

## Full-Length Article

**Efficacy of Pain Management: *Integration versus Distraction***Joanne V. Loewy<sup>1,2</sup><sup>1</sup>The Louis Armstrong Center for Music & Medicine, Mount Sinai Beth Israel, New York, NY, USA<sup>2</sup>Icahn School of Medicine, New York, NY, USA**Abstract**

The following is a position paper substantiating the recommendation for an integrative approach to evaluate, treat and manage the predictable and/or unpredictable experience of pain in medical procedures so frequently required for infants, children and adult patients. Although decades of articles in journals and texts support distraction as a recommendation for protecting and diffusing a patient's experience of procedural pain, the rationale for thorough evaluation followed by suggestions for the provision of integration as a treatment option is described and considered as a best practice intervention.

**Keywords:** *Pain, procedures, veni-puncture, music medicine, music therapy*multilingual abstract | [mmd.iamonline.com](http://mmd.iamonline.com)**Introduction: Disclosure informing perspective**

A 'hospitalist' is a descriptive term that refers to a type of practice coined in name, in 1996. Specifically hospitalists are "specialists in inpatient medicine ... who will be responsible for managing the care of hospitalized patients in the same way that primary care physicians are responsible for managing the care of outpatients [1]

Although this definition has expanded through the years to include teaching and research, 'hospitalists' who have trained in hospitals and work at the bedside, rounding daily, could still currently be defined as a rare breed of doctors, nurses, and therapists who encounter a unique subset of circumstances in the fast-paced world of patient care and medical management. As out-patient practices have grown, and hospital admissions including length of stays have decreased, the emergent themes and crises that comprise the acute care of disease-severity have, in a certain way, turned the training of hospitalists into an arguably growing refined subset of clinical practice.

I consider myself to be a 'hospitalist' -as the first 13 years of my hospital tenure was primarily at the bedside, first with Pediatric patients, and then within the department of Family Medicine, in ICUs and eventually with Oncology patients. My on-the-job learning and training alongside doctors and nurses was foundational to my understanding of, not only disease

identification, stratification, course of treatment and traumatic circumstances, but has also served as a 'marker' and basis for my understanding the often subtle distinction that can exist between 'illness' and 'wellness.'

This is not unlike earlier training where my beginning work as a psychotherapist at a clinic within a school setting, behooved in-depth study of child development. This leant critical insight to the problems and circumstances I encountered in providing music therapy for children and teens with emotional disturbance, mental illness, and other varieties of labels and definitions. For me, this crystalized the realization that one cannot treat blindly- in a vacuum. We must understand the spectrum of well and not well, and it is imperative that we have at the very least, a most basic understanding of the 'norm' in 'normal' and the 'dis' of what pervades one's body sense and experience of 'dis' - 'ease.'

Music as an art, and primal expressive modality, recognizably can challenge such labels and diversifications in ways that we are only beginning to understand. Where memory is seemingly erased in dementias, for instance, we find study after study rendering succinct evidence of a 'music brain.' [2-5] We now have evidence of pathways that have upheld the imprint of musical neural mapping. Where mood and affect can be markedly impaired, we recognize through research, that there is significance in music therapy's capacity to improve functioning in depressed individuals, and also suggested efficacy in findings reflecting decreased anxiety. [6]

Furthermore, comprehensive research reviews have demonstrated that music can reduce opioid requirements, with evidence that its effect on postoperative pain may be potent. In a Cochrane Review [7] investigators examined the effect of music on acute, chronic, or cancer pain intensity, pain relief, and analgesic requirements. Of 51 studies evaluated, 4 of these findings reported that subjects exposed to music had a 70% higher likelihood of having pain relief than

**PRODUCTION NOTES:** Address correspondence to:

Joanne V. Loewy DA, LCAT, MT-BC, Address: The Louis Armstrong Center for Music and Medicine, Mount Sinai Beth Israel, 16th and 1st Avenue, 6 Silver 21, New York, NY 10003, USA. Email: [Joanne.Loewy@mountsinai.org](mailto:Joanne.Loewy@mountsinai.org) | COI statement: The authors declared that no financial support was given for the writing of this article. The authors have no conflict of interest to declare.

unexposed subjects. In the 3 studies that assessed opioid requirements 2 hours after surgery, subjects exposed to music required less morphine than subjects who did not hear music. Additionally, in 5 investigations that evaluated analgesic requirements in the 24-hour period following surgery, the music group required considerably less morphine than those in the control group.

