

# Hearing assessment after referral in universal newborn hearing screening

## Diagnóstico audiológico de lactentes após falha na triagem auditiva neonatal universal

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### ABSTRACT

**Purpose:** To study the process of hearing assessment in infants who were referred by professionals responsible for Universal Newborn Hearing Screening (UNHS). **Methods:** Analysis of the medical records of 51 infants referred by maternity hospitals where UNHS was performed and were referred to a Hearing Health Center, between January and June 2021. Infants who completed hearing assessment, who never attended the appointments, or were lost during the diagnostic process were identified. Attempts were made to contact infants' guardians in order to understand the reason for missing the appointments. **Results:** The attendance to the diagnosis was 75%. Fifty percent of the infants completed hearing assessment as recommended, up to 3 months of life. The attempt to contact parents who missed the appointments was successful, and the most frequent reasons are: the infant was ill on the day of scheduled appointment, distance from home to the hearing health center, parents' working hours. **Conclusion:** For the diagnostic stage, the attendance rate and the age for completing hearing assessment were below the recommended. The active search for telephone contact and use of phone messaging application was important to reduce evasion by seventy-six percent. Tools that optimize the diagnostic process with less infants missing still must be studied.

**Keywords:** Hearing; Screening; Diagnosis; Loss to follow-up; Hearing loss; Newborn

### RESUMO

**Objetivo:** Estudar o processo de diagnóstico audiológico de lactentes que falharam na Triagem Auditiva Neonatal Universal (TANU). **Métodos:** Análise dos prontuários de 51 lactentes que falharam na TANU nas maternidades do município e que foram encaminhados a um centro de referência em saúde auditiva para diagnóstico audiológico, entre janeiro e junho de 2021. Foram identificados os lactentes que finalizaram o diagnóstico, aqueles que não compareceram ao agendamento para exames ou evadiram durante o processo. Tentativas de contato foram realizadas com os responsáveis pelos lactentes que evadiram, para identificar o motivo da evasão. **Resultados:** O comparecimento ao diagnóstico ficou em 75%, com evasões entre o encaminhamento da maternidade para o centro de referência, bem como durante o processo de diagnóstico. Cinquenta por cento dos sujeitos concluíram as avaliações audiológicas até os 3 meses de vida. A tentativa de contato foi bem-sucedida com os responsáveis pelos lactentes que evadiram, sendo os motivos mais frequentes: adoecimento do lactente, distância entre a moradia e o centro de referência, horário de trabalho dos pais. **Conclusão:** Na etapa de diagnóstico, o índice de comparecimento e o tempo de conclusão até o terceiro mês de vida da criança ficaram abaixo dos índices recomendados, diminuindo a efetividade do Programa de Triagem Auditiva Neonatal Universal (PTANU). A busca ativa por contato telefônico e uso de aplicativo de mensagem telefônico foi importante para reduzir a evasão em 76%. Outras ferramentas que aprimorem o processo para um diagnóstico não prolongado, evitando evasões, necessitam ser estudadas.

**Palavras-chave:** Audição; Triagem, Diagnóstico; Perda de seguimento; Perda auditiva; Neonatos

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## INTRODUCTION

Neonatal hearing health programs aim to carry out actions in order to minimize the consequences caused by congenital and permanent hearing loss in infants. These are actions that involve hearing screening, medical and audiological diagnosis, and therapeutic intervention, when necessary, in order to guarantee the development of speech and language in infants with hearing loss<sup>(1-4)</sup>.

