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Abstract

Environmental music therapy (EMT) is a noninvasive mind–body intervention that considers the physical, psychological, and cultural needs of patients, caregivers, and staff. Quantitative and qualitative analyses of the effect of EMT on patients, caregivers, and staff revealed that EMT, involving the purposeful use of live music, showed positive effects on stress level and reduced the perception of noise in patients and caregivers when applied in common and treatment areas of the Cancer Center and outpatient infusion facility at a large inner-city hospital. Environmental music therapy attended to the immediate needs of patients and caregivers in a culturally sensitive way both prior to and during treatment. The present study additionally evaluates the effect of EMT's capacity to alleviate compassion fatigue and stress in oncologists, nurses, and other health professionals.

Keywords

chemotherapy, music medicine, music therapy, oncology, burnout

The purpose of this article is to describe the impact of an environmental music therapy (EMT) pilot program as a noninvasive, mind–body intervention in cancer care. Environmental music therapy, a method of live music therapy first defined by music therapist Steve Schneider,^{1,2} focuses on the physical, psychological, and cultural implications of treatment. The intervention was applied in outpatient areas of an urban cancer treatment center including the waiting room and the chemotherapy infusion suite. Environmental music therapy addresses the needs of caregivers, medical staff, patients, and families who might experience intense emotional stressors.^{3,4} Environmental music therapy may prove useful in addressing the effects of music on compassion fatigue experienced by people caring for severely ill patients. Furthermore, the application of live music in fragile environments may have a positive impact on noise and address its possible infringements on an expectant healing environment with vulnerable populations, such as waiting rooms, ICUs, and spaces shared by patients, staff, and caregivers.⁵

Literature Review

Few studies investigate the emotional stress that can accompany patients awaiting chemotherapy or how this experience is perceived. The complex emotions associated with the process of awaiting chemotherapy treatment may influence treatment outcomes,⁶ reinforcing that environmental conditions are an

important component of cancer care and worthy of comprehensive investigation.⁷⁻¹¹ Specifically, the physical components of the waiting room and common areas where treatment is administered communally are not typically addressed in the medical literature. At some centers, there is a need for a significant improvement in patient-related issues including accessibility, patient comfort, environmental conditions (noise, ventilation), organizational and functional aspects of the services related to information (reception, health and nonhealth information), privacy (the calling system, confidentiality), and patients' waiting time.⁷ The emotional impact of waiting was measured through a 15-item questionnaire identifying moods and fears

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of 355 patients with cancer in an outpatient oncology clinic.⁶ More than 300 patients suggested that the presence of aesthetic experiences during the waiting period contributed to create a constructive, free, and personalized waiting experience, contrary to the boredom and psychological distress-inducing state represented in the usual waiting room experience.

The use of receptive music listening as an intervention in environmental conditions has been increasing in recent years.^{6,12-16} Such initiatives seek to improve the overall well-being of patients and decrease the physical and psychological impact of waiting periods in threatening situations identified by patients, such as surgery, medical procedures, and oncology treatments.⁶ In 1 trial, prerecorded music in presurgical patients in the waiting room was shown to decrease stress and increase relaxation when compared to a control where no music was utilized.¹⁷

Anxiety disorders are often prevalent in patients with cancer and can interfere with their ability to tolerate treatment. The prevalence of anxiety is particularly high among patients awaiting diagnostic procedures in oncologic settings.^{18,19} The effects of anxiety potentially provoked by sterile and unfamiliar environments for even short waiting periods may affect patients both psychologically and physiologically, and this may be reflected through incremental shifts in heart rate, blood pressure, respiration, nausea, and behavioral and cognitive changes.²⁰⁻²² Mulcahy et al documented the effects of waiting, which are described by many patients as the worst part of the cancer experience. The authors remarked on the loss of control that often can accompany the waiting process. Participants described the experience of waiting as “stressful,” “frightening,” and “the hardest part of the cancer journey.” Anxiety, depression, and increased physical pain were also documented in this study.²³

The effect of music on anxiety experienced by patients in short stay settings was assessed through a review of 12 research studies that concluded that music was effective in reducing some or all of the anxiety measures.²² Each of the studies included in this review required patients to listen to prerecorded music through earphones. Significantly, none of the studies specifically mention the provision of live music. In addition, the music described was confined to 3 or 4 genres rather than being uniquely patient selected. This may limit the cultural inclusivity that we believe is critical to individualized patient-centered care. More recently, Cooper and Foster utilized a broad scope of musical genres in their elegant study “The use of music to aid patients’ relaxation in a radiotherapy waiting room.” Notably, this study does not clarify the nature of the provided music as live or recorded, nor does it specify the training of those who provided the music.²⁴ We consider both of these components to be crucial to the study of a music therapy intervention in fragile environments.

