

Analysis of Hearing Monitoring in Children during Annual Visits to an Outpatient Hearing Health Service Program

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Abstract

Preserving the integrity of the auditory system is crucial for language development, learning, and social interaction. Any interruption in these processes during development can result in significant functional impairments. The objective was to carry out a longitudinal analysis of audiological data from children who underwent an initial assessment at SASA in 2018 and were followed up for 4 years at the outpatient's annual consultations. This is a retrospective cross-sectional study with children who underwent initial assessment for hearing loss and follow-up at a reference service for the Unified Health System (SUS), from January 2018 to December 2022. Children aged 0 to 12 years old who underwent an initial assessment for hearing loss and follow-up in the service's database, where secondary data analyses will be carried out. Data from 127 subjects with an average age of 20 months were analyzed. 60.62% of the subjects were diagnosed with some degree of hearing loss, and the etiology of the change remained unknown in 29.90% of the cases. A considerable percentage of subjects remained under follow-up during annual consultations. There was good adherence to annual returns and follow-ups at the outpatient clinic, indicating a high attendance rate.

Keywords: Health Care, Child Health, Hearing, Hearing Loss

Introduction

The integrity of the auditory system is extremely important for language acquisition, learning, and socialization [1]. For children to develop well and acquire language, they need to be able to detect sounds, locate them, discriminate, memorize, recognize and understand them [2]. In this regard, any interruption during the development of these stages can lead to significant functional damage, so early diagnosis and intervention are essential for children with hearing loss [3]. According to the Brazilian Society of Pediatrics [4] and Correia *et al.*, [5], children with hearing loss who receive early diagnosis and intervention have significantly better results in the development of language skills, increased vocabulary, speech intelligibility, and socio-emotional aspects. Several risk factors can lead to the development of hearing loss in childhood, which can be genetic or acquired and can occur during the intrauterine, perinatal, or postnatal period [6].

Knowing the etiology of hearing loss will enable the professionals involved to provide educational knowledge to the family about the child's hearing loss, thus increasing the chances of family engagement and support for rehabilitation [7]. Also, epidemiological knowledge of hearing loss will allow hearing health programs, in terms of promotion, prevention, diagnosis, and rehabilitation, to be planned according to the demands of each region in the country. In Brazil, however, just a few studies provide the profile of patients treated in hearing health programs, making it difficult to plan actions aimed at this population [3].

The Ministry of Health, based on Decree 7.612, launched Regulation GM/MS No. 2.776 in 2014, in which, based on this document, the hearing rehabilitation process includes audiological diagnosis, selection, fitting and granting of individual sound amplification devices (ISADs) and speech therapy. It also reinforces the importance of hearing follow-

up, intending to monitor hearing loss and make adjustments to the characteristics of the ISAD, as well as guiding the use and handling of the device [8].

Comprehensive care for users of Hearing Health Care Programs is the main factor in the success of ISAD fittings, so monitoring allows users to improve their quality of life, enable literacy and future insertion into the job market, however, periodic monitoring of children with hearing loss is still a major challenge [9]. Given this context, this study aimed to analyze the hearing follow-up of children who underwent an initial assessment at SASA in 2018 and were followed up for 4 years at the outpatient clinic's annual visits.

Methods

Type of study

This is a retrospective cross-sectional study at an Outpatient Hearing Health Service (OHS), a reference in the State of Santa Catarina (SC), which included users aged between 0 months and 12 years, who underwent an initial assessment in 2018 with a longitudinal analysis regarding follow-up visits from February 2018 to December 2022. The collection period is related to the beginning of the use of electronic medical records, considering that assessments in 2018 became

more complete and accessible. Data was collected from the multidisciplinary team's assessments regarding initial assessment, hearing diagnosis, ISAD fitting, and hearing follow-up.