The Universal Neonatal Hearing Screening (UNHS), preferably performed in maternity hospitals in the first month of life, allows the identification of possible hearing disorders in infants with or without Risk Indicators for Hearing Impairment (RIHL). In case of referring in the UNHS test and retest, the next diagnostic step is triggered<sup>(3,4)</sup>. The diagnostic process involves a medical evaluation and electrophysiological and electroacoustic procedures and its completion is recommended until the third month of life, in 90% of infants referred after the refer in UNHS. At this stage, we intend to confirm the hearing loss, characterizing it by its type, degree, and configuration, through tests such as the Auditory Brainstem Response (ABR), with click stimulus to verify neuronal synchrony, and ABR with specific frequencies (ABR-SF) for 500, 1000, 2000 and 4000Hz, by air and bone conduction, when necessary. Electroacoustic tests involve the performance of Evoked Otoacoustic Emissions (EOAE) by transient stimulus and distortion product; the recording of acoustic immittance measurements with tympanometry and the investigation of the acoustic reflex. A behavioral assessment to observe auditory behavior can be part of the audiological assessment. It is recommended that, if the infant has a confirmed permanent hearing loss, the selection and indication of hearing devices and speech-language therapy need to be started until the sixth month of life, because the development of neuronal plasticity<sup>(2)</sup>.

The three stages of the program - identification, diagnosis, and intervention - must be integrated and subsequently, with the stipulation of goals at the time of completion. The Joint Committee on Infant Hearing (JCIH) named this process steps 1-3-6, that is, the screening step 1 must be carried out within the first month of life; stage 3 is the diagnosis being concluded, preferably, until the third month of life; and stage 6 is the intervention measures, which should not exceed the sixth month of life. Professionals working in Universal Neonatal Hearing Screening Programs (UNHSP) should try to follow the recommended goals and ages, considered as quality criteria in the evaluation of a program<sup>(2,3)</sup>. Recommendations made by international UNHSP state the importance of keeping the infant in natural sleep during the audiological assessment process, contributing to a better recording of the tests applied<sup>(5-7)</sup>.

However, the timely intervention and the quality of UNHSP have been compromised by the dropout rates in the different stages of the program. Recent studies have reported that aspects related to the infant, family, or organization of health services may contribute to *loss to follow-up* or delay in reaching a diagnosis<sup>(8-11)</sup>. Difficulties in contacting families by telephone further exacerbate the active search for those who are lost between the stages of screening to diagnosis. Studies have shown difficulty in making contact with families who have not finalized the diagnosis<sup>(10,11)</sup>. For this reason, research that

describes these steps should be conducted, so that the intervention starting before six months of age is achieved.

The purpose of the UNHSPs is the timely intervention for infants with hearing loss, so when the previous steps are not performed or there are gaps to be solved, their main objective is not fulfilled, affecting the cost-effectiveness of the action<sup>(3)</sup>. Therefore, the present study aimed to study the evasion in the audiological diagnosis process for infants after the UNHS failure, describing its causes and the means of contact used for the active search of these subjects. This information may help in the organization of medical and audiological diagnostic services, seeking greater efficiency and effectiveness in care, greater adherence of families in the processes, and integration between the different levels of health care.