### The experience of treating pain

As a hospitalist, there is one area where education and training is vastly enriched with experience, and that is in facing patients who experience pain. While education and research related to the classification and training of pain management has grown, no one would deny that nothing is comparable to learning about pain from both the face-to-face experience of meeting and treating patients who are experiencing pain, coupled with seeing how various practitioners evaluate and treat patients' experience of pain. Suffice to reflect and report that although the status of pain reporting has made it "the fifth vital sign" and a required measurement on the patient bedside flow-sheet, the variances of how pain is treated in actuality is largely influenced by a host of complex variables including best practice guidelines, and practitioners' beliefs and values.

In 2015, for instance, a recent 4-year emergency room study of 6,710 emergency department (ED) visits revealed that minority patients were less likely than white patients, to receive analgesic medications for abdominal pain by 22-30 percent. [8] It is important to recognize that society's beliefs and the economics of pain can challenge practice activity. 20 years ago education was erring toward believing the patient's experience of pain at face value, and pharmaceuticals were seemingly prescribed more readily. Today, while the pharmaceutical industry may be booming, we are in an age of opioid crisis, and this has affected the assessment and treatment of pain. Prescribing has in turn become more complicated, and influenced by a myriad of non-medical factors.

Additionally, studies of procedural pain, the topic of this article, have not been well investigated. In 2008, a nursing study reviewed 1469 published articles on interventions for acute procedural pain in hospitalized children, for example, found only 5 reports were high-enough quality to be reviewed.[9] Admittedly, procedural pain is difficult to research.

### Etiology

As a hospitalist, it is well understood that the most essential aspect of treating pain is to first understand its etiology. Because pain as a symptom helps doctors differentiate, or rule out aspects of one disease from another, its diagnostic implications may raise frustration. Witnessing patients'

discomfort and having to wane through it is uncomfortable, even while knowing that pain can inform and render hints about the roots of its causes. Assessment, education, and treatment are the cornerstones of best practice. For music therapists, it may be useful to classify pain as chronic, acute or procedural. This will provide a foundation for creating a treatment plan.

This article is not about the disease aspects of pain related to its etiology, pathway, mechanism, nor is it related solely to the treatment of pain's physical manifestation. Indeed, there are music therapy treatments recommended for the experience of pain, particularly in the experience of chronic pain or acute pain crises where the physiological, social, and patient-role experiences are complicated topics and deserve specific attention as topics for research and study in their own right. These are beyond the confines of this article. As such, it cannot be overstated how essential it is for music therapists who treat pain to understand its roots diagnostically- e.g. whether pain is neuropathic, nociceptive, inflammatory, or non-inflammatory.

Equally important is our grasp of pain's emotional context, which is what I call the 'point of trauma' (POT). This is because the memory people associate with when (the context) and where the pain first started will likely forever be imprinted and related to aspects that influence the 'how' 'why' and/or even the root of the pain itself. We can work with this.

