

# *Evaluation of User Satisfaction of Hearing Aids (HA) in the Amazon*

## *A Avaliação da Satisfação dos Usuários de AASI na Região Amazônica*

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### SUMMARY

#### **Introduction:**

The main function of human hearing is enabling oral communication. In this sense, hearing loss impairs severely communication skills and social relationships of individuals. Therefore, the project “USP in Rondônia” of FOB/USP conducts expeditions travelling to the municipality from Monte Negro/RO allowing the promotion of hearing health.

#### **Objective:**

To assess the level of satisfaction user with hearing aids (HA).

#### **Method:**

Was accomplished a prospective study of 18 individuals with hearing loss fitted with hearing aids in the Clinic of Oral and Fono Audiological Health from Monte Negro/RO. For the evaluation, we used the questionnaire for self-assessment IOI-HA (International Outcome Inventory for Hearing Aids).

#### **Results:**

Concerning the seven domains assessed, it was verified that the average referring to the use was 4.2, the benefit was 3.9, the limiting of residual activity was 3.7; the satisfaction was 4.4, the restriction of participation of residual activity was 3.8, the impact on others was 4.3 and 3.9 for the quality of life. Respecting the factors one and two, it was applied the statistical test t-Student founding no statistically significant difference. However, the analysis of the score relative to factors one and two showed good results as the individual's interaction with his hearing aid and with their environment, respectively.

#### **Conclusion:**

With this study, we can demonstrate the high grade of satisfaction from the use of hearing aids presented by the majority of the sample collected in all domains analyzed.

#### **Keywords:**

hearing, hearing loss, hearing aids, rehabilitation, patient satisfaction.

### RESUMO

#### **Introdução:**

A principal função da audição humana é possibilitar a comunicação oral. Neste sentido, a deficiência auditiva prejudica gravemente as habilidades comunicativas e as relações sociais dos indivíduos. Dessa forma, o projeto “USP em Rondônia” da FOB/USP realiza expedições itinerantes ao município de Monte Negro/RO possibilitando a promoção da saúde auditiva.

#### **Objetivo:**

Avaliar o nível de satisfação dos usuários de aparelho de amplificação sonora individual (AASI).

#### **Método:**

Foi realizado um estudo prospectivo com 18 indivíduos com deficiência auditiva, adaptados com AASI na Clínica de Saúde Bucal e Fonoaudiológica de Monte Negro/RO. Para a avaliação foi utilizado o questionário de auto-avaliação IOI-HA (International Outcome Inventory for Hearing Aids).

#### **Resultados:**

Em relação aos sete domínios avaliados, verificou-se que a média referente ao uso foi de 4,2; do benefício foi de 3,9; da limitação de atividade residual foi de 3,7; da satisfação foi de 4,4; da restrição de participação de atividade residual foi de 3,8; do impacto nos outros foi de 4,3 e 3,9 para a qualidade de vida. Com relação aos fatores 1 e 2, foi aplicado o teste estatístico t-Student não encontrando diferença estatisticamente significante. No entanto, a análise das pontuações referentes aos fatores 1 e 2 mostraram bons resultados quanto a interação do indivíduo com o seu AASI e com seu ambiente, respectivamente.

#### **Conclusão:**

Com este estudo pode-se atestar o alto grau de satisfação do uso do AASI apresentado pela maioria da amostra coletada, em todos os domínios analisados.

#### **Palavras-chave:**

audição, perda auditiva, auxiliares de audição, reabilitação, satisfação do paciente.

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## INTRODUCTION

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The University of São Paulo (USP) keeping on the tripod teaching, research and extension structured in the 90's an advanced center of research in the municipality of Monte Negro, Rondônia state called the Institute of Biomedical Sciences 5 (ICB5). This Institute was founded with the aim to study and monitor tropical diseases, more common to cities in the north of the country. In order to provide better health's conditions to the population, the Dentistry School of Bauru (FOB-USP), in 2002, began working in partnership with ICB5. This work is being conducted by the needs of oral health and speech of the population, making it possible to plan research and clinical care population.

