

# Newborn Hearing Screening in a Public Maternity Ward in Curitiba, Brazil: Determining Factors for Not Retesting

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## Abstract

**Introduction** Law 12.303/10 requires hearing screening in newborns before hospital discharge to detect possible hearing problems within the first three months after birth. If the newborn fails the test or presents signs of risk for hearing loss, it must undergo a retest and monitoring during the first year of life. In practice, this often does not happen.

**Objective** To identify, in a group of mothers of children with risk factors for hearing loss, the determining reasons for non-compliance with the auditory retest.

**Method** This is a cross-sectional quantitative study. For data collection, we handed a semi-structured questionnaire to 60 mothers of babies at risk for hearing loss who did not attend the hearing retest after hospital discharge. The questionnaire investigated their age, education, marital status, level of knowledge about the hearing screening, and reasons for non-compliance with the retest. We compared and analyzed data using the Chi-square test at a significance level of 0.05%.

**Results** Our study found that 63% of the respondents were unaware of the hearing screening and most did not receive guidance on testing during prenatal care; 30% of participants stated forgetting as the reason for not attending the retest. There was no significant relationship between age, education, and marital status regarding knowledge about the test and the non-compliance with the retest.

**Conclusion** Identified as the most significant determining factors for non-compliance with the newborn hearing screening retest were the surveyed mothers' forgetting the date, and their ignorance as to the importance of retesting.

## Keywords

- ▶ hearing
- ▶ deafness
- ▶ speech-language pathology
- ▶ pediatric nursing

## Introduction

It is a global consensus that hearing loss of early childhood onset negatively impacts the child's development.<sup>1,2</sup> Early diagnosis of hearing loss allows phon audiologists to take educational and clinical measures to minimize the effects of such loss.<sup>1,3</sup>

A speech-language therapy referral geared to the specific needs of the child, such as hearing rehabilitation through

electronic devices, as well as to the development of oral, written, or sign language may promote more effective participation of these children in different social contexts (such as with family, at school, at work and in the community at large) when performed in early childhood.<sup>4</sup>

In 2010, the Brazilian government approved Federal Law number 12.303, which mandates Newborn Hearing Screening (NHS) in newborns before hospital discharge, to ensure effective access to hearing health programs.

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Nonetheless, it is worth noting that when the NHS results present inconsistencies, babies should be re-evaluated (retested).<sup>5</sup>

Given that deafness incidence is higher in children with risk factors, according to the recommendations of the Joint Committee of Infant Hearing (JCIH), audiological monitoring is essential for all at-risk infants presenting high-risk indicators for hearing loss (HRIHL), starting with NHS. This also applies to infants at risk of neural conduction disorders and/or dysfunction of the auditory pathway in the brainstem, other hearing disorders, and/or delayed development of speech and language.<sup>3</sup>

Currently, it is up to the speech-language therapist who performs the NHS to guide the family towards retesting, thereby ensuring accurate and early diagnosis of deafness and allowing full treatment to the child.

Despite all the progress already achieved in the field, Brazilian studies show that the retesting compliance rate is low, which undermines the effectiveness of NHS programs.<sup>2,6-10</sup>

In this regard, we emphasize the need to implement actions developed by multidisciplinary teams that aim to sensitize the baby's mother and other relatives to the importance of following up the NHS with a retest. In this context, it is worth noting the relevance of actions undertaken by speech-language therapists and nurses, both being directly involved with the postpartum period. It is especially important that nurses work directly with those under their care, spending significant time in contact with patients hospitalized due to illness or childbirth.<sup>11</sup> According to COREN,<sup>12</sup> nurses, as educators and professionals who work directly in maternal and child health, can contribute to raising awareness and guiding the people involved in processes where health monitoring occurs.

Considering the above, the present study aims to identify and analyze determining reasons for non-compliance with the auditory retest, according to a group of mothers of children with risk factors for hearing loss.

## Materials and Methods

The Human Research Ethics Committee from the authors' institution approved this study, under registration number 830071, according to resolution 466/2012.

This is a quantitative cross-sectional study conducted in a public maternity hospital in Curitiba, in the state of Paraná, during the sample period from July to December 2013.

The research sample consisted of 60 mothers of newborns with HRIHL who did not attend the hearing retest appointment. All newborns in this sample should have had audiological monitoring for one year based on risk indicators. The inclusion criteria of the mothers in the study were being over the age of 18 years, having babies born between July and December 2013, having not attended the NHS retest, agreeing to participate in the study, and signing the consent form. Excluded from the study were mothers under 18 years of age and those who were not able to understand the proposed questionnaire.

It is routine in the women and newborn healthcare unit of Curitiba to actively search for mothers who do not follow the regulations established for monitoring at-risk infants. Thus, mothers who composed the sample for this study received a phone call reminding them to return to the Unit to perform various procedures, including the auditory retest. On the day set for the evaluation, after receiving guidance on the purpose of the research and its protocols, the interviewer invited the mothers to participate in the study.

