Community-based infant hearing screening for early detection of permanent hearing loss in Lagos, Nigeria: a cross-sectional study

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Objective To determine the feasibility and effectiveness of a community-based universal infant hearing screening programme for detecting permanent congenital and early-onset hearing loss (PCEHL) in Lagos, Nigeria.

Methods This is a cross-sectional study in which all infants aged 3 months or under attending four bacille Calmette–Guérin (BCG) immunization clinics accounting for over 75% of the BCG coverage in the study location were screened by community health workers between July 2005 and April 2006. Screening followed a two-stage protocol involving transient evoked otoacoustic emissions and automated auditory brainstem responses. The main outcome measures were screening coverage, referral rates, return rates for second-stage screening and evaluation, yield and age at PCEHL diagnosis.

Findings In total, 2003 (88%) of 2277 eligible infants attending the four BCG clinics were successfully screened between July 2005 and April 2006 at a mean age of 17.7 days, with no parent declining screening. The majority (55.2%) were born outside a hospital and, of such infants, 77% were born in traditional herbal maternity homes. The overall referral rate for diagnostic evaluation was 4.1%. Only 61% (50/82) of those referred returned for evaluation, and 45 of them were confirmed with PCEHL. Additionally, 11 infants who had previously passed the first screening stage were also found to have PCEHL, resulting in a yield of 28 per 1000 (56/2003). The mean age at diagnosis was 51 days. The sensitivity, specificity and positive predictive value of the first screening stage were 80.4%, 99.7% and 90.0%, respectively. The positive likelihood ratio was 268, while the negative likelihood ratio was 0.2.

Conclusion Routine hearing screening of infants attending BCG immunization clinics by community health workers was feasible and effective for the early detection of PCEHL in Lagos, Nigeria. However, an efficient tracking and follow-up system is needed to improve return rates for second-stage screening and diagnostic evaluation.

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Une traduction en français de ce résumé figure à la fin de l'article. *Al final del artículo se facilita una traducción al español.* الترجمة العربية لهذه الخلاصة في نهاية النص الكامل لهذه المقالة.

Introduction

WHO estimates that globally the number of people with hearing loss, defined as a loss of more than 40 dB on the hearing loss scale (> 40 dB HL), has more than doubled from 120 million in 1995 to at least 278 million in 2005, thus making this condition the most prevalent sensory deficit in the population.[1–3] Permanent hearing loss can occur at any age but about 25% of the current burden is of childhood onset.[1] Annually, up to 6 per 1000 live-born infants, or 798 000 babies worldwide, suffer permanent hearing loss at birth or within the neonatal period and at least 90% of them are in developing countries.[4]

Permanent congenital and early-onset hearing loss (PCEHL) is etiologically heterogeneous and associated with significant and irreversible deficits in linguistic, cognitive and psychosocial development.[5–9] Primary prevention through immunization, genetic counselling, and improved antenatal and perinatal care may help to address some environmental causes, such as birth trauma, infection and neonatal jaundice requiring exchange blood transfusion, but has a limited impact on genetic or hereditary etiologies, such as connexin 26, Pendred and Usher syndromes.[1,10] Moreover, effective primary prevention is rarely possible in the 38–60% of children with idiopathic PCEHL who live in developing countries.[11,12] Nonetheless, such infants can develop essential language and cognitive skills if the condition is detected early and they are provided with appropriate intervention services within the first year of life.[13–15]

In recognition of the complementary value of implementing both primary and secondary prevention measures for permanent hearing loss, the World Health Assembly passed a resolution in 1995 urging Member States to:

prepare national plans for the prevention and control of major causes of avoidable hearing loss, and for early detection in babies, toddlers and children within the framework of primary health care.[16]

Although the resolution did not propose methods of achieving the goal of early detection, universal newborn hearing screening using transient evoked otoacoustic emissions (TEOAE) and automated auditory brainstem responses (AABR) before hospital discharge has been effective in many countries.[17–19] In

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the absence of such objective screening, PCEHL may not be detected until the child is 2–6 years of age, when intervention outcomes may be suboptimal.[17]

Current evidence suggests that Nigeria has the highest proportion of developmentally disadvantaged children in the world, excluding those with hearing loss.[20] Nonetheless, the present standard of maternal and child health care in the country makes the primary prevention of PCEHL untenable. In addition, conventional hospital-based universal hearing screening programmes are unlikely to be effective, as the majority of births occur outside regular hospitals.[21] Routine childhood immunization programmes in developing countries often provide effective community-based platforms for attracting a significant number of babies born outside regular hospitals for new health interventions under the concept of "immunization plus".[22] Consequently, this study set out to determine the feasibility and effectiveness of community-based (i.e. non-hospital) universal infant hearing screening during bacille Calmette–Guérin (BCG) immunization for the early detection of PCEHL in Nigeria.

