

Hearing Aid Use and Adherence to Treatment in a Publicly-Funded Health Service from the City of São Paulo, Brazil

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Abstract

Introduction Periodic follow-up appointments are important to ensure long-term effectiveness of rehabilitation with hearing aids. However, not all users are able to maintain adherence to recommendations prescribed during the fitting process and some do not attend those appointments, which compromises the effectiveness of treatment.

Objective Compare hearing aid use after 1 year between subjects who did not attend a follow-up evaluation appointment at a publicly-funded health service (nonattenders) and those who attended the appointment (attenders). Reasons for nonuse of hearing aids and unscheduled appointments were also analyzed.

Methods Prospective observational cross-sectional study. Nonattenders and attenders in a follow-up evaluation appointment were interviewed by telephone about hearing aid use, reasons for nonuse, and unscheduled appointments.

Results The nonattenders group consisted of 108 subjects and the attenders group had 200 subjects; in both groups, most users kept bilateral use but the nonuse rate was higher in nonattenders. The main reason for nonuse of hearing aids among nonattenders was health problems; fitting problems was the main reason for nonuse in the attenders group. Health problems and issues like unavailable companion and transportation difficulties were the reasons for unscheduled follow-up appointments.

Conclusion Nonattenders had a greater nonuse rate and were more likely to abandon hearing aid use. Measures to increase hearing aid use and adherence to prescribed recommendations are also necessary to ensure long-term effectiveness of rehabilitation with hearing aids.

Keywords

- hearing aids
- public health
- patient compliance

Introduction

According to hearing aid fitting guidelines,^{1–3} rehabilitation with hearing aids should maximize residual hearing of subjects over time, including characteristics of hearing loss, individual profile, and personal needs. To keep fittings up-

to-date, periodic interventions might be necessary to solve problems that may occur over time, such as broken earmolds or changes in hearing.^{4,5} Therefore, follow-up appointments are essential to guarantee long-term effectiveness of treatment.^{2,3,5–7}

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Patient adherence in long-term treatment for chronic conditions may also influence outcomes and effectiveness of interventions. The term *adherence* refers to the degree a subject's behavior corresponds to and agrees with the prescriptions and recommendations of the proposed treatment, and adherence may be influenced by factors related to the disease itself, the treatment process, the health care provider, and social and economic aspects, among others.^{8–12} Poor adherence results in poor health outcomes, limited control of the disease, waste, and underutilization of treatment resources.¹⁰

Hearing aid use can reflect the effectiveness of hearing rehabilitation.¹³ Users tend to abandon hearing aid use over time, mainly because of fitting problems.^{4,5,14–16} On the other hand, not all users adhere to the treatment's prescriptions, and some do not attend follow-up appointments, which may directly affect long-term effectiveness and nonuse of hearing aids.

The purpose of the present study was to compare hearing aid use between subjects who did not attend a follow-up evaluation appointment at a publicly-funded health service (nonattenders) and those who attended an appointment (attenders). Reasons for nonuse of hearing aids and unscheduled appointments were also analyzed.

Methods

This cross-sectional survey was approved by protocol number 0160/10 by the ethics committee on research. In all, 376 users whose hearing aids dispensed and fitted 1 year previously in a publicly-funded health service from the city of São Paulo, Brazil, were selected from medical records and invited to participate in this study via telephone interview. Considering one of the purposes of this study was to identify factors that lead to hearing aid nonuse and use/fitting problems that may occur over time, we sought to select subjects who did not have other issues that could affect hearing aid use and maintenance, such as chronic middle ear infection or fluctuating hearing loss.

Inclusion criteria were: adults (at least 18 years old) diagnosed with mild to moderately severe, bilateral and symmetric sensorineural hearing loss, who wore digital behind-the-ear hearing aids with nonlinear amplification in both ears for 1 year, with no previous experience with hearing aids. Subjects with neurologic disorders, outer or middle ear malformations, manual dexterity problems, or fluctuating hearing loss were excluded.

Procedures

Active Search by Telephone

All 376 subjects were invited by telephone to attend a follow-up evaluation of hearing aid use in the same institution that fitted the hearing aids for them, as described by Iwahashi et al.⁵ Up to five phone call attempts in three different times of the day were made, and subjects were considered unreachable by telephone if the phone number was incorrect or none of phone call attempts were answered.

When a phone call was successfully made, subjects were offered three different options to schedule an appointment for the follow-up evaluation. To reduce the number of non-attenders, subjects were called the day before the scheduled appointment as a reminder or to reschedule a new appointment if necessary. Subjects who did not schedule an appointment were asked about the reason for not attending the publicly-funded health service.

