Auditory rehabilitation: family's role in adherence to the use of wireless transmission system in school

Reabilitação auditiva: papel da família na adesão ao uso do sistema de transmissão sem fio na escola

Rehabilitación auditiva: el papel de la familia en la adherencia al uso del sistema de transmisión sin hilo en la escuela

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Abstract

Objective: *describe and analyze the Frequency Modulation System (FM) adaptation process and its consistency of use in the classroom in children with hearing loss, taking into consideration family role relevance as an intermediary between the health service system and the school.* ***Method:*** *As part of the methodology a couple of steps were carried out: medical records analysis, FM adaptation and initial explanations to parents, such as device handling, battery lifetime and transmitter. At the same day, parents were asked to take this information to teachers and two returns were scheduled. At the first return, three activities were carried out: a speech perception evaluation, an initial interview with parents to obtain non-recorded information and the application of a socioeconomic questionnaire. The second return, when daily use of the FM system was registered by reading the transmitter record, and another interview with parents was performed, collecting information regarding the use and difficulties encountered.* ***Results:*** *43.9% children used FM consistently and 56.1% inconsistently. Additionally, it was found that kids with unilateral losses tended to lower use of FM. There was no statistically significant association in*

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Authors' contributions: AGEB Elaboration of the research project, data collection and analysis, writing and review of the manuscript. BCAM Co-advisor of the research, elaboration of the research project and review of data analysis. LBF Collaboration in methods elaboration and final review of the manuscript. BCACN Advisor of the research, elaboration of the research project and final review of the manuscript.

Source: CNPq e Capes

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Received: 03/10/2016
Accepted: 05/12/2016

the consistent use of FM when compared to the school characteristics. Most parents reported that their children were using FM, nevertheless, the average hours did not confirm this information. ***Conclusion:*** *The findings of this study suggested that there should be greater teacher´s monitoring by parents together with an audiologist, who can verify the use of the FM system at the school through direct measurements on the transmitter.*

Keywords: *Hearing loss; Frequency modulation system; Adherence to treatment; Family*

Resumo

Objetivo: *descrever e analisar o processo de adaptação e consistência de uso em sala de aula, do sistema de Frequência Modulada (FM) em crianças com deficiência auditiva, considerando a relevância do papel da família como intermediária entre o serviço e a escola.* ***Método:*** *Foi realizada entrega e adaptação do FM e explicações iniciais para pais, tais como: manuseio do dispositivo, duração da bateria e posicionamento do transmissor. No mesmo dia, os pais foram orientados a levar essas informações aos professores e foram agendados dois retornos. No primeiro foram realizadas avaliação de percepção de fala, aplicação do questionário socioeconômico e entrevista inicial com os pais, para obter informações que não constavam no prontuário; no segundo retorno, ocorreram o registro do uso diário do FM e a entrevista com pais para coletar informações quanto ao uso e dificuldades encontradas.* ***Resultados:*** *Observou-se equilíbrio quanto ao uso do FM. 43,9% utilizaram de forma consistente e 56,1% de forma inconsistente. Verificou-se que as crianças com perdas unilaterais tiveram tendência a menor utilização do FM. Não foi encontrada associação estatisticamente significativa no uso consistente do FM, quando comparado com as características da escola. A maioria dos pais relatou que os filhos estão fazendo uso do FM, no entanto, a média de horas não confirmou essa informação.* ***Conclusão:*** *Os achados deste estudo sugerem a necessidade de assistência aos pais na relação com os professores e na consistência de uso do sistema FM, a partir de relação formal estabelecida com a escola e o acompanhamento pelo fonoaudiólogo do serviço de saúde, que pode monitorar o uso do sistema na escola através de medidas diretas no transmissor.*

Palavras-chave: *Deficiência auditiva; Sistema de frequência modulada; Adesão ao tratamento; Família.*

