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Teleaudiology: professional-patient communication in hearing aid programming and fitting via teleconsultation

Teleaudiologia: comunicação profissional-paciente na programação e adaptação de aparelhos de amplificação sonora individuais via teleconsulta

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ABSTRACT

Purpose: To evaluate if teleconsultation affects professional-patient communication as well as patient satisfaction with the care for the hearing aid programming and fitting compared to the face to face consultation. **Methods:** Forty hearing aid candidates aged over 18 years with symmetrical sensorineural hearing loss ,from mild to severe degrees, were randomly divided into two groups: control (face to face) and experimental (synchronous teleconsultation assisted by a facilitator). Consultations were filmed, timed and their contents were analyzed according to the "Davis Observation Code" (DOC). The "Patient Experience Questionnaire" (PEQ) was also administered in order to assess the satisfaction with the consultation. **Results:** When compared to face to face consultations, explanations given by the professionals on the consultation structure and the performance of procedures were more frequent and participant' spontaneous expressions on his condition were less observed in teleconsultations. There was no difference between groups regarding the following dimensions of the PEQ: "Outcomes of the Visit", "Communication Barriers", and "Communication Experience". Significantly higher scores were obtained for teleconsultation in the dimension "Emotions after Consultation". The experimental group had a positive experience with the presence of the facilitator. **Conclusion:** The performance of the hearing aid programming and fitting via teleconsultation impacted some aspects of professional-patient communication; however, patient satisfaction regarding the care provided was not affected.

Keywords: Teleconsultation; Hearing loss; Counseling; Hearing aids; Audiology

RESUMO

Objetivo: Avaliar se a teleconsulta afeta a comunicação profissional-paciente e a satisfação com o atendimento para programação e adaptação do aparelho de amplificação sonora individual (AASI), em comparação à consulta presencial. **Métodos:** Quarenta candidatos ao uso do AASI, com idade superior a 18 anos e perda neurossensorial simétrica, de grau leve a severo, foram distribuídos aleatoriamente, em grupos controle (presencial) e experimental (teleconsulta síncrona assistida por um facilitador). As consultas foram filmadas, cronometradas e seu conteúdo analisado, de acordo com o "Código de Observação de Davis" (DOC). Os participantes também responderam ao "Questionário de Experiência do Paciente" (PEQ), para avaliar a satisfação com a consulta. **Resultados:** Nas teleconsultas, as explicações do profissional sobre a estrutura da consulta e realização de procedimentos foram mais frequentes e expressões espontâneas do participante sobre a sua condição foram menos observadas do que nas consultas presenciais. Não houve diferença entre os grupos, quanto às seguintes dimensões do PEQ: "Resultados da Consulta", "Barreiras de Comunicação", "Experiência de Comunicação". Pontuações significativamente maiores foram obtidas para a teleconsulta na dimensão "Emoções após a Consulta". O grupo experimental teve experiência positiva com a presença do facilitador. **Conclusão:** Houve impacto da condução da programação e adaptação do AASI, via teleconsulta, em alguns aspectos da comunicação profissional-paciente sem, contudo, afetar a satisfação do paciente quanto ao serviço recebido.

Descritores: Teleconsulta; Perda auditiva; Aconselhamento; Auxiliares de audição; Audiologia

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INTRODUCTION

The relationship between the health professional and the patient is a complex interpersonal one, which has a strong emotional burden and requires mutual cooperation so that a common purpose is reached. To improve the processes involved in this relation is determinant for the humanization and quality of the services provided. The human, experiential, psychological and cultural dimensions of the disease need to be considered in the professional-patient relationships[1].

Despite the technological advances of the hearing aids, an increase in the number of users or a dramatic improvement with such devices was not verified over the years. Many users of high technology hearing aids have reported their problems were not solved, suggesting the need for changes to improve aural rehabilitation – one of them is the adoption of the person-centered approach[2].

Among other aspects, the person-centered approach highlights the fundamental importance of a good professional-patient relationship for obtaining satisfactory results. Besides that, professional and patient have different expertise, which strengthen the clinical encounter. Thus, the power and responsibility over the treatment must be shared[3,4]. The person-centered approach is opposed to the biomedical model, which is prevalent in many practices of audiology professionals. Such model, professional or disease-centered, provides the professional with more authority and decision-making power on the treatment[5].

Professional-patient relationship attributes which share similar components to the ones described in the person-centered approach were identified as being important to decision-making for the acquisition of the hearing aid as well as to the success obtained with this device[6].