As well, theory and an adherence to reading about and familiarizing our database on the ever-growing knowledge related to pain theory may be well advised. How those who treat pain conceptualize aspects of the experience- be it through the lens of the Gate Control or subsequent Neuromatrix theories, or by focusing on the influence of genetics, culture and learning- can lead toward insightful explanation and deeper understanding of pain and its mechanisms:

"Although under most circumstances transmission of nociceptive information results in pain perception, many physicians and patients are unaware that nociception is dissociable from the experience of pain. In other words, nociception can occur in the absence of awareness of pain, and pain can occur in the absence of measurably noxious stimuli. This phenomenon is observable in instances of massive trauma (such as that which might be incurred by a motor vehicle accident) when victims exhibit a stoic painless state despite severe injury, and conversely, when individuals with functional pain syndromes report considerable anguish in spite of having no observable tissue damage." [10]

Pain, and in particular chronic pain is often affiliated with emotional and physical stress, which the neuromatrix theory defines as activation aspects that intertwine the perceptual, homeostatic, and behavioral experiences of discomfort. The actual output of a surging neural network that is reactive rather than primarily evoked by inflammation or pathology,

translates to there being direct potential for the influence of music in the patterning of the brain's response to activation aspects. As the neuromatrix may be modified by sensory experience and is genetically influenced, music might be able to serve as a primary mechanism to influence, re-direct, modulate activity generating the neural pattern that produces pain. The neuromatrix and subsequent theories take into account stress and tension, and furthermore the conditions under which the pain occurs.[11]

This article will address procedural pain, which is differentiated from acute or chronic pain. Acute pain is often the result of a crisis and implies a shorter duration than chronic pain, which is more likely affiliated with a (prolonged, long-term) disease or condition. Procedural pain, which takes place in the context of a treatment, has a focus on the delivery of a procedure whereby the patient's involvement may have significant influence on how the pain is experienced. Medical procedures are reported as the most significant and distressing cause of pain, particularly for hospitalized children. A recent study of 107 inpatients or their parents residing on 4 hospital units were interviewed and chart-checked during 4 nonconsecutive days revealed continued high frequency of undertreated pain in children. The authors concluded that the highest rates of pain reports were related to procedures and the authors concluded that these kind of painful episodes are preventable and should be targeted.[12]

The aforementioned comprehensive review on "acute procedural pain" defined it as a "common experience for hospitalized children that ...despite mounting research on treatments for acute procedure-related pain-remains inadequately treated." The extreme fear of medical procedures involving needles is known as trypanophobia. This needle phobia involving injections or hypodermic needles was first formally defined as condition in the DSM-IV as 300.29.3 (Manual of Mental Health Disorders, 4th Edition (DSM-IV) A recent study of 1,024 children & 883 adults, revealed that 24% of the adults and 63% of children reported a fear of needles and this influenced immunization non-compliance. [13]

In 2016 the New England Journal of Medicine published the following statement: "Pain during neonatal procedures is inconsistently assessed and often inadequately treated. In addition to ethical reasons for pain alleviation, research has shown that repeated painful stimuli early in life are associated with physiologic instability, dysregulation of stress response systems, and abnormal neurodevelopment. Based on recent evidence, the American Academy of Pediatrics has updated its recommendations for the prevention and management of procedural pain in neonates." [14]

Procedural pain is a critical venture for the hospitalist, as often the first experience a patient will encounter is the venipuncture - either from an IV insertion or from a blood draw. Unlike an acute pain or chronic pain, procedural pain is a type of pain where the practitioner and team can mandate some

control. It provides ample opportunity for a consult for the music therapist who can assess, attend, and treat the potential for fear and anxiety through integration on many levels. Integration can encompass mind/body strategies for the patient, team and environmental aspects of care. Music therapy can be seminal in fostering safety and collaborative treatment in the following ways: integration for the team with the patient using music, and integration of the procedure itself with easeful strategies inclusive of relaxation, breathing, release, and/or singing and/or instrumental play-all of which can generate a sense of trust in self and others. Perhaps most important in this process is the forging of a potential for resilience which promotes durability, fortitude, and endurance.

While recent studies suggest reduced pain in pediatric inpatients, a closer look at the outcomes indicates underutilization of pain management strategies. As I see it, the problem may not be a lack of focus or an oversight on the medical community's attempt to treat procedural pain, but rather a lack of sophistication in how we treat procedural pain. Procedural pain is distinguishable as the one kind of pain that most often involves a 'hands-on' approach, which can be perceived as most invasive and threatening.

