FEATURES

The Impact of a Live Therapeutic Music Intervention on Patients’ Experience of Pain, Anxiety, and Muscle Tension

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This exploratory study demonstrated the positive impact of live music as a holistic patient intervention directed toward reducing pain, anxiety, and muscle tension levels of patients admitted to a tertiary care center for an emergent medical condition. Music can be combined with other holistic interventions to positively impact patient outcomes. KEY WORDS: live therapeutic music, music therapy, pain control strategies, relaxation and pain control

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Music has been a part of culture throughout history and has been linked to health and emotional well-being since the times of Greek mythology.1 In Old Testament biblical times, David soothed King Saul’s spirits with his harp (1 Samuel 16:23, Revised Standard Version), and many mothers have long known that a soothing lullaby can calm and comfort a fussy baby. Florence Nightingale, the founder of modern nursing, specifically addressed how music could aid the patient-healing process.2 Although some empirical evidence of the benefit of music for specific types of patients has been identified in the last 3 decades, data are lacking in terms of identifying when patients may derive the most benefit from therapeutic music interventions, such as during or after painful or anxiety-producing procedures, or at times of mild versus moderate or severe pain, anxiety, and tension. In addition, the issue of use of taped versus live music interventions and patient-chosen versus provider-chosen musical selections has not been addressed adequately enough to propose a standard protocol for use of therapeutic music interventions for either specific patient populations or hospitalized patients as a whole.

THEORETICAL BASIS FOR USE OF MUSIC AS AN INTERVENTION

Use of music as a nursing intervention is based on several theoretical perspectives, both from within and outside the nursing arena. Nursing “focuses on the holistic care of human beings and the use of multiple healing modalities when participating in a caring–healing relationship.”3(p56) Holistic nursing, in particular, focuses on the interconnectedness of body, mind, spirit, emotions, energy, environment, and relationships in the totality of a person’s health state, and in the development of interventions to promote healing and well-being.4 Holistic nurses design environments that promote healing, comfort, and well-being, in partnership with patients and family. Using music to promote comfort and well-being fits well within the scope of holistic nursing practice.5

Theories from outside the nursing field also support the use of music for reducing pain and promoting patient well-being. The gate-control theory of pain is familiar to most nurses, having been published in 1965 by Melzack and Wall.6 It is proposed that a mechanism within the dorsal horn of the spinal cord functions as a “gate” either promoting or inhibiting the transmission of pain impulses to the brain. Both nonpain stimulation of large nerve fibers and stimulation of cortical brain centers by pleasant stimuli that activate descending nerve impulses can close the dorsal horn gate and block the transmission and perception of painful stimuli.7 Melzack has since expanded his framework and given it a new title: the neuromatrix

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theory of pain. The revised framework posits that pain is a multidimensional experience influenced by the interaction of a number of factors including an individual’s experiences, emotional and stress state, cognition, and built-in genetic makeup, as well as the cyclical processing and synthesis of nerve impulses. Melzack recognizes that the body acts as a “whole” and is felt as a unity, a position that is shared by holistic nursing. The use of music as an intervention to reduce pain would fit within both Melzack’s gate control and neuromatrix theories of pain, as it could modulate the sensory experience of the pain and also the cognitive, motivational, and emotional responses that comprise the affective component of pain.

A theory more familiar to music therapists that also can help explain the influence of music on humans is the entrainment theory. The human body has a number of rhythms and vibrations, including those of large structures such as the heart and other organs, as well as those within individual cells. Entrainment itself happens when 2 vibrating objects come into the same vibratory pattern. According to this theory, sound vibrations from slow, rhythmic musical selections can influence the body’s rhythms (such as brain rhythms, vital signs, etc) to “match” or be in harmony with the rhythm of the music. In order for entrainment to occur, however, the music stimulus should have a consistent rhythm and amplitude. Researchers have documented variation in body rhythms such as respiratory length, pulse, and diastolic blood pressure as well as electrodermal and zygomatic activity, based on the type and tempo of music exposure. The music suggested to promote entrainment in a positive vibratory pattern should have a slow tempo (between 60 and 80 beats per minute), should be instrumental or vocal without words, and should have a soothing, repetitive nature.

