

PATTERNS—A Model for Evaluating Trauma in NICU Music Therapy: Part 2—Treatment Parameters

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While preterm infants are born with survival mechanisms intact, they lack the protective buffering system of the intrauterine environment. Dysmature neurological functioning and the absence of coping strategies further impede the preterm infant's capacity to manage the heightened states of arousal commonly linked to an NICU hospitalization. Music therapy offers a unique capacity to enhance healing across the spectrum of experience, and research in NICU music therapy has shown consistent benefit for infants, parents, and caregivers within this environment. Integrating current evidence across disciplines in developing new models of treatment is key to building fully informed and

responsible practices. PATTERNS (Preventive Approach to Traumatic Experience by Resourcing the Nervous System) was developed to address this need by both identifying the broad-ranging potential for traumatic experience in a hospital environment and utilizing this scope of potential exposure to trauma as a construct for the formation of a preventive music therapy treatment model that is based on latent human resiliency and trauma renegotiation principles.

Keywords: trauma; medical trauma; family-centered care; medical music psychotherapy; NICU music therapy

While preterm infants are born with survival mechanisms intact, they lack the protective buffering system of the intrauterine environment and are not yet equipped with coping strategies, which typically develop over time in response to life experience. Dysmature neurological functioning also impedes the preterm infant's capacity to manage heightened states of arousal, which occur automatically in response to life threat perceived through the sensory systems.

PATTERNS—Preventive Approach to Traumatic Experience by Resourcing the Nervous System—is a multilayered treatment model designed to address the

potential for traumatic experience across systems of development and levels of impact. PATTERNS in NICU music therapy integrates theory and best practices from NICU music therapy, trauma, high-risk infant development, and transpersonal psychology and is based on the use of trauma renegotiation and music therapy principles to develop, restore, or otherwise engage absent and/or latent human resiliency processes. The goal in developing this model is to offer a discriminating focus to treatment that may enhance medical music therapy intervention hospital-wide and across micro- and macrosystems of contact.

In Part 1 of this article series, critical elements of trauma-informed NICU music therapy best practices were identified and utilized as a foundation for this model's development (Stewart, 2009b). Treatment design and scope were also discussed, and six treatment goals were defined: (1) stabilization, (2) self-regulation, (3) integration, (4) attachment/social engagement, (5) restorative experience, and (6) future planning. Part 2 of this article series explores the treatment parameters of the NICU PATTERNS model to facilitate incorporation of this model into NICU music therapy practice.

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This article is the second installment of a two-part series. Part 1 of this series, published in the July 2009 issue of *Music and Medicine* (Vol. 1, No. 1, pp. 29-40), established the theoretical and design foundation for this model. Part 2 defines and describes essential treatment parameters to facilitate the PATTERNS model into NICU music therapy practice.

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PATTERNS-Informed Treatment Parameters

Psychological First Aid

Psychological first aid is a term commonly assigned to efforts that provide emotional support in times of crisis. While several organizations have developed a psychological first-aid protocol, the most prominent and highly referenced approach has been developed jointly by the National Center for Post Traumatic Stress Disorder (NCPTSD) and the National Center for Child Traumatic Stress (NCCTS), highlighting eight core actions: engagement, attention to safety and comfort, stabilization, information gathering, practical assistance, connection with social supports, psychoeducation, and linkage with collaborative services (Brymer et al., 2006).

While it may be uncommon to encounter an NICU parent, caregiver, or staff member in acute crisis, it is important for the unit to have a plan of action in place in order to respond quickly if or when these circumstances occur and for the music therapist to understand his or her role in providing supportive assistance. It is also important to be able to identify signs of increasing distress in adults that may lead to experiences of acute crisis, both to provide interventions that assist in stabilizing and containing arousal and to make valuable referrals to interdisciplinary team members available in the institution of practice and in the outer community. The NCPTSD and NCCTS (Brymer et al., 2006) note these warning signs in identifying acute distress:

- Disorientation
- Confusion
- Frantic behavior
- Panic
- Extreme withdrawal
- Extreme irritability and anger
- Excessive worry

Gradations of these symptoms can be used to evaluate levels of parent and caregiver distress across a continuum of experience, further informing treatment needs and goals of care.