Interview

Users, respective caretakers, or users' acquaintances were interviewed by telephone after stating they authorized the use of collected data in this study. The audiologist responsible for the research conducted all the interviews, as a previous step to the follow-up evaluation described in Iwahashi et al.,⁵ to consider the probable bias for subjects who would not attend the appointments. The interview consisted of the following questions: (1) Have you been wearing your hearing aids? (2) Do you usually wear both hearing aids (bilateral), only one hearing aid (unilateral), or none of them? If the subject wore none or only one of the hearing aids (unilateral), a third question was asked: (3) What is the main reason for not wearing your hearing aids?

Data Analysis

Subjects were divided in two groups according to attendance at the follow-up appointment. The nonattenders group comprised all subjects who were absent from or did not schedule a follow-up appointment, and the attenders group contained all subjects who attended the follow-up evaluation appointment.

Data were analyzed with descriptive statistics and logistic regression analysis.¹⁷

Results

Active search resulted in 308 users interviewed by telephone, or 81.91% of the initial sample (→ **Fig. 1**). The nonattenders group consisted of 108 subjects; 63 (58%) were women and 45 were men (41%), and their ages ranged from 21 to 94 years (mean 69.71, standard deviation [SD] ± 15 years). The attenders group consisted of 200 subjects, of whom 102 were women (51%) and 98 were men (48%), with ages ranging from 26 to 101 years (mean 71.33 years, SD ± 11 years). In both groups, most subjects did not have more than 4 years of formal education and were not economically active.

Most subjects in both groups maintained bilateral use of hearing aids after 1 year, but nonuse was greater in the nonattenders group (→ **Fig. 2**). Inferential analysis by logistic regression showed that being from the attenders group was statistically different from nonattenders group, adjusting for gender, degree of hearing loss, and age; in other words, only attendance was associated with hearing aid use (→ **Table 1**). Logistical regression analysis also showed that the probability of abandoning hearing aid use was significantly higher in the nonattenders group; there was no intersection between the confidence intervals, and abandoning use was more than twice as likely as that for the attenders group (→ **Table 2**).

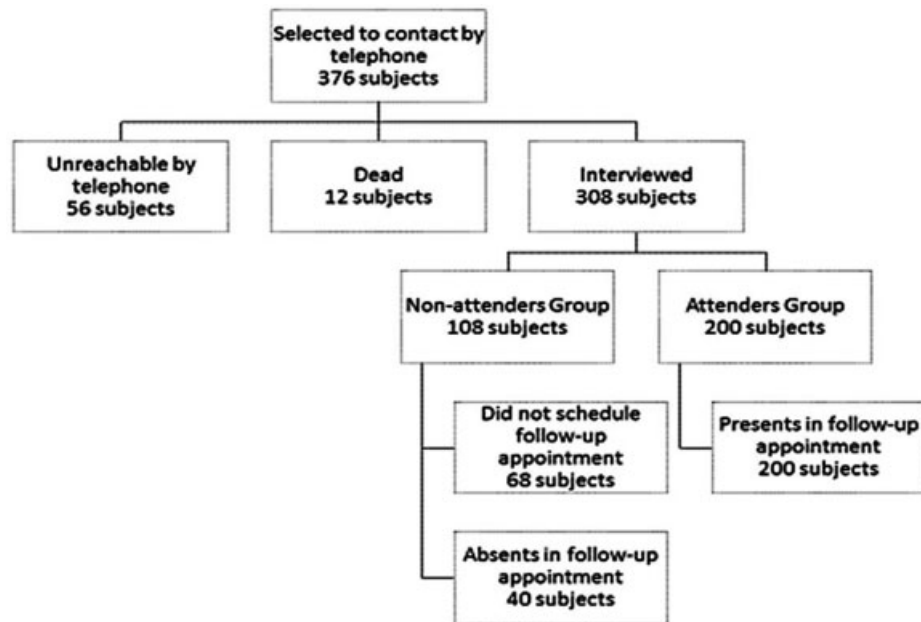


Fig. 1 Outcomes of active search by telephone.

Stated reasons for nonuse of hearing aids differed between both groups. Health problems were an important issue for nonuse in the nonattenders group; fitting problem was the main reason in the attenders group (►Table 3 and ►Table 4).

The main reasons indicated for unscheduled follow-up appointments in the nonattenders group were health problems and unavailable companion (►Table 5).

Discussion

Studies about effectiveness of hearing health care provided by publicly-funded services are important to improve treatment quality and optimize the utilization of public resources.^{5,18,19}

However, effectiveness is not only affected by lack of quality in treatment or limited resources, and this study took a different approach, evaluating how treatment adherence could affect outcomes in rehabilitation with hearing aids in a publicly-funded service located in the city of São Paulo, Brazil.

