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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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 Otoacoustic 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 se-
vere sensorineural hearing losses and temporary middle ear
effusion. In addition, their use means added cost, highly
certified 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 infec-
tion. Children are generally tested in WB nurseries during
sleep-time, according to well established timetables. New-
borns 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 hospitali-
ization 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 De-
cember 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 tradi-
tional 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 audiolo-
yology technicians coordinated by a senior audiologist. In both
nurseries, the OAEs were recorded after the mid-day feed-
ing, 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 gen-
eration Automated-OAE screener (AccuScreen) and a stand-
ardized 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
(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 REFES in phase two and
were evaluated with an ABR. Fourteen cases (0.7%) pre-
senting hearing impairment were identified, 4 cases with
bilateral losses and 10 with unilateral losses. 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 au-
diological service, in 367 cases parents refused the test be-
cause 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).

Discussion
Newborn hearing screening programmes represent a use-
ful 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 rehabilita-
tion programme to be started immediately. Hearing resto-
ration with hearing aids and/or cochlear implants reduces
not only the impact of hearing loss on language skill learn-
ing, 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 pro-
grames to screen newborns for hearing defects were first

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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. The most staunch opposition came from Bess and Paradise. 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.

The costs involved in administering a hearing screening test are relatively low. 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 an ABR. 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. 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.

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. 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.

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.

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.
References


Received: January 28, 2008 Accepted: July 20, 2008