Full-Length Article

Music Therapy and Procedural Support: *Defining and Identifying Areas of Practice*

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Abstract

The use of music therapy for procedural support in medical settings is an area of increasing interest, yet the topic has a paucity of information detailing the variety of techniques and practices involved in this particular approach. This article surveys current literature regarding procedural support including music therapy, child life, and medical supports, and highlights some unique and potent aspects of music therapy which may serve as a catalyst for its use in practice. The authors focus on the use of music therapy in the pediatric hospital setting, but not exclusively, and advocate for a comprehensive working definition of procedural support.

Keywords: ***music therapy, pediatric, medical, procedural support*** multilingual abstract | **mmd.iammonline.com**

Music therapy has many applications that span human development from early childhood to end of life. In medical settings, music as therapy helps create positive healing moments in sterile environments. Using music therapy as part of invasive or painful medical procedures is a therapeutic method that benefits patients as well as medical personnel. The term "procedural support" (PS) is now being used to describe this approach yet is not recognized as a medical, therapeutic, or treatment term. The term does not exist in scholarly literature in medical, child life, or other creative arts therapies work. In music therapy literature, there are few works that specifically refer to procedural support in a formalized manner [1-5]. This lack of acknowledgement may come as a surprise to many practicing music therapists who have heard the term used by other clinicians or learned about it in some other way. There is no common definition for procedural support yet it has become part of the music therapy lexicon.

The purpose of this article is to define PS in music therapy specific to pediatric settings, review literature referring to it, share discussions the authors have had with leaders in medical music therapy who advocate its use, and advocate for PS to become a definitive part of music therapy practice. At the heart of this article is the realization that music therapy is one of the only viable and meaningful therapeutic treatments in assisting children who undergo difficult and often uncomfortable medical procedures. Music therapy interventions are not limited to preparing for a procedure or processing reactions afterwards, but also offer the patient a way to engage in a personalized therapeutic interaction while the procedure is taking place.

What is procedural support?

Procedural support is a concept that is used in medical settings by child life specialists and other non-music therapists, such as nurses. PS is also referred to in the literature as distraction [3], while in music therapy it is viewed as a more engaged and active process, with terms like alternate engagement and integration being used [6]. PS, including procedural preparation was first defined in child life literature as "support during medical procedures" [1]. Given there are non-music therapy supports worth reviewing, we also included here the idea of procedural support offered before, during, and after a medical procedure. We will also take a look at music as a therapeutic tool, which is used by a wide range of individuals though there are vast differences in what is considered to be music therapy work and what it means to use music therapeutically. Yinger and Gooding [2] conducted a systematic review of music-based interventions in PS and separated interventions into two categories: music therapy and music medicine. The authors' intention was to articulate a path to the development of a theory of procedural support. They defined music therapy as "the use of music interventions by a credentialed music therapist to accomplish individualized goals within a therapeutic relationship", while "music medicine was defined as passive listening to prerecorded music provided by medical personnel other than a music therapist" (p. 2) [2]. These definitions will be used throughout this review for consistency through the articles presented.

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Medical settings

Procedural support in hospitals has become a topic of interest for a number of reasons, including cost effectiveness, reduction of anesthesia, and a reduction in the perception of pain by the child patient. Yinger [3] conducted a randomized controlled study that examined the effect of a single music therapy session conducted with children undergoing immunizations with specific attention to procedural support before, during, and after the shot was administered. She found children who received music therapy "showed significantly greater rates of coping behaviors" as compared to the participants in the control group (p. 354) [3]. Her work points to the viability of procedural support in this type of medical intervention.

While music therapy support is delivered exclusively by board certified music therapists, music medicine can be administered by any medical professional, as well as other PS that can be given by child life specialists in a pediatric setting. Anesthetics, sedation, and child life specialists are all used to alleviate patients' anxiety in hospital settings, yet upon a closer look at the literature, it is clear there is no consensus on a consistent definition of procedural support.