Methods

Location and setting

This cross-sectional study was conducted in an inner-city area of Lagos, Nigeria, with a population of 243 777. The area is served by one general, one pediatric and one maternity hospital as well as by seven health centres, all of which are state-owned, and by several private hospitals. The availability of an established audiological centre that could provide appropriate interventions for children in whom PCEHL was detected was a key factor in choosing this study location.[23] Ethical approval for the study was obtained from University College London, the United Kingdom, and the Lagos State Health Management Board, Nigeria.

Of the seven primary health-care centres that offered routine BCG immunization weekly from Monday to Thursday, we selected four clinics that accounted for over 75% of BCG vaccinations in this study location, as indicated by records obtained from the local health authority. In Nigeria, BCG is the first vaccination given to children, usually within the first month of life.

Participants

All infants aged 3 months or less who were attending one of the four BCG clinics between July 2005 and April 2006 were enrolled in the study. This age limit provided an opportunity to evaluate our results against international benchmarks for infant hearing screening programmes.[18] Older infants were excluded because of the increased difficulty of testing and the prevalence of otitis media with effusion, which is associated with false-positive test results.[24,25] Since BCG vaccination was usually administered shortly after birth, we did not expect any significant selection bias to result from our age limitation.

Screening personnel

Two full-time and two part-time staff members with no prior experience in audiological testing were given two weeks' focused training by the principal investigator. This included an overview of the peripheral auditory pathway and basic screening techniques. One full-time staff member with experience as a community health worker was the designated screener, and the other full-time staff member provided the screener with administrative support. One part-time staff member provided extra administrative support on days when clinics were exceptionally busy while the second part-time staff member provided clerical assistance for data entry.

Screening procedure

A two-stage screening protocol was implemented. It consisted of first-stage screening using TEOAE and second-stage screening using AABR for all first-stage referrals. This two-stage protocol typically has a sensitivity of 92%, a specificity of 98% and a positive likelihood ratio of 61.[26] Both instruments used were within the manufacturers' first calibration period throughout the duration of the study and were fully automated to display the test outcome as "pass" or "refer".[27,28] The instruments were powered by an inbuilt rechargeable battery that could provide up to 10 hours of testing time.

At each of the community centres infants were tested using TEOAE in a designated room in which the ambient noise level did not interfere with the proper functioning of the screening instruments. Screening was performed before BCG vaccination whenever possible. Babies who were referred following first-stage screening were scheduled for AABR screening within one week at one of the four community centres. To assess the efficiency of first-stage screening, every tenth baby who passed underwent second-stage screening with AABR. Children who failed were scheduled for diagnostic evaluation. This consisted of tympanometry, which included a high-frequency (1000 hertz) probe tone for babies less than 4 months old, diagnostic tone pip auditory brainstem responses using insert earphones, and visual reinforcement audiometry for babies older than 6 months, as appropriate. Generally, the evaluation followed the parameters and protocols recommended for newborn hearing screening programmes in the United Kingdom (available at: http://hearing.screening.nhs.uk/protocols_audioassess). As an incentive for parents, all services provided under the programme and transportation to the diagnostic centres were free. Follow-up counselling and interventions, including the provision of hearing aids where appropriate, were provided for parents of babies in whom severe-to-profound bilateral sensorineural hearing loss was confirmed, while ongoing parental surveillance was recommended for babies with mild-to-moderate or unilateral hearing loss.

Primary outcome measures

The case definition for this study included mild and unilateral PCEHL (≥ 30 dB HL) as recommended by the United States Joint Committee on Infant Hearing (JCIH) and in line with WHO's International Classification of Functioning, Disability and Health, which stresses function and life skills alongside impairment.[18,29] The degree of hearing loss was classified as mild (30–40 dB HL), moderate (41–70 dB HL), severe (71–90 dB HL) or profound (> 90 dB HL).[18] The feasibility of universal newborn hearing screening was determined by the availability of a suitable test environment and the ability of non-specialists or community health workers without prior audiological experience to conduct hearing screening for neonates. Effectiveness was determined by JCIH benchmarks as no such standards currently exist for developing countries:[18]

(i) At least 95% of eligible neonates should be screened before hospital discharge or by the age of 1 month within 6 months of programme initiation.
(ii) The percentage of neonates who fail screening tests and are referred for diagnostic evaluation should not exceed 4% within the first year of programme initiation.
(iii) At least 70% of infants requiring diagnostic evaluation should be assessed.
(iv) The mean age at which hearing loss is confirmed should be 3 months or less.
(v) The sensitivity, specificity, positive predictive value and positive and negative likelihood ratios of the two-stage screening test should be calculated.