Inclusion criteria

Users aged between 0 months and 12 years who joined OtovidaInstitute'sSASAforevaluation,diagnosis,rehabilitation with ISADs and hearing follow-up and are registered with the SUS Hearing Health System (AVOS) in the State of Santa Catarina, who underwent an initial assessment in 2018 and later follow-up visits from February 2018 to December 2022.

Exclusion criteria

Users who had inconsistent responses to the Audiology Pure-Tone Testing, in which the results were considered inconclusive by the evaluator, were excluded.

Research tools

Data was collected from the SUS Auditory Health System (AVOS) database in the State of Santa Catarina at Otovida Institute, which receives primary care demands and specializes in auditory diagnosis and rehabilitation, providing care for users from all walks of life (Figure 1).

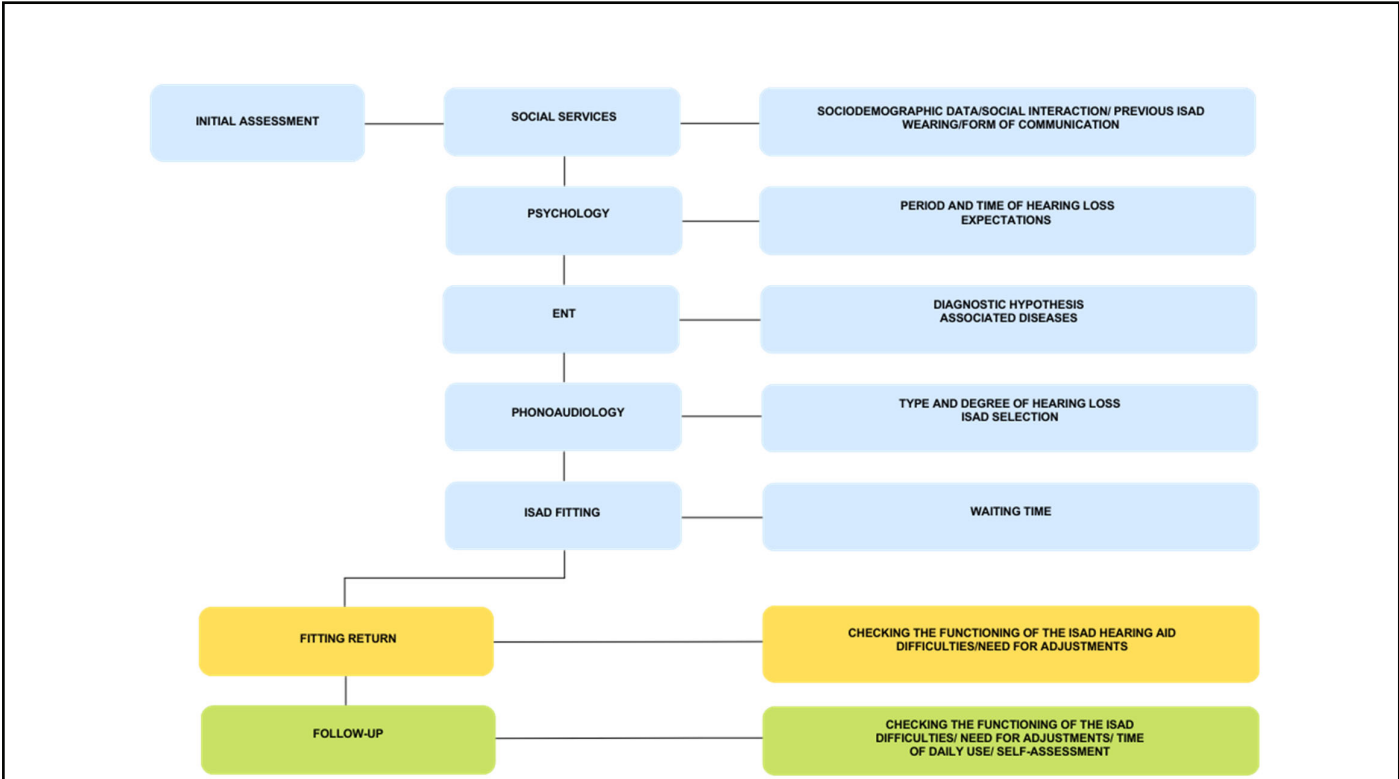


Figure 1. Flowchart of the research collection stages.