Resumen

Objetivo: *Describir y analizar el proceso de adaptación y el uso de consistencia en el aula, el sistema de modulación de frecuencia (FM) en niños con pérdida auditiva, teniendo en cuenta la importancia del papel de la familia como intermediario entre el servicio y la escuela.* ***Método:*** *Se llevó a cabo la entrega y adaptación de FM y explicaciones iniciales a los padres, tales como: el manejo de dispositivos, duración de la batería y el posicionamiento del transmisor. El mismo día, los padres fueron instruidos para llevar esta información a los maestros y se imputaron dos vueltas. En la primera vuelta se realizó la evaluación de la percepción del habla, la aplicación del estudio socioeconómico y la entrevista inicial con los padres para obtener información no contenida en el registro. En la segunda vuelta, que se llevó a cabo la grabación de FM uso diario y las entrevistas con los padres, la recogida de información sobre el uso y las dificultades encontradas.* ***Resultados:*** *No hubo equilibrio en el uso de la FM. 43,9% utiliza constantemente y el 56,1% de manera inconsistente. Se encontró que los niños con pérdidas unilaterales tendían a un menor uso de FM. no hubo asociación estadísticamente significativa en el uso consistente de FM en comparación con las características de la escuela. La mayoría de los padres dicen que sus hijos están haciendo uso de FM, sin embargo, el número medio de horas ha no se ha confirmado esta información.* ***Conclusión:*** *Los resultados de este estudio sugieren que debería haber una mayor vigilancia de los padres con los maestros, y visualizar en el audiólogo, que puede controlar la utilización del sistema en la escuela a través de mediciones directas en el transmisor.*

Palabras clave: *Pérdida de la audición; Sistema de frecuencia modulada; La adherencia al tratamiento; Familia.*

Introduction

The rehabilitation process of a hearing impaired individual in an oral approach has the main goal of reducing the negative effects of hearing loss on communication. The speech-language pathologist and audiologist has the important role of evaluating, assisting and creating conditions for the hearing-impaired patient to develop speech and language[1].

One of the determinant aspects in this process is the selection of appropriate electronic devices. Hearing aids and cochlear implants (CI) significantly amplify the possibility of an effective communication, since these devices allow children to have audibility for speech and environmental sounds, which makes them active members in their families and social circles[2].

Nevertheless, the hearing aid and/or CI may not assure the necessary hearing levels in all environments, specially those where noise, lack of visual contact and reverberation hamper hearing. It is known that background noise hinders communication and generates fatigue due to the child's effort to concentrate; moreover, it may impair learning, since the student can miss part of the content or not learn the entire message, which hinder his understanding[3].

In this sense, children with hearing impairment and cochlear hearing loss present greater difficulty to understand speech in noisy environments, and need a greater signal-to-noise ratio than individuals with normal hearing[4].

The FM system is an electronic device that optimizes the hearing aid and/or CI fitting, improving signal-to-noise ratio and increasing signal comprehension (speech) in noisy, reverberant environments, or when the sound source is distant. This device works as a wireless microphone and is composed by a transmitter and a receiver. The transmitter is used by the sound source (the teacher, for example). It captures the sound signal and transmits it through modulated frequency to the receiver, which is attached to the user's hearing aid and/or CI.

The ordinance 1.274 from June 25th 2013 included the FM system in the table of procedures, drugs, ortheses, prostheses and special materials of the Unified Health System (SUS). Thus, users of hearing aids and CI, specially children and teenagers with speech recognition ability, will be able to use this technology within the school environment, helping their learning process. As with any other technology, appropriate and consistent use of the device is determinant for the benefits that it can bring[5].

Treatment adherence is a process that depends on the partnership established between professional and patient. Hence, health actions must be elaborated focusing on people rather than only on the procedures, integrating guidelines, information and adequacy of the therapeutic schemes to the patient's lifestyle[6].

Family is a determinant part in the therapeutic intervention process, since they are with the child most of the time. However, many parents are not able to take on more responsabilities due to the lack of conditions or time, because of work[7]. Several studies confirm that family's involvement in all stages of the children's fitting process significantly increases the possibility of success, particularly when they establish clear expectations and engage in treatment, in contrast to those who are satisfied to only being enrolled in the hearing health service, either because they are unfamiliar with the use of the devices or even because they do not know how to use it properly[5].

It is kown that it is difficult for parents to accept the use of technology right after the hearing loss diagnosis, since it confirms that their "perfect child" presents an imperfection. Parents usually want their children to use something invisible, that can be hidden, but once they get to feel more comfortable about their child's hearing loss, they begin to accept the benefits of hearing assistive technologies and to encourage its use. As their children grow up and start to go into noisy environments, such as school, it is clear the need of technology to minimize the noise effects and the distance from the teacher in the classroom[8]. As mentioned before, many parents and teachers still resist the use of technology and the FM system, and try to use alternative methods, such as positioning the child in the front roll of the classroom, among other alternatives that might substitute the device. However, it is important to guide the family, pointing out the benefit of the system in relation to the distance and the noise. It is also the speech-language pathologist and audiologist's role to support and encourage parents in structuring the communication process of the child, guiding them on the need to use hearing assistance and the FM system.