Hearing Aid Use and Attendance in Follow-Up Appointments

Among possible factors related to hearing aid use evaluated in ►Table 1, only attendance to follow-up appointment was statistically significant to use between age, gender, or degree of hearing loss. This differs from results seen in Swiss population in a study by Bertoli et al,²⁰ where age, gender, and

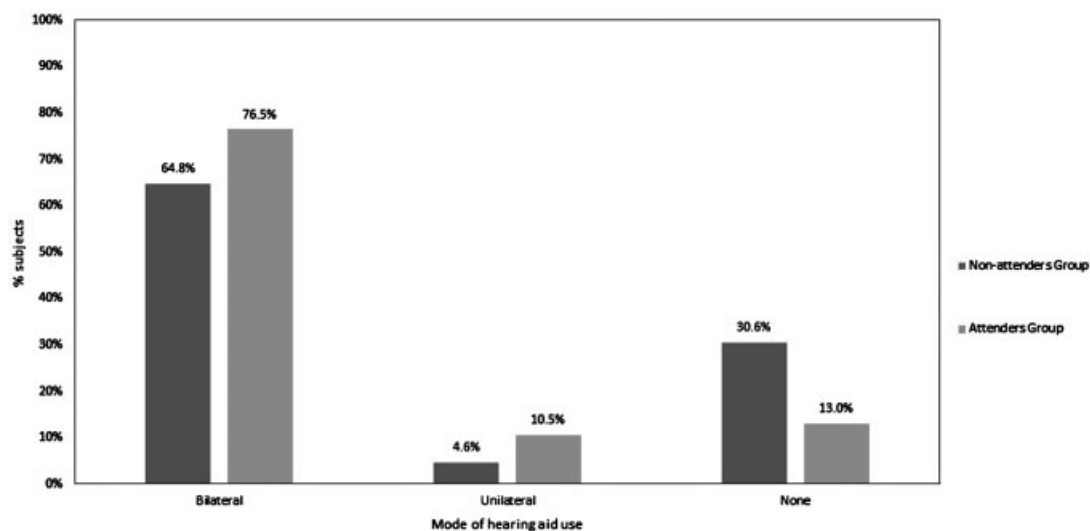


Fig. 2 Hearing aid use according to attendance in follow-up appointment.

Table 1 Model of logistic regression for estimate of hearing aid nonuse according to age, degree of hearing loss, gender, and group

Variable	Estimate	Standard error	p Value ($\alpha = 0.05$)
Constant	-0.72	0.38	0.058
Age	0.02	0.01	0.191
Degree of hearing loss (moderate)	0.03	0.37	0.928
Degree of hearing loss (moderately severe)	0.32	0.47	0.502
Gender (male)	-0.48	0.31	0.116
Group (attenders group)	-1.04	0.30	<0.01

Table 2 Model of logistic regression for estimate of hearing aid nonuse in nonattenders and attenders groups

	Estimate (%)	95% confidence interval	p Value ($\alpha = 0.05$)
Nonattenders group	30.6	22.6–39.9	<0.01
Attenders group	13.0	9.0–18.4	<0.01

degree of hearing loss were statistically significant to use but agrees with results by Lupsakko et al²¹ and Jerram and Purdy.²²

As seen in ► **Fig. 2**, most users kept bilateral use of hearing aids after a year, and the nonuse rate in the nonattenders group was more than twice that in the attenders group. Estimates in ► **Table 2** also revealed that treatment was less effective in nonattenders of follow-up appointments, considering the significantly greater probability of abandoning hearing aid use. In short, nonattenders were more likely to become nonusers of hearing aids, or from a different perspective, treatment effectiveness tended to be weaker in non-adherent users.

Even with actions to improve the coverage and quality of rehabilitation with hearing aids, it is essential that subjects follow the recommended prescriptions in treatment for its adequate execution by the publicly-funded health services, otherwise all the efforts will lead to insufficient treatment success and outcomes.¹⁰ The nonattenders group consisted of 35% of participants; changes in the follow-up system are required to raise attendance and adherence after the fitting process for better use of hearing aids over time and optimization of public resources.