The professional-patient communication is essential in the person-centered approach and its impact on health results may occur by different routes. Better intervention results are associated with positive affective responses and a cozy conversation[3]. The dialog alone may be therapeutic, directly lowering the patient anxiety, for instance. More often, such communication indirectly influences health results, acting on treatment motivation, confidence in the professional and service, self-efficacy for self-care, and mutual consent and understanding between patient and professional[7].

Preoccupation with professional-patient communication efficiency becomes more evident when distance consultations (teleconsultation), carried out in different fields of audiology, are considered[8]. This scenario may present challenges to professional-patient communication, with the need for a greater use of communication repair strategies[9,10], mostly for the hearing impaired.

Another important point is that the presence of the facilitator in teleconsultations adds a third person into a traditionally dyadic interaction: professional-patient. It´s also noteworthy that, in teleconsultation, the eye contact, prime for establishing a good communication and transmitting to the patient the impression of attention and engagement with the conversation, can be more intricate. Other nonverbal communication aspects such as touch and body language, which signal important information on reception and affective behavior, are hindered or impeded in teleconsultation, what can cause a feeling of a "robotic" and "artificial" consultation for the patient[3].

For these reasons, this study aimed to evaluate professional-patient communication during the process of the hearing aid programming and fitting via teleconsultation and patient satisfaction with this kind of service compared to traditional face to face consultation.

METHODS

Prospective, randomized, controlled study carried out at the Speech-Language Pathology and Audiology Clinic, Bauru School of Dentistry – Universidade de São Paulo (USP), after approval by this Institution Research Ethics Committee (043/2011).

A total of 40 subjects participated voluntarily in the study after signing a Consent Form. All 40 met the following inclusion criteria: to be regularly enrolled in the Speech-Language Pathology and Audiology Clinic, FOB-USP, be over 18 years old, present mild to severe bilateral symmetrical sensorineural hearing loss[11], have no previous experience with the use of hearing aids and present no associated impairments, except for visual impairment correctable with lenses.

Participants were randomly divided into experimental group, which carried out the procedures via synchronous consultation, and control group, which carried out the procedures face to face (Table 1). For both groups, the treatment was carried out by a specialist Speech-language pathologist with experience in sound amplification.

The HA programming was carried out with the Hi-Pro® interface connected to a computer which had the NOAH® 3.0 platform (HIMSA) and the HA manufacturers programming softwares used in this study (Belton®, Phonak®, Oticon®, Resound®, Rexton® and Siemens®). The Affinity equipment (Interacoustics®) was also connected to this computer. The HA electroacoustic characteristics were calculated from pure-tone thresholds according to the NAL-NL1 prescription rule[13]. The fitting manager of the HA was positioned to the maximum level in order to provide an amplification characteristic closer to the prescribed one.

Verification was carried out using probe microphone measures (Affinity® equipment). We used compound, modulated stimulus to obtain the real ear unaided response – REUR with an intensity of 65 dB NPS, and the real ear aided response – REAR with intensities of 50, 65 and 80 dB NPS. The REAR values were compared to the prescribed targets by the NAL-NL1 rule in the frequency span from 125 to 6k Hz. Manual adjustments were performed whenever necessary in order to

Table 1. Sociodemographic, audiometric and individual hearing aid data

Audiologic and demographic data		Groups		Total (n=40)
		Control (n=20)	Experimental (n=20)	
Age (years)	$\bar{x}$±SD	69.15±14.97	69.95±13.46	69.55±14.06
Gender				
Female	n (%)	9 (45%)	6 (30%)	15 (37.5%)
Male	n (%)	11 (55%)	14 (70%)	25 (62.5%)
Socioeconomic level[12]				
Upper low	n (%)	17 (85%)	16 (80%)	33 (80%)
Low middle	n (%)	3 (15%)	4 (20%)	7 (20%)
Schooling				
Illiterate	n (%)	2 (10%)	1 (5%)	3 (7.5%)
Basic	n (%)	16 (80%)	15 (75%)	31 (77.5%)
Secondary	n (%)	1 (5%)	4 (20%)	5 (12.5%)
Higher education	n (%)	1 (5%)		1 (2.5%)
Average ISO threshold of the better ear	$\bar{x}$±SD	44.8±16.50	47.95±11.69	46.38±14.21
HA type				
Intra-aural	n (%)		5 (25%)	5 (12.5%)
Retroauricular	n (%)	20 (100%)	15 (75%)	35 (87.5%)

Note: $\bar{x}$ = mean; SD = standard deviation; ISO = Mean of the frequencies of 500, 1k, 2k and 4k Hz

reach equalization with the rule (difference between measured and prescribed values in the order of ± 5 dB)[14] except when the patient had complains regarding the loudness and the quality of the amplified sound.

