Telehealth: verification of the effectiveness of an orientation program and audiological counseling for adults through teleconsultation

Telessaúde: verificação da efetividade de um programa de orientação e aconselhamento audiológico para adultos através da teleconsulta

Telesalud: comprobar la eficacia de un programa de orientación y consejería audiológica para adultos a través de la teleconsulta

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Abstract

Objective: This study aimed to verify the effectiveness of guidance and counseling of patients with hearing disabilities, users of individual hearing aids (HA), through teleconsultation. Method: The sample consisted of 23 users of hearing aids. Patients were organized into groups separated by locality and participated in three sessions of audiological orientation through teleconsultation. Inventory self-assessment IOI-HA was used to verify the user's behavior change after the intervention group at distance. We evaluated the seven dimensions of the instrument: daily use, benefit, limitation of daily activities, satisfaction, participation restriction, impact on others and quality of life, pre- and post-intervention. Results: It was found that the counseling program was effective for the monitoring of individual hearing

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device users, since significant changes were observed (p-value = 0.039 <0.05) in the level of satisfaction. The results signaled that the therapeutic support using teleconsultation with adult / elderly favored behavior change. Conclusion: The use of teleconsultation for guidance and auditory group counseling proved to be an effective and viable tool for new adult users of individual hearing aids.

Keywords: *Telemedicine; Hearing loss; Counseling; Hearing aids; Remote consultation.*

Resumo

Objetivo: Este estudo teve por objetivo a verificação da efetividade de orientação e aconselhamento de paciente com deficiência auditiva, usuário de aparelho de amplificação sonora individual (AASI), através da teleconsulta. Método: A amostra foi composta de 23 pessoas usuárias de AASI. Os pacientes foram organizados em grupos separados pela localidade. Participaram de três sessões de orientação e aconselhamento audiológico utilizando a teleconsulta. Foi utilizado o inventário de auto-avaliação IOI-HA para verificar a mudança de comportamento do usuário após a intervenção em grupo à distância. Foram avaliadas as sete dimensões do instrumento: uso diário, benefício, limitação de atividades diárias, satisfação, restrição de participação, impacto nos outros e qualidade de vida, pré e pós-intervenção. Resultados: Verificou-se que o programa de aconselhamento foi eficiente para o acompanhamento dos usuários de aparelho de amplificação sonora individual, pois foram verificadas mudanças significativas (p-valor = 0.039 < 0.05) no nível de satisfação. Os resultados sinalizaram que o apoio terapêutico utilizando a teleconsulta com adulto/idoso favoreceu a mudança de comportamento. Conclusão: O uso da teleconsulta para orientação e aconselhamento auditivo em grupo mostrou-se uma ferramenta efetiva e viável para novos usuários adultos de aparelho de amplificação sonora individual.

Palavras-chave: *Telemedicina; Perda auditiva; Aconselhamento; Auxiliares de audição; Consulta remota.*

Resumen

Objetivos: *Este estudio tuvo por objetivo la verificación de la efectividad dela orientación y consejería de paciente con deficiencia de audición, usuario de audífonos individuales (AI) por medio de la teleconsulta.* ***Método:*** *La muestra fue de 23 personas usuarias de AI. Los pacientes fueron organizados en grupos separados por localidad. Participaron de tres sesiones de consejería audiológica utilizando teleconsulta. Fue utilizado e inventario de auto-evaluación IOI-HA para comprobar e, cambio de comportamiento del usuario después de la intervención en grupo, a distancia. Se evaluaron las siete dimensiones del instrumento: uso diario, beneficio, limitación de actividades diarias, satisfacción, restricción de participación, impacto en los demás y calidad de vida, antes y después de la intervención.* ***Resultados:*** *Se encontró que el programa de asesoramiento fue eficiente para acompañar los usuarios de audífonos individuales, porque se observaron mejoras significativas (p-valor = 0,039< 0.05)en el nivel de satisfacción. Los resultados señalaron que el apoyo terapéutico que utiliza la teleconsulta con el adulto mayor favorece el cambio de comportamiento.* ***Conclusión:*** *El uso de la teleconsulta para orientación y consejería auditiva en grupo resultó ser una herramienta efectiva y viable para nuevos usuarios adultos de audífonos individuales.*

Palabras clave: *Telemedicina; Pérdida auditiva; Consejo; Audífonos; Consulta remota.*

Introduction

Telehealth is a broadly defined term used to include the services provided at distance by healthcare professionals with the assistance of communication technology. The concept of telehealth incorporates a wide range of activities, which go beyond patient care; it also encompasses the promotion of disease prevention, epidemiological surveillance, management of healthcare services and environmental protection, among others[1].

