Otology

Role of the "rooming-in" on efficacy of universal neonatal hearing screening programmes

Impatto del "rooming-in" sull'efficacia degli screening uditivi neonatali universali

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SUMMARY

Sensorineural hearing loss is one of the most common congenital abnormalities in infants and it affects approximately one to two neonates in every 1000 births. Early identification of hearing loss in the newborn is the first step for a successful rehabilitation programme. The introduction of Otoacoustic Emission responses as a useful tool in hearing screening programmes, allowed the identification of hearing loss in the well-baby nursery and in targeted populations of the neonatal intensive care unit. Recently, a new concept of breastfeeding during hospitalization after birth has been developed. Indeed, the so-called "rooming-in" allows a mother to stay with her child in the same room, located in the nursery. This new trend has been developed to avoid any psychological adverse consequences of birth on the child-mother relationship. To enhance how "rooming-in" could affect the Universal Neonatal Hearing Screening (UNHS) programmes, an analysis has been made of the data coming from two maternity wards using different breastfeeding protocols. Data obtained demonstrate a worse performance on obtaining essential benchmark in the UNHS in the maternity ward where rooming-in is adopted (60% of newborns tested). UNHS programme efficacy could be affected by the wider adoption of the "rooming-in" regimen in the maternity wards and early detection of hearing loss revealed by UNHS could be vanished by dispersion of patients. In fact, more data are necessary to evaluate the impact of rooming, even though our data show a worsening in the UNHS results.

KEY WORDS: Hearing loss • Newborns • Hearing screening programmes • Rooming-in

RIASSUNTO

L'ipoacusia neurosensoriale è una delle più comuni anomalie congenite in età pediatrica e colpisce circa 1-2 bambini ogni 1000 nati. L'identificazione precoce della ipoacusia nel neonato è il primo passo verso un programma di riabilitazione di successo. L'introduzione delle otoemissioni acustiche (OAEs) quale metodica diagnostica efficace nei programmi di screening uditivi ha consentito di identificare l'ipoacusia nelle maternità e/o in una popolazione selezionata. D'altra parte, negli ultimi anni, è stato introdotto un nuovo concetto di allattamento al seno durante l'ospedalizzazione del neonato. Infatti, il cosiddetto "rooming-in" consente alle madri di stare nella stessa stanza dei loro bambini nei reparti di maternità. Questa nuova tendenza è stata sviluppata al fine di evitare avversi effetti psicologici correlati alla nascita nel rapporto madre-bambino. Per evidenziare come l'adozione del "rooming-in" può incidere sull'efficacia degli screening uditivi neonatali universali, gli Autori hanno analizzato i dati provenienti da due reparti di maternità nei quali si esegue lo screening uditivo neonatale universale, ma che adottano un diverso regime di allattamento al seno. I dati ottenuti dimostrano risultati peggiori nel raggiungimento degli obiettivi fondamentali dei programmi di screening uditivi neonatali universali in quella maternità ove è adottato il regime del rooming-in (solo il 60% dei bambini esaminati). L'efficacia dei programmi di screening uditivo neonatale universale possono così essere inficiati da una più ampia diffusione del regime "rooming-in" nei reparti di maternità, che favorirebbe la dispersione di pazienti ed impedirebbe la diagnosi precoce delle ipoacusie neurosensoriali congenite. Comunque, anche se i nostri dati dimostrano il mancato raggiungimento degli obiettivi laddove esiste il rooming-in nei programmi di screening uditivo neonatale universale, ulteriori dati sono necessari a conferma di quanto emerso dal presente studio.

PAROLE CHIAVE: *Ipoacusia • Età neonatale • Screening uditivo neonatale • Rooming-in*

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Introduction

Hearing loss in infants is one of the most common congenital abnormalities and it affects approximately one to two neonates in every 1000 births. Early identification of hearing loss in the newborn is the first step for a successful rehabilitation programme. Over the years, developments in technique and instrumentation have significantly altered the direction, accuracy and the results of the screening programmes. In fact, the introduction of Otoacustic Emissions (OAEs) as a useful tool in the hearing screening programme allowed hearing loss to be identified in well-babies (WBs)