After the HA programming and verification, an informative counseling was carried out on the following topics: HA and/or auricular molds sanitation and cares; battery insertion and removal; HA and/or auricular mold insertion and removal, memory button handling and volume control, when available, and phone use.

All procedures were filmed with a digital camera of high resolution (Sony® DCR-SR45) supported on a tripod and positioned at a distance of 60 centimeters from the evaluator and participant. The image capture included their head and shoulders during the whole treatment. The consultation length was also determined by the filming analysis.

The procedures were carried out via synchronous teleconsultation, with remote control of applications. A Speech-language pathologist without any experience in the HA selection and fitting process acted as a facilitator. He was previously trained on the use of the softwares Skype® and TeamViewer 8®, HA connection to the programming cables, insertion and removal of the HA and/or probe tube, probe tube calibration and participant positioning for the tests[8]. The facilitator also lead the participants to the treatment room ("test environment"), informing them as to the type of consultation to be carried out.

The same computer which was previously used, coupled to the Hi-Pro® and to the Affinity® equipment, was connected to the internet (local area network - LAN USP with 10 Mbps), to the webcam (Logitech QuickCam Orbit®) and to the speakers (Trend SPK 745®). The Speech-language pathologist specialist was positioned in the "remote environment", located in the same building, but 30 meters far from the test environment. This professional used a notebook with a webcam connected to a headset type headphone and microphone (Loop Way Connect 3000) and to the LAN USP.

The application Skype 5.0 (Microsoft®) was used to broadcast the audio and video between the two environments. The software TeamViewer 8® enabled the remote control of the applications via internet. Such configuration enabled that the Speech-language pathologist specialist had, at the same time, the control and viewing of screens of the HA programming softwares and the Affinity® as well as audio and video communication with the patient and the facilitator. Thus, it was possible to perform, via synchronous teleconsultation, the procedures of programming the hearing aid, probe microphone measures and informative counseling, following the same procedures already described for the control group.

The teleconsulttions were filmed using the software Camtasia Studio 8.0 (TechSmith Corporation®) allowing the capture of the computer screen and audio. The teleconsultation length was determined from the filming analysis.

The Patient Experience Questionnaire (PEQ), translated and adapted by the authors for the Brazilian Portuguese according to the stages recommended in the literature[15], was applied for both groups after the HA programming and verification procedure[16] (Appendix 1). Until the end of this study, no studies were found on the validation of this questionnaire in Brazil.

The PEQ was chosen as it had been developed under the premise of the patient-centered model, emphasizing the sharing of experiences in order to capture the patient´s more immediate, personal and affective responses, evaluating the users` satisfaction after consultation. This instrument presents 18 items divides in five dimensions:

- Consultation result (items 1 to 4): related to patient experience during consultation, doubts clarification and how consultation helps to deal with the health problem.
- Communication Experience (items 5 to 8) related to professional/patient communication, if this communication was easy and if the patient felt understood.
- Communication barriers (items 9 to 12): related to communication problems during consultation.
- Experience with the facilitator (items 13 and 14): related to the feeling of the patient towards the presence of a third person in the consultation.
- Emotions after consultation: Four numerical scales related to patient´s emotions and feelings by the end of consultation. The scales varied from one to seven, higher values represented positive feelings.

Except for the dimension "emotions after consultation", the participant responses were given in a 5 point *Likert* scale varying from "much more" to "not a little" (dimensions "communication experience", communication barriers" and "experience with the facilitator"). A value from one to five was attributed to each response alternative, and the more positive experiences were associated to a higher value.

The score in each dimension of the EPQ was obtained summing up the responses of each item. The maximum possible scores, for each dimension, were equal to 20 points (Outcomes of the Visit"; "Communication Experience"; "Communication Barriers"), 28 points ("Emotions after Consultation") and 10 points ("Experience with the facilitator"). It must be highlighted that the dimension "Experience with the facilitator" was applied only to the experimental group, and its result was calculated separately. Therefore, the maximum possible total score of the PEQ was equal to 88.

The content of the consultations was evaluated from the "Davis Observation Code" - DOC[17] also translated to the Brazilian Portuguese by the authors. In this scale for the observation of doctor-patient interactions, six groups of behavior professional practice were identified: technical, health behavior, vicious, active patient, prevention and counseling. Each group consists of at least one DOC code (Chart 1).