Next, the mothers answered a semi-structured questionnaire that collected data on their age profile, marital status, educational level, knowledge of NHS, and reasons for non-compliance with the retest.

The level of knowledge about NHS and the reasons for non-compliance were cross-referenced with some variables: mother's age, education level, and marital status.

Then, the answers were subjected to a statistical Chi-square test for a level of significance with  $p$  values  $< 0.05$ , which were considered statistically significant.

## Results

The maternity ward where this study was developed is a leader in the city of Curitiba in caring for high-risk pregnancies. Between the months of July and December 2013, the period for data collection, 733 babies were born in this hospital, all with some HRIHL.

Before hospital discharge, all infants underwent a hearing screening and were expected to return for retesting within 15 days. According to the hospital data, 89% of the babies returned for retesting.

Of the 82 (11%) mothers who did not return with their infants, 60 were selected for the study as they fell within the listed inclusion criteria. ► **Table 1** shows the socio-demographic characteristics of the sample.

Regarding the level of mothers' knowledge regarding NHS, we observed that: 38 (63%) mothers did not know about the infant hearing test or NHS; 100% of the sample believed their child could hear well; 17% had a close relative with hearing loss and knew its harmful effects; 90% reported that they did not receive information on NHS during the prenatal period; 90% knew that their infant had undergone NHS before hospital discharge, but only 38% reported knowing the test result; 62% of mothers did not know who the health professional was who performed the examination on the child; 91% of mothers received guidance on doing the hearing retest, but 90% did not know why it should be done.

Considering that none of the interviewed mothers took their infants to the hearing retest, we investigated the reasons for non-compliance. ► **Table 2** lists the most frequent responses.

The majority of the sample reported not knowing what the infant hearing test was (63%) and most of the sample forgot about the retest or claimed to have forgotten the date (50%). Thus, we analyzed the relationship between maternal age, education level, and marital status as variables. We applied the Chi-square test and ► **Tables 3, 4, and 5** describe the results.

**Table 1** Description of sample according to age, education level, and marital status ( $N = 60$ )

Variable	Frequency	%
Age		
Under 20 years	7	11.67
20 to 29	25	4.67
30 to 39	21	35.00
40 years older	7	11.67
Education level		
Primary incomplete	13	21.67
Primary	18	30.00
High School	28	46.67
College	1	1.67
Marital status		
Single	37	61.67
Married	18	30.00
Divorced	4	6.67
Widowed	1	1.67

**Table 2** Reasons for non-compliance with NHS retest ( $N = 60$ )

Variable	Frequency	%
Forgot appointment	18	30.0
Did not know	12	20.0
Mother's health problems	05	8.3
Health unit on strike	04	6.6
No one to accompany them	04	6.6
Family health problems	03	5.0
Transportation problems	03	5.0
Too much information upon discharge	02	3.3
Bad weather	02	3.3
Scheduling conflict	02	3.3
Death in the family	01	1.6
Could not miss work	01	1.6
Lack of time	01	1.6
Personal issues	01	1.6
Baby's health problems	01	1.6
Total	60	100

Abbreviations: NHS, newborn hearing screening.

## Discussion

The NHS program aims at early detection of hearing loss in children and directing toward appropriate treatment to minimize the effects of deafness. Thus, to achieve satisfactory results, it is essential to have the families' adherence.<sup>8</sup>

During the period for the data collection for the study, 733 babies with HRIHL were born in the maternity ward and 89% returned for retesting at the scheduled date, which is considered high when compared with similar studies.<sup>8,13,14</sup>

The predominant age distribution of the sample was 20–39 years old, however 23% of mothers were outside of this range (older than 39 or younger than 20). Pregnancies at the extremes of reproductive life of women have higher risk of adverse outcomes and complications during pregnancy and childbirth, as well as during the neonatal period.<sup>15</sup>

Regarding level of education, most mothers (51.67%) had only a primary level of education. One study that researched the reasons for non-attendance of the retest by mothers and their newborns showed a series of reasons, among which was low parental education levels as one of the key factors that limited the mothers' understanding of the importance of NHS.<sup>16</sup>

With regard to marital status, 70% of the sample at the time of hospital discharge did not live with a spouse. In one study,<sup>10</sup> authors examined the marital status of mothers in a database of 27,817 live births at a maternity ward, and they concluded that the probability of retest non-compliance for single mothers was 1.4 times higher than those who lived with a spouse.

On matters relating to knowledge about NHS, the number of mothers who did not know about the procedure was considered high – a fact confirmed in other research,<sup>15</sup> where only 34% of mothers reported knowing about NHS during pregnancy, from a total of 1022 mothers surveyed.

In our study's sample, 17% of mothers reported having someone in the family with hearing loss, and yet the mothers still did not return for the hearing retest. Among the possible reasons for such a result, is that a mother's fear of obtaining confirmation of her child's hearing problem in the retest, considering the possibility of such loss to be hereditary. It is worth noting that studies<sup>8</sup> point to the recurrence of resistant attitudes as part of a process of denial, and only later will come acceptance of the fact that the child has organic and/ or sensory impairment.

