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# Music Therapy for Infants with Neonatal Abstinence Syndrome

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# Music Therapy for Infants with Neonatal Abstinence Syndrome

## **Abstract**

Over a quarter of a million infants each year are born with neonatal abstinence syndrome (NAS). There is a trend for treatment of NAS to move away from pharmaceutical to non-pharmaceutical interventions to manage symptoms. This paper describes the treatment model called Rhythm, Breath, Lullaby: First Sounds (RBL).

## **Keywords**

Hospital Setting; Infants; Music Listening; Music Therapy; Neonatal Abstinence Syndrome (NAS); Newborn Infants; Receptive Music Methods; Recorded Music Listening; Substance Abuse and Addiction; Symptom Management

## **Disciplines**

Music Therapy | Substance Abuse and Addiction

# **Music Therapy for Infants with Neonatal Abstinence Syndrome**

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## **Introduction**

Among populations impacted by addiction, the focus has been primarily on adults. However, a population that often remains unseen involves infants who are born dependent upon substances, or infants born with neonatal abstinence syndrome (NAS). The numbers are staggering. In 2005, one study revealed that 225,000 infants were born opioid dependent. Currently, that number has quadrupled, launching this crisis into what is considered an epidemic. Every twenty-five minutes a baby is born suffering from opioid withdrawal (1).

There are two kinds of NAS: the first occurs when a baby is exposed to an opioid while in utero. The second occurs after an infant is born and requires opioid medication to manage pain, and thus, an eventual weaning process is required. In some NAS cases, the mother of the baby took an opioid illicitly. Other times, the mother of the baby was prescribed methadone through a treatment program. In many of these cases, a doctor may recommend that women continue taking methadone throughout pregnancy, so as not to risk the baby's withdrawal in the womb. At birth, infants experience withdrawal symptoms similar to those of adults in detox. Symptoms can include tight muscle tone, seizures, jittering and irritability.

The second type of NAS occurs after an infant is born and requires opioid medication to manage pain, and thus, an eventual weaning process is required. This type of NAS is called "iatrogenic." Infants who are weaned off of pain medication may experience similar withdrawal symptoms to those of infants exposed in-utero.

There is a trend for treatment of NAS to move away from pharmaceutical to non-pharmaceutical interventions to manage symptoms. A recent study from Yale University called "Eat, Sleep, Console"(2) has suggested that the use of kangaroo care and other kinds of caregiver contact may be more beneficial to babies' development, may foster bonding and attachment, may eliminate the need for morphine in some babies and may shorten the length of hospital stay. This study provides support for the development and testing of other non-pharmaceutical interventions.

Music therapy is a non-pharmacological approach applied to a range of symptoms in infants in Neonatal Intensive Care Units (NICU). Music entrainment is a technique frequently used in music therapy with NICU patients. Entrainment involves matching an infant's behavioral state in real time with live music; subsequent changes in the music will create desired changes in the corresponding behavioral state. For example, an infant with NAS may have instances of crying inconsolably, jittering or may have an aversion to being touched during standard care. A music therapist may offer an intervention using the Remo Ocean Disc (3) to enhance sleep or to entrain to the infant's heightened respiratory rate. By matching the infant's behavioral state musically and gradually slowing down the music, the therapist is able to transition the infant to a calmer

state wherein vital signs are stabilized. Often times, after experiencing the soothing and calming effect of music, the infant will transition to a sleep state, an important outcome for infants with NAS who may have abbreviated sleep times and need additional sleep for growth and development.. The sound of the Remo Ocean Disc can mimic the sound of the intrauterine fluid infants hear while in the womb. This sound, familiar to infants, has implications of comfort and safety.

### **The Rhythm, Breath, Lullaby Model**

The Remo ocean disc is an essential part of a treatment model called *Rhythm, Breath, Lullaby: First Sounds* (RBL). The RBL model is the basis of our work specifically with infants born with NAS. Dr. Joanne Loewy, Director of the Louis Armstrong Center for Music and Medicine in the Mount Sinai Hospital System, developed and tested this model the results of which were published in the 2013 article (3).