Interdisciplinary Collaboration

In addition to ongoing interdisciplinary collaboration intended to build rapport and exchange

information gleaned and evaluated uniquely from the perspective of each team member, special emphasis should be placed on communications with the medical team prior to each music therapy session, particularly with the infant's assigned nurse (or nurses). Nurses are most abreast of the infant's daily status, sleep-wake and feeding cycles, and ongoing treatment needs. They also interface regularly with parents and caregivers and can be a significant resource in this care setting.

Therapists should work intimately with assigned nurses to evaluate optimum treatment times based on the infant's response to routine nursing intervention and to ascertain specific environmental needs and parameters during treatment in order to contain arousal and to maximize utilization of services provided. For instance, lowering lighting sources not needed for immediate medical care can help to minimize both visual and auditory stimulation. This helps ensure that the interventions provided by the therapist can be appreciated by the infant constructively and can be differentiated from ambient sound stimuli.

Scheduling sessions to match the infant's general tolerance of stimulation could help to ensure treatment periods that work within the infant's window of tolerance. Sometimes "more" is "too much." This familiar concept applies to music therapy intervention as well as to routine medical care. While clustering care is a common technique used in the NICU to allow sustained periods of rest for the infant, layering music therapy services to the clustered treatments may impair the infant's capacity to utilize and benefit from the interventions provided or, in worst-case scenarios, add to the infant's already elevated arousal level. Collaboration with assigned nurses, particularly in combination with observation and music therapy assessment, can help to determine whether clustering or staggering music therapy with medical interventions is preferred.

Temperature regulation needs should also be discussed with the infant's assigned nurse prior to music therapy to determine if a temperature boost should be activated during the treatment period, which helps to maintain the infant's temperature while isolette portals are open. The temperature boost can decrease physiological stress due to the increased effort to maintain body temperature, whereas, if unnecessary, proceeding without the boost can help to diminish ambient sound levels inside the isolette.

Another consideration is the level of oxygen support provided during music therapy sessions in relationship to the infant's baseline needs for the day. Monitoring increases and decreases made by staff to the level of oxygen support, which reflects the level required by the infant to maintain stable oxygen saturation levels, can offer a further reflection of the infant's capacity to utilize and benefit from the treatment provided.

Finally, it is important to collaborate with staff to schedule undisturbed time for the infant after the session. This provides an opportunity for the infant to integrate treatment experiences, sustain achieved and/or improved state regulation, and safeguard against the development of a patterned connection between rest and threat.

Pacing

Pacing relates to elements of the treatment construct, such as duration and contact frequency, and to the movement between and within interventions. While research is yet to be conducted in these areas, clinical experience reveals consistent practice tendencies based on infant responses.

Session duration appears best evaluated on a case-by-case and session-by-session basis, with consideration of each infant's capacity to utilize and benefit from music therapy. As such, toleration of stimulation at the time of contact must be carefully assessed. These capacities, based on clinical observation and consultation with the assigned nurse, are then viewed in combination with treatment goals, medical acuity, music therapy assessment, and stage of development to determine needs in the moment and to dictate session length. Clinical averages suggest that the most premature infants benefit from frequent and brief contact periods. As infant development continues to progress, session length tends to increase accordingly. While contact frequency would optimally remain consistent, this is often unrealistic given music therapy staffing resources and conflicting unit responsibilities. Further research may help to substantiate the needs and benefits of consistent music therapy follow-up in order to advocate for additional staffing.

The pacing of sound and music interventions within the NICU music therapy session is a subtle and sensitive art that involves attunement to self and infant in order to direct the flow and shaping of interactions. In addition to guiding entrainment, a

slow and flexible pace is necessary to counter experiences of "too much, too fast, too soon," typical of hospitalization and characteristic of traumatic overwhelm. This can be achieved by moderating musical complexity and intensity to match and delicately strive to expand the infant's range of resiliency, and by providing intermittent opportunities of rest based on infant cues to support physiological integration.