In the phonoaudiological aspect, actions of health promotion and prevention are carried out focusing on the 5 areas of speech therapy: language, hearing, orofacial motility, voice and public health. Thus, the population became aware of hearing problems and disorders of human communication. In terms of hearing health in 2007 the firsts hearing aid (HA) were adapted, and the rehabilitation program was started.

Hearing loss can be considered a complete or partial loss of ability to obtain auditory information, providing restriction and / or inability to perform activities related to hearing. Hearing impairment (handicap) is not related to the skills resulting from hearing impairment or disability that limit or prevent the individual from performing activities considered as normal, affecting their family relationships, work and society (1). Since the main function of human hearing is to enable oral communication, hearing loss damages severely the communication skills and social relationships of individuals.

In order to softened the stigma and provide a better quality of life of individuals with hearing loss, it is indicated the use of hearing aids (2). The HA has the basic principle of operation to capture ambient sound, amplification and processing of sound, and finally directing the amplified sound to the ear via the external auditory meatus through an auricle mold (3).

Despite technological advances in sound amplification systems, the user satisfaction remains a challenge for audiologists and the high rates of abandonment of the use of hearing aids, a serious problem for health services (4). As in Brazil, but also in other countries like the case of the United States, the rate of dissatisfaction with the hearing aid has already reached 47% and 18% dropped out of the hearing rehabilitation (5).

Thus, the success of the process of adapting the

hearing aid depends, among others, the individual's satisfaction with the results of the use of amplification (6). User satisfaction can be assessed by the auditory rehabilitation outcome that represents the most comprehensive range of factors needed for the final result, which is rehabilitation. The variable of interest is the view of the patient regarding the use of his hearing, not only with performance (4,7,9), depending exclusively on the perceptions and attitudes of the user (10).

A method for assessing the degree of user satisfaction in relation to the use of hearing aids are the questionnaires of self-evaluation. In Brazil, some self-assessment questionnaires were translated and adapted to the reality of our country, investigating the degree of user satisfaction and benefits achieved by the reduction of hearing impairment due to use of hearing aids (6,11).

The questionnaire IOI-HA (*International Outcome Inventory for Hearing Aids*) translated into Portuguese by Bevilacqua et al. as International Questionnaire – Hearing Aids (QI - HA) (8,11) (Figure 1) is a self-assessment instrument that allows measuring the degree of user satisfaction of hearing aids concerning its prosthesis and its environment, beyond to be a simple tool, easy to use and, serves as a facilitator instrument during the period of acclimatization of auditory prosthesis (12).

Thus, this study aimed to evaluate the level of user satisfaction with hearing aids (HA), seen in the municipality of Monte Negro through the project "USP in Rondônia.

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## METHOD

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After approval of the Committee of Ethics in Human Research of the Dentistry School of Bauru, University of São Paulo FOB / USP under opinion. Nº29/2008 the present study was conducted at the Oral Health and Phonoaudiological Clinic from Monte Negro / RO. These itinerants expeditions of undergraduates and graduates students of the municipality of Monte Negro / RO are part of the Project of University Extension - "USP in Rondônia.

Adjustments were made to 44 individuals; however, the participants were 18 individuals of both genders. All participants were volunteers having signed the free and informed term of consent. As inclusion' criteria were selected the individuals with hearing loss fitted with hearing aids and who returned for follow-up after 3 months.

To assess the satisfaction of users in relation to hearing aids, the survey was conducted the self-assessment questionnaire IOI-HA. This questionnaire is a subjective

**IOI - HA**

**Cox; R.M.; Stephens; D, Kramer SE. Translations of the international outcome inventory for hearing aids (IOI-HA). *Int.J. Audiol* 2002; 41:3-26.**

1. Think of the time it used the (s) your (s) device (s) of hearing aid (s) in the last two weeks. How many hours used (s) a hearing individual (s) on a normal day?

do not used  used less than 1 h / day  between 1 and 4h/day  between 4 and 8h/day  more than 8h/day

2. Think about that situation you would like to hear best before getting your device(s) of hearing aid(s). In the last two weeks, as the equipment (s) of hearing aid (s) help (or helped) you in that situation?

did not help (ed)  it quite help (ed)  it help (ed) a few  
 it help (ed) a lot  it help (ed) moderately