In the context of Audiology, the Regional Council allows professionals to provide services such as telecounseling, telehealth second opinion, teleconsultation, telediagnosis, telemonitoring and teleducation, as long as the procedures performed ensure the same effectiveness of those performed in person[2].

As far as the use of teleconsultation in audiology is concerned, it has been described in the relevant literature as an effective tool for different purposes, from screening procedures, for the early detection of hearing loss, to intervention approaches to hearing disability[3-5].

Over the years, several studies have shown that adverse circumstances in the social, emotional, cognitive and behavioral aspects also influence in the quality of life of a hearing impaired individual. Many are the strategies that might be effective to decrease the impact of hearing loss in a person's life; among them fitting hearing aids (HA), group intervention programs, and individual programs.

The technology in HA has also gathered state of the art technology in order to offer proper amplification to meet users' different needs, seeking to improve the hearing abilities and their adjustment to social situations harmed by their hearing sensitivity decrease. Improving individual's hearing capacity means to reduce the sensory deprivation and the handicap (participation restriction), preventing social isolation and providing them with an improvement in their capacity of interacting with the environment in which they live[10].

The World Health Organization (WHO) established in 2003 a new model of the objective of audiological rehabilitation when it launched the ICF-International Classification of Functioning, Disability and Health. By incorporating this new model, audiological rehabilitation was redefined to repair or perfect participation in activities considered challenging to people with hearing disabilities; process in which functionality and the use of the hearing aid are the key points.

In 2004, the Ministry of Health established the National Policy on Hearing Healthcare through Ordinance GM/MS No 2073/2004[12]. According to these new policy guidelines and the new instruction bulletin of audiological rehabilitation, it has been established by Ordinance 793 of April 24th, 2012 and GM 835 of April 25th, 2012, that moderate and high complexity medical centers must ensure HA fitting process. It has also been set that during the validation the amplification, speech perception protocols and patient/family benefit and satisfaction questionnaires should be administered. Regular monitoring of this patient for checkup, medical advice and counseling has also been guaranteed after this national policy. Nonetheless, the monitoring and rehabilitation programs have not grown in the same proportion, making the hearing aid underrated and underused after its adaptation[15].

The monitoring suggested by the instruction bulletin of hearing healthcare[12,13]is a regular procedure, which consists of otolaryngologic and audiological assessment, with the following objectives: check for possible changes in patients' audiological condition, adjustment needs in ear molds or in HA electroacoustic characteristics, and guide patients and their family on how to use this device. The frequency of this monitoring depends on the age of the individual.

However, there is a lot to be done to the effective monitoring of HA users in the area of audiological rehabilitation in the public service. According to hearing health reports[14], some of the weaknesses verified while following up post adaptation patients are the lack of organization of reference and counter-reference; the lack of professionals specialized in rehabilitation in the patient's hometown and the difficulty in keeping them returning to the services in the period suggested by the healthcare ordinance[16].

It is already known that the lack of orientation and proper monitoring will lead to discontinued use of HA. Creating and implementing rehabilitation programs at distance might be an alternative to guiding and counseling HA new users.

Since there is agreement on the necessity of audiological monitoring, orientation and counseling of HA new users, and due to the operationalizing difficulty of the National Policy on Hearing Healthcare concerning its spread throughout the

regions, this study aims to verify the effectiveness of the intervention program based on group guiding and counseling sessions by using teleconsultation to guide and counsel patients with hearing disabilities who are the new users of HA provided by the Brazilian Public Healthcare System (SUS).

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Method

Prospective study, approved by the institution's Human Resource Ethics committee, under the existing number 183/11, carried out from the Telehealth Center at Hospital Cassiano Antônio de Moraes, supported by Secretaria de Saúde do Estado do Espírito Santo.

