

CHARACTERIZATION OF NEWBORN HEARING SCREENING PROGRAMS OF MATERNITY UNITS LOCATED IN THE CITY OF JOÃO PESSOA, PB, BRAZIL

Caracterização dos programas de triagem auditiva neonatal das maternidades localizadas no Município de João Pessoa-PB

Maria Augustta Sobral de França Malheiros⁽¹⁾, Hannallice Gottschalck Cavalcanti⁽²⁾

ABSTRACT

Purpose: to evaluate the newborn hearing screening (NHS) programs of maternity hospitals located in the city of João Pessoa, PB, Brazil. **Methods:** a total of five maternity/hospital institutions participated in this study (one federal, one municipal, two state and one private maternity hospital), being selected those who presented a Newborn Hearing Screening program. The questionnaire “Newborn Hearing Screening Survey” containing 29 questions was applied to five audiologists and five health managers. **Results:** all maternity hospitals carry out their NHS programs in the rooming, neonatal ICU and intermediate-risk nursery. Hearing screening is routinely requested by the medical staff and authorized in the four hospitals. However, in one of the maternity hospitals, hearing screening is not routinely requested. All screenings are performed by the audiologist. The unique method for performing screening is the use of evoked otoacoustic emissions. The number of referrals to re-tests varied between 4% and 15%. All maternity hospitals provide the results of the hearing screening concerning the “PASS” by means of a written report. The cases that require monitoring or audiologic diagnostics are followed to public and private reference services. The audiologist ensures and monitors the diagnosis in four of the maternity hospitals surveyed. Only one hospital reports that it is an assignment of the social service staff. **Conclusion:** the methodology of the TAN program has proved suitable for babies from the group without risk for hearing loss, but not for the babies in the risk group. The greatest problem of the NHSP in João Pessoa occurs in the stage of recording the results and control of referrals. There isn't a database that enables you to control the coverage of TAN, the retests, referrals and false positives. There is a dissociation between program steps, scarce resources and lack of effective participation of managers, despite the publication of the law on the mandatory completion of EOE in maternity and recommendations of the Ministry of Health for its realization.

KEYWORDS: Hearing Loss; Neonatal Screening; Parenting

■ INTRODUCTION

Hearing is an essential sense for the acquisition and development of language and speech. The integrity of the auditory system is then necessary to allow individuals to listen, understand, create

contents and express themselves through the language¹. Hence, hearing loss in childhood could reflect on the development of language, if not treated timely.

Studies have shown that the prevalence of severe or profound bilateral hearing loss is 1-3/1,000 live births in developed countries and 6/1,000 live births in developing countries^{2,3}. An inadequate pre-, peri- and post-natal care can lead to high rates of deafness due to deficient health care towards the pregnant woman or the baby⁴. Based on that, the Newborn Hearing Screening (NHS) turns to be

⁽¹⁾ Hospital Universitário Lauro Wanderley, HULW-UFPB, João Pessoa, Paraíba, Brasil.

⁽²⁾ Universidade Federal da Paraíba-UFPB, Audiologia/Doutorado, João Pessoa, Paraíba, Brasil.

Conflict of interest: non-existent

an effective method to identify hearing loss and, therefore, has become mandatory in many countries worldwide⁵. The advances in technology since the 1990s have made possible that NHS establishes diagnosis and rehabilitation before six months of life⁶. Before the NHS was created, the diagnosis of a severe hearing loss was established around two years of life and the use of hearing aids usually started up to two years later⁷.

An effective program of NHS depends on the presence of good infrastructure that involves the initial hearing screening, audiologic diagnosis and a physician able to describe the type, degree and impact of the hearing loss and rehabilitation for referred cases⁸. The program should be universal, that is, cover at least 95% of newborns. Furthermore, it is essential to perform a concomitant monitoring of the hearing loss undetectable at birth, offer psychological support and technology for intervention and rehabilitation, and information to parents whose babies were diagnosed with hearing loss⁹.

The NHS should be performed while the newborns are in the maternity unit or up to their first month of life. The tests used to perform a hearing screening are: Evoked Otoacoustic Emissions (EOE) and/or Auditory Evoked Potential of the Brainstem (AEPB), based on the assumption that EOE are indicated for children without risk for hearing loss and AEPB for those at risk¹⁰.