Some adaptations were made in the DOC due to this research purposes. The group "vicious" (use of substances and smoking behavior) was excluded as it was not addressed in these study consultations. On the other hand, the code AI ("Informative Counseling") was included to denote the process.

The analysis and codification of the observed behaviors were carried out for each 15 seconds of filming of a given consultation. One or more observed behaviors (DOC codes) were marked for each interval in a specific table. The total number of a consultation codes and the number of a given DOC code were computed. The frequency of a DOC code was obtained by dividing this code division number by the total quantity of codes in the consultation[18]. The sum of all DOC codes regarding one group of practice behavior was also carried out in order to determine the frequency of such group.

The communication happened mainly between the participant and the professional as the facilitator of the teleconsultations was instructed to interfere minimally during the treatment. For this reason, only such interactions were codified for the experimental group.

The t test was used to compare the length of the consultations and the frequency of the codes and groups of behavior observed for each consultation type. The comparison of the PEQ questionnaire score among the groups was carried out using the Mann Whitney test. A 5% alpha was adopted in each of the cases.

RESULTS

Initially, it must be emphasized that there was no difference (t Test) between the groups regarding the (p=0.86), gender (p=0.33), and mean of thresholds of the best ear (p=0.49) (Table 1).

Consultation length varied from 21.26 to 37.46 minutes (control) and from 18.50 to 39 minutes (experimental) (Table 2).

Regarding "Patient Experience Questionnaire", statistically significant differences were found between groups only for the dimension "Emotions after Consultation", in which the experimental group obtained a higher score (mean = 27.80) than the control group (mean = 26.6) (Table 3).

For the dimension "Experience with the facilitator", which was applied only to the experimental group, the patients´ score varied from 6 to 10 (mean = 8.20; SD=1.85). Regarding the professional-patient communication, we observed a significant difference of the groups (Table 4) and behavior codes (Table 5) between the teleconsultations and the face to face consultations.

DISCUSSION

The consultation length depends on different variables, the health professional, the patient, the relationship between them, the consultation reason, organizational issues, among others. In this study, anther variable was introduced using communication and information technology. On the average, the time spent for the HA programming and verification procedures via teleconsultation was 5.87 minutes greater than the time spent in face to face consultations (Table 2). As a consequence, the total time of the teleconsultation was 16% (4,23 minutes) longer than the face consultations, and such findings in agreement with other studies[8,19].

Chart 1. Adaptation of the Davis Observation Codes used in this study

Group	Abbreviation	Codes	Definition
Technical group	TG	Consultation structure (CE)	Discuss what will be carried out in the consultations
	NA	Anamnesis	Professional and patient discussing the current complaint
	FI	Family information	Discussion on the medical and/or family history
	PE	Physical exam	Patient physical evaluation
	FB	*Feedback*	Professional explaining the exams results to the patient
	TP	Treatment planning (TP)	Professional prescribing the treatment that will be performed
	TE	Treatment effects (TE)	Professional asking or patient informing on the treatment results
	PC	Procedure	Any diagnostic or treatment procedure performed in the medical office
Health behavior	OB	Observance	Discussion of previously requested behavior (treatment observation)
	HE	Health education	Professional introducing information concerning the patient health
	OS	Health promotion	Professional requests a behavior change to increase or promote health
	NU	Nutrition	Any question on the patient diet
	EX	Exercises	Any question on physical exercises
Active patient	HK	Health Knowledge (HK)	Professional asks or patient spontaneously says what he knows about health
	QU	Questions	Patients asking
	CV	Conversations	Any conversation with no relation to the consultation
Prevention	PS	Preventive service	Professional discussing. planning or performing any screening task to prevent diseases
Counseling	CO	Counseling	Professional debating the interpersonal relationships or the current emotional condition of the patient or the family
	IC	Informative counseling	Professional offering information and training to the patient on how to use the device (e.g.: HA)

Table 2. Consultations length

Procedures	Time (minutes)				p-value
	Control (n=20)		Experimental (n=20)		
	$\bar{x}$	SD	$\bar{x}$	SD	
Programming and verification	11.04	2.29	16.91	3.62	0.01*
Informative counseling	15.02	5.14	13.39	3.25	0.24
Total length	26.07	4.45	30.30	5.18	0.02*

*Significant values ($p<0.05$) – t Test
Note: $\bar{x}$ = mean; SD= standard deviation

Regardless of previous training, the instruction to the facilitator contributed the most for the increase of the teleconsultation length, especially with regard to the completion of the HA verification, which requires the mastery of specific techniques for its implementation - for instance, the correct placement of the probe tube in the external auditory canal.