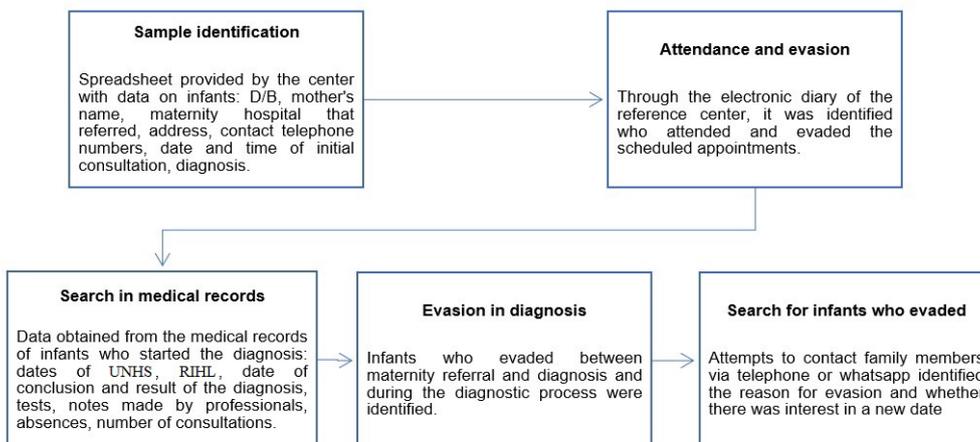
## METHODS

Retrospective and descriptive study with documental analysis of the medical records of subjects referred from maternity hospitals under municipal management, after UNHS failure, to a reference center in hearing health in the city of São Paulo. This research was approved by the Research Committee of the Division of Education and Rehabilitation of Communication Disorders of the Pontifical Catholic University of São Paulo (DERDIC/PUC-SP) and by the Research Ethics Committee (CEP), under number CAAE 37166020.9.0000.5482. The Infant Hearing Center (CeAC – DERCIC/PUC-SP), the location of the present study, is a reference center in hearing health in the city of São Paulo, characterized as CER II (Center Specialized in Hearing and Intellectual Rehabilitation), which performs hearing screening, audiological diagnosis, intervention and rehabilitation in infants and children. In the study, 51 infants who failed UNHS and were referred to CeAC were included in the period from January to June 2021.

We prepared a flowchart to elucidate the methodological path in which data collection was carried out (Figure 1).

The research started with the identification of the sample, from an Excel spreadsheet, made available by the reference center, with information on the infants referred in the period. Thus, the convenience sample used was characterized. With these data, it was possible to identify who had attended the initial consultation for the diagnosis or who had evaded the referral from the maternity hospital to the referral center. The research in medical records was carried out for infants who started the diagnosis, collecting information regarding their process within the diagnostic stage. The data found were arranged in an Excel spreadsheet for analysis. Four study groups were defined: infants who attended and completed the diagnosis; infants who attended, however, had not completed the process; infants who did not show up on the scheduled date and, therefore, dropped out since the referral from the maternity hospital, and infants who attended the diagnosis but dropped out during the diagnostic process.

Contact attempts were made with those responsible for subjects who never attended, or who evaded during the diagnosis process. First, two attempts were made to make contact by phone and, if unsuccessful, messages were sent via the *Whatsapp* application. This contact aimed to identify the reason for the dropout and offer a new date to continue



**Figure 1.** Methodological process of data collection  
**Subtitle:** D/B = date of birth; UNHS = Universal Neonatal Hearing Screening; RIHL = Risk Indicators for Hearing Impairment

**Chart 1.** Variables studied and the respective data analysis

Variables studied	Data analysis
UNHS dates (test and retest)	Age of infants at UNHS stages, arrival, and completion of diagnosis
Date of referral to diagnosis	
Completion date	
Presence of loss or hearing within the normal range, type, degree, and laterality of hearing alterations	Audiological result
Attendance/absences	Qualitative description of subjects who evaded and the form of contact used in the search
Infant identification	
Telephones	
Report from parents/guardians via phone/WhatsApp	Identification of reasons for evasions
Audiological result	Relationship with the types of hearing loss and the age of the infant after the diagnosis
Diagnosis completion date	
RIHL	Relationship of presence and amount of RIHL with completion of diagnosis
Diagnosis completion date	

**Subtitle:** UNHS = Universal Neonatal Hearing Screening; RIHL = Risk Indicators for Hearing Impairment

the process. In the contact, the following question was used: *“We would like to know if everything is ok and understand the reason for the absence on the day scheduled to carry out tests on the baby. If you are interested, we can set a new date.”* In this way, a less directed answer was sought, making the parents’ answers more flexible, in order to obtain the reasons that led to the absence or evasion in the process. Parents/guardians were informed and invited to participate in this research and the Informed Consent Form (ICF) was read during the phone call, or sent by Whatsapp.

The collected data were organized in an Excel spreadsheet for further descriptive analysis of the following variables, as shown in Chart 1.

The RIHL were based on the 2007 JCIH<sup>(1)</sup> and the Multiprofessional Committee on Hearing Health (*Comitê Multiprofissional em Saúde Auditiva - COMUSA*)<sup>(3)</sup>, as the municipal UNHSP uses the following indicators: heredity; consanguinity; use of ototoxic medications; mechanical ventilation; permanence in the Neonatal Intensive Care Unit (NICU) for more than five days; hyperbilirubinemia; severe perinatal anoxia; ventricular hemorrhage; weight less than 1,500 grams; congenital infections; craniofacial and ear anomalies; postnatal bacterial or viral infections; neurodegenerative disorders or sensorimotor neuropathies; head trauma and chemotherapy.