Casuistry- Three municipalities where the Telehealth Program was fully operating at the time were selected. The municipalities are São Mateus, in the north of the state of Espírito Santo, Muniz Freire and Itaguaçu, in the mountainous area. Based on the choice of municipality and on the municipal Secretariat of Health registration records, 150 patients, HA users without access to hearing rehabilitation in their hometown were randomly chosen. The inclusion criteria were age above 21 years old; acquired hearing loss; use of behind the ear (BTE) and In the ear (ITE) hearing aid (HA); time of HA fitted; no previous experience with other hearing aid; and no return to the service which supplied the HA.

Patients were included in the casuistry only after signing the informed consent form. As an exclusion criterion, patients who did not attend all proposed sessions were excluded. Thus, this study casuistry is made of 23 patients.

Equipment- the activities were organized from the use of the communication technology via Adobe®, Acrobat®Connect™Pro Meeting, a web system that enables the interaction of numerous participants through voice and image sharing.

Researchers made previous contact with the Family Health Program coordinators of each area, local social worker and local speech therapist, who organized the demand to the place where there was connectivity of the municipality Telehealth program remote station, and agreed on the activity calendar.

Three group guidance and audiological counseling sessions were held for 1 hour and 30 minutes long each, at the State Center for Telehealth. The sessions aimed at enabling the individuals to find solutions for their difficulties, which interfere and influence on the hearing loss acceptance and the adoption of the rehabilitation process. A week break was allowed between each teleconsultation session, and all sessions had the content presented through the use of Power point.

The themes were selected according to researchers' general agreement, so as to organize the information for patients in way to enable patient--centered guidance. This allows better understanding of the nature of hearing loss and realistic expectations of the benefits and limitations of amplification. Then, the focus was centered on the hearing device (information related to use and cautions) and effective measures to reduce the effects of hearing loss and to optimize patients hearing abilities with the use of amplification. Therefore, the themes were divided per session as follows: Session 1: Theme A- The anatomophysiology of hearing, hearing loss, audiological assessment, Session 2: Theme B: hearing aid and ear molds: Insertion and removal of hearing aid, batteries, external controls, telephone use, care and cleaning, and Session 3: Theme C: strategies of communication: the set of activities that work as facilitators so that the message is more easily received visually or aurally.

In order to evaluate the performance of patients who wear hearing aids, the International Outcome Inventory for Hearing Aids (IOI-HA)18 was administered by the mediator in each city (social worker or speech therapist) for patients' self-assessment before and after intervention. IOI-HA questionnaire consists of seven questions and it evaluates seven domains that verify the HA fitting result regarding daily use, benefit, everyday activity limitation, satisfaction, residual participation restriction, impact on others and quality of life. Each item receives a score from 1- 5, from the worst answer to the best answer. Thus, a higher score points at a better result and a lower score indicates a worse result.

In the beginning of the first session, the each city mediator handed the IOI-HA to every patient. Then the researcher instructed patients on how to fill in the questionnaire. The researcher read the questions one by one and then, gave the command to fill in the questions, simultaneously and individually. The same procedure was repeated for the post-intervention questionnaire administration in the end of the last session.

Statistical Method

The first result presented was submitted to descriptive analysis, in order to sum up and describe the data. In order to evaluate the performance of patients who use hearing aid, the non-parametric test Wilcoxon was used for paired samples. It is an alternative to t-Student test for paired samples, exempt from the assumption that the variable in question has normal probability distribution. This way the 23 patients were evaluated in two moments, before and after the intervention. The software program used to perform the analysis was IBM SPSS Statistics 19.

Results

Patients' total average age was 65.8 years old, in which 23 was the minimum age and 91 the maximum age. Concerning the sex of participants, 12 are male, with ages ranging between 23 and 91; and 11 are female, with ages ranging from 43 and 84.

The sessions lasted for 1h30m each. However, some connection problems compromised the length of sessions. One of the most relevant problems was the lack of preparation of municipality computer technicians, who showed great difficulty in handling the transmission technology, thus delaying the beginning of the first session for having difficulty to connect with the Telehealth Center. The days scheduled for the beginning of the session in Muniz Freire and Itaguaçu were changed due to lack of internet access in both municipalities. They were rescheduled for the following week. Throughout the three sessions, the connection remained stable most of the time.