Chemotherapy treatment presents in one study as a potentially critical time of anxiety for family caregivers of patients with cancer.²⁵ The State Anxiety Inventory and a semistructured interview were used to measure family caregivers’ anxiety in a sample of 344 family caregivers from oncology and general hospital environments.

Significant differences in the level of anxiety in family caregivers were dependent upon the sex type, the ward (inpatient vs outpatient), residence proximity of the patient, socioeconomic and illness-related factors, and the health care system support.²⁶ For the staff providing care, a population grossly under-investigated, compassion fatigue and burnout often led to high turnover rate, job-related error, and lower patient satisfaction scoring. In such environments, nurses, in particular, are susceptible to feeling emotionally compromised.^{12,27}

Methods

This pilot study was the first of its kind to report the findings of patient, caregiver, and staff attitudes of an EMT intervention in the waiting room and infusion suite of a cancer center. The music for the EMT interventions was selected based on the dynamics of the physical space, the level of noise in the room, and sporadic listener musical requests. The music was employed intentionally to match and reflect the environment in the moment and was tailored to meet the needs and preferences of the patients, caregivers, and medical staff as identified through weekly surveys. Background noises, such as beeping monitors, pump sounds, and talking, were addressed through the melding of tones and timbres in an otherwise often acoustically taxing environment. Music was played as a duet or solo on 2 instruments, solo with accompaniment of the following instruments: violin, keyboard, guitar, and comfort sounds (Remo ocean drum; see Note 1) and were utilized by 2 music therapists in the target areas. The musical repertoire was comprised of a wide range of genres, including but not limited to classical, new age, R&B, gospel, reggae, world music, and folk music (Appendix A, available online at <http://mmd.sagepub.com/supplemental>). The music therapy team checked in with staff prior to assessing the acoustic environment. The environmental noise was assessed through listening and evaluation for 5 minutes prior to the actual commencement of playtime. The 30-minute intervention began with an improvisation utilizing a slow tempo, which served to explore simple movements of melodies that incorporated the sounds of the environment (in the natural surrounding of sounds, eg, pump alarms, prosody of voices). These sounds were utilized as the basis for melodic and harmonic structure. The improvisation of the opening provided a natural harmonic structure base that created opportunity for clinical improvisation that became a basis for our ability to modify the tempo and dynamic to meld with the listeners’ awareness. When we sensed tension through observation of listeners’ facial expression and body gesture, we adapted our music in the moment to address it. Repetitive melodic patterns permit a high grade of anticipatory feeling and may communicate a sense of diminishing unpredictability that impairs the patients’ quality of life. Additionally, through harmonic progressions and consistent rhythmic aspects of familiar tunes, the therapists provided the listeners with opportunities for tension release and a venue for a healing environment through auditory consonance. As staff members’ listening became consistent, there was a trend toward their gradual

familiarity with the music and therapists. As such, their participation in the sessions increased to the point where they were requesting songs that held personal significance, and there were moments of clear engagement in the music, both actively and passively.

The participants were invited to complete a voluntary survey available to all patients, staff, and caregivers regarding the impact of EMT sessions and the experienced effect of the music and its dynamics (Appendix B, available online). Surveys were distributed by the research assistant prior to EMT, or placed near locations where staff were located with the indication that their completion was optional, and collected after the 30-minute intervention, during a 4-month period, where EMT was provided 1 day each week for a period of 4 months. In total, 52 surveys were collected within 2 environments of the chemotherapy infusion area. A total of 27 patients and 10 caregivers responded to the questionnaire. A total of 15 staff members volunteered to participate in the study; and of these, 10 were recruited in the infusion suite unit and 5 in the oncology waiting room, on the basis of availability during the data collection period. The number recruited was approximately 30% of the total number of doctors and nurses employed within the unit, and 90% of the total of administrative personal within the waiting room area.

1. The infusion suite: January 2010: 24 surveys were collected from 11 patients, 3 caregivers, and 10 staff members; and
2. The waiting room: February, March, April 2010: 28 surveys were collected from 16 patients, 7 caregivers, and 5 staff members.

