearing aid user.

Implications

This questionnaire can be used to measure hearing aid benefit as a screening in outreach programs where facilities and manpower for carrying out objective evaluation are limited like rural areas. Also, it can be used to obtained information from an individual's hearing complaints with the hearing which cannot be possible through conventional audiometric testing. The information from the questionnaire can also be utilized while counselling the hearing impaired individual and his/her family members. Information obtained by means of the questionnaire can be very helpful to do fine tuning for digital hearing aid according to the patients need and also helpful in the selection of the hearing aid and assistive listening device according to persons difficulty like difficulty in listening telephone or music.

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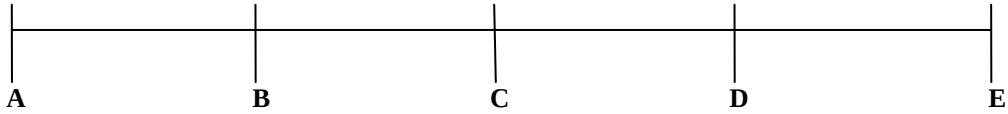
Appendix

Instruction: Please tick (✓) the answer (**A**, **B**, **C**, **D**, and **E**) that comes close to your everyday experience. Notice that each choice includes a percentage. For example, if a statement is true about 50% of the time, circle '**C**' for that question. If you have not experience the situation we describe, leave that item blank.

Scoring as follows:



Never	***Occasionally***	***Half of the time***	***Generally***	***Always***
(0%)	(25%)	(50%)	(75%)	(100%)

1. Communication in favourable condition (in quiet):

Questions	Without hearing aid	With hearing aid
Are you able to understand speech from a distance of 3-4 feet?	A B C D E	A B C D E
Are you able to understand speech from a distance of 4-5 feet?	A B C D E	A B C D E
Are you able to follow the family member's conversation?	A B C D E	A B C D E
Are you able to interact at home without asking any repetition?	A B C D E	A B C D E
Are you able to listen to the soft speech?	A B C D E	A B C D E
Are you able to follow speaker conversation without feeling it's too loud?	A B C D E	A B C D E

Questions	Without hearing aid	With hearing aid
Are you able to understand speech without looking for lip-movements?	A B C D E	A B C D E
Do you understand speech without hearing any distortion?	A B C D E	A B C D E
Are you able to understand speaker's speech (male/female)?	A B C D E	A B C D E
Are you able to hear the sound from front direction?	A B C D E	A B C D E
Are you able to hear the sound from side (right or left) direction?	A B C D E	A B C D E
Are you able to hear the sound from back direction?	A B C D E	A B C D E
Are you able to monitor your own voice while speaking to others?	A B C D E	A B C D E
Are you able to listen television with the same volume as others in your home?	A B C D E	A B C D E
Are you able to understand the dialogues while watching television?	A B C D E	A B C D E
Are you able to listen to the radio?	A B C D E	A B C D E

2. Communication in unfavourable condition (in noisy and reverberent condition):

Questions	Without hearing aid	With hearing aid
Are you able to understand speech from a distance of 3-4 feet in noisy situation (e.g. group, office)?	A B C D E	A B C D E
Are you able to understand speech from a distance of 4-5 feet in noisy situation (e.g. office, group discussion)?	A B C D E	A B C D E
Are you able to understand conversation of family members when the television is on?	A B C D E	A B C D E
Are you able to follow conversation with your friend or family member in a restaurant?	A B C D E	A B C D E
Are you able to follow conversation with shopkeeper in a market place?	A B C D E	A B C D E
Are you able to listen to conversations when you are in a group of friends?	A B C D E	A B C D E
Are you able to understand speech without looking for lip-movements in a noisy situation?	A B C D E	A B C D E
Are you able to localize sound from front direction in a noisy situation?	A B C D E	A B C D E
Are you able to localize sound from back direction in a noisy situation?	A B C D E	A B C D E
Are you able to understand conversations in social gatherings such as marriage, party etc?	A B C D E	A B C D E
Are you able to follow the conversation of your friend or family member in a park?	A B C D E	A B C D E
Are you able to understand the announcements in a railway station?	A B C D E	A B C D E
Are you able to understand the announcements in a bus stand?	A B C D E	A B C D E
Are you able to follow conversation inside a moving bus?	A B C D E	A B C D E
Are you able to follow conversation inside a car when stereo is on?	A B C D E	A B C D E
Are you able to follow the dialogues in a movie theatre?	A B C D E	A B C D E
Are you able to follow the lectures in a classroom?	A B C D E	A B C D E
Are you able to follow the conversation of your friend inside a shopping mall?	A B C D E	A B C D E