However, the increase in the length of teleconsultations must be considered in the broader context of situations requiring the offer of such services. In areas where there is shortage of skilled professionals, either the patient or the professional needs to travel in order to have access to health care. Such travel, when not hindered or even prevented by geographic and economic barriers, per se adds greater cost and time to the treatment[8].

Nowadays, the Speech-Language and Audiology Federal Council[20] allows the implementation of speech diagnostic and therapeutic procedures, via teleconsultation, when there is another speech-language pathologist present assisting the patient. Even though, as it was observed in this study, the needs

Table 3. Scores obtained in the dimensions of the Patient Experience Questionnaire (PEQ)

PEQ dimensions	Control (n=20)		Experimental (n=20)		p-value
	$\bar{x}$	SD	$\bar{x}$	SD	
Consultation result	17.6	2.5	17.6	2.7	0.93
Communication experience	19.10	1.62	19.60	1.62	0.48
Communication barriers	17.70	3.01	18.50	2.24	0.60
Emotions after consultation	26.65	2.35	27.80	0.89	0.01*
Total	81.05	5.48	83.50	3.80	0.18

*Significant values (p<0.05) – t Test
Note: PEQ = Patient Experience Questionnaire; $\bar{x}$ = mean; SD = standard deviation

Table 4. Comparison between the group behavior frequencies of the Davis Observation Code

Categories	Control (n=20)		Experimental (n=20)		p-value
	$\bar{x}$	SD	$\bar{x}$	SD	
Technical group	0.33	0.14	0.40	0.07	0.04*
Health behavior	0.19	0.05	0.15	0.05	0.02*
Active patient	0.19	0.08	0.16	0.08	0.27
Prevention	0.09	0.06	0.07	0.04	0.30
Counseling	0.21	0.04	0.22	0.04	0.54

*Significant values (p<0.05) – t Test
Note: $\bar{x}$ = mean; SD= standard deviation

Table 5. Comparison of the DOC behaviors observed between the groups (n=40)

Group	Davis observation code	Control (n=20)		Experimental (n=20)		p-value
		$\bar{x}$	SD	$\bar{x}$	SD	
Technical	Consultation structure (CE)	0.04	0.02	0.06	0.02	0.001*
	Feedback (FB)	0.08	0.04	0.07	0.03	0.67
	Treatment planning (TP)	0.04	0.04	0.05	0.05	0.46
	Treatment effects (TE)	0.02	0.02	0.01	0.02	0.19
	Procedure (PC)	0.15	0.06	0.21	0.06	0.001*
Health behavior	Observance (OB)	0.19	0.05	0.15	0.05	0.03*
Active patient	Health Knowledge (HK)	0.07	0.04	0.02	0.04	0.001*
	Questions (QU)	0.12	0.06	0.14	0.07	0.37
Prevention	Preventive service (PS)	0.09	0.06	0.07	0.04	0.30
Counseling	Informative counseling (IC)	0.21	0.04	0.22	0.04	0.54

*Significant values (p<0.05) – t Test
Note: $\bar{x}$ = mean; SD = standard deviation

of training to implement facilitation specific procedures can continue as teleconsultation generally involves professionals with different expertise.

In regard to technical issues, audio and video data transmission kept stable during all sessions, except for two cases in which there was an internet connection failure, interrupting the consultation for some seconds. It is noteworthy that the network infrastructure was enough to clearly provide video and audio signal transmission and such conditions may not be reproduced in other place, in rural areas, for instance. In audiology, the need of teleconsultation studies in places with lower infrastructure is acknowledged in view of potential challenges regarding transmission delay, audio and video clarity loss, which severely affect the communication, mainly with the hearing impaired.

The PEQ results (Table 3) indicated very positive experiences with the consultations for both groups. The shifts of the scores to maximum levels for the dimensions "communication barriers", "experience after the consultation" and "experience with the facilitator" were also observed in the PEQ validation

study and such results were attributed to the difficult of patients to express negative opinions[15].

High scores were also observed in the evaluation of satisfaction of the hearing impaired with the treatment implemented face to face and via teleconsultation[21]. Though they must not be invalidated, this study results must be interpreted considering that the responses for the evaluation questionnaires, administered where the service is offered, are influenced in some way by the patients` worries as to the impacts that a negative response can bring to the care they receive.