Table 3 Reasons for nonuse of hearing aids in nonattenders group

Reason	n	%
Health problems	11	28.9
Poor sound quality	5	13.2
Poor benefit	5	13.2
Faulty hearing aid	2	5.3
No need of hearing aids	1	2.6
Could not state the reason	14	36.8
Total	38	100.0

Table 4 Reasons for nonuse of hearing aids in attenders group

Reason	n	%
Poor sound quality	14	29.8
Poor benefit	8	17.0
Manual dexterity issues	7	14.9
Faulty hearing aid	7	14.9
Fit discomfort	5	10.6
Health problems	4	8.5
Lost hearing aid	2	4.3
Total	47	100.0

Reasons for Nonuse of Hearing Aids

As seen in ► **Tables 2** and **3**, reasons for nonuse of hearing aids differed in both groups. In the nonattenders group, 36.84% subjects could not state reasons for nonuse reasons, which was not seen in attenders group and which may indicate subjects less interested in treatment; 28.95% reported health problems as major reasons, and the remaining 34.21% had hearing aid fitting issues. In the attenders group, only 8.51% stated health problems as a reason for nonuse; most nonusers had hearing aid fitting issues.

Table 5 Reasons for unscheduled follow-up appointments by subjects of nonattenders group

Reason	n	%
Health problems	22	32.4
Unavailable companion	21	30.9
Unavailable to schedule appointment	11	16.2
Transportation difficulties	8	11.8
Returned hearing aid	6	8.8
Total	68	100.0

In both groups, the majority of subjects evaluated were more than 65 years old, a portion of the population more often affected by chronic and disabling diseases, which may lead them to remain in bed or be unable to wear hearing aids. Health problems was the most commonly stated reason for nonuse in the nonattenders group and also the main reason for unscheduled follow-up appointments (► **Table 4**), affecting adherence to treatment as a whole. The authors considered as health problems when users, caretakers, or acquaintances stated an issue caused by health problems that would affect hearing aid use, which included middle ear infection, ear eczema, pneumonia, necessity to keep hearing aids in all the time, recovering from ear surgery, and recovering from cancer treatment. There were times the interviews were held with users' neighbors or acquaintances, and the subject could not give the precise information.

The other reasons for nonuse of hearing aids in both groups were fitting problems or problems caused by doubts regarding maintenance and use, which were also seen in other studies; these problems can be solved with adjustments and orientations usually done in follow-up appointments to maintain the long-term effectiveness of rehabilitation with hearing aids.^{4,5}

Reasons for Unscheduled Follow-Up Appointments

Excepting returned hearing aids, which was a small percentage of total sample, all reasons for unscheduled follow-up appointments refer to difficulties to fulfill attendance and maintenance to treatment adherence.

Health problems affected attendance in appointments and was the most often cited reason for unscheduled follow-up appointments. Statements included necessity to stay in bed all the time, treatment of middle ear infection, and physical injury that hampers locomotion until health service, for example, severe stage of osteoarthritis.

Most users were elderly people who lived far from the health service and needed a companion to bring and accompany them to appointments, which at times could not happen mainly due to companion's work activities or also work activities of users, which is reflected in the unavailability to schedule appointment.

Transportation difficulties were also an important factor to consider, because most users depended on public transportation and needed to take up to six different buses to attend appointments, which sometimes is financially expensive and/or physically demanding to their health conditions.

Measures to ease adherence with treatment recommendations by hearing aid users could improve the effectiveness of rehabilitation and optimize public resources, perhaps even more than attempts to improve the quality or coverage of health services, as suggested by World Health Organization.¹⁰

Long-term effectiveness of rehabilitation with hearing aids provided by publicly-funded services needs to be improved, which could be done with implementation of measures to increase adherence to hearing aid use and to prescribed recommendations, to ensure quality of treatment and optimization of public resources over time. Distance learning programs for orientation and counseling of hearing aid use

using the Internet, tele-audiology, videoconference software, or instructional videos could help users to solve problems that may affect fitting quality, such as adequate insertion of earmolds, maintenance and cleaning of earmolds and hearing aids, and use of hearing aid drying container. Health services in Brazil are decentralized; hearing aid follow-up centers could also be implemented in basic health units according to geographical distribution to decrease attendance difficulties related by nonattendant users.

Conclusions

- Most users kept hearing aid use in both ears after 1 year, but the nonattenders group had a greater nonuse rate and were more likely to abandon hearing aid use, which represents a population less adherent to the treatment prescriptions and a less effective hearing rehabilitation.
- The main reason for nonuse of hearing aids among the nonattenders group were health problems, unlike the fitting problems related by nonusers of the attenders group.
- Health problems and problems like unavailable companion and transportation difficulties were the reasons for unscheduled follow-up appointments.
- Measures to increase adherence to hearing aid use and prescribed recommendations are also necessary to ensure long-term effectiveness of rehabilitation with hearing aids.

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