#### Assessment

If experience is the golden teacher, and if meaning is to be constructed and well-defined from careful scrutiny of our clinical investigations, along with comprehension and undertaking of research, then managing pain with patients (inclusive of the anxiety often harbored by patients of all ages and diagnoses, and often accompanying family members as well) is best informed through careful assessment. [15,16] I would include the following as critical factors in pain assessment.

#### Critical Factors in the procedural assessment:

1. Age, gender, diagnosis and culture
2. Past hospitalizations and procedures
3. Past traumas, situational and developmental
4. Expressive/repressive qualities of verbal expression
5. Beliefs/reality/fears/fantasies related to current diagnosis & treatment strategies
6. Benefits/detriments of including family members (parents/children/spouse/siblings) during the procedure
7. Accidents and co-morbidities

A careful eye on these 7 critical factors as assessed by a doctor, nurse, music therapist, social worker, or child life specialist can ease the preparation for recommended strategies that will influence the impact of the procedure-provider's selected activity of the accompanying strategy. These factors separately

and collectively have been supported in the literature as being informant of how endurance of outcomes will be achieved.

## Distraction

Miriam Webster's definition of distraction is:

“having one's thoughts or attention drawn away: unable to concentrate or give attention to something.” The synonyms that follow this definition of distraction include “pulling away” or being “harassed, confused, or deranged especially by strong feelings.”[17] While the research surrounding the technique of distraction as a tool for pain management is obviously in pursuit of removing what may be perceived as stressful or invasive, the engagement of doctors, nurses and other healthcare professionals who aim to distract during procedures has often been perceived by patients to be manipulative. No one can deny the intention of distraction to be anything short of well-meaning, yet its efficacy is questionable. And while dozens of articles seeking to support the utilization of “distraction” as a pain management treatment for patients who must undergo procedures have implemented and substantiated in their summaries “distraction” as a proven technique, a closer look at the data does not validate such efforts.

Non-pharmacologic techniques, such as distraction are often defined in the literature as watching television or a movie, or more recently playing video games –such as virtual reality [18] and while “self report” measurements reflect a decrease in pain experience physiological variables are mentioned by the authors of a recent review as needing further investigation.

Distraction should not be ruled out as an option for patients who are on-board for using such a tool. The position of this article is that it should be formally assessed as one option, and not taken as an assumption. Whether to include family members as part of the procedure, may or may not be useful, and needs to also be carefully assessed. Early in my hospital work, I observed and worked with clinicians who assumed best practice was to include parents and then saw the detrimental effects when the anxiety related to pain procedures were expressed in front of their children, which prompted this statement:

“It is not useful for a child of any age to watch a parent fall apart at the moment procedural pain is experienced. This is a time in which a patient needs strength and ego support. Parents with the best of intentions can exacerbate the child's pain and anxiety by feeding into their own expressions of fear during a procedure.” [19]

Cards, toys, heat, ice, relaxation techniques, interaction with therapy pets (and for children: play) have been shown to lessen the experience of pain in children, and even symbolic play works well as an option prior to procedures.[20] These can be utilized as mechanisms of potential integration. The assumption that distraction is most useful is overlooking

integration as an option that in the long run may provide more potency and longevity. This may be particularly advantageous for patients who will be required to endure additional procedures over their course of treatment-such as newly diagnosed diabetes or burn victims needing daily debridement. A best practice consideration mentions the notion of, ‘one voice’ [21] rather than many to ease tension. This is important as when patients express fear, tension or yell and cry, caring family members and staff often tend to become hyper vigilant and the non-collaborative ‘jumping in’ to protect, even with best intentions can add to the atmosphere of cacophony, which counteracts provisions and perceptions of a safe and trusting environment.

## Music, music therapy and distraction

Much of the literature involving pain and distraction with music is authored by practitioners whose efforts are aimed to provide sensorial support through using familiar tunes for children, or in providing relaxation programs for adults. Most of the studies are not well controlled as far as the decision-making, institution, and/or reporting the music details related to choice, duration and impact of therapeutic benefit. Nevertheless, the intention in testing the observed and notable hypothesis that music can lessen pain perception of procedures is notable and has built our literature base.

