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ORIGINAL REPORT

Effects of Music Therapy on Anesthesia Requirements and Anxiety in Women Undergoing Ambulatory Breast Surgery for Cancer Diagnosis and Treatment: A Randomized Controlled Trial

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ABSTRACT

Purpose
To investigate the effect of live and recorded perioperative music therapy on anesthesia requirements, anxiety levels, recovery time, and patient satisfaction in women experiencing surgery for diagnosis or treatment of breast cancer.

Patients and Methods
Between 2012 and 2014, 207 female patients undergoing surgery for potential or known breast cancer were randomly assigned to receive either patient-selected live music (LM) preoperatively with therapist-selected recorded music intraoperatively (n = 69), patient-selected recorded music (RM) preoperatively with therapist-selected recorded music intraoperatively (n = 70), or usual care (UC) preoperatively with noise-blocking earmuffs intraoperatively (n = 68).

Results
The LM and the RM groups did not differ significantly from the UC group in the amount of propofol required to reach moderate sedation. Compared with the UC group, both the LM and the RM groups had greater reductions ($P < .001$) in anxiety scores preoperatively (mean changes [and standard deviation: −30.9 [36.3], −26.8 [29.3], and 0.0 [22.7]), respectively. The LM and RM groups did not differ from the UC group with respect to recovery time; however, the LM group had a shorter recovery time compared with the RM group (a difference of 12.4 minutes; 95% CI, 2.2 to 22.5; $P = .018$). Satisfaction scores for the LM and RM groups did not differ from those of the UC group.

Conclusion
Including music therapy as a complementary modality with cancer surgery may help manage preoperative anxiety in a way that is safe, effective, time-efficient, and enjoyable.

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INTRODUCTION

Women who are undergoing surgery for breast cancer diagnosis and treatment often experience heightened anxiety.[1-2] Although surgical anxiety may be managed by administering larger dosages of anxiolytic drugs, these drugs can depress circulation and respiration, making nondrug alternatives particularly attractive.[3]

Music therapy, defined as the clinical and evidence-based use of music interventions by a credentialed professional for the purpose of accomplishing individualized goals within a therapeutic relationship,[4] offers a safe and cost-effective adjunct to standard surgical care.[5] As a familiar and esthetic medium, music offers positive auditory stimuli that can mask adverse sound stimuli,[6] influence biochemical production,[7] improve emotional health through normalization of an unfamiliar environment,[8] and provide a sense of hope, empowerment, and enhanced well-being.[9] The literature reveals that interventions of music therapy and "music in medicine" are effective in reducing anxiety[10-13] and anesthesia requirements[14-15] in the surgical arena. A systematic review of randomized controlled trials studying the anxiety-sparing effects of music found that anxiety was significantly reduced in twelve of the 24 reviewed studies (including five of nine interventions that were performed intraoperatively).[16] Most of the existing research, however, constitutes "music in medicine" because it involves passive listening of prerecorded, staff-selected music, facilitated by nonmusic therapy staff.[17] In addition, despite the proven efficacy of live music with many

medical populations,[18-23] live music is rarely seen or studied in the surgical arena as a result of crowded preoperative rooms, time constraints, and the lack of employment of music therapists in operating wards. The use of both live and recorded music therapy in the surgical realm, however, may improve outcomes.[24,25]

Other complementary medicine modalities, such as hypnosis[26-28] and acupuncture,[29] have been found to reduce preoperative distress with interventions of 15 to 30 minutes in duration. It has been suggested that just 15 minutes of listening to music may also be effective in the reduction of anxiety.[30]

In a busy surgical setting, however, 15- to 30-minute intervals may not be available for complementary modalities, and the question arises as to whether a shorter music-therapy session might provide emotional relief. The objective of our study was to investigate the efficacy of one live or recorded song, within a 5-minute music therapy session, in the management of preoperative anxiety. The primary hypotheses were that, in comparison with patients in the control group, patients in the perioperative music arms of the study would require less anesthesia to reach a state of moderate sedation and would experience greater anxiety reduction preoperatively. Secondary hypotheses were that women in the music arms would have a decrease in recovery time and higher patient satisfaction levels as compared with those women in the nonmusic control group.

