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Original articles

Evaluation of the newborn hearing screening program of the Univag Clinic School

Avaliação do programa de triagem auditiva neonatal da Clínica Escola do Univag

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ABSTRACT

Purpose: to verify if the percentage of newborns that referred at screening hearing phase of the newborn hearing screening service of the School Clinic of the University Center in Várzea Grande is within the specified quality indicators of the Newborn Hearing Screening services.

Methods: a retrospective study was performed, in which the results of the exams of Transients Otoacoustic Emissions held from October, 2013 to August, 2014, of a free service of optional neonatal hearing screening in the private sector of a university in the city of Várzea Grande-Mato Grosso, Brazil were carried out. The sample consisted of 251 participants, subdivided into two groups: low-risk group composed by 210 participants, 100 were female and 110 male and; high-risk group composed by 41 participants, 17 female and 24 male.

Results: the Transients Otoacoustic Emissions test was analyzed. In the low-risk group, 39.52% passed, 4.76% failed and 55.71% did not attend the service for completion of screening. The high-risk group, 48.78% passed, 14.63% failed and 36.59% did not attend the service for completion of screening as shown in Tables 1 and 2.

Conclusion: the percentage of newborns that referred at the screening hearing phase by the assessed service is above the recommended by literature.

Keywords: Triage; Hearing; Infant, Newborn

RESUMO

Objetivo: verificar se a porcentagem de recém-nascidos que falharam na triagem auditiva do serviço da Clínica Escola do Centro Universitário de Várzea Grande está dentro do determinado pelos indicadores de qualidade dos serviços de Triagem Auditiva Neonatal.

Métodos: estudo retrospectivo, no qual foram analisados os resultados dos exames de Emissões Otoacústicas Transientes realizados no período de Outubro de 2013 a Agosto de 2014, em um serviço gratuito de triagem auditiva neonatal opcional do setor privado de uma universidade da cidade de Várzea Grande-Mato Grosso, Brasil. Compuseram a amostra 251 participantes, subdivididos em dois grupos: grupo de baixo risco composto por 210 participantes, sendo 100 do gênero feminino e 110 do masculino e; grupo de alto risco composto por 41 participantes, sendo 17 do gênero feminino e 24 do masculino.

Resultados: foram analisados os resultados da triagem auditiva obtidas com o teste das Emissões Otoacústicas Transientes sendo que no grupo de baixo risco 39,52% passaram, 4,76% falharam e 55,71% não compareceram ao serviço para finalização da triagem. Já no grupo de alto risco, 48,78% passaram, 14,63% falharam e 36,59% não compareceram ao serviço para finalização da triagem, conforme demonstrado nas Tabelas 1 e 2.

Conclusão: a porcentagem de indivíduos que falharam na triagem auditiva neonatal pelo serviço avaliado está acima do preconizado pela literatura.

Descritores: Triagem; Audição; Recém-Nascido

INTRODUCTION

Neonatal hearing screening programs are important as they aim at detecting early hearing disability and are feasible due to the low cost and the ease of execution under training and supervision[1].

According to GATANU[2] carrying out routine neonatal hearing screening (NHS) is the only strategy able to detect early hearing alterations that could interfere with the individual's quality of life. Hearing screening should be performed in all the newborns (NBs), preferably before being discharged or within the first month of life.

In the global scenario, the NHS (Neonatal Hearing Screening) has been carried out and, despite the problems found, it continues to be performed and improved according to the possibilities of each place[3].

In Brazil, it can be highlighted the great advance in the public scope with the creation of the National Policy of Hearing Attention through the Government Order GM/MS nº 2.073 of 28/09/2004[4], and the Nacional Law of Neonatal Hearing Screening nº 12.303 of 02/08/2010[5], aiming at the execution of early detection of deaf and the support to the individual with hearing impairment, which must be widely spread and fulfilled by society.

The most recommended procedures for neonatal hearing screening in the international literature are the evoked otoacoustic emissions (OAE), narrowband tonal signals originated in the cochlea in response to an acoustic stimulus[6].

Newborn Hearing Screening uses electroacoustic and electrophysiological measures, such as transient evoked otoacoustic emissions (TOAE) and the Automatic Auditory Brainstem Response (ABR-A), since this population is unable to answer adequately to behavioral tests due to age[7]. These two techniques have been largely applied as efficient tools in the Universal Neonatal Hearing Screening (UNHS), both in developed and developing countries[8].