Stage A

Initial assessment visit: Users were seen by a multidisciplinary team, and data was collected from each professional's AVOS record file. Sociodemographic data, presence of difficulties in social interaction, previous wearing of ISAD and the form of communication used by the patient were collected from the Social Service. From the psychological interview, information was collected on the period and time of hearing loss and expectations regarding wearing the ISAD hearing aids. From the ENT assessment, data were collected on the main and secondary diagnostic hypotheses, as well as the main associated diseases. From the audiological assessment, data was collected for each ear on the type and degree of hearing loss, indication for ISAD and type of ISAD selected, type of sound transmission, and the class of ISAD selected.

ISADs fitting visit: Information was collected on the waiting time between the first visit and the fitting of the hearing aids.

Stage B

Fitting return visit: Data was collected on the functioning of ISADs, the status of the mold/tube or capsule, the need to modify the acoustic parameters, and the user's complaint regarding ISADs, as well as information on the time between the ISAD fitting and the user's return for a visit or the no show at the fitting return.

Stage C

Follow-up stage: Data were collected on annual return visits until December 2022. The data collected verified the situation of the hearing aids, the status of the molds, the need for adjustments to the settings, main complaints regarding use, time of daily use, self-assessment of the benefit of using

the hearing aids, the examiner's consideration of the user's performance, the need for replacement of requested and authorized hearing aid molds and replacements.

Data analysis

The data was organized in Microsoft Excel® spreadsheets and then exported and analyzed using MedCalc® Statistical Software version 22.006. Quantitative (numerical) data was analyzed using descriptive statistics with summary descriptive measures (position and variability), such as mean, median, minimum, maximum and standard deviation, as well as relevant statistical graphs to provide adequate visualization of the results obtained. To describe the (categorical) variables, descriptive statistics were used with single and double-entry tabulations, referring to the absolute and relative frequencies relevant to the object of study.

Ethical approval

This study was approved by the Research Ethics Committee (CEP) of the Federal University of Santa Catarina, under CAAE: CAAE: 39562720.8.0000.0121.

Results

In 2018, 127 subjects underwent an initial assessment for hearing loss, of which 51.20% (n=65) were identified as female, and 48.80% (n=62) were identified as male. Of the 127 subjects assessed, 39.40% (n=50) showed no hearing alterations and were discharged from the SASA, while 60.62% (n=77) were diagnosed with some kind of hearing loss. Within the latter group, 29.90% (n=38) of the subjects had alterations of unknown etiology and, in 6.30% (n=8) and 5.50% (n=7) of the cases, respectively, chronic otitis media and genetic factors were identified as the main causes of hearing loss (Table 1).

Table 1. Sociodemographic characteristics of subjects seen at SASA for initial assessment in 2018.			
Variable (n=127)	n	Frequency (%)	P*
Gender			0.791
Male	62	48.80%	
Female	65	51.20%	
Total	127	100.0%	
Education level			<0.0001*
Not literate/Not attending	59	46.40%	
Early Education	31	24.40%	
Elementary Education	33	26.00%	
APAE	4	3.10%	
Total	127	100.0%	
Etiology			<0.0001*