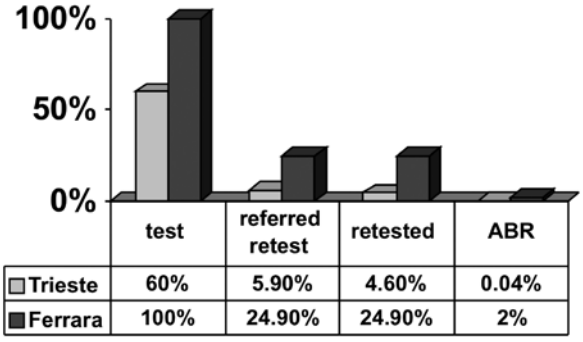
and in a targeted population. Nonetheless, OAEs are not designed to differentiate between mild, moderate and severe sensorineural hearing losses and temporary middle ear effusion. In addition, their use means added cost, highly qualified examiners, more elaborate equipment. Usually, newborn babies are left alone in nurseries, away from their mothers, in order to be protected from any kind of infection. Children are generally tested in WB nurseries during sleeptime, according to well established timetables. Newborns are in the same room and, therefore, it is possible to test them, one by one, in a relatively short time. In the last few years, a new concept of breastfeeding, during hospitalization after the birth, has been developed. Indeed, the so-called "rooming-in" allows mothers to stay with their child in the same room in the nurseries. This new trend has been developed to avoid any adverse psychological consequence of birth on the child – mother relationship.
This new approach in the maternity wards could affect the efficacy of the hearing screening programmes, requiring new resources. A comparison has, therefore, been made of the hearing screening programmes, performed in two WB nurseries with different breastfeeding strategies, in terms of efficacy, costs and parents' compliance.

Material and methods

A review has been made of the audiological data collected from a cohort of patients hospitalized in two different WB nurseries (Trieste and Ferrara, Italy) from April 2003 to December 2004. In this period, 1979 WBs were born in the Maternity Department of S. Anna Hospital, Ferrara, and 2371 infants in the maternity ward of "Burlo-Garofolo" Children's Hospital – Trieste. The first department is a traditional WB nursery. In the maternity ward of Trieste, the "rooming-in" regime has been adopted since early 2000. In both departments, the UNHS were performed by audiology technicians coordinated by a senior audiologist. In both nurseries, the OAEs were recorded after the mid-day feeding, while the infants were sleeping, at least 24 hours after birth. Patients who were discharged at the week-end were invited to return the following Monday to perform the test. Hearing screening tests were conducted with a fourth generation Automated-OAE screener (AccuScreen) and a standardized three-phase screening protocol was used (OAEs – OAEs – ABR). OAEs were assessed at three frequencies, i.e., 1.0, 2.0 and 4.0 kHz. An acceptable OAEs response, in both ears, was necessary for a PASS. If the second phase was considered a REFER, then a clinical ABR evaluation was scheduled within 30 days of the second OAEs test. The clinical ABR evaluation uses a click-based protocol to identify the hearing threshold of the infant down to hearing levels relative to 30 dB nHL. In order to identify the causes of hearing loss of patients during hospitalization and of the drop-outs in the retest session, in the Trieste, department, a phone survey was performed.

Results

From the two population of infants, all neonates (100%) from the Ferrara WB nursery were screened, while from the Trieste nursery only 1434 (60.4%) were tested. Of the latter, 141 infants (5.9%), were referred for a retest, but only 110



	test	referred retest	retested	ABR
Trieste	60%	5.90%	4.60%	0.04%
Ferrara	100%	24.90%	24.90%	2%

Fig. 1. Trieste and Ferrara UNHS experience.

(4.6%) returned to the Trieste Audiology Department. Only one infant (0.04%) was assessed with ABR and his hearing was found to be normal. One patient who did not undergo the retest session revealed a profound hearing loss at the age of 12 months.
In the Ferrara nursery, 493 retests (24.9%) were conducted and 40 infants (2%) resulted as REFERs in phase two and were evaluated with an ABR. Fourteen cases (0.7%) presenting hearing impairment were identified, 4 cases with bilateral losses and 10 with unilateral loses. The data are outlined in Figure 1.
The telephone survey revealed that, out of 937 patients, 435 had been unable to perform the test because they were discharged during the week-end; in the following weeks, the parents forgot to come for the appointment at the audiological service, in 367 cases parents refused the test because they believed their child had no hearing problems, 135 parents complained that nobody informed them about the availability of the test. Of the 31 patients who did not return for the retest session, 9 parents answered that they did not know that it was possible to perform a retest session, 12 parents did not consider the OAEs useful, 10 parents said they forgot the appointment (Fig. 2).

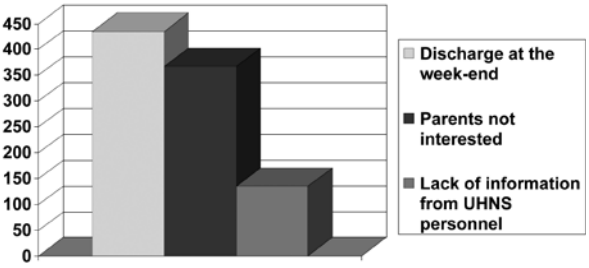


Fig. 2. Causes of failure in Trieste's UNHS programme.