In this context, this study proposes the investigation of the main variables involved in family's adherence to the use of the FM system, understanding its relevance and impact in different situations. A better understanding of these aspects not only brings benefits to the child's development, but also constitutes a basis for new approaches in the services, involving the child, the family, the FM system and the speech-language pathologist and audiologist. In the last two years, other wireless transmition technologies have been made available with the same objective of facilitating communication in noisy environments. These devices, though with a different technology, have the same function and the same advantages of the FM system.

The aim of this study was to describe and analyze the fitting process and the consistency of use of the Frequency Modulated system – FM (or other wireless transmition system) in the classroom by hearing impaired children, particularizing the family's role as intermediate between the hearing health service and the school.

Methods

This was a descriptive prospective cross-sectional quantitative and qualitative study, which is part of the line of research on child hearing of the Program of Graduate Studies in Speech-Language Pathology and Audiology of the Pontifícia Universidade Católica de São Paulo. It was carried out at the Child Hearing Center (CeAC – Derdic/PUC-SP). According to the ethical precepts in human research, the parents or caregivers received a letter of information about the procedures of the research and signed a Free and Informed Consent, authorizing their participation in the study.

The research project was approved by the Research Ethics Committee of the institution, under protocol number 45415514.1.0000.5482 (Plataforma Brasil). Participants were 63 parents and/or caregivers of users of frequency modulated systems granted by SUS at Derdic/PUCSP in the year of 2015. Initially, patients' medical records were analyzed, they were granted and fitted the FM system, and initial explanations were provided to parents and/or caregivers about handling the device, battery life, and positioning the transmitter and the microphone.

Data obtained from the medical records included: gender; age; age at diagnosis; age at the first hearing aid fitting; hearing age; audiometric thresholds for 500, 1k, 2k and 4kHz, for both ears; Speech Intelligibility Index (SII) for the better ear, which is considered as the one that better represents the child's speech perception performance; region of residence; frequency of speech-language therapy sessions; history of the consistency of use of the hearing aids; level of education of the child; and level of education of parents or caregivers. On the same day, families were oriented to pass along these information to the teachers, and two returns were scheduled. In the first return, which took place one week after the delivery of the device, the WASP and the initial interview with the parents were conducted to obtain information that were not displayed on the medical records. The socioeconomic questionnaire was also applied. The second return took place thirty days after the delivery of the FM. At this moment, the daily use of the FM system was registered through the reading of the transmitter record and through an interview with parents and/or caregivers regarding the use and difficulties found during it.

Data analysis used the Chi-square association test (X2) and, when a variable presented a cell with expected value inferior or equal to 5, the Fisher's Exact test was applied. In the analysis of independent variables, associated to the outcome inconsistency of use of the FM system, the cutoff established for consistency of use was ≥1.5 hour/day; <1.5 hour/day was classified as inconsistent use. The nonparametric Mann-Whitney test was used to verify the groups differences regarding consistency and inconsistency of use of the FM system, according to quantitative variables. To identify the correlation between the mean time of use and the independent quantitative variables, the nonparametric Spearman correlation test (r) was used (r = 0.10 until 0.39 = weak correlation; r = 0.40 until 0.69 = moderate correlation; r = 0.70 until 1 = strong correlation) (Dancey and Reidy, 2005). A descriptive level of 5% was assumed for statistical significance. Data were entered on Excel and analyzed using the software Statistical Package for the Social Sciences (SPSS) version 22.0 for Windows.

Results

The descriptive analysis of this study was focused on children who received the FM system at the CeAC and returned to the service two times, as pre-scheduled (n = 63).

Children's mean age was 9.5 years (SD = 3.1), and the most frequent gender was female (52.4%). Regarding the type of hearing loss, 84.1% (53) presented bilateral hearing loss (with bilateral hearing aids or bimodal hearing – hearing aid + CI) and only 15.9% (10), unilateral. Henceforth, results are presented following this classification.

The degree of hearing loss of the studied population was calculated from the average of the 500 Hz, 1 kHz, 2 kHz and 4 kHz thresholds of the better ear. Classification was carried out according to the standards of the World Health Organization (WHO, 2006). From the individuals with bilateral hearing loss, 38% presented moderate degree loss; 26%, severe; 19%, profound; and 17%, mild. In the sample with unilateral hearing loss, 60% presented moderate degree loss on the affected ear; 30%, severe; and 10%, mild.

The analysis of the studied population showed that 87.3% (58 individuals) took the FM system to school; 47.6% (30) lived in the South region of the city and, regarding the socioeconomic level, there was higher concentration of individuals in classes B2 (34.9%) and C1 (38.1%).