3. Think back to the same position as they would like to hear better, before getting your device(s) of hearing aid(s). What degree of difficulty you find STILL in the same situation using the device (s) of hearing aid(s)?

very much difficulty  quite difficulty  a moderate difficulty  a little difficulty  no difficulty

4. Considering everything, do you think it is worth the use of device (s) of hearing aid (s)?

it not worth  it worth a little (helped a few)  it worth moderately  
 it quite worth  it worth a lot

5. Think of the last two weeks, using the device(s) of hearing aid s)? As their heard problems affected you in your activities?

affected very much  quite affected  affected moderately  affected a little  do not affected

6. Think of the last two weeks, using the device(s) hearing ai(s). As their hearing problems affected or bothered other people?

affected very much  quite affected  affected moderately  affected a little  do not affected

7. Considering everything, how do you think that your device(s) of hearing aid(s) changed your enjoyment of life or joy in life?

for the worse or less joy to live  there was not alteration  a little more joy to live  
 a quite joy to live  much more joy to live

**Figure 1.** Model of the questionnaire of self-assessment IOI-HA – absent.

assessment tool that aims to measure the areas that may be important for successful adaptation. The application of the questionnaire was performed after 3 months of hearing aid fitting.

The IOI-HA is composed of 7 questions that are proposed to assess 7 areas: 1. Use 2. Benefit 3. Limitation of residual activity, 4. Satisfaction 5. Restriction of the residual 6. Impact on others and 7. Quality of life.

These areas are evaluated in the condition with the HA, after the user has had an experience with amplification. In the eighth question, it is verified the hearing difficulty degree that the individual presents without the use of

hearing aids. Therefore, the eighth question was not used in the results of this study.

For the analysis of the responses of the IOI-HA were considered: a score for each question, the total score, and score considering two factors: factor 1, which reflects the individual's interaction with the HA (items 1, 2, 4 and 7), factor 2, related to the interaction of the individual and its environment (items 3, 5 and 6). The score ranges from 1 (worst result) to 5 (best result) for each item, and the maximum score (amount of all items) is 35 points.

The questionnaire was administered bodily in a waiting room, using a structured interview technique,

being performed oral reading of the questions and alternatives and the participants chose the alternative that is deemed appropriate without interference from the evaluator. This technique was chosen to avoid answers that did not correspond to reality by the difficulty of understanding of individuals. The time of administration of the IOI-HA was approximately 10 minutes.

To compare the mean scores of the questionnaire among the 7 areas were used Variance Analysis for repeated measures and Tukey test. To compare the average of the scores of factors 1 and 2 used the Treset t test. Was adopted at 5% level of significance ( $p < 0,05$ ).

## RESULTS

In this study, individuals who represented the sample were 13 of the male sex (72.2%) and 5 of the female sex (27.8%) aged between 15 and 82 years (average of 45.6 years) and 3 (16.7%) elderly (aged above 65 years) and 15 (83.3%) adults.

As recommended by the classification of the World Health Organization (WHO), we used the average of auditory thresholds of aerial via in the frequencies of 500, 1000, 2000 and 4000 Hz, thus the participants had an

average of auditory thresholds of aerial via in the frequencies of 500 to 4000 Hz in the right ear ranged from 30.0 to 102.5 dB (average 58.9 dB, SD = 22.5) in the left ear and from 37.5 to 101.3 dB (average of 68, 6 dB, SD = 20.6).

Concerning the degree of hearing loss, based on the ears with better hearing thresholds, we observed the presence of mild hearing loss ( $n = 4$ , 22.2%), moderate ( $n = 9$ , 50%), severe ( $n = 1$ , 5.6%) and acute ( $n = 4$ , 22.2%). As the laterality, only 1 (5.6%) participant had unilateral hearing impairment.

In the Table 1 is described the data on individual scores, total score, beyond the average, standard deviation, median, minimum, and maximum.

The Figure 2 shows the percentage of individuals in the sample, which obtained the highest score in each area assessed.

Considering the results presented it is observed that the area was the highest scoring of Q4 (66.7%) and the lowest score was that of Q3 (33.3%), in other words, 66.7% of individuals report that is worth it a lot using the HA and 33.3% have difficulties with hearing regarding the activities they would like to hear well.