Non-music therapy procedural support

While music therapy offers one kind of PS, medical procedures have been taking place for many years without the use of music. From a medical perspective, the use of anesthetics, a substance to block pain, is one of the most common types of support. The earliest use of anesthesia dates back to the 1840's [7]. Today, there are three types of anesthesia that are used which are local, regional, and general. During the use of local and regional anesthesia, the patient stays awake and alert for the procedure. Local anesthesia, such as EMLA cream, is used to numb only a small area of the body, where regional anesthesia is used to block pain to an area of the body and is commonly used in childbirth in the form of an epidural. General anesthesia will make you unconscious and is widely used for a variety of surgeries and procedures. The patient does not feel pain and may not remember the procedure. The type of anesthesia used depends on many factors including age, weight, type of procedure, and more. While the use of anesthesia is very safe and major complications are rare, there is always a chance for side effects including sore throat, vomiting and nausea [8]. Anesthesia today is a routine part of many medical procedures.

Another medical use of support during procedures is sedation. A sedative can help a patient relax for procedures, and can also be used in conjunction with an anesthetic. With the use of sedation, the patient will typically stay awake, but depending on what is used may not be able to speak. Along with being paired with anesthetics, sedatives can be used on their own to assist with anxiety towards procedures. Sedatives are depressants and are most commonly used in the form of benzodiazepines such as Diazepam (Valium) or Alprazolam (Xanax) [9]. There is a diagnostic criterion for procedural anxiety in the DSM under "Specific Phobias" of diagnostic criteria A: "Marked fear or anxiety about a specific object or situation (e.g., flying, heights, animals, receiving an injection, seeing blood)" [10]. Sedatives can be given to assist with procedural anxiety in regards to, for example, anxiety of MRI claustrophobia, blood injection phobia, and more [11].

Child life specialists

Child life specialists who work in a children's hospital offer various services to assist a child patient as well as family members during the hospital stay, all of which are designed to help the patient cope with treatments [1]. A child life specialist is a professional "with expertise in helping children and their families overcome life's most challenging events […] particularly those related to healthcare and hospitalization" [12]. Child life specialists have a range of procedural support that they offer, with the main language around the phrase "preparation programs" (p.3) [13]. For example, Koller reveals multiple types of programs including "role rehearsals with dolls, puppet shows, teaching of coping and relaxation skills, and orientation tours of the operation room" (p.3) [13].

We wanted to know more about what these specialists offer and so conducted a comparison of fifteen different children's hospital websites from across the country (see table 1). Of the fifteen hospitals surveyed, fourteen used the word "preparation" when describing their services, meaning PS is offered in advance of a procedure. The types of programs that Koller [13] revealed were consistent with the types of programs the hospitals offered, per their websites. Eight of the websites also claimed to offer support during the procedure. An interesting point of notice is that of those eight, six of them use the word "distraction" as a part of their program. Of the fifteen children's hospital websites, all but one of them offered music therapy as an additional service to patients, validating the use of music therapy a part of a team approach. Table 1 shows the hospital programs that child life specialists offer as stated on their websites, as well as the department that houses music therapy if it is offered in the hospital.

Table 1: *Children's Hospital Website Comparison of Child Life Supports*

Children's Hospital	"Preparation"	Preoperative Tour	During Procedure	Medical Play	Is a Music Therapist Employed by the Hospital	Where Music Therapy is Housed in the Hospital
A	Yes	Yes	Distraction	Yes	Yes	Child Life
B	No	Yes	None	No	Yes	Child Life Program
C	Yes	No	None	No	Yes	Creative and Therapeutic Arts Services
D	Yes	No	Other	Yes	Yes	Creative Arts Therapy Program
E	Yes	Yes	None	Yes	Yes	Child Life Services Programs
F	Yes	No	Distraction	No	Yes	Expressive Therapy Program
G	Yes	No	Distraction	Yes	Yes	Child and Family Life
H	Yes	No	Distraction	No	Yes	Inpatient Rehabilitation Program
I	Yes	No	None	Yes	Yes	Family Services
J	Yes	No	None	No	Yes	Creative Arts Program
K	Yes	No	Other	Yes	Yes	Therapeutic Play Programs under Child Life
L	Yes	No	Distraction	No	Yes	Artist Programs
M	Yes	Yes	None	No	Yes	Family and Volunteer Services
N	Yes	Yes	None	No	Yes	Newborn Services
O	Yes	No	Distraction	Yes	No	N/A