Questionnaires were classified into 6 questions: question 1, evaluation of the effect of the music on the environment; question 2, evaluation of the perception of the music with respect to volume; question 3, type of preferred music or genre; question 4, how did the music change the environment (open question); question 5, future recommendations (open question); and question 6, comments (open question). The questionnaire was anonymous, with space to indicate the area in which the intervention took place and the role of the responder (patient, caregiver, and medical staff, including administrative personnel in the infusion suite). Surveys were independently and collectively analyzed after 30-minute weekly EMT interventions by a research assistant who was not privy to the intentions of the study outcomes. The provision of the current 30-minute intervention of live music was based on the principles of EMT that are identified in clinical practice and in the research literature,^{15,16,28} where the primary focus seeks to promote health between the hospital community and its physical environment.²⁹⁻³² In addition to surveys gathered by the research associate, the team of 2 music therapists who provided the EMT maintained a log that was inclusive of comments made by patients, caregivers, and staff. This article also includes results of a qualitative phenomenological analysis to illustrate themes by displaying findings through direct quotes from participants' accounts. These excerpts of illustrative comments made throughout the 4 months of the intervention

were indicative of physical and emotional shifts in perceptions and attitudes both prior and during chemotherapy treatment. The surveys asked patients, caregivers, and staff to rate the impact of the music on the individual (patient, personal, or professional caregiver) and on the environment and to further describe their favorite musical genres. They were also invited to provide favorite songs or music and to provide recommendations for future implementation of EMT.

Statistical Analysis

The statistical analysis was conducted by a statistician using Stata version 12.³³ The primary variables of interest were the ratings of music loudness and effect, the location where the music was listened to, and the category of the rater (staff, caregiver, patient). All of these variables were categorical in scale and all associations between the ratings of the music and the other primary variables were evaluated using Pearson chi-square and Fisher exact tests.

Results

The data provided valuable information regarding the impact of EMT and resulted in future recommendations for continued EMT in the waiting room as well as for individual music therapy interventions in the oncology infusion suite. Analysis of the data collected in the surveys demonstrates the impact of the intervention on participants with results including emotional reactions to the music and changes in the perception of noise. The results indicate that modulation of noise levels through musical experiences can address physical and emotional needs. The overall analysis of question 1 is based on an assumption that the responses would be uniform across the categories, indicating a strong and significant tendency for the respondents to respond with category 4 (changed the environment) or category 5 (extremely changed the environment) rather than randomly across categories (Figure 1). By analyzing the categories of the relationship between where the music was heard and the judgment of the effect of the music on the environment, we found a statistically significant relationship between setting and judgment. The effect is due to the preponderance of "extremely influential" judgments in the infusion suite versus the higher rate of judgments in the lower category "changed the environment" in the waiting room (Figure 2). The overall test of question 2 versus an assumed uniform response distribution shows that the respondents overwhelmingly chose category 3 or "Just right" to describe the music's sound quality (Figure 3). Figure 4 analyzes the relationship between the category of the responder and his or her judgment of the effect of the music, as we observed in negative responses among staff in the infusion suite. There was no overall significant association between a person's category and his or her judgment of the effect of the music. However, there were 2 staff members who judged the effect to be disturbing, representing about one-third of the deviations from the overall expectation. When we look at the association between category and the judgment of the effect of the music in the environment

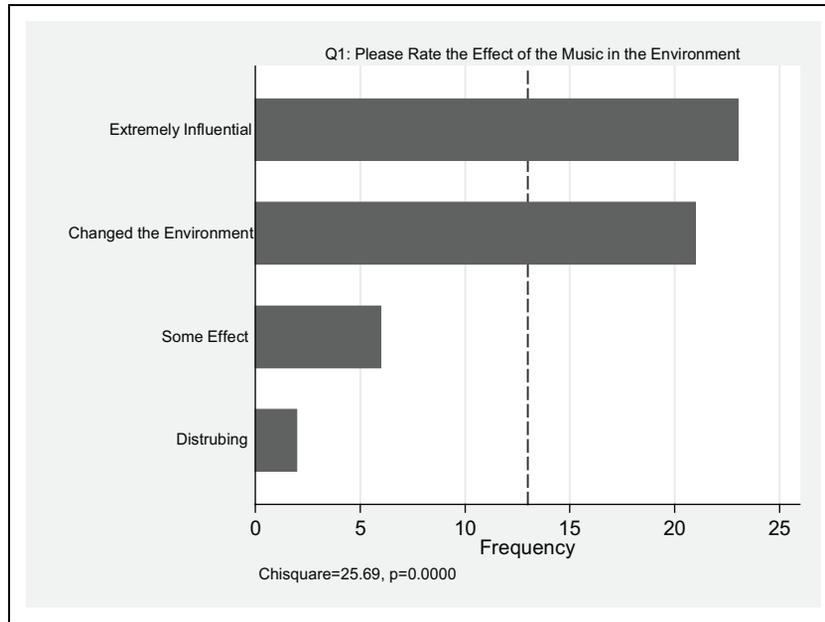


Figure 1. Overall test of question 1: Please rate the effect of the music in the environment versus uniform distribution.