**Table 1.** Individual values obtained for each question, the total score, average, median, standard deviation, minimum and maximum.

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	TOTAL
I1	5	4	3	5	3	4	4	28
I2	3	5	5	5	5	5	5	33
I3	3	2	3	2	2	3	2	17
I4	3	5	3	5	5	4	5	30
I5	4	5	4	5	4	4	4	30
I6	5	4	3	5	2	5	4	28
I7	3	4	2	3	3	4	3	22
I8	4	3	3	5	4	3	4	26
I9	4	5	4	5	4	5	4	31
I10	5	5	5	5	5	5	5	35
I11	4	4	4	4	4	5	3	28
I12	4	4	5	5	4	5	4	31
I13	4	5	4	4	4	5	4	30
I14	5	4	5	5	5	5	5	34
I15	5	4	5	4	2	5	3	28
I16	5	4	4	5	5	5	5	33
I17	5	3	4	5	5	4	5	31
I18	4	1	1	3	2	2	2	15
X	4,2	3,9	3,7	4,4	3,8	4,3	3,9	28,3
M	4	4	4	5	4	5	4	30
SD	0,8	1,1	1,1	0,9	1,2	0,9	1,0	5,4
MIN/MAX	3/5	1/5	1/5	2/5	2/5	2/5	2/5	15/35

**Caption:** I=individual; X=average; M= median; SD=standard deviation; MIN= minimum; MAX= maximum; Q1= Use; Q2= Benefit; Q3= Residual activities limitation; Q4= Satisfaction; Q5= Residual participation restriction; Q6= Impact in other and Q7= Quality of life.

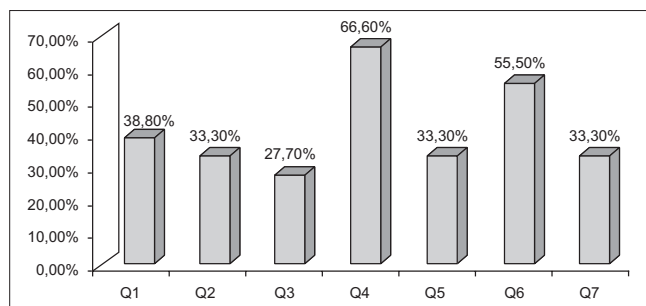


Figure 2. Percentage of individuals that obtained the maximum score on each question - non-existent.

These findings can also be seen in Table 1, whereas the highest average (4.44) in Q4 was the lowest average (3.72) was that of Q3, concerning satisfaction and limited residual activity, respectively.

Table 2 can be seen the average, the lower and upper limits (confidence interval 95%) of the issues, Factor 1, Factor 2 and Total Score. The factors 1 and 2 are presented in their gross and adjusted values. The latter were corrected by dividing the average by 4 and 3, and these figures the amount of issues relevant to each factor. Thus, we attempted to match the weight of each question and thus applied the Student t-test between factors 1 and 2 found no statistically significant difference ( $p = 0.172$ ). The total score also presented with a gross and adjusted value, which was divided by 7, which is the value related to the total issues of this instrument.

In addition, comparisons were made between the seven questions of the instrument used by the analysis of variance with a criterion for repeated measures found a statistically significant difference ( $p = 0.015$ ). Thus, we applied the Tukey test and there was this difference between questions 3 and 4.

## DISCUSSION

According to the American Speech-Language-Hearing Association - ASHA, the process of adapting of the HA must follow steps related to the evaluation of the candidate to use amplification, intervention planning and identification of individual needs, selection of the physical and electro acoustic of the hearing aid, performance verification of devices, guidance and advice to the user and the validation process, which reviews the impact of intervention in the perception of disability and *handicap* (13).

In the validation phase, the questionnaires application is extremely necessary, since it assesses the benefit and the influence of sound amplification in the life of the user, in the social, educational and emotional ambit.

Table 2. Description of estimated average, lower and upper limits (confidence interval 95%) of the IOI-HA issues, factor 1 and factor 2 and, total score.