Several articles stand out as representative of trends in the database related to music distraction in procedural pain. A recent study led by doctors compared noise-canceling headphones to music and to control.[22] 88 male patients received one of the 3 randomized conditions. Music recordings of Bach, were aimed to “distract subjects from the noise of the equipment.” According to one of the doctors and co-author of this study, his “personal feeling is that this works because of distraction”, ([www.everydayhealth.com/pain-management/a-pain-playlist-using-music-for-pain-therapy.aspx](http://www.everydayhealth.com/pain-management/a-pain-playlist-using-music-for-pain-therapy.aspx)) Thomas Polascik, MD, director of the Society of Urologic Oncology Program and professor of surgery at Duke University in Raleigh-Durham, N.C). “Music distracted patients from the rather loud sound made by equipment used for the test, reducing anxiety better than the other two options.”

Another article led by nurses compared the effects of meditation to music interventions in pre-selected choices of instrumental jazz, classical piano, harp and flute, nature sounds or world music.[23] To evaluate the impact of interventions on patient anxiety, pain and fatigue during imaging-guided breast biopsy, 121 women needing percutaneous image-guiding breast biopsy were randomized into 3 groups: guided meditation, music and standard care control group. In evaluating meditations (recorded speaking), versus meditations and “music interventions” (recorded music selected from playlists offered), versus a control, the meditation group reported the least amount of pain. Ideally in

an integrative experience, options of entrainment along with live and interactive cues within the music likely could have stronger enhancement/engagement of comfort options with potentially more assurance provided in the moment when singing or language is included. During biopsy, the meditation group listened to an audio recorded, guided, “loving-kindness meditation” rather than music or controls, who received the usual “supportive dialogue” from the biopsy team.

A recent study of 200 children (7 to 12 years old) requiring blood tests randomized into 4 groups: distraction cards, music, distraction cards and music, and controls included data obtained from interviews with the patients, their parents, and a blind observer before and after the procedure. Using Wong-Baker FACES and anxiety levels assessed using the Children’s Fear Scale, the findings of these 3 different distraction methods (distraction cards, listening to music, and distraction cards and music) on pain and anxiety relief in children during phlebotomy. While pain and anxiety were seen in all 3 “distraction” methods during blood draws, no statistical significance was observed. Like so many “music therapy” articles in medical journals, this study had no evidence of music therapy, nor involvement of a music therapist. The music and cards used were assumed to be patient-preferred based on well-known folk themes of the culture, but in the end, was researcher-selected, and used passively, in recordings.[24]

Interestingly, music therapy studies on procedural pain are minimal. There is not so much distinction between live and recorded uses of music, and the definition stratifying “distraction” from “integration” has up until now, not been well described. In 1997, a compelling single case study combined the terms of “relaxation” and “distraction” –and notably this case study was with a patient who had chronic pain, but with acute episodes. The choice of music for the prescribed listening experience was based on ‘somatron’ music, as the music therapist used the vibration chair and seemingly did not assess preferred music of the patient or music related to her cultural background.[25]

One study of music therapy[26] and another of music therapy and child life find that utilizing parent raters[27] and/or outside observers and/or nurses, who rated young children’s painful reactions to procedures provide resourceful means of evaluation. Having multiple perspectives can be an insightful way to measure painful perceptions and can serve to broaden how we can remain acutely informed of a young child’s procedural pain experience.

Live music was used in debridement study with pediatric patients, but the songs utilized indicated that they were selected from pre-determined children’s songs[28] or “age appropriate” songs[29]. Integration as a best practice model can forfeit control of musical selections in the moment, so that the music therapist can provide clinical decision making at the whim of the patient and substantiate influence depending on the context of the conditions (the practitioner, nurse

technician etc) In this way the ultimate control and support is captured most respectfully and spontaneously and matches the complex needs of the moment.