Data analysis

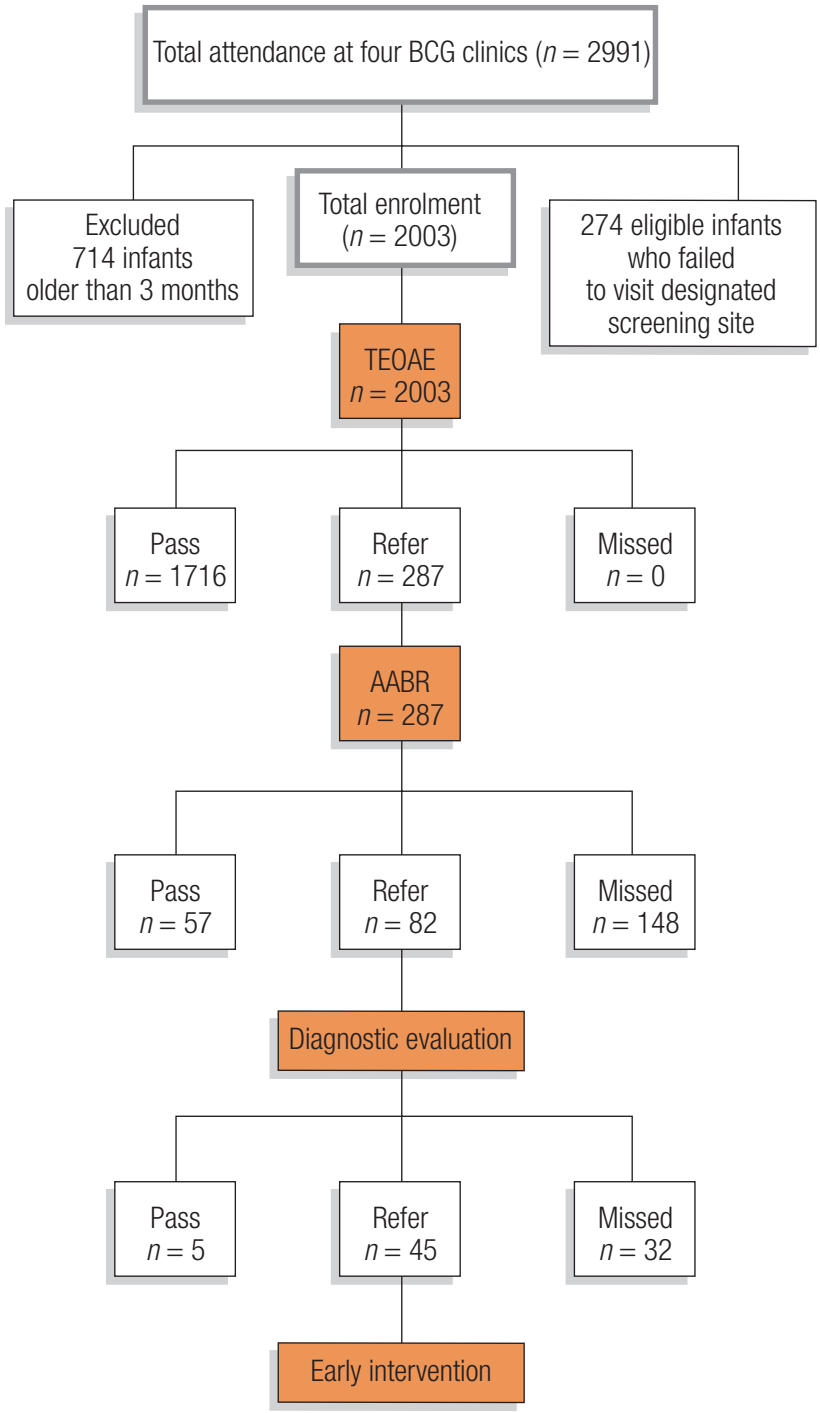
Data tracking and management software (HI*TRACK for Windows Version 3.5 Desktop, National Center for Hearing Assessment and Management, Logan, UT, United States of America) was used to monitor the screening programme and to track mothers so that losses to follow-up could be minimized. Data were transferred to a worksheet (Excel 2003, Microsoft, Redmond, WA, USA) for preliminary verification and, thereafter, exported to SPSS (for Windows, version 13.0, SPSS Inc., Chicago, IL, USA) for statistical analysis. Differences between groups were explored using the two-tailed χ^2 test and significance was judged using 95% confidence intervals (CI). Prevalence rates were adjusted for infants who did not return for diagnostic follow-up to account for any response bias.