PATIENTS AND METHODS

Design, Setting, and Participants

A three-group randomized controlled trial design was used. Participants were patients undergoing surgery for potential or known breast cancer under monitored anesthesia care at two University Hospitals Health Systems hospitals: University Hospitals Case Medical Center, located in Cleveland, OH; and University Hospitals Richmond Medical Center in nearby Richmond Heights, OH. Participants were accrued between August 2012 and July 2014. Eligible participants were English-speaking women, 18 and older, with an ASA classification of I-III. Patients with profound mental illness, developmental disability, significant hearing loss, and those currently taking narcotics were excluded from the study. Patients were able to decline participation at any time although there were no withdrawals from the study. The University Hospitals Case Medical Center Institutional Review Board approved the study, investigators held human subjects certifications, and written informed consent was acquired from all participants.

Investigators received the schedules of patients from the surgeon's staff. Using a script, patients were invited to participate via phone. After verbal interest was expressed, each patient was asked to name a preferred song that would help her feel calm and supported should she hear it before surgery. Participants were randomly assigned at a 1:1:1 ratio to a control or one of two experimental groups with use of an online randomization module, which ensured adequate concealment. Patients were randomly assigned to receive either patient-selected live music (LM) preoperatively with therapist-selected recorded music intraoperatively, patient-selected recorded music (RM) preoperatively with therapist-selected recorded music intraoperatively, or usual care (UC) preoperatively with noise-blocking earmuffs (NBE) intraoperatively. A permuted block randomization scheme was used with random block sizes to prevent personnel from guessing the next assignment.

Treatment Conditions

Once a participant was welcomed, gowned, in bed, and settled in a preoperative room, a registered nurse research assistant administered a pretest to obtain a measurement of patient-assessed, baseline anxiety. Each patient in the LM group listened to a live presentation of her preferred song performed vocally with guitar or keyboard accompaniment by the music therapist, who stood at the patient's bedside. Each participant who was randomly assigned to the RM group listened to a downloaded recording of her preferred song via headphones while the music therapist stood outside the room. In both 5-minute experimental groups, music therapists engaged the patient in a short music-therapy session that included the preferred song plus brief conversation, which integrated processing of the song and questions surrounding the patient's song choice. Preferred music was offered preoperatively to introduce familiarity and autonomy[31] to a time surrounded by unfamiliarity and limited self-government. Patients in the UC group did not receive music and only received usual preoperative care for 5 minutes. During the trial period, UC patients did not have contact with the music therapist but instead waited for surgery in typical fashion. The registered nurse research assistant collected post-test anxiety data for each participant after the preoperative experimental or control condition was complete.

Patients who received LM or RM preoperatively were lent headphones and an MP3 player filled with a therapist-selected playlist of instrumental harp music for intraoperative listening. The therapist-selected music incorporated the evidence-based parameters of smooth melodic lines, stable rhythms, and consistent dynamics[7] and consisted of original, unfamiliar compositions to avoid negative memory associations. Before traveling to the operating room, the recorded music was initiated and volume levels were adjusted to the patient's preference. Control patients wore NBE during surgery to cancel any possible music played by the surgeon. Participants in all three groups were given fentanyl in the amount of 1 microgram per kilogram and Versed (midazolam) in the amount of 0.02 milligrams per kilogram. Anesthesia personnel adhered a Bispectral Index (BIS; Aspect Medical Systems, Norwood, MA) monitor sensor to the patient's forehead, then administered a propofol drip. The music therapist was present throughout all surgeries to ensure that the musical equipment was functioning properly. Patients wore music headphones or NBE until the conclusion of surgery. Additional information about the materials used to deliver LM and RM is included in the Appendix (online only).