Music and medicine

Music and Medicine is a term that is used by Yinger and Gooding [2] as a "music-based intervention" (p.3) [2], which is the use of pre-recorded music provided by someone who is *not* a board certified music therapist. Of the 50 articles in Yinger and Gooding's [2] review, 42 of them were noted to have a high risk for bias, three with a moderate risk and only five with a low risk for bias. Within the studies with low bias, significance was established for decreasing pain and anxiety in pediatrics when recorded music was used during a procedure. Kwekkeboom [14] conducted a study of music versus distraction in the use of procedural support. Kwekkeboom articulated how music can be used for more than a "just a source of distraction" (p.434) [14] in being used to assist in pain relief. The author looked at the use of music (a cd of patient's preferred music style) and distraction (a book on tape) as additional strategies to manage pain and anxiety, which also allowed the patients to take their regular medications based on need. This study however, showed no significant difference between any of the groups [14]. Bradt and Dileo (2013) [15] conducted a systematic review for The Cochrane Collection which analyzed "the effects of music interventions with standard care versus standard care alone" (p. 1) [15]. The authors identified 26 trials focused on

preoperative anxiety outcomes, all of which relied upon listening to pre-recorded music with no randomized controlled studies identified that used live music provided by a music therapist. They concluded music listening is an effective non-pharmacological intervention for reducing patient anxiety. Implications for music therapists who offer live music as their primary mode of clinical service were hard to deduce, given the reliance upon passive listening.

Matsota et al. [16] conducted a review of the use of music for pre- and post-operative stress and anxiety and found that music can have positive anxiolytic effects. Understanding pain management in children can be difficult due to a number of factors including age and developmental stage [17]. Eden et al. [17] examined a number of pain management techniques for vaccination pain in children and adolescents one of which was the use of music therapy which yielded no significant reduction in pain or stress indicators in children, but a questionnaire revealed a significant decrease of pain experience in adolescents with the use of "music distraction without headphones" (p.130). The elucidation of music's ability to lower patient anxiety through empowerment, neurological mechanisms, aesthetic engagement, and active support is, however, important information for any board certified music therapist practicing in a medical setting. The caveat these authors offer, however, is that music's effectiveness is diminished when severe pain is present; they also stress that the mechanics of how music achieves positive results is not well understood.

Music therapy procedural support

According to Walworth [18], the practice of music therapy to support patients during procedures was first identified in 2002. Since this seminal work other reviews have been conducted which pertain to music therapy and procedural support. For example, Yinger and Gooding's [2] systematic review covers 50 studies having to do with PS. Of these 50 only 12%, or six of the articles in the review used music therapy instead of a music medicine, and all six were noted to have a high risk of bias. Due to the presence of high bias in the music therapy studies we decided to consider the work from a music medicine perspective only. Table 2 and table 3 represent literature reviewed and the summation of what types of procedures were specifically studied. Articles are separated by single study (table 2) or literature review (table 3). Similar to Yinger and Gooding's [2] review, most of the reviews consisted of both music therapy and music medicine approaches.

***Table 2**: Research Articles: Music and Procedural Support*

Author	Title of Article	Age of Participant(s)	Procedure	Live or Recorded Music	Intervention Facilitated by MT-BC?
Yinger, O. S.	Music therapy as procedural support for young children undergoing immunizations: A randomized controlled study	4-6 years	Immunizations	Live	Yes
Ullsten, A., Eriksson, M., Klassbo, M., Volgsten, U.	Live music therapy with lullaby singing as affective support during painful procedures: A case study with microanalysis	Premature infants	Venipuncture	Live	Yes
Kwekkeboom, K. L.	Music versus distraction for procedural pain and anxiety in patients with cancer	Adults, 35 - 72	Noxious medical procedures, i.e. biopsy, port placement	Recorded	No
Eden, L. M., Macintosh J. L., Luthy, K. E., Beckstrand, R. L.	Minimizing pain during childhood vaccination injections: improving adherence to vaccination schedules	3 - 6 years and 13 - 25 years	Vaccinations	Recorded	No
Loewy, J., Hallan, C., Friedman, E., et al.	Sleep/sedation in children undergoing EEG testing: A comparison of chloral hydrate and music therapy	1m - 5 years	Electroencephalogram (EEG)	Live	Yes