## RESULTS

This study did not have access to the total number of screenings performed nor to the total number of failures in the period performed in the UNHS service. Only the number of infants referred to the service where the study was carried out was known.

Regarding the attendance for the medical and audiological diagnosis, 75% (n=38) of the infants showed up on the scheduled date and 25% (n=13) were absent. Therefore, they evaded between the maternity referral and the diagnosis stage. The categorization of RIHLs was obtained from medical records of infants who started the diagnosis and RIHL was identified in 23 (61%) subjects, with the most frequent being in the NICU for more than five days, use of ototoxic medication and mechanical ventilation. Fifteen subjects (39%) did not present RIHL (Table 1).

Among the 38 infants who started the audiological diagnosis, 24 completed this process, of which half completed it before 3 months of life. One infant remained under diagnosis until the end of data collection and 1 died. Dropout during the audiological diagnosis was identified in 12 participants in the study (Figure 2)

After calculating the ages of the infants at the time of referral for diagnosis and of those who completed this stage (Table 2), we observed that 1 subject was referred to the diagnosis at nine days of age, without undergoing UNHS, due to the presence of bilateral ear malformation, which is the reason for his early referral. The subject referred with 390 days missed the recommended retest 15 days after hospital discharge, requesting a new return months later, which caused an advanced age at the beginning of the diagnostic process.

The scatterplot (Figure 3) shows the age of the infants at the referral for diagnosis and its duration. The result showed that

**Table 1.** Percentages and frequencies of Risk Indicators for Hearing Impairment in infants who attended the diagnosis

RIHL	n	%
Heredity	3	5,9%
Consanguinity	1	2,0%
Use of ototoxic medication	8	15,7%
NICU stay > five days	11	21,6%
Use of mechanical ventilation	7	13,7%
Hyperbilirubinemia	3	5,9%
Severe perinatal anoxia	3	5,9%
Ventricular hemorrhage	1	2,0%
Birth weight < 1500g	4	7,8%
Congenital infections	1	2,0%
Craniofacial/ear anomalies	6	11,8%
Signs associated with the syndrome	3	5,9%
Total	51	100%

**Subtitle:** RIHL = Risk Indicators for Hearing Impairment; n = number of subjects; % = percentage; NICU = Neonatal Intensive Care Unit; > = greater than; < = less than; g = grams

the infants were referred within 30 days after the completion of UNHS. However, some remained a long time in the diagnostic process, increasing the age of completion.

Regarding the result of the audiological diagnosis, 20 infants (83%) had hearing disorders and 4 of them (17%) had normal hearing. Sensorineural hearing loss had the highest occurrence, with 58% (n=14), followed by conductive hearing loss, with 25% (n=6). In this study, we did not find infants with mixed losses and with the spectrum of auditory neuropathy. With regard to the degree and laterality of the hearing alterations, 6 infants (30%) had mild hearing alterations, 5 (25%) had a moderate degree, 5 (25%) had severe hearing loss and 4 (20%) had profound hearing loss. In 16 infants (80%) bilateral hearing alterations were diagnosed and, in 4, unilateral alterations (20%).