Assessments

Preoperatively, RN research assistants asked participants to give a self-assessed rating on the minimally burdensome Global Anxiety-Visual Analog Scale (GA-VAS)[32,33] before and after the 5-minute experimental or control condition. The BIS, used intraoperatively, measures the effects of sedatives on the brain, displaying a value between 100 and 0 on the monitor to correspond with alertness. In this study, after signal quality on the monitor was achieved, propofol was titrated to the patient and the dose in milligrams was recorded when a reading of 70 was reached on the BIS. A BIS reading of 70 is labeled to be a general representation of moderate sedation in which a patient "may respond to loud commands or mild prodding/shaking."[34] Recovery time was record as the interval between surgery end time and the time when the patient had met discharge criteria according to hospital policy and procedure, determined by the recovery nurse. Patient satisfaction was measured with a five-item questionnaire administered to participants verbally by a staff member before discharge, with use of a Likert scale (range, 1 to 7). The questions were constructed from points on the CAHPS Surgical Care Survey of the Consumer Assessment of Health Providers and Systems (CAHPS) program, which is a program of the US Agency for Healthcare Research and Quality.[35] In addition, subjective data were recorded on the participants' response to the question: "What are your thoughts about your surgical experience?"

Statistical Analysis

Data were analyzed following the intent-to-treat principle; participants who did not receive their intended intervention were included in the arms to which they were randomly assigned in the analyses. Pairwise Wilcoxon rank sum tests were used to compare outcomes between study arms. As specified in the protocol, primary outcomes were the amount of propofol anesthesia required for sedation and the change in GA-VAS score from pretherapy to post-therapy, while secondary outcomes were the amount of time it took for the patient to recover from anesthesia and the patient-reported satisfaction score. The primary interest was in comparing each music therapy group to the control group with use of a two-sided test with a significance level of .025 to allow for two comparisons made per outcome. Although no multiple testing

correction was made to account for two primary outcomes, results in this article do not change if such a correction is made (ie, requiring $P < .0125$ for any of the four primary comparisons). Comparisons of outcomes of LM versus RM groups were also examined as secondary questions, with no adjustment for multiple comparisons. Effect sizes, defined as the difference in estimated means divided by the SD of the control group, are also presented for comparisons of the music therapy arms to the control group. Confidence intervals (CIs) for mean change in anxiety scores and comparisons of the changes among treatment arms were made from a multiple regression model, regressing change in GA-VAS score on the pretest GA-VAS to allow for different slopes in the three treatment arms. The model also used a heteroscedasticity-consistent estimator of the covariance matrix when computing standard errors using the acov option in SAS Proc Reg, Version 9.3 (SAS Institute, Cary, NC). In secondary analyses, this regression model or analysis of variance was used to adjust for hospital and for surgeon when comparing study arms with respect to primary and secondary outcomes. It should be noted that adjustment for these variables did not change the pattern of significant findings for any of the primary or secondary outcomes.

Study data were collected and managed using Research Electronic Data Capture (REDCap) tools hosted at University Hospitals of Cleveland. REDCap is a secure, web-based application designed to support data capture for research studies, providing an intuitive interface for validated data entry; audit trails for tracking data manipulation and export procedures; automated export procedures for seamless data downloads to common statistical packages; and procedures for importing data from external sources.

Table 1. Baseline Characteristics of Participants

Variables	All Participants (N = 201)	LM Group (n = 68)	RM Group (n = 68)	UC Group (n = 65)
Mean age ± SD	59.4 ± 15.7	58.8 ± 14.4	58.2 ± 17.6	61.3 ± 14.9
Race, No. (%)				
White	150 (74.6)	51 (75.0)	46 (67.7)	53 (81.5)
Nonwhite	51 (25.4)	17 (25.0)	22 (32.3)	12 (18.5)
Surgery type, No. (%)				
Biopsy	97 (48.3)	39 (57.4)	32 (47.1)	26 (40.0)
Lumpectomy	52 (25.9)	12 (17.7)	18 (26.5)	22 (33.9)
Re-excision	35 (17.4)	13 (19.1)	11 (16.2)	11 (16.9)
Port surgery	6 (3.0)	2 (2.9)	3 (4.4)	1 (1.5)
Mass excision	7 (3.5)	1 (1.5)	3 (4.4)	3 (4.6)
Other	4 (2.0)	1 (1.5)	1 (1.5)	2 (3.1)
Hospital, No. (%)				
UHCMC	133 (66.2)	47 (69.1)	41 (60.3)	45 (69.2)
UHRMC	68 (33.8)	21 (30.9)	27 (39.7)	20 (30.8)

Abbreviations: LM, live music; RM, recorded music; SD, standard deviation; UC, usual care; UHCMC, University Hospitals Case Medical Center; UHRMC, University Hospitals Richmond Medical Center.