In Brazil, high satisfaction results are common when users of the Unified Health System (SUS) are evaluated. This is attributed to gratitude bias. Another bias may also appear in situations where the user has great affinity with the professional care providers, making it harder to evaluate his real perspective. These subjects sociocultural level is another difficulty pointed out as they often need assistance from the professional to answer the questionnaires what can influence the responses[22].

The absence of significant difference between the groups for the dimensions "Outcomes of the Visit", "Communication Experience" and "Communication Barriers" indicate that both groups judged positively the effects of the consultations regarding doubts clarification, assistance to deal with the hearing impairment, and decrease of their communication difficulties. Such data also showed that, in both groups, most of the participants felt the professional understood their worries and felt confident and cared by the professionals. In other studies, the patient also evaluated the professionals clinical skills and competences in the same way in both teleconsultation and face to face consultation[9,21,23].

Regarding the "Emotions after Consultation", the score of the experimental group was significantly greater than the group control. However, this result must be analyzed cautiously as this PEQ subscale was derived from a small number of respondents, and it needs improvement[15]. Thus, although statistically significant, it is not possible to say that such increase of the PEQ score for the experimental group was clinically relevant. Anyway, the fact that the teleconsultation provoked positive emotions to the patient is encouraging considering that one of the purposes on an effective therapeutic communication is to assist the patient to deal with negative emotions that can complicate a particular treatment[7].

The dimension "Experience with the facilitator" indicated that the participants didn´t feel uncomfortable with the presence of a third person during consultation. Literature suggests, in some cases, that the facilitator is also recognized by the patient as a health care provider and can complement the attention given in order to compensate the physical distance of the professional, strengthening the patient confidence in teleconsultations[24].

However, it is important to highlight that the analysis of PEQ individual data showed that seven of the experimental group participants answered they preferred a face to face conversation. Another study[25] observed that 30% of the 116 participants did not wish to use teleconsultation services, preferring the traditional consultation. The patients who already had knowledge on telemedicine and used the internet for health issues were more indicated to participating of teleconsultations.

The analysis with the "Davis Observation Code"[17] showed that, in both consultations, the greatest frequency of the behavior groups were in a decreasing order: technical, counseling, health behavior, active patient and prevention (Table 4). The performance of physical exams, tests and other "technical" procedures are common in face to face consultations with different health professinals[13,26]. In this research, the nature of the consultation can have contributed to the existence of a large percentage of behaviors of the "Technical" group.

The HA programming and verification involve the implementation of specific procedures, necessary to ensure patient comfort and audibility of amplified sound signals. So, some contents were discussed with all participants such as (Table 5): the purpose of the consultation and procedures ("consultation structure – CS"), main features of the HA chosen ("treatment planning – TP"), the way the procedures would be carried out, the procedures results and the necessary behaviors for the adjustment of the hearing aids based on such results ("feedback - FB") and patient initial perceptions as to the use of amplification ("treatment effect – TE"). The proper procedures were also carried out such as, for instance, the probe microphone measures ("procedure – PC").

The frequency of the "Technical" group was significantly greater in teleconsultations (Table 4), probably due to the greater time spent in the performance of the HA programming and verification procedures which were measured by the facilitator. Such hypothesis is reinforced because the codes "consultation structure – CS" and "procedures – PC" were also significantly more frequent in teleconsultations (Table 5).

There was no significant difference between the code "treatment planning – (PT)" and the other groups (Table 5). As consultations were held for the granting of the hearing aids, we assume the decision to use the device had been taken previously and the professional was reaffirming it.

The absence of some DOC codes for the "Technical" group (Chart 1) is justified as the individuals had done the anamnesis and diagnostic procedures previously to the consultation for the HA granting, and such information was in the medical records. Otoscopy, though a patient physical exam, is part of a stage for carrying out the probe microphone measurements, so it was incorporated to the code "procedure" (PC). The presence and frequency of the different DOC groups varied according to the consultation nature. In follow-up consultations, a lower frequency was observed for the codes "anamnesis" and "family information"[27].

Regarding the code "family information - FI", in the Audiology clinic particularly, the discussion about family antecedents (medical history) is usually performed in the diagnostic

sessions. Nevertheless, it is of great relevance for the process of the HA selection and fitting to address the family functioning and how such relationships are being affected by the hearing impairment. This occurs as family members are one of the main communication partners of the patient, besides influencing in the search, maintenance and results of the aural rehabilitation[4].

