Archives of Disease in Childhood, 1986, **61,** 637–638

Annotations

Hearing screening in infancy

Screening for normal hearing is usually carried out at between 7 and 9 months of age by distraction techniques, as by this age infants should be able to localise sound on a horizontal plane.

Past results

Results of such screening methods alone have been disappointing. The poor outcome was highlighted by the European Economic Community study, which identified an incidence of hearing impairment (loss >50dB) in children at age 7 years of approximately 1:1000. In the United Kingdom hearing impairment was suspected in nearly 30% of those thought to have a congenital loss by 1 year but only confirmed in 11%, and by the age of 3 years only 55% of the children had been identified.[1]

Attempts have been made since then to improve the screening programme with the aim of identifying all hearing impaired children in the first year of life. Recent figures from Manchester, however, reveal that the mean age of identification there over the last 4 years was 23·3 months, and this is typical of the results in many districts. In addition, 44% of these children had passed a screening test, delaying recognition of their hearing loss.[2] This is obviously unsatisfactory, and, furthermore, advances in audiological techniques have led to an emphasis on hearing aid fitting in the first six months of life.[3] This suggests that methods of identifying hearing impaired children need re-evaluating.

Strategies to improve identification

Improved reliability of 8 month screening. It is very important that *all* personnel carrying out distraction tests to screen hearing are properly trained with regular updating. Two people are needed to test a child reliably, and in practice these are often health visitors or clinic nurses, who often have continuing contact with the families.

The testing room needs to be reasonably sound treated (not near a noisy area such as the clinic waiting room or a main road), and it needs to be emphasised that it is not possible to test children reliably at home or in a busy paediatric clinic.

Test sounds used should be both frequency specific and of known intensity. In addition to high frequency rattles and voice, instruments delivering warble tones are now produced with known intensity at a measured distance. There is also a speech level meter available at reasonable cost so that the intensity of voice can be measured. These advances should improve the accuracy of the actual test sounds.

It is important to screen as many of the children as possible, but compliance of a population can vary despite every attempt to encourage parents to attend. Some districts report 90% or more attendance rates but others will have attendance figures of nearer 50%, and much time will need to be spent in tracking down non-attenders. For screening to be meaningful coverage should ideally approach 100%, and if this cannot realistically be achieved additional strategies need to be considered.

Increasing the awareness of hearing loss. In this country the Nottingham area has pioneered the use of a check list on normal responses to sound in infancy.[4] It is given to new parents on discharge from hospital and followed up by their health visitor. At the same time an open access service has been set up and children at risk from perinatal problems and those who failed during a trial of the Acoustic Response Cradle (ARC) have been tested by auditory evoked brain stem responses (ABER). The results suggest that the majority of hearing impaired children are being identified in the first year of life, but the contribution of the check list is less clear, as the above measures plus intensive health visitor training have also increased the awareness of hearing loss early in infancy.

A similar check list on normal responses to sound and early language development is also being used in the United States and Canada.[5] In these countries it is circulated to paediatricians and primary physicians, as they are the usual referers to the audiology services.

Neonatal screening The ARC was developed in the UK to screen the hearing of normal neonates and has undergone preliminary trials.[6] The tester, usually a nurse, has to be reasonably trained and the programme needs good administrative cover. The

trials suggest that between 2 and 3% of the infants tested will fail on two occasions and require further evaluation. This means that electrophysiological testing (usually ABER) must be available. This is best provided in specialised multidisciplinary units under the direction of an audiological physician, so that babies identified as hearing impaired can be examined and investigated and appropriate hearing aids be fitted.

Screening of high risk cases. An alternative approach to neonatal screening is to test, using ABER, those children at high risk of hearing loss.[7] This includes infants with a family history of hearing loss, congenital infections, and perinatal problems. The incidence of hearing problems in these children appears to be around 10%. Other cases should be identified by more conventional screening methods.

Conductive losses

If the screening tests are carried out correctly at 7–9 months not only should a few children with sensorineural or severe conductive problems be identified but also a much larger number of infants with middle ear effusions. These children and those with acute otitis media need to be followed up to ensure that the condition resolves spontaneously.[8] In the majority of cases the middle ears clear within six to eight weeks, but after three months the chance of spontaneous resolution is far less. Those children in whom the fluid persists need to be considered for myringotomy and grommet insertion, particularly if there is another handicapping condition such as visual loss or mental retardation that could exacerbate the effects of a hearing loss on language development.

Future outlook

To identify hearing impaired infants as early as possible most districts in the future are likely to use a combination of screening methods, the exact format depending on local conditions. It is evident that no one method in isolation is going to be sufficient and that even if neonatal screening were to become universal some children would still need to be identified at a later stage because of administrative failures or progressive hearing losses.

References

1 Martin JAM, Moore WJ. *Childhood Deafness in the European Community*. Luxembourg: Commission of the European Communities, 1979. (EUR 6413).

2 Newton V. Aetiology of bilateral sensorineural hearing loss in young children. *J Laryngol Otol* [Suppl no 10], 1985.

3 Gerber SE, Mencher GT, eds. *Early diagnosis of hearing loss*. Proceedings of the Saskatoon Conference on Early Diagnosis of Hearing Loss. New York: Grune and Stratton, 1978.

4 McCormick B, Wood SA, Cope Y, Spavins FM. Analysis of records from an open-access audiology service. *Br J Audiol* 1984;**18**:127–32.

5 Task Force on Childhood Hearing Impairment. Report on childhood hearing impairment. Ottawa: Department of National Health and Welfare, 1984.

6 Bhattacharya J, Bennett MJ, Tucker SM. Long term follow-up of newborns tested with the auditory response cradle. *Arch Dis Child* 1984;**59**:504–11.

7 Durieux-Smith A, Picton TW, eds. Neonatal assessment by auditory brainstem response—the Canadian experience. *J Otolaryngol* [Suppl no 14], 1985.

8 Smyth GDL, Hall S. Aetiology and treatment of persistent middle ear effusion. *J Laryngol Otol* 1983;**97**:1085–9.

S Bellman
The Hospital for Sick Children, Great Ormond Street, London WC1N 3JH