Results

Over 75% of BCG vaccinations were administered in the first month of life and the mean age at screening was 17.7 days (standard deviation 19.1 days) (Fig. 1). In total, 2991 babies attended the four centres during the study period; 714 of them were older than 3 months and were excluded from the study. Of the 2277 eligible for hearing screening, 274 (12%) missed screening during the first 2 months of life because the initial referral system required mothers who attended some BCG clinics to go to another designated clinic for hearing screening. This system was subsequently changed to enable the screening team to cover a different clinic each day from Monday to Thursday. Thereafter, screening coverage improved significantly to 100%, as no parent withheld consent. Over the entire screening period, 2003 of the 2277 eligible babies were covered (88%; 95% CI: 86.6–89.2%). Under half (898 or 44.8%) were born in a private or government hospital, while 853 of the 1105 (77.2%) who were born out of hospital were born in a herbal home (i.e. a traditional maternity home) (Table 1).

Of the 2003 babies screened using TEOAE, 287 (14.3%) were referred for AABR. Of these 287, 57 (19.8%) passed,

Fig. 1. **Summary of screening outcomes for infants who underwent two-stage hearing screening with AABR and TEOAE in Lagos, Nigeria, 2005–2006**



AABR, automated auditory brainstem response; BCG, bacille Calmette-Guérin; TEOAE, transient evoked otoacoustic emissions.

82 (28.6%) were referred for diagnostic evaluation and 148 (51.6%) defaulted. Therefore, of the total population of 2003 babies screened, 82 (4.1%; 95% CI: 3.3–5.1%) failed the two-stage screening process and were referred for diagnostic evaluation. Correspondingly, 82 of the 1855 (4.4%; 95% CI: 3.6–5.5%) who completed two-stage screening were referred for diagnostic evaluation. Thereafter, 50 of these 82 babies (61.0%) returned for diagnostic evaluation, and 45 (90%) of them were confirmed as having PCEHL: 38 (84.4%) bilaterally and seven (15.6%) unilaterally (Table 2). Thus, of the 1855 babies who completed screening protocol, 45 were found to have PCEHL (i.e. 24.3 per 1000; 95% CI: 18.2–32.3 per 1000), while 27 had moderate-to-severe PCEHL (i.e. 14.6 per 1000; 95% CI: 10.0–21.1 per 1000).

In addition, every tenth infant who passed TEOAE was scheduled for AABR testing to ascertain the rate of false-negative screening results. Thus, 172 of the 1716 (10%) infants who passed the TEOAE test were selected to undergo AABR testing, and 75 (44%) of them returned. Of these 75 babies, 14 (18.7%) were referred for diagnostic evaluation and PCEHL was confirmed in 11. These 11 were the false-negatives for first-stage screening.

Of the babies who underwent two-stage screening combined with the 172 who were additionally selected for AABR testing, 10 had severe bilateral hearing loss, 25 had moderate bilateral hearing loss and 12 had mild bilateral hearing loss, while nine had unilateral hearing loss (Table 2). Overall, 56 of the 2003 babies screened were found to have PCEHL, giving a "yield" of 28.0 per 1000 (95% CI: 21.6–36.1 per 1000). Correspondingly, 56 of the 1823 babies who completed two-stage screening and who attended diagnostic evaluation were found to have PCEHL, giving an overall prevalence of 30.7 per 1000 (95% CI: 23.8–39.7 per 1000), while 35 of the 1823 had moderate-to-severe hearing loss (i.e. 19.2 per 1000; 95% CI: 13.9–26.6 per 1000). Significantly more male than female infants were confirmed as having hearing loss (36 versus 20; $P = 0.045$). The age at diagnosis of the 56 children with hearing loss ranged from 20 to 129 days (mean, 51 days; standard deviation, 29.4 days).