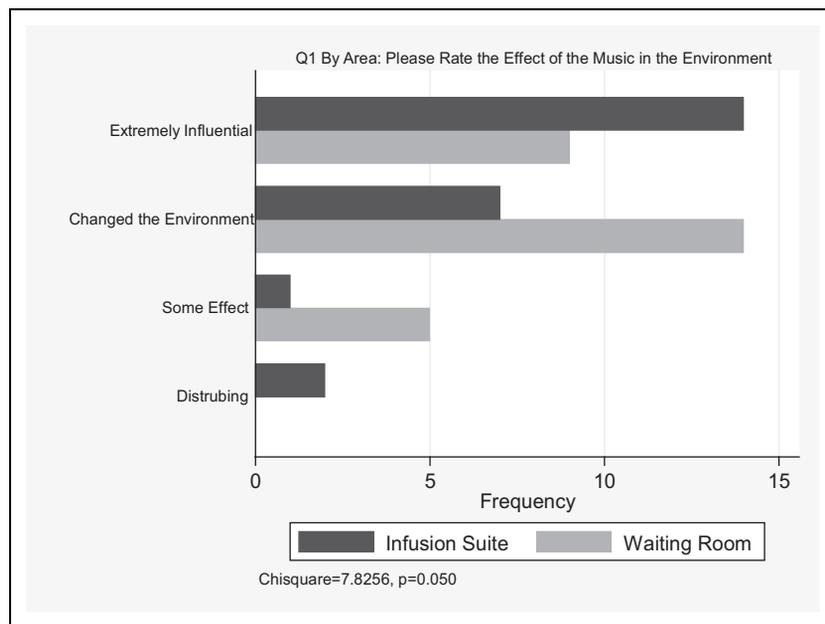


Figure 2. Tabulation of area by question 1: Please rate the effect of the music in the environment.

but only in the waiting room, Figure 5 shows a slight tendency for staff members to judge the music to be extremely influential, which is the opposite of the judgment made in the infusion suite. When we look at the judgment of the loudness of the music by category, again we see the staff judging the music to be soft or too soft more than we would expect by chance. This is marginally significant by the Fisher exact test ($P = .065$) and in conjunction with the findings in Figure 6.

Figure 7 shows the results of surveying the music preferences of the raters. The most popular genre of music was classical

($n = 37$), followed by easy listening ($n = 28$). Since the raters were allowed to choose more than 1 genre, it was not possible to calculate a chi-square test, which would require that the counts be independent.

Qualitative Phenomenological Analysis

This study additionally included qualitative analysis, employing interpretative phenomenological analysis (IPA)—a methodological framework increasingly used in health care

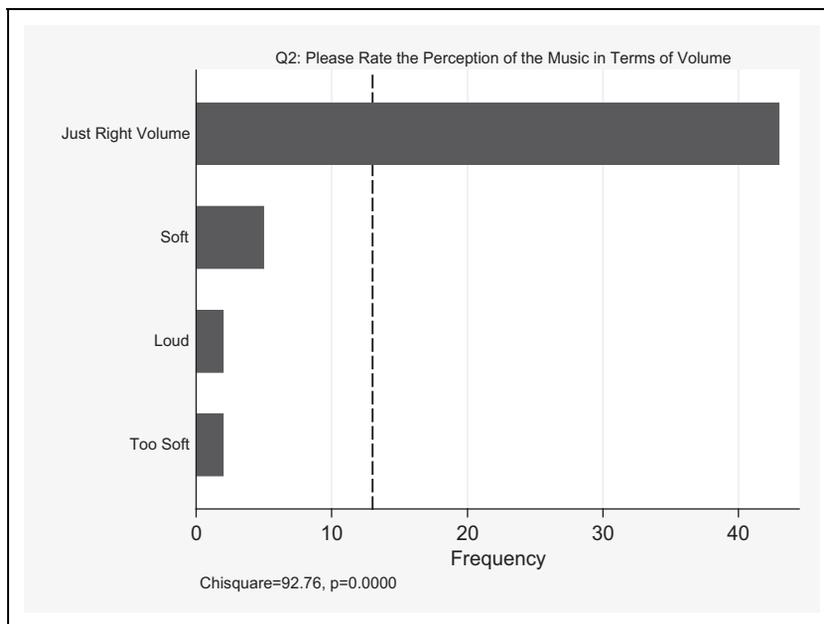


Figure 3. Overall test of question 2: Perception of the music in terms of volume versus uniform distribution