Attunement

Fischer (2009) describes the trauma therapist as a neurobiological regulator. This statement reflects the importance of the therapist's attunement to the patient's arousal level within each moment of interaction. Additionally, it acknowledges the need for a thorough understanding of the nature and quality of interpersonal processes on a physiological level. Emphasizing attunement on a physiological level within a multidimensional perspective will significantly affect the therapist's ability to respond effectively to cues of hyperarousal and regulation, as well as help to safeguard the therapist against vicarious traumatization (Levine & Poole-Heller, 2002).

The therapist's capacity for attunement is deeply imbedded in self-awareness. Endeavoring in self-exploratory experiences that deepen self-knowledge is commonly emphasized among therapy professionals, particularly in terms of countertransference, yet attention to physiological states within this schema often receives less attention than emotional and psychological ones. The therapist not only must be highly familiar with one's inner landscape and areas of vulnerability but also must notice the impact of responses to the NICU environment and be able to access and effectively utilize coping tools that help to maintain inner calm and focus. This is key to facilitating organized and regulated states for the infant, whose immature system is reliant on external conditions to guide inner states.

Layering attunement to self with attunement to the patient, caregivers, and environment are crucial to facilitating healing change. This allows the therapist to sensitively monitor and adjust to varying degrees of distress and resiliency across the spectrum of care and will improve the therapist's capacity to distinguish between constructive (regulation and development of homeostasis) and destructive (dissociation) forms of habituation. Tracking regulatory states along both autoregulatory and interactive planes of experience helps to broaden the level of attunement to patterns

of resilience and dysregulation, thus expanding the range of impact (Schore, 2001).

Relative to affect attunement (Stern, Hofer, Haft, & Dore, 1985), it is important to acknowledge the sensitivity of the preterm infant to the emotional state of the caregiver, which is perceived through facial and body movements, touch, and voice, and the infant's ability for predictive interpretation (Trevvarthen & Aitken, 2001). Furthermore, it has been evidenced that sympathetic, individualized care can provide lasting physiological benefits for infants in the NICU (Trevvarthen & Aitken, 2001).

Working Peripherally

Working the periphery, or "working the edges," may be best understood by visualizing the old children's toy, the Slinky. This toy is a long, flexible string of coils. When compressed, as with hyperaroused energy in the nervous system, there is no space between each coil to allow movement and flow. Working the periphery, in terms of trauma and hyperarousal of the nervous system, is working with the most immediate "edge" of the arousal while maintaining connection to regulatory resources (Levine & Poole-Heller, 2002). Referring back to the image of the compressed Slinky, this would be like releasing one coil at a time, alternating from one side of the compressed Slinky to the other until the toy is fully released, fluid, and flexible.

This technique can also be referred to as "looping" (Levine & Poole-Heller, 2002). Working the periphery, or looping, rather than connecting immediately to the center of the trauma, and thus the peak of activation, titrates the discharge of stored energy in the nervous system and increases manageability of the experience, facilitating systemic integration while avoiding retraumatization. When working with preterm infants, it is important to note that the environment and immature development already provide an ongoing connection to arousal for the infant. In this case, the concept of looping is applied to developing and increasing periods of stability, while helping to contain periods of instability as they may occur naturally. Again, the focus is to engage the body's organic, self-regulatory capacity.

Working the periphery can also be used as a concept of layering. Given the extreme vulnerability of most preterm infants, it is wise to introduce interventions first in their simplest form, with progression of the intervention following the infant's cues of

tolerance and utilization. For example, when introducing rhythm for purposes of entrainment, the intervention may start first with basic beat, followed by heartbeat rhythms, and then by pulses that emphasize rocking meters (Abrams et al, 2000; Loewy, 2005a). This same approach may be applied to the progression of multimodal stimulation—that is, visual image of the therapist, to auditory input, to tactile input (hand cradling), to vestibular and/or proprioceptive input (rocking). Incorporating multiple modalities in NICU music therapy may facilitate integration, enhance motility of frozen energy (as in "stuck" patterns of hyperarousal), or help to contain states of disorganization.