**LITERATURE REVIEW**

**Recorded music**

A number of studies have been conducted investigating the impact of music on patients’ anxiety, pain, and perception of well-being, with positive results. Most studies have used recorded rather than live music, most likely because of the widespread availability of recorded music, the low cost of providing this therapeutic intervention, and also the ability to “blind” patients and researchers to the participant group assignment in randomized controlled trials (RCTs). Individual studies have found that recorded music interventions reduced non-ambulation-associated pain for postoperative intestinal surgery patients, reduced pain and nausea for patients undergoing bone marrow transplant procedures, and reduced anxiety and intubation time for patients undergoing cardiovascular surgery. In addition, music was found to reduce the anxiety of children undergoing casting-related procedures and adult patients experiencing gastrointestinal procedures.

However, a review of 4 literature-synthesis studies related to the impact of music on pain and anxiety yielded rather mixed results. Cooke and colleagues compiled a synthesis of studies investigating the impact of taped music on anxiety in short-term patient-waiting periods, finding that most studies demonstrated reduction in state-anxiety scores as measured by the State-Trait Anxiety Inventory, but findings were mixed in terms of physiologic measures (reduction in pulse, blood pressure, or respirations). In another synthesis study, Nilsson reviewed RCTs investigating the impact of taped music on perioperative pain and anxiety levels of patients having elective surgeries, finding that in half (12) of the 24 studies measuring anxiety levels, patients who experienced music interventions reported significantly lower anxiety scores. In 13 of the 22 studies that investigated pain as a dependent variable, patients exposed to music interventions reported significantly less pain; and in 7 of the 15 studies measuring patient analgesic use, patients experiencing a therapeutic music intervention required less analgesic medication. Listening to recorded music resulted in lower heart rate and blood pressure in 6 of the 22 studies that measured these variables, and lower respiratory rate in 3 of the 8 studies that used respirations as a variable.

In another research synthesis by Richards et al, reported findings were similar to those of Nilsson in relation to the impact of recorded music on patient pain levels, with 4 of the 9 reviewed studies reporting that recorded music significantly reduced patient pain levels. However, only 1 of 6 reviewed studies measuring patient analgesic use, patients experiencing a therapeutic music intervention required less analgesic medication. Most recently Capeda et al synthesized data from 51 studies in preparation of the Cochrane Review on the impact of recorded music interventions on patient pain. They found considerable variation in the reported effect of a therapeutic music intervention on pain...
intensity, with pooled estimates indicating that patients exposed to music reported 0.4 less pain on a 10-point scale than control patients, and required 1 mg less morphine within a 2-hour time frame than nonexposed patients. These findings did not appear to differ on the basis of whether the patients self-selected the type of music they would listen to or were not given a choice in music selection. Authors concluded that music may reduce patient pain, but the magnitude of impact may be relatively small, making it difficult to determine the clinical importance of this intervention. The Cochrane Review did not address the impact of music on patient anxiety, patient satisfaction, or physiologic measures, but authors did recommend further investigation of the effect of music on variables such as patient anxiety, as well as the combination of music with other therapies to enhance therapeutic effect.

Live music

The impact of use of live therapeutic music interventions with hospitalized patients is less commonly investigated, and many of the studies that have incorporated live music interventions have not incorporated randomization or control groups, but rather, employ pre–post measures with the patients serving as their own control. Part of the reasoning for the lack of RCTs using live music is that the circumstances surrounding the intervention are less controlled with the presence of a music practitioner, and it is impossible to blind either staff or patients to the treatment.

One study of live music interventions that did use a control group indicated that daily music interventions contributed to lower anxiety levels, improved perceptions of hospitalization, increased relaxation, and lower stress, but did not impact patient–pain levels or lengths of stay for patients undergoing elective brain surgery procedures. Another randomized study using live music interventions found that 20 minutes of live music resulted in reductions of anxiety, fear, and fatigue measures along with diastolic blood pressure readings, and an increase in reported relaxation among patients undergoing chemotherapy treatments. Additional studies have found that live harp music reduced patient-reported pain and anxiety as well as systolic blood pressure of postoperative vascular and thoracic surgical patients, and reduced patient mean arterial pressure, heart rate and respiratory rate during the immediate preoperative period for patients having ophthalmic surgery.