3. Listening over telephone:

Questions	Without hearing aid	With hearing aid
Are you able to hear the ringing of telephone?	A B C D E	A B C D E
Are you able to listen to telephone conversation in a quiet situation (e.g. bedroom, office cabin etc.)?	A B C D E	A B C D E
Are you able to converse through mobile phone in a market place (e.g. shopping mall, general store, vegetable market)?	A B C D E	A B C D E
Are you able to converse on telephone without asking any repetition?	A B C D E	A B C D E
Are you able to hear the voice clearly on telephone without hearing any distortion?	A B C D E	A B C D E
Are you able to follow the conversation without any tolerance problem?	A B C D E	A B C D E
Are you able to recognise male speaker's voice through	A B C D E	A B C D E

telephone?		
Are you able to recognise female speaker's voice through telephone?	A B C D E	A B C D E
Are you able to recognise child speaker's through telephone?	A B C D E	A B C D E
Are you able to listen to telephone/mobile phone conversation in telecoil mode?	A B C D E	A B C D E

4. Listening to music:

Questions	Without hearing aid	With hearing aid
Are you able to listen to the music in quiet situation (e.g. home, office cabin?	A B C D E	A B C D E
Are you able to follow the music playing in a high background noise (e.g. marriage, birthday party)?	A B C D E	A B C D E
Are you able to follow the music while driving the car?	A B C D E	A B C D E
Are you able to recognise the musical instruments (e.g. tabla, guitar, piano, and drum) while listening to music?	A B C D E	A B C D E
Are you able to follow the lyrics (wordings) of the song in quiet situation (e.g. home, office room)?	A B C D E	A B C D E

5. Annoyance:

Questions	Without hearing aid	With hearing aid
Do you feel comfortable listening to home environmental sounds (e.g. cooker whistle, door bell, alarm, telephone ring)?	A B C D E	A B C D E
Do you feel comfortable hearing traffic noise (e.g. bike/scooter/truck)?	A B C D E	A B C D E
Are you able to tolerate the sound when you pass through noisy environment (e.g. construction area, factory, office)?	A B C D E	A B C D E
Do you feel comfortable about the sound produced while eating?	A B C D E	A B C D E
Do you feel comfortable while listening to television?	A B C D E	A B C D E
Are you able to tolerate children's scream while playing without any irritation?	A B C D E	A B C D E

6. Social and emotional behaviour:

Questions	Without hearing aid	With hearing aid
Do you feel embarrassed when meeting new people?	A B C D E	A B C D E
Do you feel frustrated when talking to members of your family?	A B C D E	A B C D E
Do you avoid your friends?	A B C D E	A B C D E
Do you feel frustrated when talking to co-workers or friends?	A B C D E	A B C D E
Do you feel left out when you are with a group of people?	A B C D E	A B C D E
Do you feel nervous in different noisy listening situations?	A B C D E	A B C D E
Do you avoid family parties or office parties?	A B C D E	A B C D E

7. Care and usage of hearing aid:

Questions	With hearing aid
Do you know when to change the hearing aid battery?	A B C D E
Do you check whether your hearing aid is in working condition, every time when you switch it on?	A B C D E
Do you wear the hearing aid in most of the listening conditions?	A B C D E
Are you able to change the program settings of your hearing aid appropriately according to the listening situation? (telecoil, noisy situation, music, etc.)	A B C D E
Are you comfortable in wearing your ear moulds?	A B C D E
Do you clean your ear moulds at a regular interval as advice?	A B C D E
Do you know what to do, if there is squealing in your hearing aid?	A B C D E
Do you go for reprogramming of your hearing aid periodically?	A B C D E
Are you concerned about hygiene of your hearing aid?	A B C D E
Do you visit your audiologist periodically for hearing testing?	A B C D E

8. Perceived benefit by family members:

Questions	Without hearing aid	With hearing aid
Do you think that the person is able to follow the conversation with family member without missing any information?	A B C D E	A B C D E
Do you think that he/she able to interact at home without asking any repetition?	A B C D E	A B C D E
Do you think that he/she is able to understand soft speech while conversation?	A B C D E	A B C D E
Do you think that he/she is able to understand family member's conversation while television is on?	A B C D E	A B C D E
Do you think that he/she is able to understand conversation in social gathering such as friend's party, marriage?	A B C D E	A B C D E
Do you think that he/she is able to listen to the telephone conversation in a quiet situation?	A B C D E	A B C D E
Do you think that he/she is able to listen to the music in home?	A B C D E	A B C D E
Do you think that he/she is feeling comfortable or not getting irritated in listening to home environment sounds (cooker whistle, door bell, alarm, telephone ring, water pump noise)	A B C D E	A B C D E
Do you think that he/she is comfortable to hear traffic noises?	A B C D E	A B C D E
Do you think he/she can converse you without frustration?	A B C D E	A B C D E
Do you that he/she mixes with friends or group of people without avoiding them.	A B C D E	A B C D E
Do you think he/she takes part in family parties or office parties?	A B C D E	A B C D E