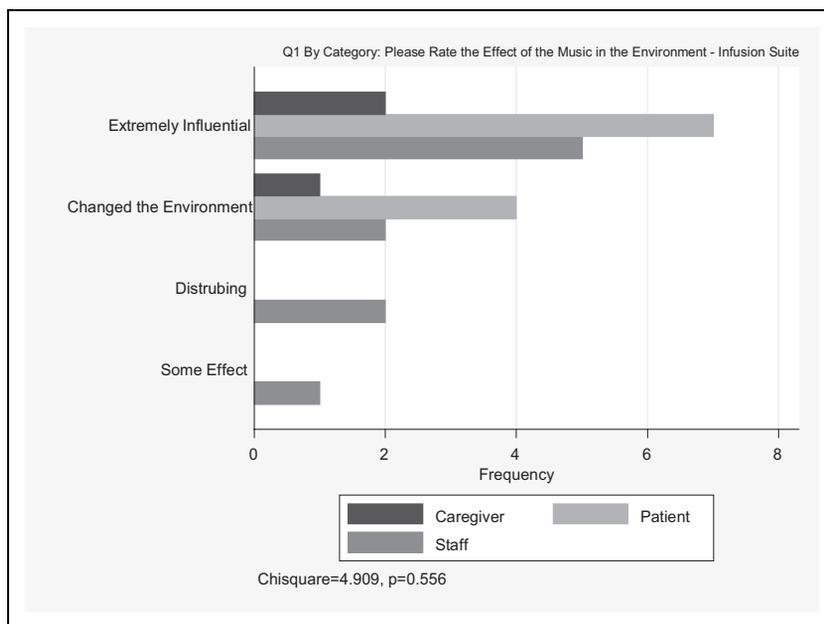


Figure 4. Tabulation of categories: Please rate the effect of the music in the environment—infusion suite

research,³⁴ which aims to illustrate master themes by firmly anchoring findings in direct quotes from participant accounts.³⁵ Reliability and validity of the results of this study were strengthened by discussions between 2 researchers who had both analyzed the data independently. All questionnaires were read through twice before the first transcript was analyzed. During the third reading, anything considered significant was coded.³⁶ The 2 music therapists that provided the intervention did not analyze the data quantitatively but were directly and purposefully involved with the qualitative analysis. Reliability and trustworthiness were

achieved through member checking by the team once the analysis was synthesized.

We identified 3 different domains from the data that were derived from several themes, representing the effect of the EMT intervention in patients and caregivers (Table 1). The data collected from staff comments were analyzed separately (Table 2).

Discussion

This study was the first of its kind, bringing knowledge to the effect of live music in critical areas such as the oncology

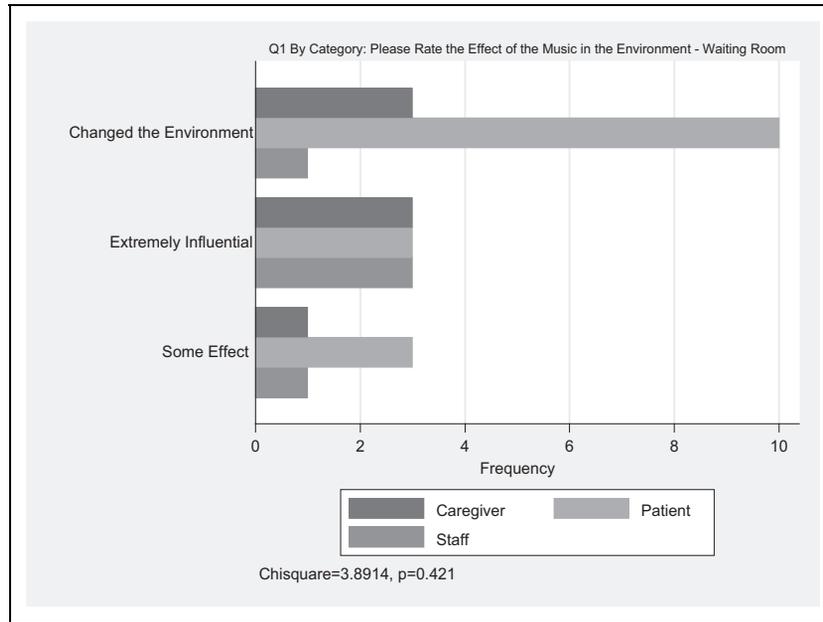


Figure 5. Tabulation of categories: Please rate the effect of the music in the environment—waiting room