The review of the literature indicates that positive patient outcomes can result from therapeutic music interventions via a variety of means—taped or live—using patient selection or offering a specifically chosen selection, and through either a single experience or repeated exposure. To date, there has not been a testing of a standardized music intervention protocol. One of the few similarities in the studies is that the style of music is usually identified as slow and lyrical, and typically without words. In addition, many of the studies have used defined patient populations—patients experiencing similar outpatient or planned surgical procedures. However, these studies do not speak of the use of music therapy interventions on a typical hospital medical-surgical unit or with the variety of patients that a nurse may care for on any given day. Often these patients are admitted unexpectedly for some type of emergent illness or injury, which may contribute to increased levels of anxiety, pain, and muscle tension. These may be the very patients who would benefit most from the relaxation effect of therapeutic music interventions.

THE THERAPEUTIC MUSIC PROGRAM AT WEST VIRGINIA UNIVERSITY HOSPITAL

The therapeutic music program at West Virginia University Hospital has been in existence for 7 years and includes a certified music practitioner (CMP) whose services are used in 2 different ways: playing scheduled music sessions in the open areas of specific units/departments, with the music potentially impacting a number of patients, families, and staff simultaneously; and conducting therapeutic music sessions for individual patients at either patient/family request or on the referral of nurses, physicians, or chaplain staff. Although patient feedback has been very positive based on an informal survey and patient request for additional music sessions, it was felt that further research to investigate the potential impact of this program was needed. Although patients in the typical medical-surgical acute-care setting vary greatly in demographics, health state, and medical interventions, many patients share the experience of pain and anxiety related to their injury/illness or to the experience of hospitalization itself and thus may respond favorably to a therapeutic music intervention. Thus a research study was planned to test the following hypotheses with a population of medical-surgical patients.
1. Patients’ subjective ratings of pain, anxiety, and muscle tension will be reduced after the experience of a therapeutic music intervention.

2. Physiologic measures of heart rate, pulse, and blood pressure will be reduced after patients experience a therapeutic music intervention.

3. Patients will view the therapeutic music experience as impacting their hospitalization positively.

METHODS

This study used a quasi-experimental methodology with a pre-post intervention design. The study population was a convenience sample of patients who had experienced an unplanned/emergent admission to an acute care medical-surgical unit of West Virginia University Hospital. The reason for selection of this population is that the 3 patient-rated variables chosen as measures of music effectiveness (pain, anxiety, and muscle tension) should be at levels high enough preintervention to document a change postintervention.

The institutional review board’s approval for the study was obtained prior to recruitment of study participants. Potential participants needed to be alert and oriented, able to respond verbally and to understand English, and expected to be hospitalized for at least 48 hours beyond the time of study intake. Potential participants were initially recruited by department nursing staff. However, as recruitment of patients was progressing quite slowly, researchers actively sought participants through weekly discussions with staff nurses to identify patients meeting study-screening criteria. After initial screening by RN staff, one of the researchers explained the study to the potential participants and obtained informed consent. Staff nurses were not asked to obtain patient consent, as patients might have felt compelled to participate, in order to please those who were their assigned caregivers. The researchers were not direct patient caregivers; thus, it is less likely that patients would feel compelled to participate in the study if they were not initially inclined to do so.

Patients also signed an authorization to use protected health information prior to participating in the study, as physiologic parameters of pulse, respiration, and blood pressure were recorded, and data related to pain medication usage was obtained from the patient medical record. Initial data were collected through open-ended questions asking about the participants’ usual response to experiencing pain and anxiety, and previous training in or use of relaxation techniques when experiencing pain or anxiety.