No hearing loss	50	39.40%	
Unknown	38	29.90%	
Chronic otitis media	8	6.30%	
Genetics	7	5.50%	
Premature birth	5	3.90%	
Secretory otitis media	3	2.40%	
Microtia	2	1.60%	
Anoxia	2	1.60%	
Ototoxicity	2	1.60%	
Stenosis of the external auditory canal	2	1.60%	
Pallister-Killian Syndrome	2	1.60%	
Hyperbilirubinemia	1	0.80%	
Genetic syndrome to be explained	1	0.80%	
Down's Syndrome	1	0.80%	
Meningitis	1	0.80%	
Tumor on the left ear	1	0.80%	
Congenital toxoplasmosis	1	0.80%	
Total	127	100%	
Family history			<0.0001*
No	114	89.80%	
Yes	13	10.20%	
Total	127	100%	
RIHL			0.0003*
No	60	47.20%	
Yes	67	52.80%	
Total	127	100%	
UNHS Test			<0.0001*
No	5	3.90%	
Yes	97	76.40%	
Does not know	25	19.70%	
Total	127	100%	
UNHS result (overall pass-fail)			<0.0001*
Pass	28	29.50%	
Fail	67	70.50%	
P* value using the chi-squared test; *Statistically significant			
Key: APAE: Associação de Pais e Amigos dos Excepcionais (Association of Parents and Friends of Children with Special Needs); RIHL: Risk Indicators for Hearing Loss; UNHS: Universal Neonatal Hearing Screening			

Concerning risk indicators for hearing loss, 52.80% (n=67) of the subjects had some risk indicator, while 47.20% (n=60) did not. Universal Neonatal Hearing Screening (UNHS) was performed in 76.40% (n=97) of the cases, and it was not performed in 3.90% (n=5) and also in 19.70% (n=25), the guardians reported that they did not know if the test had been performed. In the general pass-fail, it was possible to see that 29.50% (n=28) of the subjects passed the exam and 70.50% (n=67) failed (**Table 1**).

As for the time needed to complete the diagnosis, 32.30% (n=41) completed at the first assessment, 22% (n=28) completed after 1 month, 14.20% (n=18) after 2 months and 11% (n=14) in less than 1 month. Of the 54 users diagnosed with hearing loss, 68.30% (n=41) were mostly fitted with ISADs one month after the initial assessment, 13.30% (n=8) after 2 months and only 5% (n=3) did not return for fitting. With regard to returning for fitting, 85.18% (n=46) returned within 30 days, 5.50% (n=3) within 60 days and 7.30% (n=4) did not return (**Table 2**).

Table 2. Time taken to complete the diagnosis, fitting and return to ISAD fitting for users seen at SASA in 2018.			
Variable (n=127)	n	Frequency (%)	P*
Time taken to complete the diagnosis			<0.001*
First assessment	41	32.30%	
<1 month	14	11.00%	
1 month	28	22.00%	
2 months	18	14.20%	
3 months	3	2.40%	
4 months	1	0.80%	
5 months	3	2.40%	
6 months	3	2.40%	
8 months	2	1.60%	
9 months	1	0.80%	
12 months	2	1.60%	
24 months	1	0.80%	
Total	127	100.00%	
ISAD FITTING			<0.001*
Did not return for fitting	3	5.00%	
1 month	41	68.30%	
2 months	8	13.30%	
3 months	3	5.00%	
4 months	2	3.30%	
Did not meet the criteria for ISAD fitting (remained in follow-up)	2	3.30%	
1 year	1	1.70%	
Total	60	100.00%	
Fitting Return			<0.001*
Did not return	4	7.30%	
30 days	46	85.18%	
60 days	3	5.50%	
90 days	1	1.80%	
Total	54	100.00%	
P* - chi-squared test; *Statistically significant			
Key: ISAD: Individual Sound Amplification Device			

Of the n=127 subjects who underwent initial assessment at SASA in 2018, 54 of them received individual sound amplification devices; however, 4 individuals did not continue, leaving 50 individuals who were followed up at the clinic's annual visits (**Table 3**).

In the first follow-up, 79.60% (n=43) of users returned within the expected period (1 year) and only 7.5% (n=4) of users did not return. Of the remaining 50 users, 9.3% (n=5) returned in less than 1 year and 3.7% (n=2) returned after 2 years. In the second follow-up, of the remaining 49 users, 61.20% (n=30) returned within 2 years, while 16.3% (n=8) did not return. Only 2% (n=1) returned within 1 year, 8.2% (n=4) returned after 3 years and 4.1% (n=2) returned after 4 years. Furthermore, 8.1% (n=4) of the subjects were transferred to another service (**Table 3**).