Most of the children (87.3%) were enrolled in regular schools, from which 38.1% (24) were municipal schools, 36.5% (23), state schools, and 25.4% (16), private schools. Regarding the level of education, it was found that 9.5% (6) were in kindergarten, 55.6% (35), in elementary school, 33.3% (21), in middle school, and 1.6% (1), in highschool.

From the children who took the FM to school, 92.7% were enrolled in regular schools and 40.0% (22), in municipal schools. Most of the children who did not take it to school – 62.5% (6) – attended state schools.

It was found that the variable level of education presented no statistically significant association to consistency of use of the hearing aids (p=0.616). The analysis of this variable showed that most of the children were enrolled in elementary school, both in the group that took and the group that did not take the FM to school.

The study found a significant difference between the subjects who took the FM system to school compared to the ones who did not take it, considering the SII of the better ear. The median of the group that did not take it was 33.0%, comparing to 67.0% from the group who took it (p=0.009). This data seems to indicate that the higher the

Table 1. Comparison of the groups according to the variables: age, SII of the better ear, percentage of correct words and percentage of correct consonants (n=63).

Variables	Took the FM to School												p (M-W)
	No						Yes						
	n	Minimum	Median	Maximum	25%	75%	n	Minimum	Median	Maximum	25%	75%	
Age	8	5,0	10,5	15,0	5,2	13,5	55	5,0	9,0	17,0	7,0	12,0	0,771
SII of the better ear	7	12,0	33,0	69,0	24,0	66,0	50	26,0	67,0	97,0	52,7	77,0	0,009
% correct words	8	0,0	63,5	100,0	0,0	99,5	55	0,0	92,7	100,0	72,9	96,9	0,315
% correct consonants	8	0,0	80,6	100,0	0,0	99,8	55	0,0	95,8	100,0	84, 6	98,3	0,325

*records with missing values

audibility for speech sounds, the greater the possibility that the FM system will be taken to school (Table 1).

From the subjects with bilateral hearing loss, it was observed that three from the 44 individuals who took the FM to school had no information on the average of use (hours/day). In the interview with the parents, they reported that the FM had been taken to school with the proper orientation, but the school refused to use the equipment. Regarding use: 43.9% (18 subjects) used the FM consistently, and 56.1% (23), inconsistently, considering the cutoff ≥ 1.5 hour/day.

In the second return, the parents were asked to answer a questionnaire about the process of passing on the guidelines of the FM use to the school. Concerning the use of the FM system, most parents believed that the teachers were using the equipment, and several of them also understand that the contact with the school is not difficult. However, some difficulties were mentioned due to the following reasons: the school found it unnecessary to use the device; the student did not need the device; schools were not willing to assume that responsibility. When asked if the teacher was present during the meeting in school, most answers were affirmative (contact were made in the teacher's presence). Regarding the form of conveying the information, most parents reported to have done it in person (orally), and most of the times the mother and/or the father was responsible for communicating with the school.

Most parents say they had no difficulty in contacting the school and the teacher. This item was answered by 39 parents; subject S53 had the information explained by the child's speech language pathologist, and the father of S66 was not able to precise the information. Nine parents indicated the need for support material. Fourty parents answered on this matter, since S66 was again unable to precise the response. Nevertheless, there was no significant difference between the groups consistent and inconsistent use of the FM system for these variables (Table 2).

Table 2. Association analysis between consistency of the FM use and variables from the interview with parents, using the Chi-square test and univariate binary logistic regression (n=41).

Variables	Use of the FM system		p (X^2)	OR*	$CI_{95\%}$	p
	Consistent	Inconsistent				
	n (%)	n (%)				
Used the FM (sic mother)§						
No	1 (16,7)	5 (83,3)	0,205	1,0		
Yes	17 (48,6)	18 (51,4)		0,21	0,0 - 2,0	0,176
Explanation in the presence of the teacher						
No	8 (61,5)	5 (38,5)	0,121	1,0		
Yes	10 (35,7)	18 (64,3)		2,88	0,7 - 11,2	0,127
Difficult contact with the school (sic mother)§						
No	18 (45,0)	22 (55,0)	1,000	1,0		
Yes	0 (0,0)	1 (100,0)		--	--	--
Difficult to explain to the teacher§						
No	17(44,7)	21 (55,3)	1,000	1,0		
Yes	0 (0,0)	1 (100,0)		--	--	--
Need for additional material in the interaction with the teacher (sic mother)§						
No	17(54,8)	14 (45,2)	0,005	1,0		
Yes	0 (0,0)	9 (100,0)		--	--	--
Total	18 (43,9)	23 (56,1)				

* the consistent group was used as reference category; §Fisher's Exact test; -- cells with null values

There was also no significant difference between these groups in the following variables: age, SII of the better ear, percentage of correct words and consonants. The records of SII with blank values referred to the children who used open fitting and, for that reason, it was not possible to measure the SII.