Patients were then asked to rate their current level of pain, anxiety, and muscle tension, using an 11-point numeric rating scale (NRS). The 0–10 pain scale is the official pain-rating scale used by the hospital and has been demonstrated to provide similar information as the visual analog scale in terms of intensity of pain ratings. It is also easy for patients to understand and use effectively. The same 0–10 NRS was used by patients to rate their levels of anxiety and muscle tension, as the scale was familiar to patients and provided efficient measurement. The NRS has been used by other researchers to measure self-reported anxiety levels. Although patients may not be as familiar with quantifying their perceived level of muscle tension, the same 0–10 scale was used for this rating, as it was felt that a familiar scale would contribute to the degree of patient accuracy in rating this variable.

Patients’ pulse, respirations, and blood pressure were measured via either manual reading or electronic device prior to the music session. The CMP then positioned himself at the side or foot of the bed and played slow tempo, relaxing harp selections on the Celtic Harp for approximately 20 minutes. The CMP did not initiate verbal interactions during the music session but did respond to patients’ questions, such as a request to identify a particular musical selection. Two patients requested that the CMP play a familiar hymn, and the harpist accommodated their requests. At the conclusion of the music intervention, measures of pulse, respirations, and blood pressure were repeated using the same equipment used for pretest data collection and patients again rated their pain, anxiety, and muscle tension on a 0 to 10 scale. In addition, patients were asked to rate the helpfulness of the music session in terms of reducing pain, anxiety, and muscle tension on a 0 to 10 scale, with 0 being not at all helpful and 10 being the most helpful they could imagine the music to be. This 10-point scale was used for the sake of consistency and familiarity for the study participants, as well as the goal to gather adequate data without causing undue stress or burden for patients who may be experiencing significant levels of pain and anxiety.

Participants who remained in the hospital for 24–48 hours after the initial music intervention were offered a second therapeutic music session, with the same data collected pre- and postintervention. At the conclusion of the second session (or the first session if patients
were to be discharged within 24–48 hours), participants were asked by either the RN discharging the patient or one of the researchers, if they were on site, to complete a written survey about the music intervention. The survey asked them to rate their pain, anxiety, and muscle tension levels during the music session in relation to prior to the session, with response options of more, about the same and less. Participants were also asked to identify how long the music effect lasted, with the response options being less than 15 minutes, 15–30 minutes, 31–60 minutes, and over an hour. In addition, participants were asked whether they used music to help them to relax or cope with pain prior to hospitalization, and if they would use music in the future to help them relax or cope with pain (forced-choice question with no, not sure, and yes options), and the type of music that they find relaxing (open-ended item). Finally, participants were asked whether they would suggest music sessions for other people who have to be in the hospital (5-point Likert response option from not at all likely to very likely). Participants were also asked to write in a response to the question asking how the music sessions affected their overall experience at the hospital.

**RESULTS**

Thirty-one patients participated in the first therapeutic music therapy session, and 20 of the initial participants completed a second music session. Eleven participants were discharged from the hospital before completing the second music session—typically were discharged over a weekend when the CMP was not available. The age of patient participants ranged from 18 to 86 years, with a mean age of 48 years. Seventeen women and 14 men participated in the study, with all but 2 being admitted for an emergent injury resulting from a trauma, fall, or auto accident, and 2 participants having been admitted for emergent illness situations. Of the participants admitted for traumatic injury, 19 had experienced 1 or more fractures as a result of the injury. The majority of participants had been hospitalized previously (71%), with most patients (79%) reporting a positive experience in their previous hospitalizations.

Study participants’ reported typical response to experiencing pain outside of the hospital environment was to take medication (35%), try to relax (26%), or reposition self for comfort (16%). Only 3 participants (10%) identified using music as a means to reduce pain prior to the music intervention study. The most commonly reported patient responses to experiencing anxiety were trying to occupy or distract themselves to relax (16%), followed by breathing (10%) and listening to music (10%). Most participants when asked directly, however, did report listening to music to relax (71%), but did not report having been taught any specific relaxation method (70%).