At the third follow-up, of the remaining 34 users, 67.60% (n=23) returned within 3 years, while 8.8% (n=3) did not

return. Only 5.9% (n=2) returned after 2 years and 11.8% (n=4) were transferred to another service. Finally, in the fourth follow-up, of the remaining 21 users, 85.70% (n=18) returned within 4 years, while 9.5% (n=2) did not return. Only 4.8% (n=1) returned in less than 1 year. No user was transferred to another service during this period (**Table 3**).

The indicated as 'returned in 1 year', 'returned in 2 years', etc., are cumulative, representing the total number of patients who returned after one, two, three, and four years, respectively. For example, the 'returned within 2 years' category includes both patients who did not return in the first year but returned in the second year, and those who returned directly in the second year (**Table 3**).

Table 4 presents the status of individual sound amplification devices (HAs) and the need for adjustments in the outpatient clinic's annual follow-ups from 2018 to 2022.

Table 3. Attendance at annual visits at Santa Catarina State Hearing Health Outpatient Service from 2018 to 2022.								
Follow-Up	1 st year		2 nd year		3 rd year		4 th year	
	n	%	n	%	n	%	n	%
Did not return	4	7.5%	8	16.30%	3	8.8%	2	9.50%
Returned in 1 year	43	79.60%	1	2.00%				
Returned in 2 years	2	3.70%	30	61.20%	2	5.90%		
Returned in 3 years			4	8.20%	23	67.60%		
Returned in 4 years			2	4.10%	2	5.90%	18	85.70%
Returned in <1 year	5	9.30%					1	4.80%
Referred to a different service			4	8.10%	4	11.8%		
Total	54	100.0%	49	100.0%	34	100.0%	21	100.0%

Table 4. Status of ISADs and need for adjustments in the outpatient clinic's annual follow-ups from 2018 to 2022.								
Follow-Up	1 st year		2 nd year		3 rd year		4 th year	
	n	%	n	%	n	%	n	%
RE ISADs Status								
Not working	2	4.00%	5	13.89%	4	15.38%	2	11.11%
Good working order	47	94.00%	31	86.11%	20	76.92%	16	88.89%
Loss					1	3.85%		
Replacement					1	3.85%		
Cochlear implant (CI) user	1	2.00%						
Total	50	100.0%	36	100%	26	100%	18	100.0%
LE ISAD Status								
Not working			2	6.45%	4	17.39%	2	14.29%
Good working order	42	100.0%	28	90.32%	18	78.26%	12	85.71%

Loss			1	3.23%	1	4.35%		
Replacement								
Cochlear implant (CI) user								
Total	42	100.0%	31	100.0%	23	100.0%	14	100.0%
RE ISAD adjustment								
No	37	74.00%	27	73.00%	20	74.10%	14	77.80%
Yes	10	20.00%	5	13.50%	1	3.70%	2	11.10%
Not applicable	3	6.00%	1	2.70%	2	7.40%	2	11.10%
Not working			4	10.80%	4	14.80%		
Total	50	100.0%	37	100.0%	27	100.0%	18	100.0%
LE ISAD adjustment								
No	35	70.00%	23	62.20%	17	63.00%	11	61.10%
Yes	7	14.00%	5	13.50%	1	3.70%	2	11.10%
Not applicable	8	16.00%	7	18.90%	5	18.50%	4	22.20%
Not working			2	5.40%	4	14.80%	1	5.60%
Total	50	100.0%	37	100.0%	27	100.0%	18	100.0%
Key: RE: Right Ear; LE: Left Ear; ISAD: Individual Sound Amplification Device.								