Regarding the distribution of the variable SII of the better ear, the median between groups were close. However, the distribution in the inconsistent group was greater. Subjects S15, S14, S13 and S12 had SII <40% and presented consistency in the use of the FM system, and subject S30, with SII >80%, also presented consistency of use (Figure 1). The number of correct consonants in the groups consistent and inconsistent was homogeneous. It was noticeable that all subjects used consonants correctly, but several of them did not use the FM consistently. The percentage of correct words, on the other hand, showed expressively greater distribution in the group that consistently used the FM system. For 50% of the subjects who used the FM consistently, the percentage of correct words varied between 65% and 97%. Such distribution may suggest that other factors can contribute to the inconsistent use of the device (Figure).

Another relevant aspect observed was the fact that, in both correct consonants and correct words,

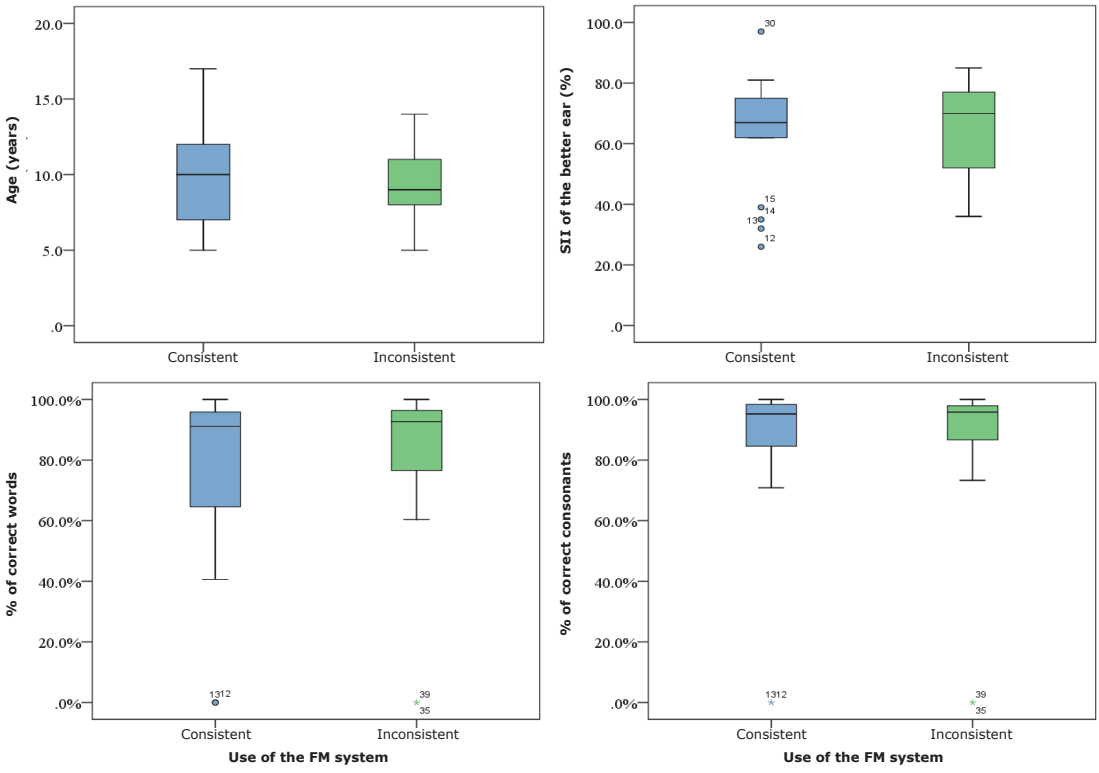

Figure 1. Boxplot distribution of the consistency of use in relation to age, SII of the better ear, percentage of correct words and percentage of correct consonants, for subjects with bilateral hearing loss (n=41).

four children refused to take the tests. Analyzing each of these cases, it was noticed that two children used the FM inconsistently (S35 and S39) and the other two, consistently (S12 and S13).