The interaction between patients and professionals involved in the remote cities was very satisfactory. In the beginning of each session the mediator of each city provided pens and sheets of paper so that the participants could take notes of their doubts during the explanations. By the end of each theme, a 30-minute moment was provided in order for participants to ask the questions they had written. This amount of time was enough to solve doubts in all sessions. In the first session, participants were suggested to write down the doubts that could arise about the use of HA along the week and to be solved in the following session. Among the most frequently asked questions are how to clean the ear canal and cotton swab use; insertion and removal of HA; when to change the batteries and where to buy them; when to change the mold; when to clean the HA and where to keep them.

Table 1 presents data from sample characterization. It was possible to notice that most of the patients (91.3%) presented presbycusis as etiology, 52.2% have profound hearing impairment, 91.3% wear HA bilaterally and 69.5% use BTEs.

TABLE 1 – CHARACTERIZATION OF SAMPLE (N=23)

Characteristics	N	%
Etiology		
Presbycusis	21	91,3
Idiopathic	1	4,34
Acoustic trauma	1	4,34
Degree of loss		
Profound	12	52,2
Moderate	7	30,4
Moderately severe	3	13
Fitting mode		
Bilateral	21	91,3
Unilateral	2	8,7
Type of device		
Behind the Ear (BTE)	16	69,6

In the Ear (ITE)	6	26,1
Open fitting	1	4,34

n:Number of subjects; %percentage

Chart 1 presents the response to the analysis about the time in which the participants used the hearing aid in the last two weeks, comparing before and after the teleconsultation sessions. It was possible to verify that those who used it for about less than 1 hour and about 1- 4 hours incorporated the responses for more than 4 hours. For instance, in the situation HA for about 4 - 8 hours a day, there was a change of 8.7% to 17.4%, and still in the situation of more than 8-hour use, it was possible to observe an increase of nearly 10% among users in this situation.

		Did not use n(%)	**Less than 1h n(%)**	**Between 1 and 4h n(%)**	**Between 4 and 8h n(%)**	**More than 8h n(%)**
DAILY USE LENGTH OF HA	Pre-intervention	4(17,4)	3(13)	4(17,4)	2(8,7)	10(43,4)
	Post-intervention	5(21,7)	0(0)	2(8,7)	4(17,4)	12(52,2)

n:number of subjects; %percentage
Chart 1 – Daily use length (hours) of ha before and after participation in the counseling group.

By verifying the amplification benefit (Chart 2), the analysis points out at a change of pre and post intervention results, especially with a decrease in the number of patients who reported that HA did not help at all (21.7% to 13%), indicating a bigger number of users who reported that HA really helped (21.7% to 39.1%).

		Did not help at all n(%)	**Helped little n(%)**	**Helped moderately n(%)**	**Helped significantly n(%)**	**Helped a lot n(%)**
BENEFIT FROM HA	Pre-intervention	5(21,7)	6(26,1)	3(13)	4(17,4)	5(21,7)
	Post-intervention	3(13)	5(21,7)	2(8,7)	4(17,4)	9(39,1)

n:number of subjects; %percentage
Chart 2 – Degree of help from hearing aid (ha) before and after participation in the counseling group.

In question 3 (Chart 3), which analyzes the limitation in everyday activities, it was observed that those who reported difficulty on a larger scale before the participation, reduced their difficulties. This was shown by the increase in the number of users answering "little or no difficulty at all".

		Very difficult n(%)	Quite difficult n(%)	Moderately difficult n(%)	Slightly difficult n(%)	Not difficult at all n(%)
LIMITATION IN DAILY ACTIVITIES	Pre-intervention	5(21,7)	7(30,4)	4(17,4)	5(21,7)	2(8,7)
	Post-intervention	5(21,7)	5(21,7)	2(8,7)	7(30,4)	4(17,4)

n:number of subjects; %:percentage

Chart 3 – Degree of difficulty in the use of hearing aid (ha) before and after participation in the counseling group.

When analyzing individuals' satisfaction with their hearing aids (Chart 4), it was evident that the decrease in the number of individuals after intervention who had answered "the use of a hearing aid was not worthwhile" (13% to 4.3%); and the 8.7% who considered it to be a little worth it, decreased by half. This has contributed to the increase in the number of patients who believed that amplification use was really worth it..