In August 2010 the Brazilian Federal Law 12.303 of 8/3/2010 made the evoke otoacoustic emissions (EOE) test ("Hearing Test") mandatory in all hospitals and maternity units for children born in their dependences¹¹. In 2012, this law gained force with the publication of the Guidelines for Newborn Hearing Screening by the Ministry of Health¹². Thus, the present study aims to assess the NHS programs of maternity units located in the city of João Pessoa, PB, Brazil.

■ METHODS

This study was approved by the Research Ethics Committee of Lauro Wanderley University Hospital (LWUH), under protocol number 183.454. The sample was composed of five medium/large hospitals performing NHS routinely, whose

professionals agreed to answer the questionnaire. The selected hospitals are categorized as follows: one federal hospital/maternity; and one municipal, two state and one private maternity units.

This is an exploratory study that was conducted by analyzing a series of cases, in order to provide greater familiarity with the topic. This study was conducted in the city of João Pessoa, northeastern Brazil, as part of a project titled "Comprehensive health of the child/ adolescent/ family from the perspective of multidisciplinary care" developed by the Postgraduate Program on Integrated Multidisciplinary Residency in Hospital Care, Federal University of Paraíba (UFPB).

The data were collected from February to March 2014, using a modified and adapted version of the questionnaire "Survey on Newborn Hearing Screening"¹³ as research instrument, which contained closed questions and content related to NHS.

The questions were grouped into five categories: 1) number of births in the units; 2) Information on the NHS program; 3) Methods, professionals and tests used to screening; 4) Results and referrals after screening; and 5) random issues, such as data management.

The data were analyzed descriptively and allocated into different topics. A total of 10 questionnaires were sent to phonoaudiologists and managers directly involved with the NHS in the selected institutions. The questionnaires were delivered in person and sent by email. All research participants signed an informed consent form according to the Resolution 196/96 of the national health council, which regulates research with humans.

■ RESULTS

A total of 10 questionnaires were sent to the professionals, of which five were phonoaudiologists and the other five were managers. The questionnaires were answered by the phonoaudiologists; however, there was no compliance on the part of the managers. Hence, the results below are based on the responses of the phonoaudiologists.

Table 1 - Summary of the responses of interviewees to a questionnaire applied in maternity units

| Variables | Maternity unit 1 | Maternity unit 2 | Maternity unit 3 | Maternity unit 4 | Maternity unit 5 |
|----------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|--|
| Births <i>per year</i> | 2984 | No response | No response | No response | No response |
| Place where the NHS is performed | Rooming; ICU; NICU | Rooming; ICU; NICU | Rooming; ICU; NICU | Rooming; ICU; NICU | Rooming; ICU; NICU |
| Time for NHS | 12h - 48h | 24h - 48h | 24h - 48h | 24h - 48h | 24h - 48h |
| Professionals involved | Phonoaudiologist | Phonoaudiologist | Phonoaudiologist | Phonoaudiologist | phonoaudiologist professors, collaborators and phonoaudiology undergraduate students |
| Method | Otoacoustic emissions | Otoacoustic emissions | Otoacoustic emissions | Otoacoustic emissions | Otoacoustic emissions |
| Referrals to retest | 11% and 15% | No response | No response | 4% and 5% | 11% and 15% |

Note: ICU= Intensive Care Unit; NICU= Newborn Intensive Care Unit.

Number of births *per year*

Only one maternity unit responded by reporting a number of 2,984 births in the last year. The NHS coverage has not been informed.

Period of completion of NHS

All maternity units reported performing the NHS in their rooming, newborn ICU and intermediate-risk nursery. The minimum and maximum times for completion of NHS were 12 and 48 hours of life, respectively.

Health professionals

In four institutions hearing screening is being performed by phonoaudiologists, preferably in all newborns and infants before discharge. In one maternity unit hearing screening is being performed by phonoaudiologist professors, collaborators and phonoaudiology undergraduate students participating of an extension project offered by the university linked to the hospital/maternity. In the latter case, not all newborns go through the NHS before hospital discharge. In all institutions a manual system is used to record the data from the screening.

The total number of phonoaudiologists who are part of the screening staff varies between two and eight *per* institution. The majority of professionals is specialized in audiology or public health, or is up to complete the specialization course in audiology.

Hearing screening is routinely requested by the medical staff, and parental consent for the exam is already implicit in the admission, as seen in four institutions. In one maternity unit, however, hearing screening is not routinely requested and parental permission is granted verbally.

NHS methods and referrals

All institutions have used EOE to perform the screening. The newborn that failures in the NHS is sent to retesting before hospital discharge within 15 and 30 days in three and two of the surveyed institutions, respectively .