As for the recognition of words, the chart of percentage of correct words in Figure 1 showed a greater distribution for children with similar SII. Once the number of correct consonants was higher than that of correct words, it is possible to affirm that there were children who were able to recognize consonants, but not necessarily the words. The use of hearing abilities in communication depends on several factors and on the contribution of orofacial reading to the daily demands.

When the quantitative analysis was examined together with the answers from the questionnaire sent to parents, the result showed that, for both groups (consistent – 48.6% and inconsistent – 51.5%), parents tended to believe that their children were using the FM system. In the interview with the parents, nine of them affirmed to be sure that their children used the FM, and in fact their consistent use was noticed by their recorded mean time of use. Eight of these subjects presented SII between 62% and 97% and one subject had SII inferior to 40%, which suggests that parents were not able to precise the use of the FM system at school because they tended to care more about the fact that the device was taken to school than about the consistency of use.

During these interviews, some difficulties in the daily use of the FM system were pointed out. The most relevant were:

Discomfort using the FM system

This difficulty is related specially with the intensity of the teacher's voice, which causes discomfort and a decrease in the use of the system.

Shyness to use the FM system

Another highlight was the fact that, for some children, shyness was a major obstacle to using the system, surpassing any benefit that the device could provide. Such fact demonstrates that this obstacle leads to the inconsistent use of the equipment. In this study, the parents of one child reported that their son was ashamed to use the FM at school, and the practical result was the inconsistent use, proved by the mean hours of use per day.

Handling of the FM by the parents

The difficulty of parents in handling the equipment can be an obstacle to the use of the FM system, since teachers are not correctly instructed on the operation of the device. This is more pronounced when children are small.

In this research, it was possible to observe that this obstacle was surpassed when children were a little older, because they learned themselves from their speech-language pathologists how to handle the equipment, and instructed the teachers on its correct operation.

Teachers' resistance to the FM use

The resistance of teachers was another difficulty found, with the indication of several factors: judging that using the equipment was not necessary, not willing to assume the responsibility for the device, among others.

In this research, three parents mentioned to have had this difficulty in the beginning, but they did not give up and went back to school more than once, insisting on the use of the FM. As a result, two children (S1, with SII of 64%, and S27, with SII of 81%) succeeded in persuading the teacher, and achieved consistency in using the FM. On the other hand, the father of subject S32, with mild hearing loss in the better ear (open fitting), could not convince the teacher to use the device.

Two actions were identified as favorable to the FM use:

Increasing the number of returns

Some parents asked for more returns, as additional attempt to persuade their children to use the equipment, which brought a positive result.

Using the support of legal institutions

Two parents reported that they only got their children to use the FM at school after contacting the city's department of education, which, together

with the hearing health service, convinced the school to use the device.

In this study, three subjects used cochlear implant in one ear and hearing aid in the other. Two of them were male and one female; one used the FM consistently and two, inconsistently. All of them presented SII of 40% in the ear with hearing aid. For CI users, although the SII cannot be obtained, it may be assumed that it would be over 70%. From these three children, two were enrolled in regular school and one in a special school that used the Brazilian sign language; one was a municipal school and two were private schools. One child was enrolled in kindergarten, one in elementary school and one in middle school.

The three subjects, with ages of 5, 11 and 13 years, showed good audibility for consonants (over 75% of correct consonants). Regarding the words recognition, It was, however, noticed that they missed more words when compared to consonants, even though they still had more than 50% of correct answers for words.

For the other viariables, three parents reported that their children used the FM system regularly. Two had the presence of the teacher in the initial explanation meeting, and all of them said they had no difficulty in contacting the school and the teacher. Only one father found it necessary to use additional support material. None of these three children's parents reported any problems in the use of the FM in school, however, only one child (S59) used it consistently.

From the ten children with unilateral hearing loss, eight took the FM to school: two of them used it consistently, and six, inconsistently. In addition, when the results of the statistical analyses for demographic and social variables were verified, it was not possible to find any significant association.

In this study, it was noticed that all children had good audibility in the ear with hearing loss. This fact is illustrated in Figure 2.

Regarding the use of the FM use, most parents believed that teachers were using the device and did not find it difficult to communicate with the school. When the variables above were analyzed, once more, no significant differences were found between the groups consistent and inconsistent in the use of the FM system.