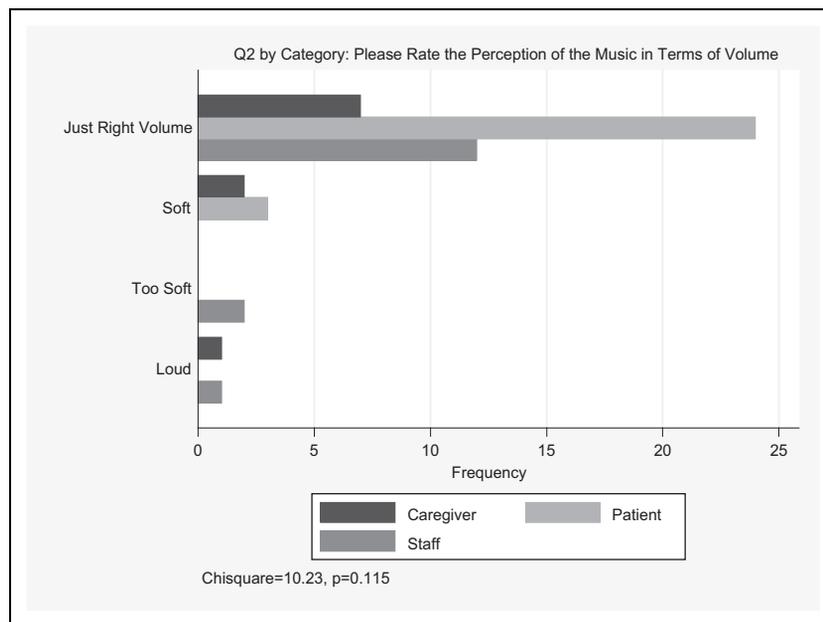


Figure 6. Tabulation of categories: Perception of the music in terms of volume

waiting room and chemotherapy infusion suite. The findings should be interpreted with consideration of the potential limitations of the study:

While the response rate of staff members in the waiting room was 90%, the response rate of the staff in the infusion suite was lower (30%), possibly affecting the representative quality of our results in that setting. We speculate that this is due to the larger number of staff working in the infusion suite, many of whom expressed lack of time to participate in the study. No incentives were offered. The design of the survey does not allow for detailed comparison between varying staff

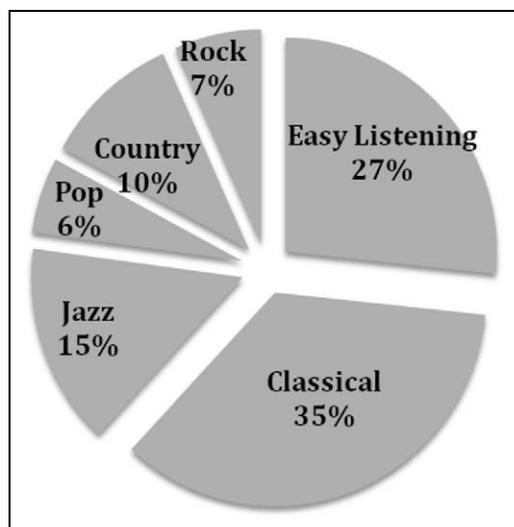
categories. Although it was not a part of this research, in the year that followed the study period, the music therapy team did have the opportunity to follow-up with interested staff in an effort to develop a more formal EMT program. This study was the pilot that laid the groundwork for such development to take place. Another limitation in the study lies in the survey, which was not a validated instrument. There is a potential limitation related to the physical configuration of both target areas: large and narrow rooms may influence the acoustic perception of the music. In addition, no preliminary studies of the emotional state of patients, through standardized tests, such as the Beck