		Not worth it n(%)	Little worth it n(%)	Moderately worth it n(%)	Quite worth it n(%)	Very worth it n(%)
DEGREE OF SATISFACTION	Pre-intervention	3(13)	2(8,7)	3(13)	4(17,4)	11(47,8)
	Post-intervention	1(4,3)	1(4,3)	5(21,7)	4(17,4)	12(52,2)

n:number of subjects; %:percentage

Chart 4 – Degree of satisfaction about hearing aid (ha) before and after participation in the counseling group**.**

With regards to limitation in everyday activities (Chart 5), it was verified that in the last two weeks, using the hearing aid(s), the number of patients who mentioned problems that affected them daily substantially decreased, i.e. from 17.4% "Affected little" to 43.5% "Did not affect at all". As far as social interaction is concerned, that is, users' opinions about their hearing loss and their relationship with third parties, nearly 50% reported that it was greatly affected, in the pre-intervention questionnaire. On the other hand, during post--intervention, it was observed an important change of more than 60% in the group that reported little or no interference in social relations with other people.

The 7th question evaluated the joy of living of HA users, noticing that after the intervention none of the participants reported that HA has worsened their joy of living; the condition of not noticing any

		Affected a lot n(%)	Affected significantly n(%)	Affected moderately n(%)	Affected little n(%)	Did not affect n(%)
DAILY ACTIVITIES	Pre-intervention	5(21,7)	8(34,8)	2(8,7)	4(17,4)	4(17,4)
	Post-intervention	5(21,7)	2(8,7)	2(8,7)	4(17,4)	10(43,5)
SOCIAL RELATIONS	Pre-intervention	11(47,8)	0(0)	1(4,3)	6(26,1)	5(21,7)
	Post-intervention	7(30,4)	1(4,3)	1(4,3)	4(17,4)	10(43,5)

n:number of subjects; %:percentage

Chart 5 - Degree of compromise of daily activities and social intercourse because of hearing aid (ha) use before and after participation in the counseling group

difference with the use of HA decreased; also, the number of users reporting that HA have increased their joy of living doubled (Chart 6).

The study was carried out with participants from different cities. Table 2 presents the Wilcoxon test for paired samples from municipalities A, B and C and grouped together. When the municipalities

		For the worse or less joy of living	No alteration n(%)	A little more joy of living n(%)	Significant joy of living n(%)	Much more n(%)
JOY OF LIVING	Pre-intervention	3(13)	2(8,7)	7(30,4)	5(21,7)	6(26,1)
	Post-intervention	0(0)	1(4,3)	5(21,7)	4(17,4)	13(56,5)

n:number of subjects; %:percentage

Chart 6 – Perception of feeling of joy of living before and after participation in the counseling group

are analyzed separately, it was observed that municipality A has not rejected the null hypothesis that the performance of patients who use HA remained the same after taking part in teleconsultation. For patients from municipalities B and C, however, the test has detected differences in patients' opinions, revealing that they had a significant improvement in their satisfaction level. When the municipalities are evaluated together, there is also an improvement in the answers of post intervention HA users (P-valor = 0.39 <0.05).

TABLE 2 - WILCOXON TEST TO EVALUATE PERFORMANCE OF PATIENTS USING INDIVIDUAL HEARING AID (HA)

Municipality	N	Test statistic Z[1]	p value
Itaguaçu	10	-1.611	0.129
São Mateus/Muniz Freire	13	-2.047	0.039*
Grouped together[2]	23	-2.729	0.005*

Wilcoxon test with significance level 0.05 Note: (1) Based on negative rankings. Note:(2) All municipalities together; * Significant values.

Discussion

The main goal of this study was to verify the teleconsultation as a tool for the follow-up of patients with hearing disabilities who are HA users. Also, based on the shortage of rehabilitation services and on the number of registered patients interested in the guidance and counselling sessions, a bigger number of samples was expected. However, there was a high dropout rate throughout the research process (85%). Among the reasons mentioned are forgetting the day of the appointment and work reasons. Our findings comply with the findings by with Jokura et al. (2012), which aimed at analyzing why users were absent in their audiological monitoring. These researchers also observed that patients who did not attend the audiological meeting presented HA results lower than those who attended it. In a training program on hearing aids to professionals who worked for an association, Ascencio (2012) described a dropout rate of 30% of participants.