Table 1. **Characteristics of infants screened for PCEHL, Lagos, Nigeria, 2005–2006**

Characteristics	Number (%) (n = 2003)
Sex	
Male	1023 (51.1)
Female	980 (48.9)
Gestational age	
< 34 weeks	15 (0.7)
≥ 34 weeks	1981 (98.9)
Unknown	7 (0.3)
Gestation	
Singleton	1997 (99.7)
Multiple	6 (0.3)
Place of birth	
Herbal or traditional maternity home	853 (42.6)
Government hospital	476 (23.8)
Private hospital	422 (21.1)
Church	122 (6.1)
Family home	119 (5.9)
On way to hospital	6 (0.3)
Unknown	5 (0.2)
Mode of delivery	
Spontaneous vertex	1904 (95.1)
Caesarean	92 (4.6)
Breech	0
Forceps or vacuum	0
Unknown	7 (0.3)

PCEHL, permanent congenital and early-onset hearing losss.

A total of 1762 infants were classified as true negatives: the 1716 infants who passed the TEOAE test plus the 57 infants who failed the TEOAE test but subsequently passed the AABR test less the 11 infants who passed the TEOAE test but subsequently failed the AABR test. The sensitivity and specificity of first-stage screening were 80.4% and 99.7%, respectively, while the positive predictive value was 90.0%. The positive likelihood ratio was 268 while the negative likelihood ratio was 0.2.

Discussion

A major finding from this pilot study is that community health workers with focused training can successfully screen infants for PCEHL. This supports the view that non-specialists could play an increasing role in the provision of basic community-oriented hearing healthcare services and validates recent initiatives addressed at reducing the shortage of health workers in resource-poor settings.[1,23,30,31] Equally noteworthy is the feasibility of using routine immunization clinics as an effective platform for conducting infant hearing screening in a developing country. The high proportion of births that was observed to occur outside hospitals in this study is similar to that in many other developing countries, particularly in sub-Saharan Africa and south Asia. Consequently, any new child health intervention must be tailored to cater for both hospital and non-hospital births.[32]

The size of the population covered by this study and the duration of the study were comparable to those of similar feasibility studies on infant hearing screening.[25,33–35] With the exception of the low attendance observed when mothers were initially referred to a single screening site, coverage was quite satisfactory relative to the 95% target for universal newborn hearing screening in developed countries. The number of babies who met our inclusion criterion but did not attend screening could not be determined because there was a lack of reliable data from the local health authority. However, the reported uptake rate of BCG immunization in Lagos is in excess of 75%, well above

the current national average of 69%, which means that BCG immunization provided a valuable opportunity for reaching the majority of eligible infants in our target community.[21,36]

The observed mean and standard deviation of the infants' age at screening show that hearing screening can be offered to the majority of babies within the first month of life, thereby making it possible to identify infants with congenital or early-onset hearing loss and still provide intervention services for speech and language development before the age of 6 months. The referral rate after first-stage screening using TEOAE was comparable to rates found in the early stages of conventional hospital-based hearing screening programmes in developed and developing countries.[37–39] Second-stage screening was effective in ensuring that the referral rate for diagnostic evaluation approached the recommended target of 4%. Further reductions in our initial and second-stage referral rates will be achievable with time and experience.[37,40]

The return rate for diagnostic evaluation far exceeded the 11% reported in a comparable programme in South Africa,[41] but fell short of the 70% target despite efforts to make contact with mothers through personal visits and voice and text mobile phone messages as well as the provision of free transport. Factors such as inaccurate contact details, change of address, lack of family support, work constraints, the "inconvenience" of travelling and superstitious beliefs about childhood deafness accounted for this outcome.[41] The default rate reflects the challenge of effective tracking and follow-up faced by similar programmes, even in developed countries.[18] Improving parental education, establishing a dedicated follow-up team and minimizing repeat visits as much as practicable, such as by performing the two screening stages on the same day for some infants, may help to reduce the loss to follow-up in the future.

The prevalence rate for PCEHL observed in this study is a major finding that deserves special attention, as it is the highest ever reported in the world. The exact prevalence rate in the population is likely to be higher given the observed false negatives. Although only a small proportion of infants who passed the TEOAE test were re-tested at least 6.4% (11/172) of this group were further confirmed with hearing loss. The rate is consistent with a recent report suggesting that Nigeria has the highest proportion of developmentally disadvantaged children in the world.[20] The social and economic burden of PCEHL on families and on society is substantial, as indicated by studies in countries with much lower prevalence rates.[42,43] Although we did not establish the etiology of PCEHL in the study population, it is likely that adverse perinatal conditions, which account for the country's exceptionally high infant and child mortality rates, also portend significant developmental and life-long disabilities for the survivors.