Table 1. Patient/Caregiver Experience

Themes	Content Exemplars
Physical domain	
Reduced anxiety, calming, relaxing effect	<p>“The Music soothed my nerves when I would normally have increased anxiety as I wait.” (Patient in waiting room)</p> <p>“Music is soothing and helpful when you are nervous about your treatment.” (Patient during treatment)</p> <p>“I relaxed more while waiting. It was soothing.” (Patient during treatment)</p> <p>“Very soothing and calming.” (Patient in waiting room)</p> <p>“Music made it much more relaxing.” (Caregiver, waiting room)</p> <p>“Having the musician (music therapist, sic) here was much better than hearing it on a CD or radio.” (Patient during treatment)</p>
Emotional domain	
Perceived changed mood, refocus, hope	<p>“The music took my focus off what I was thinking of and created a bed of warmth.” (Patient, infusion suite)</p> <p>“It changed my mood from bad to good.” (Patient, waiting room)</p> <p>“I enjoyed my appointment more than ever. I was really impatient and the music calmed me down.” (Patient, waiting room)</p> <p>“Whatever problems one is facing, you enable everyone to see those difficulties in a lighter way.” (Patient, waiting room)</p> <p>“It helped change the mood of my sister who is a patient.” (Caregiver, infusion suite)</p> <p>“Very uplifting to the spirit.” (Caregiver, waiting room)</p>
Aesthetic domain	
Unexpected pleasant effect, beauty	<p>“It affected me greatly, before I was even aware of its effects—good medicine. Very unusual, I did not expect it. Relaxing. Takes your mind away from your thinking, if only for a while.” (Patient, infusion suite)</p> <p>“It was beautiful. Music is soothing and helpful when you are nervous about your treatment.” (Patient, waiting room)</p>

Table 2. Staff Experience

Themes	Content Exemplars
Improved mood	<p>“Come Thursday, we are packed with patients and they will love the music.” (Staff, waiting room)</p> <p>“Isn’t it possible to have you here for 2 hours? You can stay here all day!” (Staff, waiting room)</p> <p>“Changed the mood in the patients and staff workers in a good way.” (Staff, infusion suite)</p> <p>“Come Thursday, we are packed with patients and they will love the music.” (Staff, waiting room)</p>
Enhanced peer staff support through spontaneous musical performances	<p>“I absolutely loved it. I used to play the piano, can I try?” (Staff, waiting room)</p>
Loss associated with oncology work that might evoke memories of previous losses	<p>“My father passed away months ago and this music reminds me of him.” (Staff, waiting room)</p> <p>“Could you please play this piece of music? This is a song I used to sing when I was a child. I don’t remember the name of the piece but my sister played it for me all the time!” (Staff, waiting room)</p>
Negative responses	<p>“Musicians are on the top of the patients. No space for intimacy for RNs to speak.” (Staff, infusion suite)</p> <p>“Irritated me. Distracting.” (Staff, infusion suite)</p>

**Figure 7.** Type of genre preference versus uniform distribution infusion suite area/waiting room

Depression Inventory, and so on, were obtained as this research is considered to be baseline.

The findings of this study indicate a strong tendency to consider the EMT intervention as beneficial. Results comparing target areas show a slight difference in the judgment of the music in favor of the infusion suite, where the predominant consideration was “extremely influential.” The tendency for the infusion suite staff members to judge the music to be disturbing contrasts with the judgment made in the waiting room, where the staff considered the intervention to be positive. The analysis of the data suggests that the medical staff may be having difficulty adjusting to the presence of music and music therapists during the treatment process. When questioned further by the research associate, reasons of space-related factors (“the keyboard was in the way at times,” etc) seemed to contribute to this slight tendency to find the music “disturbing.” On the contrary, staff in the oncology waiting room seemed to perceive the intervention as beneficial for both patients and staff. Physical design of both target areas

may have influenced the perception of the music regarding the volume. Surprisingly, the responders overwhelmingly rated the music as “right volume.” Again, the marginal negative judgment to consider the music in the infusion suite either too soft or too loud may be influenced by the way the room is designed, with a narrow space for patients to be lined along one side.

The comments by responders yield significant results in terms of physical, emotional, and aesthetic domains, which suggest how EMT and individual music therapy sessions can increase the patients’ and caregivers’ feelings of control, coping, relaxation, self-awareness, self-esteem, and physical comfort.^{25,37-39} Listening to relaxing music has been proven to be effective in reducing physical symptoms such as anxiety, ameliorating waiting-related side effects, and lowering treatment-related distress. Music therapy is used to engage and support hope as a part of the patient’s belief system with regard to his or her life and treatment. It can enhance feelings of comfort, hope, and joy. Environmental music therapy can ease the experience of trauma for patients experiencing fear and overwhelm. This has been supported in the findings of Porges⁴⁰ who described the effects of music therapy on individuals’ social engagement system. Music therapy involves an artistic medium utilized purposefully for interpersonal and emotional aesthetic expression while providing opportunity for discovery, experience, and transformation, particularly with aspects of the self in relation to the self, and within the environment, which is inclusive of others. The listeners can be transformed through musical experience. Music can increase the awareness of beauty and emphasize the creation of space for positive things, as reflected in the comments made by patients and caregivers throughout the course of the 4 months.