In the first annual follow-up, it was found that 94.00% (n=47) of the hearing aids in the right ear (RE) and 100% (n=42) of the hearing aids in the left ear were working correctly. Meanwhile, only 2.00% (n=4) of RE ISADs were not working. In the second follow-up, 86.11% of the RE ISADs and 90.32% of the LE ISADs were working correctly and 13.89% (n=5) of the RE ISADs and 6.45% (n=4) of the LE ISADs were not working.

As for the third follow-up, 76.92% (n=20) of the RE ISADs and 78.26% (n=18) LE ISADs remained in good working order, while 15.38% (n=4) of the RE ISADs and 17.39% of LE ISADs were not working. Finally, in the fourth follow-up, 88.89% (n=16) of the RE ISADs and 85.71% of the LE ISADs (n=12) remained in good working order and 11.11% (n=2) RE ISADs aids and 14.29% (n=2) of the LE ISADs (n=2) were not working correctly (**Table 4**).

As for the need for adjustments, during the first follow-up, 74.00% (n=37) of the RE ISADs and 70.00% (n=35) of the LE ISADs did not need to be adjusted. At the second follow-up, 73.00% (n=27) of the RE ISADs and 62.20% (n=23) of the LE ISADs were not adjusted. At the third follow-up, 74.70% (n=20) of the RE ISADs and 63.00% (n=17) of the LE ISADs did not require adjustments. At the fourth follow-up, 77.80% (n=14) of RE ISADs and 61.10% (n=11) of LE ISADs did not require adjustment (**Table 4**).

Table 5 refers to satisfaction and the main complaints regarding ISAD wearing at annual follow-ups. In the first year of follow-up, 76.00% (n=38) and 72.00% (n=36) of users were satisfied, both in RE and LE, respectively. The main complaint reported in the RE and LE was low volume, with 10.00% (n=5) and 8.00% (n=4) respectively (**Table 5**).

Table 5. Satisfaction and main complaints regarding ISADs in annual outpatient follow-ups from 2018 to 2022.								
Follow-Up	1 st year		2 nd year		3 rd year		4 th year	
	n	%	n	%	n	%	n	%
ISAD complaint RE								
Not applicable	2	4.00%	1	2.70%	3	11.10%	1	5.60%
Satisfied	38	76.00%	30	81.10%	17	63.00%	13	72.20%
Loud volume	1	2.00%						
Low volume	5	10.00%	1	2.70%			2	11.10%
Micro phony	2	4.00%	1	2.70%				

Not working			3	8.10%	3	11.10%	1	5.60%
Does not want to wear	1	2.00%	1	2.70%	4	14.80%	1	5.60%
Post-surgical discomfort	1	2.00%						
Total	50	100.0%	37	100.0%	27	100.0%	18	100.0%
ISAD complaint LE								
Not applicable	9	18.00%	6	16.20%	5	18.50%	4	22.20%
Satisfied	36	72.00%	26	70.30%	14	51.90%	12	66.70%
Loud volume					1	3.70%		
Low volume	4	8.00%					1	5.60%
Microphony			1	2.70%				
Not working			2	5.40%	3	11.10%		
Does not want to wear	1	2.00%	1	2.70%	4	14.80%	1	5.60%
Lost it			1	2.70%				
Total	50	100.0%	37	100.0%	27	100.0%	18	100.0%
Key: RE: Right Ear; LE: Left Ear; ISAD: Individual Sound Amplification Device.								

In the second year of follow-up, 81.10% (n=30) (RE) and 70.30% (n=26) (LE) were satisfied and the main complaint was that the ISAD was not working in both ears, with 8.10% (n=3) for RE and 5.40% (n=2) for LE. As for the third year of follow-up, 63.00% (n=17) were satisfied with the RE ISAD and 51.90% (n=14) with the LE ISAD. With regard to complaints, 14.80% (n=4) did not want to wear them bilaterally. At the fourth follow-up, 72.20% (n=13) reported that they were satisfied with the RE ISAD and 66.70% (n=12) with the LE ISAD. With regard to complaints, 11.10% (n=2) reported that the volume was low (**Table 5**).