## Integration

Webster’s definition of integration is “the act or process or an instance of

integrating; such as: incorporation as equals into society or an organization of individuals of different groups or coordination of mental processes into a normal effective personality or with the environment.[30]

As music therapists, we might be selling ourselves short by mere suggestion that listening alone or playing live music and “looking away from” will afford patients an easier trek away from the experience of pain experience. In fact, I have observed the opposite. With careful assessment and patient-informed resiliency techniques, we can guide patients through painful procedures and witness moments that inform them of how their focus on succinct elements of music can take them through procedures with minimal or no pain at all. The patient and his/her mind is not being distracted, it is in fact utilizing aspects of music’s potency to gain assertion and directive-ness that can foster resilience. Once this confidence is maintained it can be suggestive and transferred to the next potentially stressful medical procedure.

In 2017, for the first time a working definition of procedural support included aspects of integration, providing inclusivity for a broad range of live music-based opportunities relative and discernable in working toward the central relationship, related to patient-need and catered music, which may be the tipping point for ensuring in-the-moment trustful efficacy of procedural pain:

“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.”[31]

This definition, the result of a review included some past models and a seminal work that provided financially effective evidence and rationale for music therapy procedural support in hospitals.[32] Another well-defined model included a qualitative analysis of procedural music therapy in pursuit of the development of a music therapy theory. The analysis supported on-going assessment of the patient, based on the evaluation of the music and the therapeutic relationship in the moment.[33]

Critical aspects of practicality related to the efficacy of the ultimate integrative functionality of procedural music therapy should consider:

1. the completion of the procedure/s at hand
2. the resilience music therapy can provide for the body-

mind connection

3. creation of a context for the patient to experience a sense of “control” or at the very least, ‘participation’ in the procedure, as opposed to passively receiving the procedure (victimization)
4. the lasting impact post-procedure for patients-implicating aspects involving continuity of care, mechanisms useful for future procedures
5. the fostering of continued trust between patient, therapist and future practitioners

The last is a seminal point, as trust of others is the cornerstone of effective treatment and is the basis of provisions necessary for the context of care throughout the treatment and in future treatment trajectories.

#### Risks of no plan

In utilizing “integration” rather than distraction, mechanisms for children and medical teams’ capacity to endure procedural music therapy will likely render the greatest benefits for patients. While distraction necessarily seeks to pull patient attention away from the pain, and may, under certain conditions be warranted, it emphasizes its components as imposed.

Integration can call upon the patient 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.”[19]

#### Holding down, “restraint” and use of force

Working in hospitals one can observe directly and indirectly (observation of procedures), children and adults being restrained by technicians, practitioners and even family members. Only a decade ago, a study acknowledged that children are generally restrained in supine position for IV starts, and that this is “a position that creates fear but is presumed necessary.” The study inclusive of 118 children 9 months to 4 years examined parents’ holding of their children in an upright position. Although the upright position didn’t decrease the number of necessary IV attempts, it was seen as an effective way to decrease IV distress in young children.[34]

Trust of conditions and of others surrounding medical treatment is critical. Lack of trust and manipulation that is inconsiderate of patient-input may have potentially harmful and traumatic impact.

One of the most thorough reviews of music and music therapy’s potential in the response and perception of pain organizes characteristics of application from early physiological laboratory studies, to audio-analgesic laboratory

studies.[35]

The summary rendered largely efficient, yet not well-defined ‘music effects’ on observational and behavioral outcomes. It was inclusive of historical stimuli conditions, such as induced shock and white noise in the laboratory, to more extensive studies on music’s effects in the OR and in painful dental procedures. The majority of these studies pay little attention to the music selection or the relationship between practitioner, accompanying therapists or specialists.

As the profession of music therapy has matured, alongside the development of integrative medicine, music medicine and music therapy may be better positioned to include patients’ desires and responses to be the focus at center stage. The realization that the body’s capacity to endure potentially painful procedures will likely have enduring ramifications for a patient’s trust of him/her self and others.