The number of referrals for retesting ranged between 4% and 5% for one maternity unit and between 11% and 15% for two other units. Two institutions did not specify their number of referrals.

One hundred percent of maternity units have delivered the results of the hearing screening by means of a written report, but only one unit does so when the newborn "FAILS". The other institutions report the "FAIL" result verbally to parents.

Follow-up

In all institutions, the result is reported only to parents/guardians. The cases that require audiological follow-up or diagnosis are referred to public and private reference services.

The phonoaudiologist ensures and monitors the diagnosis in four of the surveyed institutions. Only in one maternity unit, the social service sector is responsible for ensuring that the audiological diagnosis is made.

The follow-up of children at risk for hearing loss occurs through audiological monitoring in the maternity units. Although the units reported this monitoring exists, no results were provided by the audiologists.

There is only one audiological referral center for diagnosis and rehabilitation of hearing impairment cases. This center was referred to by the respondents as the "State and Municipal Rehabilitation Center" and it is to where the maternity units refer children in need of care. One unit could not indicate

the reference center for diagnosis and rehabilitation either in the city or state area.

■ DISCUSSION

The findings of our study can provide inferences about the operation and procedures of the NHS programs conducted in maternity units located in the city of João Pessoa. A total of seven maternity units were found in this city registered by the National Registry of Health – CNES, which indicates that most of them hold a NHS program. The law 12303/10 may have influenced the increasing number of NHS programs operating in the country.

The number of births *per* year was reported by only one maternity, which indicated a total of 2,984 births in 2013. The data described by DATASUS (Health System Database) show an average of 19,046 live births in 2012 in the city of João Pessoa¹⁴, but fail to indicate the number of newborns screened in this city. Therefore, there is a need to survey the number of children screened annually so that to determine if the programs are achieving the goals recommended by the Ministry of Health (MOH), which is 95% coverage of live births with the ambition of reaching 100 %.

We found that EOE test is the predominant procedure in hearing screening, despite the recommendation of the Ministry of Health for the use of Auditory Evoked Potential of the Brainstem (AEPB), when there is the presence of a risk factor contributing to hearing impairment. Currently, the Ministry of Health advocates the use of EOE for the population of newborns without risk for hearing loss as it is a quick, simple and non-invasive procedure; however, it does not identify retrocochlear hearing losses that can occur in the presence of risk factors. AEPB is recommended for retests to reduce the false-positive results and therefore unnecessary referrals for diagnosis¹⁰. Nevertheless, the literature shows that a few institutions have made use of AEPB in Brazil¹⁵ and a reduction of costs allied to lack of resources certainly contributes for the selection of EOE. Therefore, the reduction in the dropout of families from the hearing screening programs for both retest and diagnosis has been challenging.

A manual data registration system is being used by all the surveyed institutions, which may reflect directly on the effectiveness of their programs. Contrarily, the literature has recommended the use of a computerized database for the NHS procedures so that results can be monitored monthly. Also, a computerized system allows tracking the cases that could not be followed up or that did not complete all the necessary steps of retest or diagnosis⁶.

Screening is performed at a mean time between 12 and 48 hours. Studies have shown a statistically significant difference as to the time of birth, with a higher failure rate for newborns screened up to 28 hours of life, in comparison with those screened after 32 hours of life¹⁶. The reduction of failures avoids the need of the family to return and prevents evasion of the NHS program.

A considerable number of referrals to retest ranging from 4% to 15% were found in our study. These findings corroborate those of other studies with similar rates of 15% and 19% of referrals to retest¹⁷⁻¹⁹. The phonoaudiologist was referred to as executor at all stages. Hence, there is no participation and involvement of a multidisciplinary team, even though studies have pointed out that the multidisciplinary team plays a fundamental role in hearing health programs in newborns and infants.

Health education provided to the population as well as information about the NHS programs; training of health workers and the active engagement of governmental or non-governmental institutions, are considered essential steps to fulfill the needs of children with hearing loss^{8,20}. The techniques and methods of hearing assessment must be assimilated by the staff^{19,21}. According to the interviewees, the phonoaudiologist is responsible for monitoring all stages of the hearing screening, and sometimes the social assistant may play a role in referring newborns or infants for diagnosis. Nevertheless, it was not specified how this monitoring happens. In order to have an effective NHS program, it becomes necessary to know not only the results of the hearing screening, but also the age of identification and confirmation of hearing loss, the period of adjustment of hearing aids and when the rehabilitation process got started.

