

## Decreasing Delays for Early Intervention in Neonatal Intensive Care Patients with Hearing Impairment

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Despite routine **screening** for hearing impairment (HI), Neonatal Intensive Care Unit infants are at increased risk for delayed **diagnosis**<sup>1</sup> of permanent HI. The prevalence of permanent HI is at least 10 times higher for NICU infants than for other infants<sup>2</sup>.

Length of hospital stay for this population often extends several months beyond birth. However, diagnostic testing on those failing the initial hearing screen is typically deferred until after discharge despite the difficulty of tracking the geographically dispersed NICU families.

The reluctance to test infants while they are a “captive population” in the hospital is due in large part to the hostile test-environment of the NICU. Infants are typically connected to multiple monitoring and support systems which contribute to extraordinary levels of electrical noise. The infants themselves are also “biologically noisy”.

The USF/TGH Infant Hearing Impairment Program viewed deferral of testing until after discharge as a missed opportunity for early diagnosis and intervention. So upon acquiring the wireless Vivosonic Integrity system, we implemented inpatient diagnostic hearing testing for all NICU infants failing the initial hearing screen. Problems previously encountered using traditional ABR systems were largely solved by the wireless technology and superior noise reduction technology. Data collected were cleaner and obtained much faster than with other ABR systems.

TGH has an 82-bed, level III NICU with treatment programs for hypoxic-ischemic encephalopathy and extracorporeal membrane oxygenation. We have a large population of infants at risk for auditory neuropathy spectrum disorder (ANSD) as well as sensorineural hearing loss (SNHL).

For hearing aid candidates, Inpatient diagnosis using frequency specific ABR thresholds has enabled early placement of hearing aids and entrance into speech and language intervention shortly after discharge. Without inpatient testing, there would have been long delays for sedated ABRs and specialty consultations.

The ability to identify the ANSD pattern (absent or severely abnormal ABR with a clearly defined cochlear microphonic) allows us to obtain all of the appropriate specialty consultations and imaging studies prior to discharge to minimize the families need to navigate the health care system. The parents can be counseled in depth about the disorder and the plan prior to discharge. The attached video shows the averaging process for a click-ABR in a patient with ANSD in the NICU. The Vivosonic Integrity allows the audiologist to send rarefaction- and condensation-responses to separate memory bins to identify the cochlear microphonic. Note that the ongoing raw activity contains considerable muscle artifact as well as periodic electrical interference, but the averaged response is quite clean.

We recently received funding from the Oberkötter Foundation for a project entitled *Decreasing Delays for Early Intervention in Neonatal Intensive Care Patients with Hearing Impairment*. One of the objectives is to identify and address barriers to other Florida hospitals adopting inpatient NICU diagnosis of hearing impairment. One such barrier will be the lack of access to wireless, noise reduction ABR technology by many hospitals with NICUs.

#### REFERENCES

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