Regarding the group "Counseling", the only code written down was "Informative Counseling – IC" and there was no statistically significant difference between the experimental and control groups (Table 5). A high frequency of such code was expected as providing information on the use and cares of the hearing aid was part of this study methodology. The absence of difference between groups is relevant considering that providing information and training on the handling and cares is one of the factors which influence the success in the use of the HA[6].

However, we must consider in the evaluated conditions the absence of communication about interpersonal relationships or current emotional condition of the patient or his family members – called personal adjustment counseling. This kind of counseling occurs in a very small proportion in health consultations as professionals worry more about getting information on psychosocial and biomedical content both in face to face consultations and in teleconsultations[10,26].

A hypothesis that can be raised is that questions or comments with emotional contents may not have been made by the participants of this study. Given the fact that the hearing loss affects social interactions, the psychological wellness, and emotional condition of the hearing impaired, it is probable that these individuals are going through such issues and that they can try to express them. However, this is not always done in an obvious way. The professional usually don´t have skills of reflexive listening to identify the emotional components and demonstrate to the patient, by using an affection response, that these were recognized and respected[28].

In audiology, it is recognized that there is a deficit in the professional formation, which does not incorporate formal courses on counseling. This limits the understanding of counseling to the supply of technical information – for instance, exam results, HA option types, among others. These weaknesses of the professional training creates a disconnection between what the patient usually seeks in aural rehabilitation services, that is, the personal support to adjust to a chronic incapacity, and what the service tends to provide – information and technology[29].

The "Behavioral Health" group was significantly higher in the face consultations (Table 4), indicating that professionals most often discussed with the patient previously requested behaviors. As the professional who carried out the consultation didn´t have any previous contact with the participant, only the discussions concerning the behaviors requested in that session were coded. In this case, such behaviors referred mainly to the tasks of handling the HA.

It's possible that the experimental group participants had fewer difficulties in handling the HA, not requiring resumed instructions as pointed in literature[8]. On the other hand, it is also possible that the use of webcams has hampered the professional to identify the patient inadequate skills to handle the HA, leading to a lower use of reparative strategies such as the discussion of such topics and reinstruction of the individual. The use of videoconference systems, which allow the professional to handle cameras to focus and zoom the images, would be more appropriate for such purpose. However, this may represent an increase of cost and infrastructure necessary to the teleconsultation. Based on this, another alternative would be the training of the facilitator to collaborate with the professional in the identification and solution of potential patient difficulties in the HA handling.

There was no significant difference in the frequency of the behavior groups "Active Patient" and "Prevention" between the face to face consultation and the teleconsultation (Table 4), corroborating with the literature[30]. However, the analysis of the DOC codes which comprise the group "Active Patient" (Table 5) showed that the participants did more questions in the teleconsultation ("questions – QU") and more spontaneous comments ("health knowledge – HK") in the face to face consultations, the latter being significant.

Firstly, it must be observed that the frequency of the group "Active Patient" was relatively low for both consultation types, indicating the professional mastery on communication. Similar results were observed in another study which evaluated face to face medical consultations[24].

It´s possible to argue that the nature of the consultations evaluated in this study may have lead to the establishment of a more asymmetric relationship with the professional dominating the clinical encounter. However, it must be also acknowledged that the organizational pressures of the health systems (for instance, shortened time of consultations, elevated number of patients) may impel the professionals to a more directive approach, lowering the frequency of time allowed for the patient to expose their points of view[24].

In the present study, the use of communication technology may have hampered the patient spontaneous comments on his condition. Other research have also reported a lower number of patients utterances[9] and mastery of the professional on communication[10] during consultations.

The contribution of the patient is necessary for the professional to understand the unique perspective of the experience of being sick and for a more productive professional-patient relationship to be established, increasing the potential of results of success and satisfaction[4]. So, professionals who use the teleconsultation still need to fall back on their skills and competences of active listening or other strategies which facilitate the patient expression.

It is also noteworthy the absence of the code "Conversations (CV)". "Ice breakers" or "social" conversations occurred in face to face consultation usually while the professional lead the participant from the waiting room to the test environment and,

for this reason, they were not recorder and coded. However, his does not exempt the fact that these behaviors no longer occurred during the consultation itself.

In the teleconsultations, the facilitator greeted the participant in the waiting room and took him to the test environment. Thus, it would be expected the occurrence of CV codes (conversation) in the beginning of the interaction between the patient and the professional. Such results indicate that, probably, the professional started the interaction with information concerning the consultation structure (CE). The "social conversation" has the role of establishing rapport and showing the interest of the professional for the patient. Literature also shows which type of conversation isn´t frequent in medical consultations carried out face to face or at a distance[10].