The RBL model is based on three prongs that involve direct care to the infant and parents through several live music interventions utilizing the Remo ocean disc. In addition to the infant, the RBL model also addresses the needs of caregivers and the general environment, including the noxious noise that may be present continually in the NICU. To promote a calming and soothing environment, music therapists may interact directly with the unpleasant sounds of talking and monitors by creating an auditory soundscape wherein these environmental sounds are included.

Another integral prong of the RBL this model addresses the state and needs of caregivers, i.e., medical staff and the infant's family as these states impact the care of the infant.

In the NICU specifically, besides the pain that the infants may be experiencing, caregivers may also have discomfort, pain and/or anxiety. Thus, music therapists address these issues for parents, who might also be in recovery, and foster the inclusion of the parents in the infant's care; role of parents at bedside is essential to the infant's growth and development.

In the NICU, the role of primary caregiver shifts from the parents to the medical staff. This shift can be difficult for parents to process especially when compounded with the wide range of emotions experienced from having a sick baby who requires continued hospitalization. In addition, parents' histories with trauma or addiction may be reactivated. Hospital restrictions, such as limits regarding visitation, may impede normal attachment and bonding for both parents and siblings. Music therapy draws upon theories of attachment and family systems and has the potential to ameliorate these issues.

Using the RBL model, music therapists attempt to recreate an auditory environment of safety, and one reminiscent of what the infant was exposed to in the womb. As detailed above, the ocean disc sounds resembles the intrauterine fluid and can be used for respiratory support and sleep. Another part of the RBL kit, the gato box, imitates a heartbeat sound and thus can be utilized for providing a calming, soothing sensation for the infant by entraining to and stabilizing the infant's heart rate. The gato box is also used for feeding support and is played to match the sucking of the infants.

Another intervention that is a part of the RBL model is Song of Kin (4). This intervention utilizes a song that's important to the family and its culture. Although this song may be from any genre (e.g., rock, pop, rap, R&B, etc.), it is modified to lullaby form. This song becomes a point of connection for the caregiver and the infant; it can imply soothing, calming, comforting, and can be used to cue sleep. This is especially impactful with parents of infants with NAS who may also have some other restrictions in visitation or access to caring for the baby; this song can provide a tangible route to bonding and caring for their infant.

The voice is also used in RBL in the Tonal Vocal Holding intervention (5,6,7). In Tonal Vocal Holding, music therapists use their voices to match, in the moment, the vocal sounds, pitch and rhythm of the infant's crying to support regulation. Therapists may also use their voices to match the tones of the monitors in the surrounding area and interact with these sounds.

The Louis Armstrong Center for Music and Medicine has published a number of articles pertaining to the NICU aside from the initial 2013 study, including one that looks specifically at song of kin and how it can support the baby's physiological functioning as well as bonding and attachment with caregivers (4). Another publication includes an examination of the role of fathers in the NICU and their involvement in music therapy (8).

Our current mixed-methods study measures the effects of music therapy on neonates diagnosed with NAS receiving care in 13 hospitals. The study focuses on the specific elements of live music and how babies are respond over time with regard to stabilization and pacification, as well as growth and development. Within a crossover design, each infant is enrolled in the study for two weeks and receives four days of a control condition and six days of a music therapy treatment condition. Outcome measures include: mean vital signs, caloric intake, sucking pattern, sleeping patterns, and Finnegan scores. This is a mixed methods study, meaning it includes the gathering of both quantitative and qualitative data. The parents involved in this study are given pre and post intervention surveys, as well as a post-partum bonding questionnaire.

The music therapy intervention used is RBL, and in addition contingent singing, also known as "parent-ease" is used. Contingent singing is based on early interaction theory and communicative musicality and involves reciprocal interactive communication with the music therapist using the voice to entrain to the infant's activity level (9). The muted egg shaker is the final intervention used for infant regulation. The therapist matches the active state that the infant is presenting with the shaker and may also playing it in a circular motion around the infant's body, addressing both visual and auditory tracking.

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