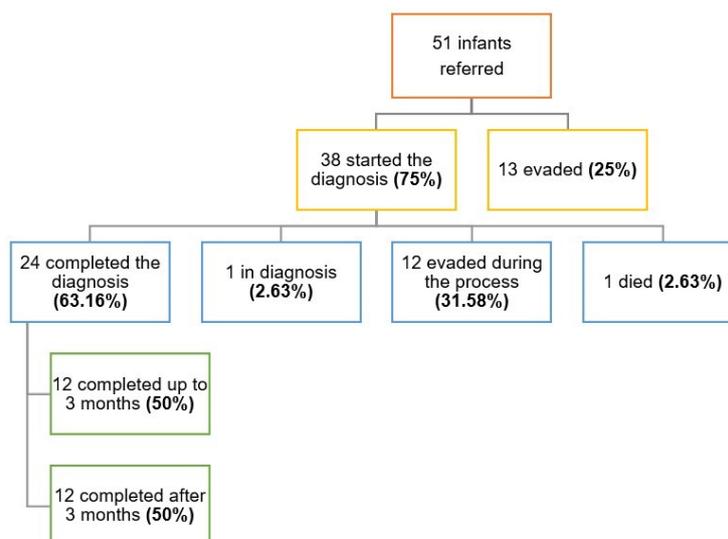
Of the 24 infants who completed the diagnosis, 15 had at least one RIHL (62.5%), and 9 (37.5%) had no RIHL. Associated RIHL were identified, and 6 infants (40%) had more than one indicator present in their histories and all were diagnosed with some hearing disorder. Two of the 9 infants (60%) with only one indicator showed normal hearing, and 7 were diagnosed with hearing loss. Table 3 shows the characterization of RIHLs according to the presence of hearing disorders.

As for evasion, 13 infants were absent on the scheduled date for diagnosis, and 12 evaded during the process. Contact with families was possible for 19 of the 25 infants who evaded the diagnosis (Figure 4). For the other 6 cases of evasion, telephone contact and *Whatsapp* were not successful. It can be said that the telephone contact strategy was effective in 52% of the cases, followed by 24% of success in the contact via *Whatsapp* message (Figure 5), which was a support for those cases in which the person responsible did not answer

**Table 2.** Descriptive summary of infant's age at referral to diagnosis and diagnosis completion (in days)

Infant age	n	Average	SD	Minimum	Median	Maximum
Referral to diagnosis	51	57	59	9	37	390
Conclusion of the diagnosis	24	99	56	30	91	213

**Subtitle:** n = number of subjects; SD = standard deviation



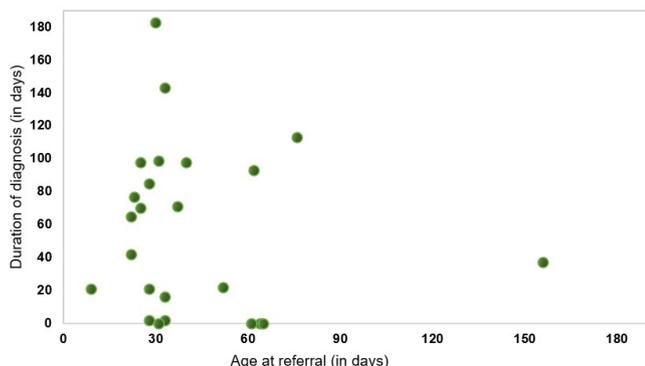
**Figure 2.** Flowchart of the outcome of the audiological diagnosis process of infants referred after failure in Universal Neonatal Hearing Screening

the phone. It is noteworthy that, in most successful phone calls, the person in charge answered on the second attempt. The reason for evasion reported by the 19 guardians was verified (Table 4), of which 4 were sick or hospitalized on the date of the consultation and 3 claimed to live far from the referral center.

**Table 3.** Risk Indicators for Hearing Impairment in infants diagnosed with hearing loss (n=13)

RIHL of infants with diagnosed hearing loss	n	%
Stay in the NICU for more than five days	7	24,14%
Use of ototoxic medication	5	17,24%
Craniofacial/ear malformation	3	10,34%
Use of mechanical ventilation	3	10,34%
Severe perinatal anoxia	2	6,90%
Hyperbilirubinemia	2	6,90%
Family history of hearing loss	2	6,90%
Weight less than 1500g	2	6,90%
Ventricular hemorrhage	1	3,45%
Consanguinity	1	3,45%
Signs associated with the syndrome	1	3,45%
Total	29	100%

**Subtitle:** RIHL = Risk Indicators for Hearing Impairment; NICU = Neonatal Intensive Care Unit; g = grams; n = number of subjects; % = percentage