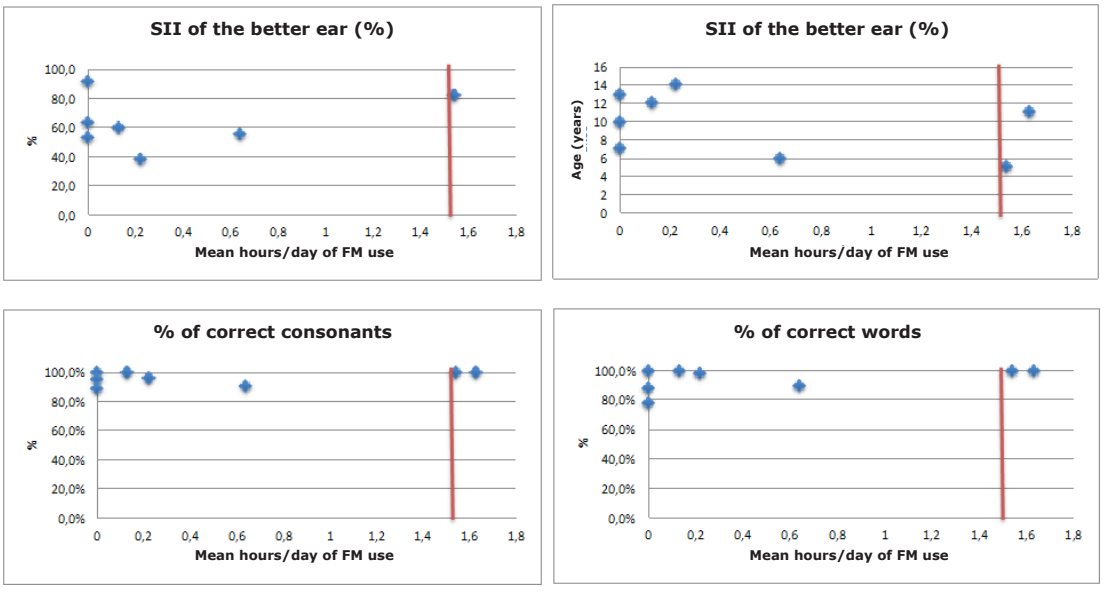

Figure 2- Spearman correlation (r) test between the mean hours/day of FM use at school vs age, SII of the ear with hearing aid, % of correct words and % of correct consonants (n=8).

Discussion

The relation between audibility of speech sounds and the use of FM systems showed there was a tendency of more hours of use in subjects with lower audibility. In this study, children with lower audibility of speech sounds were those with bilateral hearing loss and less than 40% of SII in the better ear.

In line with this observation, it was possible to notice that, from the children in this study with bilateral hearing loss, the ones with better audibility tended to use the FM less (Figure 1). Data seem to point to the fact that the audibility of speech sounds (measured by the number of correct words) was better in the group that presented inconsistent use of the FM system when compared to the consistent group. Although both groups had a similar median, there was greater variation and a lower lower limit in the consistent use group (64.6% vs 75% in the inconsistent use group).

Still corroborating this tendency, the observation of children with CI with good audibility of speech sounds showed a lower number of hours using the FM system. Considering that this refers to a small sample of only three children, more particular conclusions about this group would require a study specially designed for this population.

Another aspect to be highlighted is the relation between audibility for speech sounds and the FM system actually being taken to school. All the subjects who took the FM to school had good audibility for speech sounds (SII>52.7% and 72.9% percentage of correct words). This tendency may be related to the fact that these children spontaneously identified the benefit of using the FM system.

However, as previously discussed, taking the FM to school does not mean the child used it consistently. For this reason, it seems that the consistent use of the FM may depend on other variables that, combined, difficult the adherence to the use of the device in the school routine. Although there is a relationship between better audibility and taking the FM to school, we did not find a significant relationship between consistent use and better audibility, which can be observed by comparing the median of the percentage of correct words in the inconsistent use group (92.7%). It is likely that the child with better audibility and little motivation to ask the teacher to use the FM system ended up adapting to the noise, using alternative strategies, such as being assigned a better seat.

Comparing the children with unilateral hearing loss – also a group with better audibility of speech sounds – with those with bilateral hearing loss (lower limit in the boxplot of word recognition were 84.9% and 64.6%, respectively - Figure 1) indicated that most children in the first group did not use de FM system consistently. Only 25% used it consistently, while 43.9% of the group with bilateral hearing loss actually had a consistent used of the device. Subjects with unilateral hearing loss are a group with particular needs and difficulties that tend to disappear during school life; however, many times, they are not recognized by the user or his family. This fact agrees with other studies that consider that hearing aid fitting must be done with caution in these children[9,10].