Table 2. **Hearing loss diagnoses in infants who either followed a two-stage screening protocol or were selected for further testing after passing the TEOAE test, Lagos, Nigeria, 2005–2006**

Type of hearing loss	Two-stage protocol[a] *n* = 2003 No. (%)	Selected for retesting[b] *n* = 172 No. (%)	Total No. (%)
Bilateral			
Mild (30–40 dB HL)	11 (24.4)	1 (9.1)	12 (21.4)
Moderate (41–70 dB HL)	19 (42.2)	6 (54.5)	25 (44.6)
Severe (71–90 dB HL)	8 (17.8)	2 (18.2)	10 (17.9)
Profound (>90 dB HL)	0	0	0
Unilateral	7 (15.6)	2 (18.2)	9 (16.1)
Total	45	11	56

AABR, automated auditory brainstem response; TEOAE, transient evoked otoacoustic emissions.
[a] This comprised a first-stage screening with TEOAE followed by a second-stage screening with AABR for TEOAE referrals.
[b] Every tenth infant who passed TEOAE and should have been removed from the programme was instead scheduled for AABR to ascertain the rate of false-negative results.

Age at diagnosis is generally viewed as a surrogate outcome measure for long-term outcomes such as quality of life, quality of family life, and educational and vocational achievement.[17] The mean age at diagnosis of less than 2 months (i.e. 51 days) observed here not only fell below the recommended target age but was also comparable to the 3 months reported for hospital-based programmes in Malaysia and Mexico.[38,44] The sensitivity, specificity and positive predictive value of our screening protocol were quite satisfactory compared with those from pilot studies in developed countries.[26] Hence, early intervention before the age of 6 months, as recommended by the JCIH, is feasible for babies born outside regular hospitals or in communities where hospital-based newborn hearing screening may be suboptimal. Infants identified early have a variety of verbal and non-verbal communication options and affected families can be helped to make informed choices after diagnosis.[45]

A limitation of our study was the high default rate, which may have resulted in our prevalence rates being understated. This requires attention in future studies. Further studies on the cost implications of this screening method and alternative approaches to screening are also needed. However, our preliminary estimate of the cost of screening per baby was less than US$ 8.0, and the cost could be significantly reduced if the programme were extended to the whole population. Since our study was conducted in an urban area in southern Nigeria, which lies outside the meningitis belt and where consanguineous marriages are less prevalent, additional pilot studies across the country are necessary to establish the effects of possible ethnic, regional, population and gender differences. These studies would provide the basis for an economic analysis of the programme and would guide the systematic implementation of this vital public health intervention within the stepwise framework already articulated by WHO.[46] It is pertinent also to note that the coverage offered by a universal newborn hearing screening programme that is carried out along with routine immunization will always be constrained by the actual coverage of the specific vaccination at any point in time, a risk that is common to all add-on interventions. Notwithstanding

these limitations, the key performance indicators observed in this study clearly demonstrate that our screening protocol could serve as an effective strategy for the large-scale implementation of this intervention. The continuum of care from birth to adolescence set out in WHO strategic directions for improved maternal and child care in developing countries already acknowledges the need for hearing screening in the first year of life and accords with the World Health Assembly resolution on the prevention of hearing impairment.[16,47] Failure to screen, therefore, can no longer be considered an option for a developing country like Nigeria, particularly given the ethical and scientific context of such a time-bound child health intervention.[48,49]

Conclusion

As global efforts progressively yield the expected reduction in childhood mortality, the development and quality of life of survivors become critical items in the global health agenda. This study has demonstrated that permanent hearing loss is a highly prevalent developmental disability in Nigeria and that it is possible to detect it early in established primary care centres using community health workers. An efficient tracking and follow-up system is needed to minimize default rates. This will result in more accurate data on the burden of PCEHL, which will facilitate appropriate national and international interventions in line with various WHO initiatives and strategic directions for improved maternal and child health care in developing countries. ■

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Competing interests: None declared.

Résumé

Tests d'audition en communauté pour les nourrissons en vue du dépistage précoce des hypoacousies permanentes à Lagos, au Nigeria : étude transversale

Objectif Déterminer la faisabilité et l'efficacité d'un programme communautaire de test systématique de l'audition chez le nourrisson, visant à dépister les hypoacousies précoces et congénitales permanentes à Lagos, au Nigeria.