**Figure 3.** Scatter plot of infant's age at referral and duration of diagnosis in days (n=24)

**Subtitle:** n = number of subjects

## DISCUSSION

When referring the maternity hospital to the audiological diagnosis stage, 75% of the infants started the process and 25% evaded it. It can be seen that the recommended goals were not met, since 90% of attendance and completion of the diagnosis is expected<sup>(1)</sup>. Brazilian studies that portray this stage are relevant but rare. The diagnosis as a step preceding the intervention is important and necessary so that timely rehabilitation actions can start early. Studies carried out at the same reference center reported that 23.5%<sup>(11)</sup> and 19.7%<sup>(10)</sup> of infants. Had dropped the program In Porto Alegre (RS), a study found that, of the 23 infants referred for diagnosis, 86.9% attended and 13.1% evaded<sup>(12)</sup>. The cities in those studies are located in regions of the country with a high number of UNHSP, with a high coverage rate (>95%) and medium and high complexity services available for diagnosis<sup>(13)</sup>, aspects that may have contributed to the low dropout rate, even without meeting the recommended goal of 90% attendance at diagnosis.

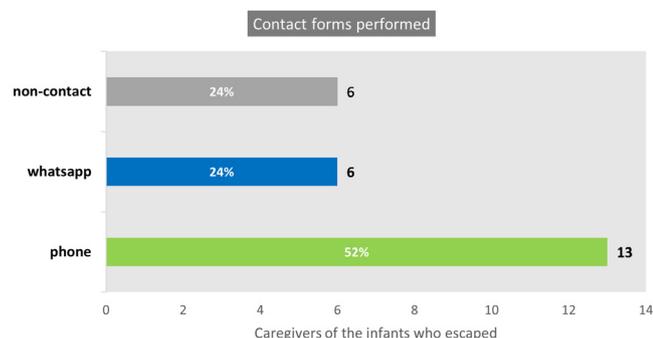
A systematic review studied articles that reported evasion in UNHSPs worldwide and identified a rate of 20% in single-center studies and 21% in multicenter studies<sup>(8)</sup>. The Center for Disease Control and Prevention (CDC) in the United States of America (USA), in 2019, identified that 27.5% of infants evaded during the diagnosis process, being considered as evasion, or due to lack of access to documentation that shows the results of the evaluations. Thus, it is not known how many completed the diagnosis due to the unavailability of data<sup>(14)</sup>. An information system, through the management of a national database, containing information on all stages of neonatal hearing health, would make it possible to understand the functioning of programs in different locations in the country<sup>(15,16)</sup> or the inclusion of validated instruments that evaluate the UNHSP, contributing to the improvement of the services provided, assisting in new decision-making and the monitoring of the implemented actions<sup>(17)</sup>.

After the diagnosis, 50% of the infants completed up to three months of age, confirming what is found in the UNHSP of the São Paulo City Hall<sup>(10)</sup>. However, this index is below expectations, that is, less than the 90% recommended<sup>(1,3)</sup>. The result observed in this study regarding the time to complete the diagnosis showed differences when compared to studies already carried out(12,14,18), however, all of them are below



**Figure 4.** Effectiveness of the contact strategy with families (n=25)

**Subtitle:** n = number of subjects



**Figure 5.** Forms of contact made with those responsible for the infants who dropped out (n=25)

**Subtitle:** n = number of subjects

**Table 4.** Characterization of the reason for evasion reported by the guardians

REASONS FOR EVASION SAID BY THE RESPONSIBLE		
	n	%
infant was ill/hospitalized	4	21%
lives far away	3	16%
father was working and could not take	2	11%
underwent/will undergo audiological assessment in another service (public or private)	2	11%
was traveling	2	11%
death	1	5%
father didn't have a car to take	1	5%
didn't know the address of the center	1	5%
returned to work after maternity leave ended	1	5%
could not attend and did not want to explain why	1	5%
didn't have money for transport	1	5%
Total	19	100%