The statistical analysis of demographic and social variables related to the use of the FM device did not show any significant correlations. Nevertheless, it is important to highlight some aspects observed in this sample that might give some direction to further studies, as well as relate or compare these different situations with similar studies carried out in other countries.

When the maternal level of education was analyzed, it was noticed that all the children whose mothers had not completed middle school presented inconsistent use of the FM system (a total of seven children, considering both the ones with bilateral and unilateral hearing loss). This relation was also observed in another study involving North American children and teenagers who were users of hearing aids. The research found a strong correlation between consistency of use of the devices and parental level of education, suggesting that parents with higher level of education tend to value the FM technology used at school, which ends up resulting in greater consistency of use in the school routine[11].

Analyzing the variable school showed that none of the studied characteristics was significant, however, the students from private schools showed a greater tendency for consistent use of the FM (p=0.06). These findings corroborate the study conducted by Davis et al, which found that the usage standards for the FM system did not seem to be influenced by school characteristics, specially when comparing between public and private schools, which might explain the tendency for greater use in the latest[12].

Another interesting aspect was the consistent use of the FM in schools that use the Brazilian sign language. Two of the three children that go to this type of school used the FM consistently.An individual analysis of these two subjects showed that both presented SII under 40% (32% and 39%) on the better ear. The child who did not use the FM presented a significant level of word comprehension (almost 80%) and a higher SII on the better ear (67%). These facts are in line with what has already been discussed, that is, children with greater hearing difficulty tend to use the FM more consistently.

The quantitative results obtained from the children and from the interview with their parents showed several aspects that could be highlighted. The first point observed during the interviews was the lack of accuracy from parents regarding the use of the FM by the children. The perception of the parents was limited to the fact that the device was taken to school and did not reflect the consistency of use. Most of them judged that children were using the FM system, even though the analysis of the mean hours of use per day recorded in the device showed exactly the opposite. This fact has been discussed in other studies that, very similarly, observed that the excessive optimism of the parents regarding the use of the equipment may lead to an unsufficient monitoring for the results to be more effective[12].

Another relevant point is that most parents suppose that, since information on the use of the device has been transmitted to the teacher, a reasonable guarantee has already been obtained regarding its use. However, the research raised doubts about the parents' ability to be good interlocutors with the teachers to guide the correct use of the equipment and informe about its relevance and benefits to the child, as well as to develop with the teachers a way to follow up the level of use and also its effectiveness. In some situations, it seems that the decision of use is more connected to the children's will than to the will of the adults responsible for them (parents and teachers).

An evidence to this fact was verified in the speech of two mothers who reported, in the return appointment, not to remember how to handle the equipment, and that their children taught the teachers how to use it. Still in this sense, McCracken and Wilding affirmed that, although some parents felt that their children were in disadvantage when compared to normal-hearing children, that they needed greater effort to understand the teacher, and found that the FM was an appropriate tool to make it up for this impairment, they respected the choice of their children not to use the FM system. This fact is more peculiar when it is verified that part of these parents are aware that this decision can limit the learning and development of their children[12].

Another important point to highlight regards the returns after the delivery of the FM system. The parents of two children asked for more returns than it was proposed by the institution, in order to create opportunity to show their children the importance of using the device. In the interview, it was evident that these parents had understood the implications and losses than an inconsistent use of the FM can bring to school performance, hindering the learning process. These cases suggest a recommendation to the speech-language pathologist to pay attention to the difficulties during their sessions and, if necessary, to propose more returns.

Regarding teachers' adherence, five parents found some resistance to the use of the FM device in the school. However, they did not give up and went to the school more than once, insisting that the equipment was used. Two of them had no option but to contact the city's department of education to assist them. In their study, McCraken and Wilding also approached this issue, highlighting that more traditional teachers needed a more careful orientation regarding the importance of using the FM system so the hearing-impaired children would benefit from them[12].

Conclusion

After analyzing the results of this study, it was possible to highlight some relevant topics with important considerations:

- Children with lower audibility tended to use the FM system more consistently.
- Children with mild and unilateral hearing losses tended to inconsistently use the FM system, and aparently judged that its use is unnecessary.
- The consistent use of the FM was not influenced by school characteristics, except for a tendency of greater use in private schools, which may signal that more attention should be given to the parents of children from public schools.
- Parental level of education did not seem to be relevant to the use of the FM system, except for parents who did not complete middle school,

whose children showed a tendency not to use the FM.

- Parents tended to be more optimistic in judging the use of the FM system, and many times seemed to leave to their children the decision to use the device, when they should have a more protagonist role, using different mechanisms to influence the consistent and better quality use.

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