***Table 3**: Literature Reviews: Music and Procedural Support*

Author(s)	Title of Article	Type of Review	Number of Sources Reviewed	Age of Patients	Music Therapy or Music Medicine
Ghetti, C. M.	Music therapy as procedural support for invasive medical procedures: Toward the development of music therapy theory	Qualitative document analysis	19	Children and adolescents	Both
Yinger, O. S., & Gooding, L. F.	A systematic review of music-based interventions for procedural support	Systematic review	50	Varies, children and adults	Both
Daniel, E.	Music used as anti-anxiety intervention for patients during outpatient procedures: A review of the literature	Systematic review	11	Unspecified	Music medicine
Bradt, J., Dileo, C., & Shim, M.	Music interventions for preoperative anxiety	Systematic review	26	Unspecified	Music medicine
Matsota, P., Christodoulopoulou, T., Smyrnioti, M.E., et al.	Music's use for anesthesia and analgesia	Systematic review	40	Unspecified	Both
Treumicht Naylor, K., Kingsnorth, S., Lamont, A., McKeever, P., & Macarthur, C.	The effectiveness of music in pediatric healthcare: A systematic review of randomized controlled trials	Systematic review	17	Elementary school age children & adolescents	Music therapy

Ghetti [1] conducted a qualitative document analysis regarding the use of music therapy and procedural support in an effort to contribute to theory construction. At the beginning of her inquiry, she listed definitions and defined music therapy as procedural support this way: "the use of music and aspects of the therapeutic relationship to promote healthy coping and decrease distress in individuals undergoing medical procedures" (p.6) [1]. Unlike Yinger and Gooding's [2] definition, this one does not state whether the provider of PS is a music therapist or not, but does allow for the inclusion of invasive and non-invasive procedures, and emphasizes the importance of the therapeutic relationship.

Music therapy approaches found in the literature on PS include music therapy in the neonatal intensive care unit [19,20], client preferred music [18,21], clinical improvisation [21], Musical Alternate Engagement (MAE) [1], integration [1] and Music Assisted Relaxation (MAR) [1]. The work done by Loewy et al. [20] indicated music has positive audioanalgesic effects, thereby reducing the need for sedation in premature infants about to undergo a medical procedure. With children and adults Loewy and her team provided mechanisms for children and medical teams to endure procedural music therapy, and they distinguished it clearly as "integration", not "distraction' as they thought the term distraction implied manipulation, while integrating through music would render the greatest benefits:

> While distraction seems to pull the child's attention away from the pain, integration calls upon the child to come into the body by focusing on the breath, heart rate, emotional intention, and resonance. i.e., the feeling of pain itself. The music is used to integrate these four areas through harmonic, rhythmic and tonal synthesis. Integration empowers a patient to take action in understanding and controlling the hurt and discomfort" (p.48, Loewy et al, 1997)

Ghetti [1] examined other sources and categorized the primary approaches of music therapy for PS as MAE, Integration, or MAR. As previously seen with Bradt and

Dileo's work [15], the literature that discusses procedural music often relies upon recorded music as the primary modality [3]. Using live music has shown to significantly impact patients' response to treatment in medical settings [22]. Offering live, versus recorded, music allows a music therapist to respond immediately to changes in patients' emotional and physiological states and use musical entrainment as a physiological mechanism of support [23]. Live music also allows the therapist to respond to changes in the treatment environment, nurse states of tension, and family dynamics.

Benefits of music therapy versus other supports

Music therapy research on PS is sparse, and there is even less information about the significance of using music therapy versus other procedural support techniques. Walworth's [18] study on music therapy and procedural support is notable here. She examined PS in music therapy as a cost effective alternative to sedation for pediatric patients undergoing Electrocardiograms, Computed Tomography (CT) scans, and other procedures. The results of this study showed high success rates for all types of procedures, implying that the procedure was completed without sedation. Walworth [18] then proceeded to present the cost analysis of these procedures when music therapy was used in the place of sedation. The analysis yielded a $74.24 difference per procedure and a total savings of $6830 for the 92 patients [18]. These results are worth highlighting: not only does the use of music therapy reduce medication costs and potential negative side effects, it also saves hours of work time for nurses "who are severely overworked" (p.281) [18] and allows them time for other pressing care tasks. This finding has implications for the hiring and employment of music therapists, and we see a need for the study to be replicated to reflect current medical costs. This is one example of how music therapy as procedural support can serve as a needed complementary therapy for medical personnel as well as the patient undergoing a procedure.