A study[9] states that, for the NHS service to have satisfactory quality it is crucial to have a rigid control of the data bank monthly, highlighting the retest control, diagnostic evaluation, intervention and audiological monitoring. According to JCIH (2007)[10] and Comusa (2010)[11] one of the quality indicators for the services of the Universal Neonatal Hearing Screening is to obtain index lower than 4% with neonates with failure result in the NHS, being necessary the regular monitoring of this value to enable the follow-up of the services results periodically[12].

Therefore, the objective of this research was to verify if the percentage of newborns that failed in the auditory screening of the service in the University Center Clinic School of Várzea Grande – UNIVAG is within the one determined by the indicators of service quality of Neonatal Auditory Screening.

METHODS

The research was initially sent to the Research Ethics Committee linked to Plataforma Brasil being approved under the number 942.238.

A retrospective study was carried out, in which the results of the TOAE carried out from October, 2013 to August 2014, of an optional free service of neonatal auditory screening belonging to the private sector of a university in the city of Várzea Grande (MT), Brazil.

The data collected were from newborns (NB) and babies who underwent a neonatal auditory screening, through the capture of transient evoked otoacoustic emissions, to evaluate the cochlear function and detect hearing losses.

Data surveys of 319 NBs medical records of newborns and babies treated in the UNIVAG clinic school, under the age of three months were carried out. Medical records of babies with incomplete anamnesis and ages over 90 days were excluded from the sample. The inclusion criteria were babies up to the age of three months, whose parents provided complete data in the anamnesis, which made it possible to classify them as low risk or high risk for hearing impairment. The risk criteria for hearing impairment considered in this study were those recommended by the Joint Committee on Infant Hearing–JCIH[10] and COMUSA[11], namely: heredity; children with low birth weight (1500g); stay in ICU more than 5 days; perinatal anoxia; neonatal Apgar 0-4 in the first minute and of 0-6 in the fifth minute; preterm birth; hyperbilirubinemia; congenital infections: German measles, toxoplasmosis, cytomegalovirus and syphilis; use of ototoxic drugs; head trauma; chemotherapy; consanguinity and head and neck malformations and/or syndromes.

The final sample consisted of 251 participants, 210 in the low risk group and 41 in the high risk group.

The protocol used in this study was the one suggested by the national and international organs mentioned earlier, that is, the NBs of both groups were screened through the TOAE (PHASE 1) and if they failed they should do a retest in 15-30 days (PHASE 2). The NBs that still failed would be referred to diagnostic centers for otorhinolaryngological evaluation,

Automatic Auditory Brainstem Response and behavioral evaluation.

The TOAE, known in Brazil as "test of the little ear", were conducted in a quiet room where the NB was sleeping, an olive-shaped tip being inserted in a probe which was introduced in the ear and acoustic stimuli (clicks) of low intensity were emitted in each ear separately, randomly, using the equipment OtoRead manufactured by Interacoustic. The reference criterion to pass the test is the presence of a superior answer to 3 dB in frequency band of 1.500 Hz and superior to 6 dB in frequency bands of 2000, 3000 and 4000 Hz[13].

The results of the research were analyzed statistically, using the percentual analysis of the variables, age in days at the moment of the exam and final result of the screening in both evaluated groups. An inferential analysis of the data was carried out using the comparison technique for two proportions, taking into account the normal distribution with their respective intervals of confidence of 95% and value inferior to 0,05 ($p<0,05$), to verify if there was statistically significant difference, between the patients of high and low risks, according to the final results of the neonatal auditory screening.

RESULTS

In Table 1 the sample characterization is shown, according to the variable age in days in the low and high risk groups. In this table it was observed that in the low risk group, most of the individuals that attended the clinic were 39 days old (34.76%) and that in the high risk group most of them attended the screening at 36 days of age (29.27%).

In Table 2 it is observed the final result of the hearing screening in the low and high risk groups. In the low risk group (n=210), 39.52% passed, 4.76% failed and 55.71% did not attend the screening for retesting and completion of screening. However, in the high risk group (n=41), 48.78% passed, 14.63% failed and 36.59% did not attend the screening for retesting and completion of screening as shown in Tables 1 and 2.

