

More Effort Needed to Protect Neonatal Intensive Care Patients from Noise

In this feature, Neonatal Intensive Care interviews clinicians and healthcare providers about the actual application of specific products and therapies. This interview is with Dr Andrew Unger, a neonatologist and neonatology researcher, and Medical Advisor to NEATCap Medical LLC.

Neonatal Intensive Care: Why is noise protection important in the NICU?

Dr Andrew Unger: Basically, for two reasons: sleep and stress.

We want to encourage *sleep* because REM sleep is critical for brain development and non-REM sleep for growth hormone secretion. Noises—particularly loud, transient noises—disrupt sleep.

We want to reduce noise-induced *stress* because it raises neonates' heart and respiratory rates, as well as their steroid levels. This causes a higher metabolic rate—and slower growth. Of course, we also don't want NICU's to be so loud on average that they might damage hearing itself—but nowadays that almost never is the case.

NIC: Are there neonates for whom effective noise protection might be particularly important?

AU: Yes: Infants with Narcotic Abstinence Syndrome, infants receiving potentially ototoxic drugs such as gentamicin, furosemide, or vancomycin, and extremely premature infants who will be exposed to abnormal sounds for long periods of time. Also, infants that are simply having trouble sleeping.

We also want to protect the hearing of infants undergoing transport and/or MR examination. Those are the medical environments where hearing damage from loud noise actually remains a possibility. In addition, a critical task during neonatal transport is maintaining patient stability until definitive care can be rendered at the new location—preferably without the need for sedation or neuromuscular blockade. Noise is a deterrent to this goal.

Similarly, during MRI exams, neonatal patients often experience noise-induced agitation, and may require sedation or even general anesthesia to get through the exam. This limits both the quality and availability of MR imaging.

NIC: Hasn't Single Family Room (SFR) architecture solved the noise problem for hospitalized neonates?

Dr Unger is a board-certified neonatologist with expertise in clinical trial processes—particularly Informed Consent—having chaired St Luke's University Health Network's Institutional Review Board from 1998 to 2012. He currently is in active clinical practice in New Jersey. If you would like to participate in this feature, as a company or healthcare provider, please contact Steve Goldstein at s.gold4@verizon.net

AU: Yes and no. Single family room designs—when available—certainly have greatly reduced the risk of NICU patient hearing loss from excessive noise. In addition, common sense modification of caregivers' behavior and improved monitor design has reduced the background noise level of most NICU's to a safe level, at least with respect to hearing loss.

SFR design has done nothing, however, to address the issue of the transient, very loud and stressful noises typically associated with patient care. In addition, SFR's may be too quiet—some exposure to human voice is essential for normal language acquisition. So SFR's aren't a panacea.

NIC: In your article in the recent Winter Edition of Neonatal Intensive Care, you state that “appropriate and effective hearing protection” should be considered a standard aspect of neonatal care. What about earmuffs and ear plugs? They've been around for decades. Don't they work?

AU: Ear plugs don't work if they aren't used, and caregivers have traditionally been reluctant to jam things that might be hard to remove into tender, tiny ear canals. Earmuffs would work—if they had sufficient sound dampening properties, were correctly sized, sturdy, usable over reasonably long timeframes without replacement, and could be snugly applied over an infants' external ears without causing skin damage.

Unfortunately, currently the most used neonatal earmuffs are single-size and only modestly acoustically effective. In addition, they bond directly via adhesive to the premature infant's skin, resulting in a risk of skin breakdown when removed.

DREAMIES are the first neonatal earmuffs that meet the size, durability, patient safety, and ease-of-use requirements of modern NICU care—and actually are effective at blocking out loud noises. In short, they fit well, stay on, and don't hurt the baby.

NIC: So, what's so special about DREAMIES? How come they work?

AU: First, DREAMIES were designed by a team including professional neonatal clinicians—present company included. Besides a sophisticated, transparent, chiral earmuff design that fits the infant skull well, the major advantages of DREAMIES are twofold: (1) They are available in 4 (soon to be 5) patient sizes appropriate for patients weighing 500 grams to 5 kilograms, and (2) most importantly, they are secured without the use of adhesive by a patented headband that distributes the stabilizing

forces around the infant skull in such a manner that it does not cause injury to the skull or the skin.

NIC: What are the advantages of DREAMIES T-M—the product for Transport and MRI?

AU: The noise environments of neonatal transports and MR imaging are different from that in a typical NICU. Sturdier earmuffs are needed for these shorter use cases. Nurses have observed infants transported with DREAMIES T-M have been more content than those without hearing protection, and they actually often sleep through noisy transport—making the job of patient monitoring much easier.

MRI studies that often had to be cut short because of patient movement now are easier to complete with DREAMIES T-M hearing protection. This is particularly useful when trying to obtain diffusion-weighted-imaging studies to detect PVL among premature infants soon to be discharged.

NIC: What do NICU nurses think about DREAMIES?

AU: Not to brag—but in every NICU so far that's used them, the nurses love them. DREAMIES are easy to learn how to put on, and they calm babies down. Nursing documentation is minimal. DREAMIES for the NICU selectively block out high-frequency noises such as those annoying alarms but allow a significant amount of voice volume—especially the lower, soothing voice frequencies to pass through. When parents come to visit, if completely unimpeded vocal interactions with the baby are desired, the earmuffs can be easily removed—and then replaced when it's time for baby to go back to sleep.

NIC: What benefits do we hope to see with effective hearing protection of neonatal patients? What more research is needed?

AU: Faster growth and shorter hospitalization among premature infants and infants with NAS. Calmer neonatal transports, with reduced use of sedation. Better imaging and reduced use of sedation among patients receiving MRI's.

There already have been numerous studies of hearing protection in neonatal patients that have suggested these effects—but all have been subject to criticism because of their small size and single NICU character, as well as possible observer bias.

The first study on the effect of neonatal hearing protection on sleep as monitored by EEG—with blinded analysis—has just been published (Ref) and demonstrates increased sleep with DREAMIES use.

Other blinded, randomized studies of the effect(s) of comprehensive noise control on NICU patients' outcomes coordinated among a group of NICU's serving a varied patient population are urgently needed. Such studies are under discussion.

Similar studies of infant MR imaging quality with and without DREAMIES use should be relatively easy to perform- and these studies are being actively pursued.

Reference

- E. Bloch-Salisbury, L. McKenna, L. Boland, D. Chin (2022). Assessment of a hearing protection device on infant sleep in the neonatal intensive care unit. *Journal of Sleep Research*, 1-5. <https://doi.org/10.1111.jsr.13610>.

DREAMIES® & DREAMIES® T-M

Advanced Hearing Protection for Neonatal Intensive Care

NICU, Transport or MRI...
we have you covered
no matter where you are!

DREAMIES

- 18 dB overall sound attenuation
- Closely simulates mother's natural noise protection
- Blocks NICU alarm sounds; allows some voice transmission



DREAMIES T-M

- 25 dB overall sound attenuation
- Blocks low-frequency Transport noise
- MR Safe
- Blocks broad-spectrum MRI noise



Features:

- **Progressive sizing** (XS, S, M, LG)
23-39 cm head circumference
- **Transparent ear cups**
 - Low profile; contoured shape
 - Soft foam seal
- **Adjustable band** for securing ear cups and ensuring proper fit
- **Ease of use** - easily integrated into patient care



Rx only



301 Broadway, Suite 203
Bethlehem, PA 18015-1559
Phone: 888-403-6328

www.neatcapmedical.com