Given that, the NHS program requires a coordinator to ensure the participation of all staff members and consequently improves the quality of the program and the outcomes. The professionals who perform both hearing screening and audiological diagnosis should be trained and oriented in relation to the techniques and protocols used²². Although we had no compliance of the managers, it is believed that their involvement can greatly contribute to the further development of the whole team.

The World Health Organization² identified some key elements for the effectiveness of a NHS program, as follows: provision of information to parents, physicians, audiologists, politicians and educators about the importance of hearing and the consequences of a late diagnosis; the development of a search and step-by-step monitoring system for the NHS program; and, finally, a family-centered support.

■ CONCLUSION

All the maternity units surveyed operate with an NHS program for newborns before hospital discharge. There was no report of data on the NHS coverage, number of newborns or infants referred to diagnosis or audiological follow-up and prevalence of hearing impairment. The phonoaudiologist is the main professional involved with the NHS, particularly in hearing screening and audiological follow-up. No support on the part of other professionals or institutions to ensure the effectiveness of the NHS program was reported. The methodology used in the program is adequate for non-risk newborns or

infants, but there is no adjustment for those included in the risk group. The greatest shortcoming of the NHS programs in the city of João Pessoa lies in the stage of data recording and control of referrals. There is not a database that enables the control of NHS coverage, retests, referrals and false-positives. These data are important indicators of the quality of the services provided and suitability of the NHS programs. Despite there is a law making mandatory to perform EOE in maternity units and the recommendations of the Ministry of Health, we found a dissociation between the stages of the NHS program, scarcity of resources and lack of effective participation of managers.

RESUMO

Objetivo: avaliar os programas de Triagem Auditiva Neonatal (TAN) das maternidades localizadas no município de João Pessoa, PB. **Métodos:** participaram deste estudo um total de cinco instituições hospital/maternidade (um hospital/maternidade federal, uma maternidade municipal, duas maternidades estaduais e uma maternidade privada), sendo selecionadas aquelas que apresentavam um programa de Triagem Auditiva Neonatal. Foi aplicado o questionário “Pesquisa da Triagem Auditiva Neonatal” contendo 29 questões a cinco Fonoaudiólogos e cinco gestores. **Resultados:** todas as maternidades realizam a TAN no alojamento conjunto, UTI neonatal e berçário de risco intermediário. A triagem auditiva é rotineiramente solicitada pela equipe médica, enquanto que para uma maternidade a triagem auditiva não é solicitada rotineiramente. Todas as triagens são executadas pelo profissional fonoaudiólogo. O método exclusivo para a realização da triagem é o uso das Emissões Otoacústicas Evocadas. O número de encaminhamentos para reteste variou entre 4% e 15%. Todas as maternidades fornecem os resultados da triagem auditiva quanto ao “PASSE” por um laudo escrito. Os casos que necessitam de um acompanhamento ou diagnóstico audiológico são encaminhados para serviços públicos e privados de referência. Quem assegura e acompanha o diagnóstico é o fonoaudiólogo em quatro maternidades. Apenas uma maternidade relata que o serviço social é responsável por esta função. **Conclusão:** a metodologia do programa de TAN se mostrou adequada para os bebês do grupo sem risco para a deficiência auditiva, porém não há adequação para os bebês do grupo de risco. A maior deficiência do PTAN em João Pessoa ocorre na etapa do registro dos resultados e controle dos encaminhamentos. Não existe um banco de dados que possibilita controlar o índice de cobertura da TAN, dos retestes, de encaminhamentos e falsos positivos. Há uma dissociação entre as etapas do programa, escassez de recursos e falta de participação efetiva dos gestores, apesar da publicação da lei sobre a obrigatoriedade da realização das EOE em maternidades e das recomendações do Ministério da Saúde para a sua realização.

DESCRIPTORIOS: Perda Auditiva; Triagem Neonatal; Poder Familiar

■ REFERENCES

1. Amaral IS, Martins JE, Santos MFC. Estudo da audição em crianças com fissura labiopalatina não-sindrômica. *Rev Braz J Otorhinolaryngol.* 2010;76(2):164-71.
2. World Health Organization, Newborn and infant hearing Screening. Current issues and guiding

- principles for action. Outcome of a Who informal consultation held at who headquarters, Geneva, Switzerland, 2009. [Acesso em 15/01/2014]. Disponível em http://www.who.int/blindness/publications/Newborn_and_Infant_Hearing_Screening_Report.pdf.
3. Olusanya BO, Swanepoel W, McPherson B. Progress towards early detection services for