Discussion

Based on the results presented, it is possible to see a small difference in the gender of the subjects assessed for hearing loss in 2018, which did not show statistically significant differences. Most of the subjects assessed were female (51.20%) compared to male (48.80%), which differs from the findings in the literature, such as in the studies by Gardonim *et al.* [9] and Botelho *et al.* [2], where the prevalence was male.

The prevalence of hearing impairment (HL) among the subjects evaluated was significant, with 60.62% of them being diagnosed with some degree of hearing impairment. It is known that AD is the most common sensory alteration in childhood, therefore, the recognition of hearing impairment as the most prevalent sensory alteration in childhood emphasizes the need to channel efforts and resources towards early detection, as well as the implementation of Preventive measures. This approach not only improves the perspectives of diagnosis and treatment, but also contributes to the overall development and increased quality of life of these children [1].

Another relevant aspect identified is that 19.70% of the subjects (n=25) demonstrated a lack of knowledge about carrying out the UNHS, revealing a gap in the participants' perception regarding the conduct of this assessment. The results of the present study echo previous investigations, notably the work conducted by Fichino *et al.* [8]. This study, which aimed to analyze the audiological characteristics of children in a reference center for hearing health in São Paulo, identified that in 33.3% of the subjects evaluated, no information related to UNHS was found. This finding corroborates the findings of the present research, suggesting consistency in the challenges perceived in relation to documentation and knowledge of assessment procedures [8].

In this study, it was observed that approximately 30% of the subjects with hearing loss had alterations of unknown etiology, corroborating the research performed by Faistauer *et al.* [7], which showed that 31.4% of the subjects assessed remained with no likely etiological diagnosis. The authors highlight the importance of investigating other genes that cause HI, which could reduce the number of children without a defined etiology.

The failure rate for Universal Neonatal Hearing Screening (UNHS) was high (70.50%), which is not in line with other studies. A study published in 2019 analyzed the effectiveness of UNHS in a University Hospital in Brazil. The study showed that the failure rate in neonatal hearing screening was 4.5% [10]. Another study showed that the failure rate for neonatal hearing screening was 4.3% [11].

It is imperative to highlight that the evaluation was carried out exclusively on patients who attended the outpatient clinic,

therefore not representing the entire child population that should be examined. The literature on monitoring children in outpatient hearing health services highlights several significant deficiencies. Firstly, limited accessibility to specialized services is a recurring concern. Many children, especially those from rural areas or those with low socioeconomic resources, face barriers to accessing quality hearing care, resulting in late diagnoses and inadequate interventions [12].

Furthermore, the lack of specialized professionals limits the ability of health services to offer continuous and personalized monitoring [13]. Finally, the lack of integration between hearing health services and other health and education services compromises the multidisciplinary approach necessary to meet the complex needs of children with hearing impairments [14,15].

Of the 127 participants who underwent the assessment, 54 of them received Individual Sound Amplification Devices (ISADs). Auditory rehabilitation, through the implementation of assistive hearing devices such as hearing aids, represents the most prevalent intervention in the treatment of individuals affected by hearing loss. The literature corroborates that wearing such devices mitigates the limitations arising from hearing impairment, promoting a significant improvement in overall functioning, both physical, psychological, and social [16].

The data indicates that a significant proportion of the children (32.30%) were diagnosed at the first assessment, highlighting the importance of effective initial assessments. The time it takes to fit sound amplification devices indicates an effective and efficient response to the initial audiological assessment. The fact that 68.30% of children diagnosed with hearing loss were fitted with hearing aids one month after the initial assessment is a positive result. In the study by Hall *et al.* [17], it could be seen that 93% of the subjects assessed received the diagnosis at the first assessment, which suggests a successful effort to provide audiological interventions in a timely manner, taking into account the specific needs of the children.