Definition of procedural support for music therapy

Given the challenges of creating a firm concept of PS as part of music therapy practice, creating a definition specific to the field is necessary. We need a concrete and agreed upon vocabulary throughout the field of music therapy. Further, there are varying levels of what constitutes PS. For example, in a neonatal intensive care unit many infant interactions, from changing a diaper to a heel stick, can be considered invasive. Even the act of taking the infant's temperature can elicit agitated responses. Further, there can be multiple definitions of PS within a single institution and even a single population. When three music therapists who work in the same hospital were asked about their procedural support approaches, three different answers and definitions were given. With the range of meanings and characterizations of PS, the authors felt a single definition is needed for the music therapy field. Given the varying definitions in the literature presented, an inclusive definition is offered as this: Procedural support in music therapy is the interactive use of music by a board certified music therapist during an invasive or painful medical procedure; the music is designed to specifically address a patient's needs including reducing anxiety and pain perception, and to encourage healthy coping behaviors.

Discussion

The literature for music therapy as procedural support is lacking in specific, rigorously conducted studies. While there are articles that discuss or analyze the concept, or offer ideas and possible theories, there are few that provide evidence-based support. What is becoming clearer is that music therapy and child life specialists offer a child patient control over a potentially distressing situation. Dr. Andrew Rossetti offers as part of his traning a demonstration of a technique that gives the patient full control over the procedure (typically non-invasive such as blood draw or IV placement) where power was ceded to the patient through alternate engagement and as was the ability to say when they were ready to begin [24]. Music therapy is a profession that complements medical practice, especially in the form of procedural support. Music therapists are able to work in tandem with nurses, child life specialists, and surgical teams to help children cope with the stressors of hospitalization and treatments. When live music is sensitively applied by a board certified music therapist in support of medical procedures, entrainment is possible [23]. Entrainment provides a unique way of meeting patients in the moment of expressed pain and working with them to decrease perceived levels of pain and discomfort.

We recommend future research studies focus on how music affects stress and the perception of pain in order to better identify how and when to use music for PS. Broadening the scope of inquiry to include methods such as psychoanalytic music therapy, Nordoff-Robbins music therapy, and neurologic music therapy to treatment would further increase our understanding of music therapy as a viable treatment option in hospitals. Each of these methods offers an immediate means of addressing patient, staff, and caregiver needs in an integrative manner and will have unique contributions to the study of music therapy as procedural support. Based upon the literature reviewed here, we propose that an integrative and dynamic music therapy approach will best serve the physical, emotional, and spiritual needs of patients undergoing medical procedures.