**Subtitle:** n = number of subjects; % = percentage

the proposed by scientific communities<sup>(1,3)</sup>. In Porto Alegre (RS), 70% completed the diagnosis up to 3 months of age<sup>(12)</sup>. Studies conducted in the US reported age at diagnosis completion. The first analyzed the progression documented after ten years of evolution of a program, from 2006 to 2016<sup>(18)</sup>, demonstrating that the audiological diagnosis up to 3 months jumped from 19.8% to 36.6%. That is, the evolution of the UNHSP occurred over time, improving indices of quality criteria, after a certain period of implementation. In 2019, this percentage increased, with 79.1% of children with a documented diagnosis completed by the age of 3 months<sup>(14)</sup>. Periodic studies must be carried out to verify the evolution of the quality indexes of the programs, including barriers or facilitating actions, so that evasion and absences do not occur during the process and, thus, the conclusion of the diagnosis on time.

In this study, the RIHL of the infants who attended the audiological diagnosis were identified and, of these, 61% had at least one indicator, with a higher occurrence of stay in the NICU for more than five days, use of ototoxic medication, and mechanical ventilation. In a study that evaluated the UNHSP in the city of São Paulo, the RIHL of infants referred for diagnosis were analyzed and at least one RIHL was found in 58.3% of the sample, with frequent stays in the NICU (43.27%), the use of ototoxic medication (38.01%) and mechanical ventilation (30.99%)<sup>(10)</sup>. A fact highlighted in the present study, which

requires attention, was the frequency of hearing loss in infants who completed the diagnosis. Four of these (17%) had normal hearing and 20 (83%) had hearing disorders. At least one RIHL was identified in 62.5% of those who completed the diagnosis. A study that evaluated the UNHSP in the city of São Paulo identified 68.7% of infants with hearing disorders and 31.3% with normal hearing, 58.6% of them with RIHL, and 41.4% without RIHL<sup>(10)</sup>. It is noted that hearing disorders are being identified by UNHS, especially in those at higher risk, as expected. A study carried out in Poland identified 51.4% of infants with conductive hearing loss, 34.9% with sensorineural hearing loss, and 13.8% with mixed hearing loss<sup>(19)</sup>. Research carried out at the same reference center as the present study, in 2019, diagnosed 65.4% of children with hearing disorders and 34.6% with normal hearing<sup>(11)</sup>. In Porto Alegre, 35% of infants were diagnosed with hearing disorders<sup>(12)</sup>. It is worth mentioning that each UNHSP can adopt different methodologies and approaches, which reflect the occurrence of the observed results, even though these programs obey the same national and international recommendations. The possibility of different rates of hearing alterations at different times and in different regions cannot be excluded, as shown by epidemiological studies. Positively, it can be highlighted that UNHS provides the identification of hearing loss in infants, which did not occur before its implementation.

In addition to the 13 infants who did not undergo audiological assessments, as they evaded between the maternity hospital referral and the referral center, some evaded during the diagnosis process (n=12). Contact attempts were mostly successful. Telephone contact, the first tool used, was more successful, but with the help of Whatsapp, it proved to be effective and profitable. The telephone contact was made during the week, in the morning and afternoon, so many responsible answered. However, they asked to return the call in the evening, as they were in working hours. The guardians who did not answer the calls could be in the same situation, so the calls may have occurred at inappropriate hour and was considered invasive. The use of Whatsapp can minimize these inopportune moments, as the user can read and answer the message in a most appropriate time. Previous studies in the site of this research indicated low levels of success in contact, respectively, 25%<sup>(11)</sup> and 49.5%<sup>(10)</sup>. One of the studies also used the help of Whatsapp; however, different results were achieved, with 50.5% of failure in contact by phone and Whatsapp<sup>(10)</sup>.