Table 1. Distribution of the participants of the high and low risk groups, as per variable, age in days at the moment of screening

Variables	High Risk Group (n=41)		Low Risk Group (n=210)	
	Frequency	Percentage	Frequency	Percentage
Age in Days	n	%	n	%
30	1	2,44	0	0
32	1	2,44	0	0
34	2	4,88	0	0
35	1	2,44	0	0
36	12	29,27	0	0
37	4	9,76	17	8,10
38	6	14,63	65	30,95
39	7	17,07	73	34,76
40	6	14,63	37	17,62
41	1	2,44	13	6,19
42	0	0	5	2,38

Table 2. Result of high and low risk groups neonatal hearing screening

NHS Result	High Risk Group (n=41)		Low Risk Group (n=210)	
	n	%	n	%
Failed	6	14,63	10	4,76
Passed	20	48,78	83	39,52
NC	15	36,59	117	55,71

Legend: NC= Did not attend the service

In Table 3, comparisons of the proportions of the results of the neonatal auditory screening between the high and low risk groups are presented. The percentage of individuals who failed and passed in the TOAE was not statistically significant in both groups, however the absence index was (p=0,021). In the low risk group the absence index was higher than 50% and in the high risk group was 36.59%.

Table 3. Inferential analysis of high and low risk groups neonatal hearing screening

Variables	High Risk		Low Risk		Δ	IC 95%	p
	n	%	n	%			
Final Result							
Failed	6	14,63	10	4,76	9,87	[-1,32 ; 21,07]	0,084
Passed	20	48,78	83	39,52	9,26	[-7,41; 25,93]	0,276
NC	15	36,59	117	55,71	-19,12	[-35,33; -2,93]	0,021

Legend: n= Number of patients Δ=estimate for the difference of proportions for CI 95%= Confidence interval of 95% for the difference of proportions. p= p-Value based on the test of normal distribution for the difference of two proportions.

DISCUSSION

This study will emphasize the percentages of pass/fail and non-attendance of newborns in a hearing screening program of a private service, since the analysis of the sample showed homogeneity between the groups. Although the sample was homogeneous, there was a higher number of male individuals concurring with other studies[14,15].

The results of this study showed that most of the participants underwent screening after the 30th day, age greater than recommended by the literature. According to a national study[2], the early detection of hearing impairment is a determining factor for the rehabilitation prognostic. JICH[10], states that NHS must be developed with the aim of diagnosing hearing loss before three months of age, and begin the intervention up to six months. For these goals to be attained they must be done during the neonatal period.

The failure index of the low risk group was of 4.76% and the high risk was of 14.63%, as shown in Table 1. This index is above that recommended by the quality criteria suggested by JCIH[10]. This finding can be explained by the rigorous analysis standard used in the institution where the data were collected. It is used at that location the reference criterion proposed by Finitzo[13], who analyzes the frequency bands of 1.500, 2.000, 3.000 and 4.000 Hz. A study conducted by the National Institutes of Health[16], detected that the TOAE are affected depending on the frequency, since the levels of noise are louder when the frequencies tested are lower, making it more difficult to detect the presence of an evoked otoacoustic emission with spectrum under 1.500 Hz. Thus, several factors that occur during the test, such as environmental noise, inefficient sealing when inserting the probe into the canal, noisy breathing, cough, swallowing, snoring and the presence of vernix caseosa would hinder a satisfactory result in the frequency of 1.500 Hz[17,18]. These associations are relevant, since the inclusion of the frequency analysis of 1.500 Hz makes it difficult to determine whether the TOAEs are absent due to lack of cochlea active process or due to external and/or internal factors mentioned before[19,20].

Another reason for this finding may be due to the fact that the service assessed is in its first year of operation. A study shows that the NHS services in an initial period may obtain index of failures higher than that suggested by the literature, since they are in a period of implementation and adaptation. In this study over a period of four years, it was obtained, at the beginning of the neonatal hearing screening program, an index of 11.1% of failures, which was decreasing with time, reaching 5% in the fourth year[21].

The highest number of failures identified in this study may have been influenced by the experience of the students in handling the equipment which agrees with the national study[22].

Upon completion of the NHS (PHASE 1), the mothers/guardians are advised about the need of retesting, which must be conducted in the period of 15-30 days. However, it was observed in this study that there was a high level of non-attendance as shown in Table 1, with a statistically significant difference between the groups, and the low risk group presenting the highest service evasion value (Table 2). A

hypothesis which justifies this finding would be that the mothers /guardians do not give due importance to the retesting, which agrees with the national study[17]. This demonstrated that for the mothers the child's return to completion of the screening (PHASE 2) becomes an unnecessary procedure, as the doctor performing the monitoring of their child no longer emphasizes the importance of the retesting. The same authors concluded that the high level of absence observed in the retest, is due to the following factors: low attendance to pre-natal appointments; presence of more than one child in the family; and absence of a partner that can help with the travels.

A hypothesis in relation to the biggest evasion of the service observed in the low risk group may be that perhaps mothers/guardians do not care about the retest, because their child does not present any significant risk factor for hearing loss.

CONCLUSION

The failure level in the neonatal hearing screening in the service evaluated is above that recommended by the literature.

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