Méthodes Il s'agit d'une étude transversale dans laquelle tous les nourrissons jusqu'à l'age de 3 mois accueilis dans quatre centres de vaccination BCG, qui assuraient plus de 75 % de la couverture par cette vaccination de la zone étudiée, ont subi un dépistage par des agents de santé communautaires, entre juillet 2005 et avril 2006. Le dépistage s'est effectué selon un protocole en deux étapes faisant intervenir des émissions oto-acoustiques évoquées transitoires et des réponses automatiques du tronc cérébral aux stimuli auditifs. Les principales mesures de résultat étaient la couverture du dépistage, les taux d'orientation vers un spécialiste, les taux de retour pour la deuxième étape du dépistage et l'évaluation, le rendement et l'âge lors du diagnostic auditif.

Résultats Au total, les chercheurs ont réussi, entre juillet 2005 et avril 2006, à pratiquer le dépistage de 2003 (88 %) des 2277 nourrissons susceptibles de participer à l'étude et fréquentant l'un des quatre centres BCG, à un âge moyen de 17,7 jours, sans essuyer de refus de la part des parents. La majorité de ces nourrissons (55,2 %) étaient nés en dehors d'un hôpital et notamment dans une maternité traditionnelle pour 77 % d'entre eux. Le taux global d'orientation vers un spécialiste pour une évaluation diagnostique était de 4,1 %. 61 % (50/82) seulement des nourrissons adressés à un spécialiste ont été ramenés pour subir l'évaluation, et parmi ce groupe d'enfants, une hypoacousie congénitale ou précoce a été confirmée dans 45 cas. De plus, on a également trouvé une hypoacousie chez 11 nourrissons ayant subi antérieurement le premier stade du dépistage, ce qui donne un rendement de 28 pour 1000 (56/2003). L'âge moyen lors du diagnostic était de 51 jours. La sensibilité, la spécificité et la valeur prédictive positive du premier stade diagnostique étaient respectivement de 80,4, 99,7 et 90,0 %. Le ratio de probabilité positive était de 268 et celui de probabilité négative de 0,2.

Conclusion Le dépistage auditif systématique par des agents de santé communautaires des nourrissons amenés dans les centres de vaccination BCG s'est révélé praticable et efficace pour la détection précoce des hypoacousies à Lagos, au Nigeria. Cependant, un traçage efficace et un système de suivi sont nécessaires pour améliorer les taux de retour en vue du second stade de dépistage et de l'évaluation diagnostique.

Resumen

Cribado comunitario de la audición del lactante para la detección precoz de la hipoacusia permanente en Lagos, Nigeria: estudio transversal

Objetivo Determinar la viabilidad y eficacia de un programa comunitario de cribado universal de la audición en los lactantes para detectar la hipoacusia congénita y precoz permanente (HACPP) en Lagos, Nigeria.

Métodos Entre julio de 2005 y abril de 2006 se realizó un estudio transversal en el que agentes de salud comunitarios cribaron a todos los lactantes de hasta 3 meses de edad atendidos en cuatro consultorios de inmunización con bacilo de Calmette–Guérin (BCG) que representaban más del 75% de la cobertura de BCG en el lugar estudiado. El cribado se basó en un protocolo en dos fases en el que se analizaron las emisiones otoacústicas evocadas transitorias y las respuestas automáticas de las vías auditivas del tronco cerebral. Las principales medidas de resultado fueron la cobertura de cribado, las tasas de derivación, las tasas de retorno para la segunda fase de cribado y evaluación, el rendimiento y la edad en el momento del diagnóstico de la HACPP.

Resultados En total se logró someter a cribado a 2003 de 2277 (88%) lactantes aptos para el estudio, con una edad media de 17,7 días, atendidos en los cuatro consultorios de BCG entre julio de 2005 y abril de 2006. Ningún progenitor rechazó el cribado. La mayoría (55,2%) habían nacido fuera del hospital, y de esos lactantes el 77% lo habían hecho en una maternidad tradicional. La tasa global de derivación para evaluación diagnóstica fue del 4,1%. Sólo un 61% (50/82) de los lactantes derivados volvieron para ser evaluados, y en 45 de ellos se confirmó la HACPP. Se detectó además HACPP en 11 lactantes que habían pasado antes la primera etapa de cribado, lo que se tradujo en un rendimiento global del 28 por 1000 (56/2003). La edad media en el momento del diagnóstico fue de 51 días. La sensibilidad, la especificidad y el valor predictivo positivo de la primera fase de cribado fueron del 80,4%, 99,7% y 90,0%, respectivamente. La razón de verosimilitudes positiva fue de 268, y la razón de verosimilitudes negativa, de 0,2.