	Confidence Interval		
	X	Lower limit	Upper limit
Q1	4,2	3,8	4,6
Q2	3,9	3,4	4,5
Q3	3,7	3,2	4,3
Q4	4,4	4,0	4,9
Q5	3,8	3,2	4,4
Q6	4,3	3,9	4,8
Q7	3,9	3,4	4,4
Gross FACTOR 1	16,5	15,0	18,0
Adapted FACTOR 1	4,1	3,8	4,5
Gross FACTOR 2	11,8	10,5	13,2
Adapted FACTOR 2	3,9	3,5	4,4
Gross TOTAL	28,3	25,6	31,0
Adapted TOTAL	4,0	3,7	4,4

Even if the use of questionnaires can measure the satisfaction, we must understand that this is a very personal assessment of the value of using HA and the satisfaction can be defined as fulfilling a desire or gratification of a specific need (14).

The fact that the individual does not reject the use of hearing aid is directly related to the acceptance of hearing loss and therefore the need for amplification, thus the relation of the time of hearing aids use in daily activities and to amplification can be quite difficult . According to the literature, the acceptance can be characterized as a psychological process of coping with the idea and feel of the hearing, while incorporating the device in your lifestyle. This attitude may or may not result in satisfaction (15).

Regarding the first question, concerning the daily use of hearing aids, the results showed an average of 4.2 being the maximum score of 5.0. These findings corroborate the literature, reporting that the daily use of user's analog hearing aid is higher when compared with other technology, noting that the study sample is predominantly users of amplification sound system from analog technology (16).

According to the data in Table 1, it was observed that the average total score was 28.3, with a maximum score of the questionnaire is 35.0. Thus, these results show a high level of satisfaction, thus providing an improved quality of life of these users. However, analyzing the data individually, we see that some users still have difficulties and dissatisfaction with the use of hearing aids.

In Table 2 there was the individual's relationship with his hearing aid (Factor 1) and with their environment (Factor 2), with the highest score of these factors, 16.5 (maximum score of 20) and 11.8 (maximum score 15) respectively, reflected good overall adjustment, as well as in another study (17). However, when compared to factors 1 and 2, statistical analysis indicates no statistically significant difference ( $p = 0.172$ ).

Comparing the scores of the seven questions comprising the questionnaire IOI-HA, there was no statistically significant difference between questions 3 and 4, respectively related to the limited residual activity and satisfaction. It can be observed by displaying the graphic 1 and the averages shown in Table 1 that the Q4 (question 4) was that obtained the highest score, while the Q3 (question 3) the lowest score. Question 4 is related to satisfaction, showing that 66.7% of subjects reported that it is worth to use the hearing aid.

The low score found in Q3 on the limitation of residual activity could be explained by the fact that they have hearing aids adjusted analog technology. These analog devices have some limitations, which were solved with the technological advances present in digital hearing aids. Digital technology provides digital signal processing, low-threshold compression and allows the user to listen to sounds than they would listen with analog hearing aids. These factors, in turn, contribute to a better speech recognition distance and improve the signal to noise ratio, as well as warning signs (14,18).

The seventh issue deals with quality of life of the user a very personal way of asking how amplification affects your enjoyment of life, but the sample does not report the maximum value in unanimously. We believe that satisfaction depends not only on hearing and acceptance of the individual to his hearing problem, but the team of professionals involved in counseling and rehabilitation of these patients.

In this context, we emphasize that these patients receive sporadic care, in which the professional expertise of the Southeast moving through expeditions traveling to the municipality of Monte Negro / RO. Thus, the shortage of trained professionals and the absence of government programs of public policies directed to health, specifically in relation to hearing health can be closely related to the dissatisfaction of users. It is noteworthy that the characterization of this population shows a lack of subsidies, such as health education and public health.

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## CONCLUSION

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Considering the results we can conclude that

individuals adapted Monte Negro / RO have a high level of satisfaction before the sound amplification. The questionnaire of self-assessment IOI-HA was effective to evaluate the satisfaction of users, easy to apply and easy to understand, requiring very little time of the attention from the individuals to complete it. It is noteworthy that in the Amazon region, where the study was conducted, there is shortage of public health policies, among them those related to hearing health.

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