References

1. Ghetti, C. M. (2012). Music therapy as procedural support for invasive medical procedures: Toward the development of music therapy theory. *Nord J Music Ther*, *2*(11), 3-35. doi:10.1080/08098131.2011.571278
2. Yinger, O. S., & Gooding, L. F. (2015). A systematic review of music-based interventions for procedural support. *J Music Ther, 52*(1), 1-77. doi: 10/1093/jmy/thv004
3. Yinger, O. S. (2016). Music therapy as procedural support for young children undergoing immunizations: A randomized controlled study. *J Music Ther, 53*(4): 336-363. doi: 10.1093/jmt/thw010
4. Ullsten, A., Eriksson, M., Klässbo, M., & Volgsten, U. (2017). Live music therapy with lullaby singing as affective support during painful procedures: A case study with microanalysis, *Nord J Music Ther, 26*(2), 142-166, DOI: 10.1080/08098131.2015.1131187
5. Daniel, E. (2016). Music used as anti-anxiety intervention for patients during outpatient procedures: A review of the literature. *Complement Ther Clin Pract*, *22*, 21-23.
6. Loewy, J., MacGregor, B., Richards, K., & Rodriguez, J. (1997). Music therapy pediatric pain management: Assessing and attending to the sounds of hurt, fear and anxiety. In J. V. Lowey (Ed.), *Music Therapy and Pediatric Pain.* (p. 45-56). Cherry Hill, NJ: Jeffery Books.
7. Anesthesia page. MedlinePlus Website. (2013). Available at: https://www.nlm.nih.gov/medlineplus/anesthesia.html
8. American Academy of Pediatrics. (2016). *Anesthesia and Children: Information for Parents*. Retrieved from https://www.healthychildren.org/English/health-issues/conditions/treatments/Pages/Procedures-With-Anesthesia.aspx
9. Health and Human Services. (2016). Sedatives and Tranquilizers. Retrieved from http://www.mass.gov/eohhs/gov/departments/dph/programs/substance-abuse/stop-pill-abuse/drug-facts/sedatives-and-tranquilizers.html
10. Anxiety disorders page. Diagnostic and Statistical Manual of Mental Disorders Website. (2015). Available at: http://dx.doi.org/10.1176/appi.books.9780890425596.dsm05http://dsm.psychiatryonline.org/
11. Choy, Y. (2015). Acute procedure anxiety in adults: Epidemiology and clinical presentation. Retrieved March 16, 2016, from http://www.uptodate.com/contents/acute-procedure-anxiety-in-adults-epidemiology-and-clinical-presentation
12. Child Life Council: Overview Of Child Life Council. (2015). Retrieved from http://www.childlife.org/
13. Koller, D (2007). Preparing children and adolescents for medical procedures. Retrieved from http://www.childlife.org/files/ebppreparationstatement-complete.pdf
14. Kwekkeboom, K. L. (2003). Music versus distraction for procedural pain and anxiety in patients with cancer. *Oncol Nurs Forum*, *30*(3), 433-440.
15. Bradt, J., Dileo, C., & Shim, M. (2013). Music interventions for preoperative anxiety. *The Cochrane Library*.
16. Matsota, P., Christodoulopoulou, T., Smyrnioti, M.E., et al. (2013). Music's use for anesthesia and analgesia. *J Altern Complement Med*, *19*(4), 298-307. doi:10.1089/acm.2010.0235
17. Eden, L. M, Macintosh, J. L. B., Luthy, K. E., Beckstrand, R. L. (2014). Minimizing pain during childhood vaccination injections: Improving adherence to vaccination schedules. *Pediatric Health Med Ther, 2014*(5), 127-140. Doi: https://dx.doi.org/10.2147/PHMT.S50510
18. Walworth, D. W. (2005). Procedural-support music therapy in the healthcare setting: A cost-effective analysis. *J. Ped Nursing*, 20(4), 276-284. doi:10.1016/j.pedn.2005.02.016
19. Allen, K. A. (2013). Music therapy in the NICU: Is there evidence to support integration for procedural support? *ADV Neonatal Care*, *13*(5), 349-352. doi: 10.1097/ANC.0b013e3182a0278b
20. Loewy, J., Hallan, C., Friedman, E., et al. (2006). Sleep/sedation in children undergoing EEG testing: A comparison of chloral hydrate and music therapy. *Am J. Electrodiagnostic Technol, (46)*, 343-355.
21. Turry, A. E. (1997). The use of clinical improvisation to alleviate procedural distress in young children. In J. V. Lowey (Ed.), *Music Therapy and Pediatric Pain.* (p. 89-96). Cherry Hill, NJ: Jeffery Books.
22. Standley, J. M. (2000). Music research in medical treatment. In American Music Therapy Association (Ed.), *Effectiveness of music therapy procedures: Documentation of research and clinical practice* (3rd ed., pp. 1–64). Silver Spring, MD: American Music Therapy Association.
23. Bradt, J. (2010). The effects of music entrainment on postoperative pain perception in pediatric patients. *Music and Medicine*, 2(3), 150-157.
24. Rossetti, A. (2014). Towards prescribed music in clinical contexts: More than words. *Music and Medicine*, *6*(2), 70-77.
25. Treurnicht Naylor, K., Kingsnorth, S., Lamont, A., McKeever, P., & Macarthur, C. (2010). The effectiveness of music in pediatric healthcare: a systematic review of randomized controlled trials. *J Evid Based Complementary Altern Med*, *2011*.

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