The high rate of fitting return (85.18% in 30 days) is also a positive indicator of good adherence to the hearing rehabilitation process. Returning is essential to ensure children receive the support they need to maximize the benefit of hearing aids. The low percentage of children who did not return for fitting (5%) is encouraging and can be seen as a sign of effective follow-up and communication with families [18]. It is important to note that there is a lack of current studies showing data on returns and rates of adherence to follow-up in the child population.

In this study, a significant percentage of participants remained monitored during the program's annual consultations over a four-year period. A survey conducted by Correia *et al.* [5]

revealed variability in participants' follow-up time, covering a range of 1 to 4 years, with an average of 2.5 years. Within the sample analyzed, 28.1% of individuals consistently maintained outpatient visits according to the established periodicity. The significant persistence of subjects in follow-up over the four years suggests a positive level of commitment on the part of the sample studied. This data is relevant, as continuity in monitoring is crucial to assess the long-term effectiveness of interventions, treatments, or health programs.

Analysis of the performance of Individual Sound Amplification Devices (HAs) during annual follow-up consultations showed a predominance of satisfactory functioning throughout all the years evaluated, ranging from 74.10% to 88.90%. Most users expressed satisfaction with the use of hearing aids, with the main complaint reported being related to low volume. In line with this, the study conducted by Chiriboga *et al.* [6] observed that the predominant complaint was related to high volume, followed by reports of hearing aids beeping and muffled sound, with an incidence of 223, 222, and 180 occurrences, respectively. This comparison highlights discrepancies in complaints perceived by users between studies, highlighting the variability in experiences reported in different contexts.

It is worth noting that the rate of correct hearing aid functioning being higher than the rate of no need for adjustments can be explained by the need to personalize the device according to the specific hearing needs of each user, adjusting it to improve comfort and effectiveness, even that it is working correctly. Additionally, adjustments may be necessary to adapt the device to different usage conditions, such as noisy or quiet environments, and during the users' adaptation period to the new device [19].

The analysis presented in this article is not free from limitations and weaknesses, such as the inadequate filling in of the subjects' information in the Hearing Health System (AVOS), Such as the absence of important information and the lack of a standard for filling in this information. Furthermore, the lack of contemporary studies on adherence to follow-up in the child population highlights the need for future research to gain a more comprehensive understanding of this crucial aspect of hearing rehabilitation.

Conclusion

The results obtained in this study confirm the comprehensive approach to the hearing rehabilitation process, which includes everything from the fitting of individual sound amplification devices to annual follow-ups to check for any adjustments and user satisfaction.

The data observed in this study showed that 60.62% of the subjects assessed had been diagnosed with some type of hearing loss, and most of the individuals received the diagnosis at the first assessment and started hearing rehabilitation

one month after diagnosis. In addition, there was adequate adherence to the fitting return and the annual outpatient follow-ups, with a high attendance rate, and it could be seen that most of the subjects were satisfied wearing the ISAD. The results presented contribute to planning the necessary improvements in the SUS hearing health program and health management, with a view to improving health indicators in primary care and public policies for the child population.

Data Availability Statement

The datasets generated during and/or analyzed during the current study are not publicly available due to ethical reasons but are available from the corresponding author on reasonable request.

Authors' Contribution

DHS Contributed to the conception and design of the study, data collection, writing, final version for publication, in addition to assuming responsibility for the entire study; LBC contributed to the conception and design of the study; MJM statistical analysis and study review; and approved the final version for publication, in addition to contributing to the design of the study, analysis and interpretation of data, writing and review; PH and KMP contributed to the conception and design of the study, writing and review; and approved the final version for publication, in addition to assuming responsibility for all aspects of the study.

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Institutional Review Board Statement

This study was approved by the Research Ethics Committee (CEP) of the Federal University of Santa Catarina, under CAAE: CAAE: 39562720.8.0000.0121.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Conflict of Interests

The authors declare no conflicts of interest.

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