Consideration of the staff comments is of utmost importance. Oncology care workers carry a significant emotional burden, supporting patients and families through difficult treatments and unpredictable courses of illness. Demanding schedules, lack of emotional support, and uncertainty of roles can lead to dissatisfaction or professional burnout.^{3,4,41,42} Staff reported the personally helpful effect of witnessing and sometimes momentarily engaging in the EMT sessions. They described through the survey reports provided that the presence of music therapy helped them improve their ability to care for patients through music’s impact on their mood, feeling states, and degree of self-awareness. As we observed in the data analysis, 2 staff participants expressed negative responses. There is a question of whether this was related to the workplace space or whether perhaps this was based on the development of a strong and intensive oncology worker–patient relationship, as we discuss in the following. Staff members are exposed to the effects of this fragile environment and may suffer while witnessing the stress of the patients. The staff members conveyed the significance of music therapy in helping to restore and create a sense of unity. Environmental music therapy can also provide staff members psychosocial support and increased coping mechanisms, which ultimately may support a professional caregiver’s capacity to cope with job-related stressors.^{40,43}

In terms of music preferences, our data indicate classical music (35%) and easy listening music (27%) as preferred genres. It is well established in the literature the type of music provision, where the preferred music is an important factor when designing EMT interventions in health care facilities.⁴⁴⁻⁴⁶ Incorporating personalized music-based coping mechanisms into the patients’ experiences may contribute to improving quality of life and subsequent treatment expectations with the capacity to foster endurance.⁴⁷⁻⁵⁰ However, this music is most commonly delivered via electronic devices, such as MP3 or portable CD players. The presented EMT intervention relies on the belief that trained music therapists may contribute to a significantly more relaxing atmosphere, creating musical structures with the potential to positively modify or alter the patient experience of waiting for chemotherapy treatment. Based on this belief and on an assessment of environmental sounds, the music therapists construct an infusion of music genres and create a quiet, aesthetically pleasing live music experience for patients, families, and professional medical staff.

Conclusion

Environmental music therapy is a relatively new modality. Although some hospitals have incorporated music volunteers and/or visiting artists, such programs generally do not take into consideration the hospital’s most fragile environments, such as ICUs and waiting rooms.⁵¹ Music therapists are trained to recognize symptoms of traumatic stress. Music therapy’s clinical training, which takes place on-site in medical settings, includes knowledge of vital signs and recognition of their impact in response to events that can exacerbate anxiety. The challenge to understand how trauma can arise is critical to the study of fragile environments in music and medicine. In following up with our study findings through interviews with the staff members who found the intervention to be disturbing, we learned that this was related to their perception of “issues of space.” The infusion suite’s spatial configuration can present challenges for live musicians (music therapists). It is strongly recommended that the therapists offering EMT observe with diligence the culture of the suite prior to any attempted therapeutic intervention. Each unit has its own host of unique challenges. It is also recommended that an in-service be provided, not only for doctors but particularly for nurses who can best advise on how to implement EMT not only with regard to patient symptomology and census for the day but also with respect to general concerns of space and flow of the unit. The nurses are the gatekeepers of the infusion suite and were helpful in the institution of EMT providing moment-to-moment assessment of the unit atmospheric stressors related to time, space, and patient history.

The EMT sessions provided in the infusion suite and waiting room accomplished the initial objectives of the pilot program. Since this was a small study, and a new program, we adhered to suggestions made by staff. A further expansion of this experience is currently being adapted to better meet individual patient and caregiver situations. Our next study will include

only handheld instruments (guitar, violin, winds) that will perhaps provide more adaptability to the space concerns. We will include larger numbers and consider the perception of time and consumer satisfaction in relation to anxiety as part of our variables. Further individuated patient-based music therapy experiences (eg live music-making or improvisation with therapist, song-writing, lyric analysis) could provide effective follow-up in evoking strengthening emotions and memories, expanding consciousness, improving mood and quality of life,⁵² decreasing physiological symptoms during treatment, and decreasing anxiety, fatigue, fear, and diastolic blood pressure during stressful moments.²⁰⁻²² This may alter the experience of trauma, fear, and overwhelm into a more acceptable physiological state,⁴⁰ thus contributing to the patient, caregiver, and staff perception of a healing environment.

Declaration of Conflicting Interests

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Note

1. The ocean drum, invented by Remo, is played by slowly rotating the instrument circularly and replicates the sounds of the water, such as rain or ocean waves. The “drum” creates a relaxing, calming effect and is widely utilized in music therapy interventions.

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