At the municipal UNHSP, when infants are referred to the diagnosis stage, the guardians receive, in writing, the date, time, and place of the consultation. At the reference center studied, attempts are made to make telephone contact one day before all scheduled appointments to remind and confirm attendance, whether for the first time or scheduled returns. In some cases, these actions have no effect, making it impossible to establish the initial bond between the service and the family. A study carried out to test new technologies to reduce absences in pediatric pulmonary tuberculosis consultations identified that the use of Whatsapp, with the sending of appointment reminders, is the most effective way to reduce absences, compared to intervention with phone calls or no intervention<sup>(20)</sup>. The authors identified the greatest interaction between the professional and those responsible for the child. Therefore, it reinforces the need to use messaging software already used for daily tasks that can facilitate communication between the health service and patients.

In this research, the reasons for evasion mentioned by the parents were: illness/hospitalization of the infant, the distance between home and the place of diagnosis, parents' work, carrying out the audiological evaluation in another service, or a trip at the time of the consultation, reasons that confirm those of another study carried out at the same reference center<sup>(10)</sup>. A systematic review that addressed the dropout in the UNHSP in several countries showed factors such as educational inequality and lack of parental knowledge about the UNHSP, the distance between home and service, work restrictions, unfavorable attitudes of parents, lower priority for hearing in the reason for other health problems, being the main causes of dropout<sup>(8)</sup>. The National Center for Hearing Assessment and Management (NCHAM) has published recommendations on promising practices to reduce dropout, citing obtaining phone numbers for relatives, contacting parents before the appointment to confirm the date, and address, and guiding for the exam day and the scheduling of two consultations for audiological evaluations, with a short interval between consultations<sup>(15)</sup>.

The results found are an alert for the determination of factors causing a more prolonged diagnostic process. A study carried out in the USA, in 2017, addressed clinical practice in audiological assessments of infants who underwent UNHS. There was variability in the tests used and the professionals responsible for the diagnosis (n=161) answered about the duration of the test application, of which 93 (57.8%) reported a duration of 120 minutes, 28 (17.4%) of 90 minutes, and 28 (17.4%), between 180 and 240 minutes for the end of the assessments, counting the time the infant took to fall asleep<sup>(21)</sup>. In addition to the standardization of audiological procedures, some studies analyze the possibility of accurate and faster tests, as control measures to reduce late diagnostic conclusions<sup>(22,23)</sup>, especially in the Brazilian context, in which socioeconomic differences, the infrastructure of service and professional training influence the effectiveness of an agile standardized protocol with the same reliability.

The present study showed the importance of analyzing the process between the referral from the maternity hospital to the diagnostic services, in cases of failure in the UNHS. In the studied municipality, diaries are available for carrying out the diagnosis, therefore, it is up to the program to monitor attendance and dropout rates at this stage. Among the reasons that emerged for evasion, several can be minimized with objective actions, carried out by professionals linked to neonatal health, such as guidelines for parents/guardians focused on the importance of diagnosis; observation by professionals regarding the results of UNHS recorded in the Child Health Handbook, during the monitoring of health and childcare in primary care (PC); PC professionals should assist parents/guardians in carrying out the new appointment when absences or dropouts occur. However, referral centers need to make spaces available for new appointments and the PC team must monitor the attendance of infants. The active search must be implemented by reference centers and PC, ensuring the integration of these services. Automatic reminders must be used for the scheduled date and confirmation by telephone or Whatsapp must be implemented as a routine, with at least three contact attempts, aiming to reduce the evasion rate. In addition, alternative numbers must be recorded, including from different family members of the infant who failed UNHS. Scheduling for diagnosis must be made at the referral center closest to the family's home and a map, address and telephone number must be provided to the

guardians, emphasizing that it is the closest to the home, even if it is far from home. Guidance on the need for natural sleep to perform the diagnosis should be reinforced and, if possible, prevent the infant from sleeping on the way between home and the referral center. The application of agile protocols by professionals working in the field of pediatric audiology can contribute to the best use of time and the visit of the infant and his family to the referral center.

## CONCLUSION

In the diagnostic stage, the attendance rate and completion time until the child's third month of life were below the recommended rates, reducing the effectiveness of the UNHSP.

Measures such as the use of reminders, phone calls, and Whatsapp messages can be effective to reduce dropout, in addition to the guidance provided by professionals who follow up the infant on PC.

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