Conclusión El cribado sistemático de la capacidad auditiva de los lactantes atendidos en los consultorios de inmunización con BCG por agentes de salud comunitarios resultó ser un método viable y eficaz para la detección precoz de la HACPP en Lagos, Nigeria. Sin embargo, se necesita un sistema eficiente de seguimiento a fin de mejorar las tasas de retorno para la segunda fase de cribado y diagnosis.

ملخص

برنامج مجتمعي لتحرِّي السمع لدى الرضَّع لاكتشاف الفقدان المستديم المبكر للسمع في لاجوس، نيجيريا: دراسة مستعرضة

الغرض: استهدفت هذه الدراسة الوقوف على مدى جدوى وفعالية برنامج مجتمعي لاكتشاف الفقدان المستديم الخلقي والمبكر للسمع، في مدينة لاجوس، بنيجيريا.

الطريقة: تم في هذه الدراسة المستعرضة تحرِّي جميع الرضَّع الذين هم في عمر 3 أشهر أو أقل، ممن يراجعون أربع عيادات للتمنيع بلقاح بي سي جي (BCG)، التي تقدِّم أكثر من 75% من التغطية بهذا اللقاح في موقع الدراسة. وقام بهذا التحرِّي عاملون في صحة المجتمع في الفترة من تموز/يوليو 2005 إلى نيسان/أبريل 2006. وانتُهِج في التحرِّي بروتوكول ثنائي المراحل، شمل قياس الانبعاثات السمعية الأُذنية المحرَّضة العابرة، والاستجابات السمعية الـمُحَوْسَبة لجذع الدماغ. وكانت القياسات الرئيسية للنتائج هي معدل التغطية بالتحرِّي، ومعدّلات الإحالة، ومعدّلات العودة للمشاركة في المرحلة الثانية للتحرِّي والتقييم، وعدد المصابين بفقدان السمع، والعمر عند تشخيص الفقدان المستديم الخِلقي والمبكر للسمع.

النتائج: تم بنجاح تحرِّي 2003 رضيعاً من أصل 2277 رضيعاً مؤهلاً (نسبة 88%) ممن يراجعون العيادات الأربع، وذلك في الفترة من تموز/يوليو 2005 إلى نيسان/أبريل 2006، وكان العمر المتوسط هو 17.7 يوم، ولم يرفض أي من آباء الرضَّع إجراء التحرِّي. وكان معظم الرضَّع (55.2%) قد وُلدوا خارج المستشفيات، ووُلد 77% منهم في دور الولادة التقليدية. وبلغ معدل الإحالة الكلي للتقييم التشخيصي 4.1%. ولم تزد نسبة المحالين الذين عادوا لإجراء التقييم التشخيصي على 61% (82/50)، وثبت أن 45 منهم مصابون بالفقدان المستديم الخِلْقي والمبكر للسمع. إضافةً إلى ذلك، تبيَّن أن 11 رضيعاً ممن شاركوا في التحرِّي الأولي مصابون بالفقدان المستديم الخِلْقي والمبكر للسمع، مما يعني أن 28 من كل 1000 رضيع (2003/56) مصابون بالفقدان المستديم. وكان العمر المتوسط عند التشخيص 51 يوماً. وبلغت حساسية المرحلة الأولى للتحرِّي 80.4%، والنوعية 99.7%، والقيمة التنبؤية الإيجابية 90%. وبلغ معدل الأرجحية الإيجابي 268، في حين كان معدل الأرجحية السلبي 0.2.

الاستنتاج: ثبتت جدوى وفعالية التحرِّي الروتيني للسمع، الذي يقوم به العاملون في صحة المجتمع، للرضَّع الذين يراجعون عيادات التمنيع بلقاح بي سي جي، بهدف الاكتشاف المبكر للفقدان المستديم الخِلْقي والمبكر للسمع، في لاجوس، بنيجيريا. ومع ذلك، تمس الحاجة إلى نظام كَفء للتتبُّع والمتابعة، لتحسين معدلات العودة للمشاركة في المرحلة الثانية للتحرِّي والتقييم التشخيصي.

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