Paired / test comparisons indicated that patient-reported pain, anxiety, and muscle tension (all rated on a 0 to 10 scale with 10 being the highest level) were significantly lower after the music intervention for both sessions 1 and 2 (see Table 1). In addition, respiratory rate was significantly lower after the music intervention for both sessions, and patient systolic blood pressure was lower after the first music session (see Table 2). Review of patient medication records indicated that 11 (42%) of the participants in the initial music session had received pain medication within 2 hours of the music session, a time frame in which the increasing effect of the pain medication might have potentiated the beneficial impact of the music on patient pain and anxiety ratings. Fewer participants (N = 4; 13%) in the second music session had received pain medication within 2 hours of the music session; thus, potential impact of analgesic medication on the second session’s pain and anxiety ratings was much lower.

Mean participant ratings of the helpfulness of the music with pain was 8 for both sessions, while helpfulness of music with anxiety was ranked 8.5 on both sessions. Participants rated helpfulness of music with muscle tension as 8.3 for the first session and 7.5 for the second session. Most patients reported that the length of the music session was about right, with none reporting that it was too long. When asked what they were thinking/doing while the harpist was playing, participants most commonly responded visualizing/thinking of a peaceful place (22%), followed by relaxing/resting (19%), thinking about the harp or music (13%), and just listening (10%). The only things reported by respondents when they were asked whether there was something that they did not like about the music session was that it was not long enough (6%) or that they did not like the disruption of needing to answer questions after being relaxed and sleepy from the harp session (3%). No negative responses were made when participants were questioned during the second music session.

There were minor intervening events during a few of the music sessions. Two patients received phone
calls, 2 participants had a pastoral visit, and environmental noise, conversation of others, or extraneous activity was noted in 3 sessions. Several patients had family members in their hospital room, but specific numeric data were not collected in relation to this circumstance. In almost all circumstances, the family member listened quietly to the music along with the patient participant.

Respondents were asked to respond to the written survey about their hospital music experience prior to discharge. All but 3 participants (89%) reported they were less anxious during their music sessions, while the remaining 3 (11%) reported their anxiety levels remained about the same. Sixty-nine percent reported less pain during the music session, while 28% reported about the same amount of pain, and 1 patient reported an increase in pain (3%). In addition, 93% of participants reported an improved mood during the music sessions. When asked how long that beneficial feeling lasted (if they found the music beneficial), 30% reported “over an hour,” 35% reported “30–60 minutes,” and 35% reported “15–30 minutes,” while no one reported “less than 15 minutes.” All respondents indicated that the music was helpful to them, and most (68%) felt the timing was good. All patients said they would suggest therapeutic music sessions, and 21% stating that they would probably suggest them. When asked prior to discharge, 93% of patients reported that they will use music in the future as a relaxation tool, an increase from the 71% who reported using it on the initial study survey. Patients reported a range of music that they find relaxing, from classical and meditation music to blues, country, and hymns/gospel, although listening to rock music to relax was seldom reported.

**DISCUSSION**

Research hypothesis 1 was supported. Participants in this small study reported significant reductions in pain, anxiety, and muscle tension ratings, and rated the helpfulness of the music with these symptoms highly after a live therapeutic music session. At discharge, the majority of patients reaffirmed that the therapeutic music intervention had reduced their pain and anxiety levels.

Research hypothesis 2 was partially supported, as there were significant reductions in physiologic measures of respirations and systolic blood pressure after the music intervention, although no changes were detected in pulse or diastolic blood pressure. These findings are similar to other studies, in that physiologic measures were not always significantly

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**TABLE 1. Paired t test comparisons of patient-reported pain, anxiety, and muscle tension**

