

NEONATAL HEARING SCREENING AND ASSESSMENT

BEHAVIOURAL OBSERVATION AUDIOMETRY

A RECOMMENDED TEST PROTOCOL

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BACKGROUND

Behavioural Observation Audiometry (BOA) involves presenting sounds to a baby and observing their responses. In the context of this paper, it is restricted to the responses before the developmental age at which babies can localise sound to the side. Nor does it include the multiple measures of behavioural responses, which are used for automated screening devices.

A variety of types of stimuli, responses, and test protocols have been employed (Wharrad 1988). The behavioural responses have ranged from internal autonomic (e.g. heart rate) to body movements (e.g. the face and eyes), from excitatory or reflexive to inhibitory or attentive.

BOA is known to be a test of limited reliability: some babies will appear to respond even though they may not have heard, and others will have heard but not demonstrated any observable response.

Even in favourable circumstance, very young babies do not respond to the quietest sounds that they can hear. They only demonstrate responses to supra-threshold levels of stimuli. It follows that babies with cochlea deafness with recruitment may demonstrate responses to supra-threshold levels while being unable to hear quieter sounds.

The battery of physiological tests of hearing such as ABR, bone ABR, tone ABR, and DPOAEs are considerably more objective and reliable. However they may not always be able to provide a complete and accurate assessment of hearing in early infancy. BOA may therefore have place in contributing -

- a) to provide information about low frequency hearing (in the absence of tone ABR),
- b) to provide more information about the hearing of neurologically immature babies where there may be doubts about the accuracy of the ABR, and
- c) to demonstrate the benefit of hearing aids, and giving indications of uncomfortable loudness levels.

Some parents may have difficulty acknowledging the results of the physiological objective tests of hearing. It might be expected that most parents would be carrying out their own hearing tests at home when their baby is suspected of being deaf.

RECOMMENDATIONS

The following recommendations aim

- to provide general guidelines only,
 - to allow reasonable individual practice, but
 - to exclude inappropriate practice.
1. Parents should receive a full explanation of the difficulties and pitfalls when observing a small baby's responses to sound.
 2. Some children's audiology centres may include BOA to their battery of tests. Others may wish to avoid it.
 3. Where it is used, the following recommendations are made:
 - a) The family must be warned about the unreliability and inaccuracy of the test.
 - b) The test must be carried out in an appropriate quiet, non-reverberant, calibrated test room.
 - c) If a baby is being held in someone's arms, they must be advised not to respond to the sound stimuli themselves.
 - d) The behaviour of the baby in the quiet must be observed for a short period prior to the presentation of any stimuli (Bench 1975).
 - e) The state of arousal is critical to obtaining responses. For younger babies (maybe under 3 months), testers should aim to catch the ideal state between light sleep and quiet awake (Bench 1975, Bench 1976). The moment when the eyelids are half-closed can be particularly sensitive. For older babies, "stilling" or attentive responses can be observed when they are more awake, but care must be taken to avoid states of strong internalised attention, or strong visual fixation. (Sonksen 1983)
 - f) Test stimuli must be mainly generated by loudspeakers, as this will reduce the possibility of baby responding to other non-auditory stimuli.
 - g) The wider the frequency band of the test stimuli the more likely the baby will be to respond (Bench 1975, Bench 1976, Trinder 1990). Broad and narrow band noise must be available. Narrow band noise at low and high frequencies should be included in the range of stimuli.
 - h) The duration of the stimulus needs to last several seconds, as the alerting and response time is longer in younger babies (Sonksen 1983).
 - i) The observer should be "blind" to the presence of the stimuli. This may be achieved by video recording, or observing from an adjoining sound-treated room, or viewing the behaviour in the presence of masking through earphones. (Gans 1987) The use of insert phones to present the test stimuli will attenuate audible sound to observers, and will provide ear specific information. The observer will require some pre-stimulus warning.
 - j) Stimuli below the level of responsiveness could act as the equivalent of "catch" or no-sound-trials.
 - k) Habituation occurs rapidly when the stimuli are supra-threshold. The setting of stimuli levels should move quickly with the aim to identify the lowest level at which responses can be observed.
 - l) Sticking rigidly to protocols should be avoided as the state of the baby will change within the test (Wharrad 1988)

IT IS ANTICIPATED THAT THE FOLLOWING ISSUES DO NOT NEED TO BE ADDRESSED:

Type of soundfield,
Calibration
Types of test procedure, algorithms, etc.
Inclusion of a certainty scale
Information sheet for parents

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