This study does not have dropout rate records due to the type of strategy offered (teleconsultation). Therefore, since it is still considered a new tool, its combined effects for effective insertion in the healthcare routine of patients with hearing disabilities need further studies. It is known that in face of the scarce availability of healthcare for most individuals with hearing disabilities, teleconsultation through the Telehealth Program may embrace the healthcare available to the population who is not covered by this service[22], such as the rural population that is part of this study sample.

Confirming the interest in approaching the amplification device user, some studies were found in the literature have to do with the intervention proposed in this study and aim to improve access and adherence to the treatment. We found a particular study that includes counseling and mapping of cochlear implant using resources from the Telehealth Program[23] for training professionals in remote areas, who together with the professional from the reference center via web, performed the hearing aid programing via teleconsultation. Another qualitative study described a counseling program for new HA users based on internet by daily email, and the results indicated behavioral changes among new HA users[24].

The first action adopted to evaluate the benefits, quantified changes related to HA functionality, which is related to the amplification use. The amount of time a HA user should wait so that the hearing amplification provide the "benefit" in everyday life is still an ever-changing issue[25]. Although this study has presented a positive change in this matter, we did not notice a statistically significant change in three weeks. Patients need to be advised that their initial experience with HA might not represent their final performance with it, for a better adhesion to the treatment and for no rehabilitation withdrawal.

HA wearing in everyday activities and amplification adaptation have are closely related. If the individuals in this study had not worn the hearing device for at least four hours, which is considered the minimum time for fitting the device at the early stages, the result obtained would not have been considered satisfactory, because the longer the HA fitting, the better the adaptation.

It is known that satisfaction with the hearing aid is influenced by the benefit noticed and vice versa[29], but it comprises other aspects such as users' expectations; the financial and psychological costs involved; the problems faced throughout the rehabilitation process and the communication difficulties, which remain even with the use of the

amplification[29]. The findings of the current study corroborate those in the literature, and also add that intrinsic factor such as expectation, attitude, personality, motivation to HA use, age and sex, and extrinsic factors, such as the hearing situations, benefit, sound quality, are variables that might be influenced by counseling.

By frequently observing the limited participation in everyday activities among elderly HA users, it is clear that hearing aids do not restore normal hearing. Studies show that hearing worsening, which is part of the aging process, affects both communication and social and emotional domains, as it entails a significant decrease in interaction and face-to-face contact. Participation limitation in everyday activities in this study complies with those findings mentioned above, and the rehabilitation process is necessary to assure a longer use of amplification and to develop adaptations in everyday life, according to each individual's needs and complaints.

Difficulty hearing and understanding during the communication might lead to interrupted social relations, since the association of aging to difficulty in communication might alter and interfere negatively in the elderly quality of life. The counseling program investigated in this study allowed HA users to face the obstacles deriving from hearing loss; to better adapt to HA use; and to be more easily reintegrated into social, family and professional life. As far as quality of life is concerned, the number of people who have reported that using the hearing aid has brought much more joy of living increased over 50%.

The substantial change observed in the group level of satisfaction is in accordance with the data from other studies[10, 30], which have reported that the use of hearing aid associated with hearing intervention programs ensure both clinical improvement and improvement in quality of life of those individuals. However, according to the literature, users' satisfaction is still a challenge for audiologists, and the high dropout rates might be minimized by group counseling and guiding programs. Compared to face-to-face care, it is seen that teleconsultation takes this process into another dimension. However, the fact that we can follow up patients without their locomotion to the reference center, which most of the times is in a different city, it is undoubtedly one of the advantages of this tool. Telehealthcare has been compared in many studies, regarding screening, diagnosis, and intervention[3,24,27], and it has shown to be able to increase rehabilitation adherence, satisfaction and users' benefit.

Conclusion

Therefore, teleconsultation used for monitoring HA users in the form of counseling and guiding has proven to be a valid tool. It is suggested that further studies are carried out for the adaptation of protocols and raising awareness of professionals and patients about this tool.

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