<table>
<thead>
<tr>
<th></th>
<th>Mean presession (SD)</th>
<th>Mean postsession (SD)</th>
<th>df</th>
<th>t</th>
<th>P</th>
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<tbody>
<tr>
<td>Session 1 pain</td>
<td>5.1 (2.8)</td>
<td>3.9 (2.9)</td>
<td>29</td>
<td>3.0</td>
<td>.005</td>
</tr>
<tr>
<td>Session 2 pain</td>
<td>4.6 (3.1)</td>
<td>2.6 (2.6)</td>
<td>19</td>
<td>3.4</td>
<td>.003</td>
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<tr>
<td>Session 1 anxiety</td>
<td>5.0 (3.5)</td>
<td>3.4 (2.8)</td>
<td>29</td>
<td>2.3</td>
<td>.03</td>
</tr>
<tr>
<td>Session 2 anxiety</td>
<td>4.9 (2.7)</td>
<td>2.6 (2.1)</td>
<td>19</td>
<td>4.3</td>
<td>.000</td>
</tr>
<tr>
<td>Session 1 tension</td>
<td>4.2 (3.1)</td>
<td>1.9 (2.2)</td>
<td>29</td>
<td>5.1</td>
<td>.000</td>
</tr>
<tr>
<td>Session 2 tension</td>
<td>4.7 (3.3)</td>
<td>1.5 (2.0)</td>
<td>19</td>
<td>4.8</td>
<td>.000</td>
</tr>
</tbody>
</table>

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**TABLE 2. Paired t test comparisons of vital signs in session 1**

<table>
<thead>
<tr>
<th></th>
<th>Mean presession (SD)</th>
<th>Mean postsession (SD)</th>
<th>df</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session 1 pulse</td>
<td>89.3 (20.3)</td>
<td>88.1 (14.1)</td>
<td>29</td>
<td>0.44</td>
<td>.66</td>
</tr>
<tr>
<td>Session 2 pulse</td>
<td>90.8 (10.7)</td>
<td>90.9 (9.3)</td>
<td>18</td>
<td>−0.08</td>
<td>.93</td>
</tr>
<tr>
<td>Session 1 respiration</td>
<td>19.1 (1.7)</td>
<td>17.5 (2.1)</td>
<td>28</td>
<td>4.2</td>
<td>.000</td>
</tr>
<tr>
<td>Session 2 respiration</td>
<td>19.6 (1.5)</td>
<td>18.4 (2.7)</td>
<td>18</td>
<td>2.9</td>
<td>.01</td>
</tr>
<tr>
<td>Session 1 systolic BP</td>
<td>127.3 (19.8)</td>
<td>122.6 (21.9)</td>
<td>30</td>
<td>2.8</td>
<td>.009</td>
</tr>
<tr>
<td>Session 2 systolic BP</td>
<td>124.8 (19.6)</td>
<td>122.2 (19.4)</td>
<td>18</td>
<td>1.3</td>
<td>.21</td>
</tr>
<tr>
<td>Session 1 diastolic BP</td>
<td>68.1 (11.4)</td>
<td>68.7 (11.9)</td>
<td>30</td>
<td>−0.4</td>
<td>.7</td>
</tr>
<tr>
<td>Session 2 diastolic BP</td>
<td>66.5 (12.0)</td>
<td>63.8 (13.7)</td>
<td>18</td>
<td>1.2</td>
<td>.26</td>
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The research by Bernardi et al\textsuperscript{13} provides one explanation for the inconsistent impact of therapeutic music interventions on physiologic measures: they found that heart rate, respirations, and blood pressure all increased upon initial exposure to both slow and fast tempo music, but that the increase was significantly less for the slow tempo selections. They noted that the greatest reductions in vital-sign measures came with a 2-minute pause in the music between musical selections, supporting the stated belief that all music serves as a stimulating event, although slow rhythmic selections cause less stimulation than faster tempo selections. Also, if the participants’ pulse was already at a rate that was close to the vibratory rate or tempo of the music, the entrainment theory might suggest that a large change in pulse would not be necessary to bring the vibration into synchrony with the music.\textsuperscript{12} On the basis of these 2 issues, we would suggest that patients’ vital sign measures not be used as primary indicators of the impact of music on patient pain and anxiety in research studies.

Hypothesis 3 was supported, as the vast majority of patients reported that the music positively impacted their pain, anxiety, and muscle tension levels, and identified that the positive influence of the intervention outlasted the music session itself. In addition, patients reported that they would suggest therapeutic music sessions to other hospitalized patients, and an increased number of patients indicated that they would purposefully listen to music to relax in the future.