Sound and Music

As in NICU music therapy best practices, the intrauterine sound environment provides the frame of reference for sound and music utilized in this treatment model. McKenna and Mosko (1990), Fifer and Moon (1995), and Schwartz, Ritchie, Sacks, and Phillips (1998) note that the infant seems to regulate to the mother's breath, heartbeat, and vocal patterns. Music therapy interventions, aimed to simulate fetal sound exposure, are often subtle—that is, sound and/or music provided at the bedside may be inaudible from even short distances from the source. This sensitivity to sound intensities is specifically designed to suite the qualities and capacity of the preterm infant. Similar sensitivity must also be placed on all elements of sound stimuli provided in music therapy in the NICU, as well as on the impact and modification of ambient noise levels.

In addition to the frequent attention to sound intensity, the concept of working the periphery should be applied to rhythm, tone, pitch and frequency, meter, tempo, melodic range, harmony, and timbre when considering sound and music interventions for preterm infants. Other considerations include the distance of the infant from the sound source and whether the infant is placed in an open crib or an isolette. While an isolette tends to buffer sound stimuli when its portals are closed, this circumstance is reversed when portals are opened and the isolette becomes a reverberant container for all sound introduced into the environment, even from sources several feet away.

The use of a sound-level monitor, when placed close to the infant's ear during treatment, can help to gauge the level of intensity of the sound and music

provided by the music therapist and can also be used to measure ambient noise levels. However, these measurements must be combined with knowledge of other properties of sound (Gray, 2000), including frequency and sound complexity, to fully assess the sound transmission. Two highly referenced sources reporting current standards and recommendations regarding sound and noise in the NICU are Philbin, Robertson, and Hall's (1999/2008) "Recommended Permissible Noise Criteria for Occupied, Newly Constructed or Renovated Hospital Nurseries" and Graven's (2000) "Sound and the Developing Infant in the NICU: Conclusions and Recommendations." These articles, however, omit important information regarding the differences between nonpatterned noise and the acoustic properties of music. Neal and Lindeke (2008), professors of nursing at St. Olaf College and the University of Minnesota, have drawn attention to this discrepancy, noting, "Music is more organized, contains fewer dynamic changes in sound amplitude, and results in responses that are the opposite of those to noise" (p. 319).

Beyond attention to foundational elements of sound and music, the musicality of the infant and the infant's tendencies to utilize sound and music for regulatory purposes are significant factors pointing to the value of music therapy interventions in the NICU. According to Trevarthen and Aitken (2001), neonates are attracted to narratives of the human voice, and they possess an intrinsic sense of pulse. Trainor and Zacharias (1998) emphasize the infant's preference for high-pitched voice and singing and report that songs are a useful tool to modulate infant emotional state and extend engagement. Parameters of music intervention for preterm infants that have been increasingly reported in the literature include the following (Abrams et al., 2000; Loewy, 2000, 2005b; Standley, 2002, 2003; Stewart, 2009a, in press; Trehub, 1990):

- Slow tempo
- Simplicity: minimal number of instruments and harmonics
- Quiet and stable dynamics: decibel levels not greater than 60-65dB (A-weighted scale)
- Repetition and consistency
- Rocking meters
- One octave tonal range maximum, beginning with middle C
- Unidirectional melodic contours, with limited changed in pitch direction
- Emphasis on descending tones to engage relaxation response

Summary

The synthesis of perspectives from multiple species, disciplines, and levels of analysis can provide a broader understanding of the processes of development. (Philbin, Lickliter, & Graven, 2000, p. S3)

Integrating current evidence across disciplines in developing new models of treatment is key to building fully informed and responsible practices. While there remains a continued need for additional research, evidence to date conveys the importance of moving forward to explore the potential benefit of the specialized application of music therapy in the NICU. PATTERNS was developed to address this need both by identifying the broad-ranging potential for traumatic experience in a hospital environment and by utilizing this scope of potential exposure to trauma as a construct for the formation of a preventive music therapy treatment model that is based on latent human resiliency and trauma renegotiation principles.

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