Finally, it is noteworthy that the professional-patient relationship, as any other human relationship, is multifaceted, dynamic and varied. The characteristics of the patient, professional, and context of this encounter influence the communication nature, way and content. A limitation of the present study, imposed by restrictions of the clinical environment in which it was carried out, is the availability of the evaluation of consultations performed by a single Speech-language pathologist, preventing data from being widely generalized.

Another limitation in that the code "Davis Observation Code"[17], though useful to identify relevant behaviors, this is not a comprehensive tool to apprehend all the elements of the professional-patient interaction. Thus, qualitative research is required for better understanding the nature of the professional--patient communication and for appropriate interventions to be applied, aiming to facilitate the interaction mediated by the technology.

CONCLUSION

In the programming and verification process of the individual device of sound amplification, there was a prevalence of technical, information supply and professional in the professional/patient communication behaviors, which may have reflected the generally procedural nature of this consultation as well as the influence of the biomedical model.

The performance of the hearing aid programming and fitting via teleconsultation impacted some aspects of professional--patient communication; however, patient satisfaction regarding the care provided was not affected.

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Appendix 1. Patient Experience Questionnaire (PEQ)

In order to provide better service, we ask your experience in this medical visit, what it felt like for you and what you think it will mean to you and your health situation.
(Please anwer all questions, even if you saw your doctor without any specific ailment or problem in mind)

Outcome of this specific visit

1. Do you know what to do in order to lower your hearing problem?

Yes, much more	☐ 5
More or less	☐ 4
A bit more	☐ 3
Not much more	☐ 2
No more	☐ 1

2. Do you know what to expect from your hearing from now on?

Yes, much more	☐ 5
More or less	☐ 4
A bit more	☐ 3
Not much more	☐ 2
No more	☐ 1

3. Will you be able to deal with your hearing problems in a diferente way?

No more	☐ 1
Not much more	☐ 2
A bit more	☐ 3
More or less	☐ 4
Yes, much more	☐ 5

4. Will this consultation help you to have fewer communication problems?

No more	☐ 1
Not much more	☐ 2
A bit more	☐ 3
More or less	☐ 4
Yes, much more	☐ 5

Communication experience

5. The professional and I had a good conversation?

I fully agree	☐ 5
I agree	☐ 4
More or less	☐ 3
I disagree	☐ 2
I fully disagree	☐ 1

6. I felt confidente

I fully agree	☐ 5
I agree	☐ 4
More or less	☐ 3
I disagree	☐ 2
I fully disagree	☐ 1

7. The professional understood my concerns

I fully agree	☐ 5
I agree	☐ 4
More or less	☐ 3
I disagree	☐ 2
I fully disagree	☐ 1

8. I felt cared by the professional

I fully agree	☐ 5
I agree	☐ 4
More or less	☐ 3
I disagree	☐ 2
I fully disagree	☐ 1

Communication barriers

9. It was a little difficult to get along well with the professional

I fully agree	☐ 5
I agree	☐ 4
More or less	☐ 3
I disagree	☐ 2
I fully disagree	☐ 1

10. During consultation, much time was spent with “small talk”

I fully agree	☐ 5
I agree	☐ 4
More or less	☐ 3
I disagree	☐ 2
I fully disagree	☐ 1

11. It was a little hard to ask questions

I fully agree	☐ 5
I agree	☐ 4
More or less	☐ 3
I disagree	☐ 2
I fully disagree	☐ 1

12. The professional made importante decisions without asking me

I fully agree	☐ 5
I agree	☐ 4
More or less	☐ 3
I disagree	☐ 2
I fully disagree	☐ 1

Experience with the facilitator

13. I felt embarassed (sky/ashamed) to talk about my problems with another person in the room

I fully agree	☐ 1
I agree	☐ 2
More or less	☐ 3
I disagree	☐ 4
I fully disagree	☐ 5

14. I prefer to undergo a usual consultation than on the computer

I fully agree	☐ 1
I agree	☐ 2
More or less	☐ 3
I disagree	☐ 4
I fully disagree	☐ 5

Immediate emotions after consultation

After this consultation, I felt:

(Polease, circle the number correspondente to your answer in each line)

Relieved	7 6 5 4 3 2 1	Worried
Sad	1 2 3 4 5 6 7	Excited
Strong	7 6 5 4 3 2 1	Weak
Tense	1 2 3 4 5 6 7	Relaxed

Thanks for your time and colaboration.