Comparison of Auditory Brainstem Response Systems in the NICU Population
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ABSTRACT

Completing auditory electrophysiologic recordings in preterm infants while in a NICU environment is a challenging procedure. Completion of a QI project can assist in determining whether investment in new technology is cost-effective. This project revealed that the Vivosonic Integiy obtained lower threshold levels in this noisy environment, and was comparable to the Bio-logic NavigatorPRO in classifying type and degree of hearing status.

INTRODUCTION

The Neonatal Intensive Care Unit (NICU) is an electrically hostile environment, with electrical signals in the frequency range of the Auditory Brainstem Response (ABR), which is much lower in amplitude than these extraneous noise sources. The NICU is also acoustically hostile, and the infant produces myogenic activity as well as respiration and vascular noise, which all can interfere with ABR recordings, particularly at low stimulus intensities.

AIMS

1. Assess effectiveness of the Vivosonic Integrity system head to head with the Bio-logic NavigatorPro ABR system for click and toneburst ABR recordings.
2. Compare thresholds obtained for both systems to determine if responses could be improved using the Bluetooth amplifier. Kalman weighting and other features of the Vivosonic system.

METHODS

Participants:
- 28 infants tested in NICU with one or both instruments
- 20 ears provided click thresholds for both instruments
- 8 ears provided tone burst thresholds for both instruments at 1, 2 or 4 kHz

Hearing Status Categories (n=ears):
- Normal = 11
- Mild = 6
- Mild to Moderate = 2
- Profound = 2 (excluded from comparison)

Procedures:
All tests were performed by an audiologist with over 10 years of experience assessing infants in the NICU with threshold ABR. Thresholds were independently verified by a second investigator. ABR protocol for the two systems is as follows:

Vivosonic Integrity
- Clicks Alternating: 37.1 kHz
- Response Filter: 100-2000 Hz
- Tones Alternating: 37.1 kHz
- Response Filter: 30-1500 Hz

Bio-logic NavigatorPro
- Clicks Alternating: 37.1 kHz
- Response Filter: 100-2000 Hz
- Tones Alternating: 37.1 kHz
- Response Filter: 70-1500 Hz

RESULTS

This figure shows the number of ears each testing was completed for each unit by stimulus type.

Thesis average
For infants tested with both units, thresholds obtained with the Vivosonic were equal to or lower than the Bio-logic. The click thresholds were significantly different (p=0.04) and a similar trend for tone bursts was shown, but Ns were too small to show a significant difference.

The click thresholds were shown to be highly correlated between the two units.

CONCLUSION

1) The number of thresholds obtained for Bio-logic and Vivosonic were equivalent for clicks and tone bursts.
2) Threshold averages were significantly better for the clicks using Vivosonic compared to Bio-logic. Similar trends were shown for tone bursts but Ns were too small to show a difference.
3) Correlation between Bio-logic and Vivosonic thresholds for clicks was high (R² = 0.79).
4) Majority of hearing status conclusions were within 10 dB (75%) of threshold differences occurred in 25% of ears.
5) In 4/5 cases, Vivosonic showed lower (better) thresholds.

Limitations:
- Infants were in an NICU environment and thus limited time was available for full head to head comparison at all frequencies.
- Time and electrical artifact often precluded a full test with both instruments, therefore, head-head data on the same infant is limited.
- Bone conduction testing was lower priority due to environment and critical status.

REFERENCES


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