Despite the high rate of ignorance, 90% of mothers reported knowing that their child had undergone a hearing test before hospital discharge. However, over 60% were unable to provide the test results. The distribution of educational material can act not only to help mothers recognize the test's importance, but also to arouse greater interest in parents about the hearing health of their children.<sup>10</sup> In addition to informative actions such as orientation with health service policies, the need for actions focused on health education is emphasized. These actions should be developed by professional teams aimed at encompassing the different aspects and dimensions involved in health and disease. In this sense, the work of nurses is important.

It is important to note that 62% of respondents did not know who the professional was that performed the NHS on their baby. It is necessary that health professionals promote dialogical relations to listen and engage the mothers, so that it is possible to exchange knowledge and empower the patient. This is one of the conditions needed for the mother to assume

**Table 3** Knowledge about NHS and reasons for non-compliance in relation to mother's age

Variable	Answer	Age (years)				p
		< 20	20–29	30–39	≥ 40	
Do you know what the NHS is?	yes	3	9	8	2	0.8861
Did you forget the retest appointment?	yes	4	4	8	2	0.2326
Were you unaware of the retest?	yes	1	5	4	2	0.3651

Abbreviations: NHS, newborn hearing screening.

**Table 4** Knowledge about NHS and reasons for non-compliance in relation to mother's marital status

Variable	Answer	Marital Status				p
		Single	Married	Divorced	Widowed	
Do you know what the NHS is?	yes	16	3	3	0	0.1800
Did you forget the retest appointment?	yes	11	5	1	1	0.1573
Were you unaware of the retest?	yes	7	5	0	0	0.2499

Abbreviations: NHS, newborn hearing screening.

**Table 5** Knowledge about NHS and reasons for non-compliance in relation to mother's education level

Variable	Answer	Education Level				p
		Primary Incomplete	Primary Complete	High School Incomplete	High School Complete	
Do you know what the NHS is?	yes	6	6	1	9	0.2581
Did you forget the retest appointment?	yes	6	4	0	7	0.2993
Were you unaware of the retest?	yes	3	4	0	5	0.7953

Abbreviations: NHS, newborn hearing screening.

the responsibility for their child's health care and act in a more constructive manner with respect to it.

When asked about the reason that led them to fail to return for the hearing retest, 30% reported having forgotten and 20% said they had no knowledge of it. Researchers in another study<sup>7</sup> with similar data indicated that these attitudes are directly related to the absence of appropriate guidance given to mothers and caregivers, and to awareness of the damage that hearing loss can cause children.

The available literature<sup>9,13,14</sup> explains that an increase in compliance depends on some strategies that encourage greater participation in the Program. Among these strategies, is health care professionals working to guide mothers and parents of newborns, as well as monitoring the families of babies that failed the NHS.

Ignorance over the need for retesting, as pointed out in this survey, is mirrored in publications on the topic.<sup>8,9,13</sup> According to the authors, there is a contradiction between what health professionals say they tell mothers about the NHS, and what

mothers report hearing from the professionals. While the multidisciplinary team reported knowing about the importance of early detection of hearing impairment and advising mothers about NHS, most mothers claimed they had not received any information during their pregnancy or during their stay in the maternity ward. The authors understand the difficulty may be that mothers receive a lot of new information about examinations and their newborns, and they are not always able to assimilate this information because mothers perceive only what they can understand.

This study could not establish a significant relationship between a mother's age, education level, and marital status and the level of knowledge about the NHS or on the reasons for non-compliance to the hearing retest, although other studies affirm a relation between retest non-compliance and marital status<sup>10</sup> and socio-cultural level<sup>8</sup> of the mother and family.

In this sense, retest non-compliance, despite recommendations given as to its importance, reflects the lack of awareness among the population about the need to monitor

child development for hearing loss prevention. We believe that the support of the interdisciplinary team is essential for targeting educational development and guidance for this population, especially from the nurse who spends more time at mothers' bedsides in maternity wards.

An American study in a maternity ward with more than 50% absenteeism in NHS follow-up<sup>17</sup> used a nurse at the bedside to perform targeted educational intervention for mothers whose babies failed their NHS. They found a significant improvement in the number of mothers who joined the program and concluded that the nurse is one of the health professionals who can contribute to and actively participate in hearing health projects in maternity wards.

It is important to analyze the concept of retest compliance in a multidisciplinary way, for although mothers are the main target of the compliance process, success depends not only on them, but also on various participants, such as family, health professionals, and the health system itself, which must be integrated. By relying on technical-scientific and popular knowledge and a professional dialogue, users can build knowledge and health education in an integrated way, which covers health-disease and care to strengthen confidence in the services received and provided.

## Conclusions

The most significant determining factors for non-compliance to NHS retesting identified among the surveyed mothers were forgetting the date and ignorance of the importance of the retest. The level of ignorance about NHS was high in the studied sample. Our research found no correlation between mother's age, education level, and marital status with knowledge of the NHS and reasons for non-adherence to retest.

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