The study hypotheses were supported even though patients were not provided with a choice of music selections or of the type of musical instrument used for the session. Research findings support the conclusions of other authors\textsuperscript{12,13} that the positive effect of therapeutic music interventions is less related to patient’s choice of music than to the tempo and rhythm of the music itself, meaning that a patient who might typically listen to country-western music may reap the same benefit from a live harp session as a patient who routinely listens to classical orchestra pieces.

\textbf{STUDY LIMITATIONS}

\textbf{Recruitment issues}

During the course of the study, some issues arose in patient recruitment, which may have resulted in selection bias. Several patients identified as potential study participants by staff nurses or physical therapists declined to participate in the study. Our perception was that some of these patients might not have been willing or able to attend to the complexities of study participation (signing consent forms, attending to the verbal description of the study, and answering a number of survey questions), because of high pain, anxiety, or emotional distress levels. Several of these patients may have willingly allowed the CMP to play for them if there were no consent and HIPAA forms, questionnaires, and other study disruptions. The patients who declined participation may have been those for whom the music could have had the most significant impact.

\textbf{Lack of randomized control design}

Another limitation in this study was lack of randomized control design. Several factors made the use of a control group difficult. The patient population on the medical-surgical units varied greatly in age, experience with the use of music for performance or pleasure, and type/severity of medical condition. Matching patients for these characteristics would have been quite impractical at this facility. In addition, as with many holistic and complementary interventions, the effect of a live music intervention is moderated by patients’ experiences with illness/injury events and their consequences (pain, anxiety, and threats to well-being) as well as patients’ experiences with music or other relaxation techniques. No 2 patients experience or respond to painful stimuli in exactly the same way.\textsuperscript{8} Thus, even if researchers attempted to match patients for control and experimental groups, the patients’ experiences and interpretations may not be the same. Also, it was not possible to blind either the patients or the data collectors and care providers to patient assignment to control or experimental group with a live music intervention.

\textbf{Potential response bias}

Researchers served as the primary data collectors in this study. RN caregivers were not used to directly recruit participants in order to avoid perceived coercion to participate in the study. They were also not used to collect patient response data in order to avoid positively biased patient reports of the music impact as a result of patients’ wish to please caregivers and continue to receive “good” care. Researchers were not involved in the direct care of patients, so there may
have been less risk for response bias. However, the response bias still existed, in that patients may have responded positively to please researchers, or because they simply found the music “pleasant” even if it had little or no impact on their pain and anxiety levels.

**IMPLICATIONS**

Although there were limitations to the study, the findings do present several implications for practice. Live therapeutic music interventions can be effective for the general medical-surgical patient population, promoting patient comfort and relaxation, and the positive effects are perceived by patients to last longer than the music itself. Nurses should be aware of the potentially significant impact of this holistic intervention on patient well-being and can work collaboratively with music practitioners to identify patients who may benefit from therapeutic music sessions, identify the best timing for the interventions, and evaluate the impact of the music on patient pain, anxiety, and perceived well-being. Nurses often know the patients most intimately and are able to refer those patients for whom music may have the most impact on well-being and comfort, and when music could potentially be combined with other therapies to increase patient benefit. Nurses can also discuss potential use of music by patients as a means of promoting relaxation and comfort in their own home environment.

Several potential areas for future research have been identified as a result of this study. One potential research area is to identify the impact of live “ambient” therapeutic music on multiple patients concurrently, as well as on staff and family members within the "music zone." Because the patient’s choice in music selection may not be as significant as the tempo and rhythmicity of the music, it is possible that live “ambient” music could have a positive impact on several patients at once. Another area for potential research is to identify the impact of live music versus recorded music, or a coordinated program of live music followed by recorded music of the same genre on patient pain and anxiety. A coordinated program of both live and recorded music would enhance the capability of nurses and music practitioners to reach a higher number of patients with the limited resources and would ensure that patients have access to a therapeutic music intervention at times when it could be most beneficial to them. Finally, research directed toward identifying the impact of a combination of holistic therapies, for instance live music and guided relaxation or scheduled use of music with pharmacologic interventions, would be a valuable addition to current knowledge base related to holistic music therapy. Ultimately, the goal of additional research is identification of “best practice” or treatment protocols to guide use of therapeutic music interventions.

**REFERENCES**