Perhaps Erik Erikson described the relationship of ‘inner’ and ‘outer’ support best in his reflection of the ‘trust versus distrust’ primal stage in his well-known ‘Eight Stages of Man’:

“The general state of trust furthermore implies not only that one has learned to rely on the sameness and continuity of the outer providers, but also that one may trust oneself and the capacity of one’s own organs; and that one is able to consider oneself trustworthy enough so that the providers will not need to be on guard, lest they be nipped.”[36]

Of course, Erikson is discussing the development of infancy here, and it may seem oversimplified to relate such a premise to the treatment of patients (children and adults) as we conceptualize their capacity to endure procedures. However, the rudimentary premise that the diagnosis and maintenance within a disease trajectory can disassemble one’s ability to maintain a sense of control, and our understanding of regression as a part of the disease process, therefore may serve herein as a presage that potentializes more forward-thinking.

#### Integrating ‘integration’ in research and practice

While the distinct implications that conceptualize our understanding of ‘integration’ as practitioners and music therapists who might aim to emphasize it as uniquely distinguishable from ‘distraction’ – the trust and endurance of procedures are likely to become more easeful as patients of all ages and diagnoses will be entrusted to participate in their care. While the majority of former music and music therapy studies of procedures may have proven ‘music’ effectiveness as audio-analgesic, not accounting necessarily for a ‘music relationship’ two studies stand out amongst the several dozen ‘procedural music therapy’ titles.

A clinical trial tested the pain relieving effect of live lullaby singing on behavioral and physiological pain responses during veni-puncture in [37] preterm and full term neonates. As acute and repeated pain, as well as the use of analgesic drugs, may have long-term negative impact on infants’

development and future behavior, this study supports the potential for complementary approaches to pain management such as music therapy.

Parent-preferred lullabies were performed live and standard care was provided for all neonates. Behavioral responses with regard to pain were assessed. Heart rate, respiratory rate and oxygen saturation were frequently collected. [37]

Although the live-lullaby singing for premature infants used during the veni-punctures may not have rendered statistical significance on the infant's pain score, arguably, the pain score measurement utilize as one of its distress components, the expression of crying (Premature Infant Pain Profile-Revised (PIPP-R) and Behavioral Indicators of Infant Pain (BIIP), which could be defined as a release-oriented coping strategy of self expression and protection. The observation of a significantly calmer breathing pattern in the lullaby versus control condition was observed in the pre-needle stage, and there were also some indications of fewer and shorter skin punctures with the singing of lullabies which were either parent-selected or culturally indicated.[37]

It has taken the medical community time and continuous research to recognize that neonates not only experience pain[38,39] , but also that the experience of infant pain can have traces of significant associated repercussions in later life. [40-42]

Another study providing succinct details advancing the uses of music with patients suffering from burns, includes several steps that surpass the usual recommendation to merely "distract." The focus of the music therapist in helping to advocate the relationship between the practitioner and patient is emphasized as key. This is one of the few studies that, although the music implemented is reportedly recorded, it is, in fact, "patient-selected" and the experience itself is directive and integrative. This is because one of the music therapist's central aims was to help the patient associate the music to the pain experience. In this way, one could characterize this study as 'integrative' as the therapist is providing ammunition for the patient to combat and furthermore potentially control future conditions of pain that might emerge in a future treatment condition.[43]