- infants with hearing loss in developing countries. *BMC health services res.* 2007;7(14):1-15.
4. Smith A. Preventing deafness: an achievable challenge. The WHO perspective. *International Congress Series.* 2003;1240:183-91.
 5. Kumar S, Mohapatra B. Status of newborn hearing screening program in India. *Int J Pediatr Otorhinolaryngol.* 2011;75(1):20-6.
 6. Lewis DR, Marone SAM, Mendes BCA, Cruz OLM, Nóbrega M. Comitê multiprofissional em saúde auditiva COMUSA. *Rev Braz J Otorhinolaryngol.* 2010; 76(1):121-8.
 7. Yoshinago-Itano C, Coulter D, Thomson V. Infant hearing impairment and universal hearing screening. *J Perinat.* 2000;20:131-6.
 8. Houston KT, Hoffman J, Muñoz KF, Bradham TS. Is the infrastructure of EHDI programs working? *The Volta Review* 2011;111(2):225-42.
 9. Hyde ML. Newborn hearing screening programs: overview. *J Otolaryngol.* 2005;34(Suppl.2):S70.
 10. Brasil, Ministério da Saúde. *Diretrizes da Atenção da Triagem Auditiva Neonatal.* 1. ed. Brasília: Ministério da Saúde, 2012. [Acesso em 09/01/2014]. Disponível em: http://bvsmms.saude.gov.br/bvs/publicacoes/diretrizes_atencao_triagem_auditiva_neonatal.pdf.
 11. Brasil, Palácio do Planalto. Lei nº 12.303 de 03 de agosto de 2010. [Acesso em 03/08/2014]. Disponível em: http://www.planalto.gov.br/ccivil_03/_Ato2007-2010/2010/Lei/L12303.htm.
 12. *Diretrizes da atenção da triagem auditiva neonatal.* [Acesso em 04/08/2014]. Disponível em: http://bvsmms.saude.gov.br/bvs/publicacoes/diretrizes_atencao_triagem_auditiva_neonatal.pdf.
 13. Kumar S, Mohapatra B. Status of newborn hearing screening program in India. *International Journal of Pediatric Otorhinolaryngology.* 2011;75(1):20-6.
 14. Brasil, Ministério da Saúde. Sistema de Informações sobre Nascidos Vivos – SINASC. Disponível em: <http://tabnet.datasus.gov.br/cgi/tabcgi.exe?sinasc/cnv/nvpb.def13>.
 15. Cavalcanti HG, Melo LPF, Buarque LFSLP, Guerra RO. Overview of newborn hearing screening programs in Brazilian maternity hospitals. *Braz J Otorhinolaryngol.* 2014;80(4):346-53.
 16. Michelon F, Rockenbach SP, Floriano M, Delgado ED, Barba MC. Triagem auditiva neonatal: índice de passa/falha com relação a sexo, tipo de parto e tempo de vida. *Rev CEFAC.* 2013;15(5):1189-95.
 17. Boscatto SD, Machado MS. Teste da orelhinha no Hospital São Vicente de Paulo: levantamento de dados. *Rev CEFAC.* 2012;15(5):1118-24.
 18. Dantas MBS, Anjos CL, Camboim ED, Pimentel, MCR. Resultados de um programa de triagem auditiva neonatal em Maceió. *Rev CEFAC.* 2009;75(1):58-63.
 19. Cavalcanti H, Guerra R. The role of maternal socioeconomic factors in the commitment to universal newborn hearing screening in the Northeastern region of Brazil. *Int. j. pediatr. otorhinolaryngol.* 2012;76(11):1661-7.
 20. Olusanya BO. Highlights of the new WHO report on newborn and infant hearing screening and implications for developing countries. *Int J Pediatr Otorhinolaryngol.* 2011;75:745-8.
 21. Griz S, Mercês G, Menezes D, Lima MLT. Newborn hearing screening: an outpatient model. *Int J Pediatr Otorhinolaryngol.* 2009;73(1):1-7.
 22. Leigh G, Schmulian-Taljaard D, Poulakis Z. Newborn hearing screening. In: *Newborn screening systems. The complete perspective.* San Diego: Plural Publishing, 2010. P. 95-115.

Received on: March 20, 2014

Accepted on: August 25, 2014

Mailing address:

Maria Augustta Sobral de França Malheiros

Avenida Olinda, 385, Apt 602, Tambaú

João Pessoa – PB – Brasil

CEP: 58039-120

E-mail: mariaaugustta@gmail.com