Discussion

Newborn hearing screening programmes represent a useful tool for the early identification of hearing loss in the neonatal period. The differentiation of the severity of the hearing loss in the first stages of life allows the rehabilitation programme to be started immediately. Hearing restoration with hearing aids and/or cochlear implants reduces not only the impact of hearing loss on language skill learning, but also the degree of communicative disability in the growing child. Acceptance of UNHS is still under debate as far as concerns cost and efficacy. When universal programmes to screen newborns for hearing defects were first

introduced, the test failure rates ranged from 2-4%. Among newborns failing the screening tests, 85 – 90% were later found to have normal hearing; this was considered to be an acceptable performance standard for well-established programmes. However, the high proportion of infants with normal hearing who failed screening led to criticism that unwarranted parental anxiety elicited by the test failure would outweigh the benefits of the programme [1].

The most staunt opposition came from Bess and Paradise [2 3]. Their concerns included the cost of increasing UNHS programmes. In addition, they believed that the UNHS only identified a minority of the total number of infants with congenital hearing loss, because the technology provided a relatively high false positive rate so that only a small fraction of infants who initially failed screening would eventually present true hearing loss. Moreover, these false-positive results may create unnecessary parental anxiety and have a negative impact on the parent-child relationship, and that certain areas may not be able to provide adequate testing or follow-up services [4].

The costs involved in administering a hearing screening test are relatively low [5]. Children who fail their screening test require evaluation by an audiologist, however, generally to perform a standard ABR in order to ascertain if the child truly has the hearing loss. In order to reduce the use of the more expensive ABR test on normal-hearing babies, a two-step screening programme has been used in recent years. Patients with no first OAE recordings repeat the test after a few days. If the child does not pass the second test, he/she will be referred to ABR [6]. In recent years, new insights have been developed on auditory neuropathy, a congenital hearing loss due to abnormal transmission of the neural impulse generated in the cochlea to the central cortex with normal cochlear function. In those cases, the presence of OAE does not detect the underlying hearing loss [7]. Parental concerns regarding false positive results in hearing screening have also been examined. Although conflicting data have been reported regarding this aspect of UNHS, considerable data have demonstrated little effect on parental stress or parent-infant relationships [8-10].

Optimal performance of a newborn screening system requires that each component of the system adheres to its responsibilities, records the performance, and keeps other system components adequately informed. The effectiveness of the system in helping children depends on the quality of each component. Screening is of no benefit unless follow-up, diagnosis and treatment are also performed in a timely and consistent manner [11]. The early hearing detection, associated with a targeted intervention process, includes well planned procedures which involve various departments in maternity hospitals. A close relationship between these departments is fundamental in order not to lack detection of newborns. Those children could drop out of the programme because they were not born in a hospital or they were discharged before being screened for hearing loss. In our experience, close collaboration between the maternity ward and the audiologist is essential in order to avoid scattering of patients in the follow-up period. In fact, the data obtained from the phone survey revealed a lack of communication between parents and the personnel involved in the clinical setting. The different regimens between the maternity wards could interfere with the benefits of a newborn hearing screening programme. A high rate of drop-out has been observed in the maternity ward where the "rooming-in" regimen is adopted. The reasons for this failure could be attributed to three major factors. The first is the lack of communication between the Audiology Department and maternity wards. Any information regarding the UNHS should be brought to the attention of the personnel, in the attempt to involve all individuals in the ongoing activity. Second, parents' information concerning the availability and advantages of the UNHS in the maternity ward should be enhanced by the nurses and the neonatologists. Many people consider hearing loss as a remote problem that they consider does not involve them and, therefore, they refuse the OAEs. Better information on the purposes of UNHS and the importance of early detection of hearing loss should be considered. Last, but by no means least, UNHS requires a room selected for this purpose where OAEs can be performed. In our experience, in the "rooming-in" maternity ward, the audiologist often encounters many technical problems in performing tests, as well as noise, and he takes a longer time to examine each patient [12].

The Joint Committee on Infant Hearing (JCIH) recommends benchmarks for screening, identification and intervention, namely:

- within six months of commencing a screening programme, hospitals must screen a minimum of 95% of the infants between birth and one month of age.
- The referral rate for audiologic and medical evaluation after screening should be 4% or less within one year of commencing the programme.
- The programme must document efforts to obtain follow-up on 95% of infants who do not pass the newborn screening and actual follow-up of 70% or more of infants [13].

The data emerging from the "rooming-in" maternity ward do not support these goals (only 60% of infants tested) and they confirm the difficult management of a UNHS in maternity wards which adopt the "rooming-in" regimen. Those results, associated with the widespread use of the "rooming-in", force us to find new solutions. One could be a greater involvement of the nurses employed in the maternity ward, even though it would imply an increase in the daily activity causing a larger number of artefacts. In those departments in which the UNHS is followed by a single audiologist, use of a room reserved for this purpose in which he/she could perform the test, at the same time each day should reduce the number of the patients lost.

Conclusions

The efficacy of UNHS programmes could be negatively affected by the wider adoption of the "rooming-in" regimen in the maternity wards and early detection of hearing loss revealed by UNHS could be vanished by dispersion of patients. In fact, more studies are necessary to evaluate the impact of rooming-in, even though our data show a worsening in the UNHS results.

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