Procedural music therapy techniques involving what is depicted as 'distraction' of live improvised music have been well-described in debridement procedures, with strong suggestion that assessment prior to procedures guide stage-phase orientations.[44] Emphasizing an alternative to distraction, noting that if the distraction condition was not effective, improvisation and songwriting were nest to be instituted, provided early recognition and convincing rationale for an 'integrative' model, whereby a patient's ideas can be organized to become part of the in-the-moment procedure strategizing.[45] This provides assurances that the conditions of patient-expression can be honored. Efficacy of focus and engagement techniques were described[46,47] as

music-based imagery (MBI) or music alternate engagement (MAE). These techniques were utilized in a more recent study[48] that reported little attention to the focus of the integrative needs of the moment and rather, proposes to: "work(s) on the premises that if conscious awareness or attention can be centered on a strong, positive, and pleasant stimulus rather than pain and other anxiety-provoking stimuli, the perception of pain can be attenuated." These intentions are well-meaning and may be useful, however a musical engagement taking integration into account may call upon the team to accept 'negative' expression, such as tears or loud unpleasant moaning. There is a musical context for every kind of expression to be held and honored. Drumming, rapping and free form vocalizing can be creative, containing, and reflect practitioners and therapists' acceptance of the patients' need to release.[16]

A study that did not include music in debridement wound care, compared 9 patients, ages 2-12, who were treated using psychological verbal interventions by 30 staff members trained in the two approaches: standard therapy (which emphasized staff control and patient distraction) with the experimental approach rendering patient-predictability and controllability of aversive 77 events. In the experimental group, treating patient control and focus on the procedure were emphasized, rather than 79 distracting away from the procedure. Comparison of groups on dependent variables such as depression and anxiety demonstrated that the experimental group fared better. There were significantly more maladaptive behaviors in the first 2 weeks of hospitalization, and higher significant depression measures upon discharge in the control group.

"It was my impression that controllability of aversive events played a major role in pain control. An increase in predictability alone did seem to be useful, but nothing seemed as effective in decreasing or eliminating pain as giving the patient control over an aversive event. Giving control of an aversive event to the patient was, in every observation, immediately followed by decreased protest and a facial expression and body posture which did not reflect pain."[49]

#### Procedural music therapy: An Integrative Model

The development of clinical strategies involving integrative techniques offer options that secure resilience based on the following postulates:

1. *Inclusion:* When the procedure is explained/ sung/ story-sung in steps (or verses) prior to, and as it will occur in the moment, and integration accompanied by a team-based course of action is part of the plan, the patient will experience group support, rather than the recipient or victim of something that is being 'done to' him/her.

2. *Control*: As the patient is provided with options to maintain directives, musically, such as a count-off prior to the insertion of a needle, or a decision of ‘fast or slow’ or an instrument (musical) for the therapist and/or person accompanying him/her in the procedure, trust of the process will ensue.

3. *Acceptance of Release*: Anxiety is associated with pain. It is therefore acceptable and expected or even encouraged that crying and/or yelling can occur at the moment of pain. The music can be entrained to provide dissonance to consonance at the point of release and move toward subtle, cued, resolve. (such as a mutual countdown for needle insertion-and a dissonant to consonant chord from yelling to toning).

4. *Patient Inquiry/Feedback*: During the procedure, the patient is given the reigns to provide check-ins for the team. (“stop” “go”-‘musical conductor’ cues) Any feedback related to temperature, unexpected occurrences involving temperature, desires for physical or emotional support are invited.

## Discussion

The presentation of an integration model, rather than a distraction model of procedural music therapy is an outgrowth of evolution within my patient-centered care model of clinical practice. It is my hope that former initial studies of procedural support representing the seeds of integrative care, and reflecting in particular, the utilization of music therapy as a best practice treatment option, will afford patients and medical practices broadened opportunities for participation that fuel important choices within their procedural pain management. This is particularly critical because it is currently widely recognized that untreated acute pain has the potential to result in both immediate and long-term consequences. Live music therapy instituting an integrative approach utilizes aspects of medical music psychotherapy (15, 16, 19, 31, 33, 44, 45) whereby patients of all ages and diagnoses can use release strategies such as breathing, as well as singing, playing and many other activities afforded through careful assessment.

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### Biographical Statements

Joanne V. Loewy DA, LCAT, MT-BC is an active clinician and researcher whose interests include integrative music psychotherapy in neonatology, pediatrics, oncology, palliative care, neurology, pulmonary care, and musicians.