Sample Size

The sample size of 67 participants per arm was chosen to provide 80% power to detect a 40% (38 mg) reduction in propofol in either music arm as compared with the control, assuming a control mean of 94 mg and a within-group SD of 70 mg, based on the results of a previous randomized trial.[14] It also provided 80% power to detect a difference in means of 0.54 SDs when examining the change in GA-VAS score and other secondary outcomes, assuming two-sided tests with a significance level of .025 to account for two comparisons (LM *v* UC, and RM *v* UC) per outcome.

RESULTS

Baseline Data

Table 1 summarizes baseline characteristics and type of surgery by treatment arm for the 201 participants who were randomly assigned to the protocol. Overall, participants had a mean (± SD) age of 59 ± 16 years (range, 18 to 94 years). The majority (74.6%) of participants were white, 22.9% were black, 1.5% were Asian, and 1.0% were Hispanic. The most common surgery types were biopsy, lumpectomy, and re-excision. The three treatment groups did not differ significantly with respect to age, race, type of surgery, or therapist. Figure 1 details patient flow through the study.

Amount of Propofol Required to Reach BIS 70

The amount (mg) of propofol needed to reach BIS 70 is summarized in Table 2. The mean amounts required were 67.2, 61.9, and 70.5 mg for the LM, RM, and UC groups, respectively. Neither music group differed from the UC group with respect to propofol requirements ($P = .17$ and .11 for LM and RM *v* UC, respectively).

Analyses of GA-VAS Scores

Table 2 presents univariable summaries of pretherapy and post-therapy GA-VAS scores as well as the pretherapy to post therapy change in GA-VAS score. Both LM and RM groups showed decreases in anxiety, with mean changes (±SD) in GA-VAS scores of −30.9 ± 36.3 and −26.8 ± 29.3, respectively, which both differed significantly ($P < .001$) from the control group's mean of 0.0 ± 22.7 on the basis of the Wilcoxon rank sum tests. LM and RM groups did not differ significantly ($P = .39$) with respect to changes in GA-VAS scores.

Analyses of Change in GA-VAS Score by Level of GA-VAS Pretherapy Score

A scatter plot of the changes in the GA-VAS score (post-therapy score minus pretherapy score) plotted against the pretherapy GA-VAS score, with regression lines fit to the separate treatment groups (Fig 2), indicated that larger changes (reductions) in GA-VAS scores were seen when the baseline GA-VAS score was high rather than low. Slopes of regressions of change in GA-VAS score versus pretherapy GA-VAS score were significantly less than zero for the LM and RM groups ($P < .001$) but not for the UC group ($P = .10$). Estimated slopes [95% CI] were −0.492 [−0.686 to −0.298], −0.448 [−0.576 to −0.320], and −0.138 [−0.303 to 0.027] for LM, RM, and UC groups, respectively. Slopes of LM and RM groups did not differ, but the slopes of both differed from that of the UC group ($P \leq .002$). The adjusted mean change in GA-VAS was estimated for each arm as the mean change when the pretherapy GA-VAS equaled 64.7, the pretherapy mean for all groups combined. The adjusted means of GA-VAS changes and the differences in adjusted means are shown in the lower part of Table 2. Anxiety was reduced more in the LM (difference, −26.5; CI, −35.5 to −17.5) and RM (difference, −25.7; CI, −33.9 to −17.4) groups as compared with the UC group, with corresponding effect sizes of −0.57 and −0.55 (Table 2). The adjusted means of LM and RM groups did not differ (difference, 0.8; CI, −9.0 to 7.4).

Time in Postanesthesia Care Unit

Times to discharge readiness (Table 3) did not differ between either music group and the control group (Table 3). However, time to discharge readiness was shorter ($P = .018$) for the LM group as compared with the RM group (difference, 12 minutes; CI, −22.5 to −2.2).

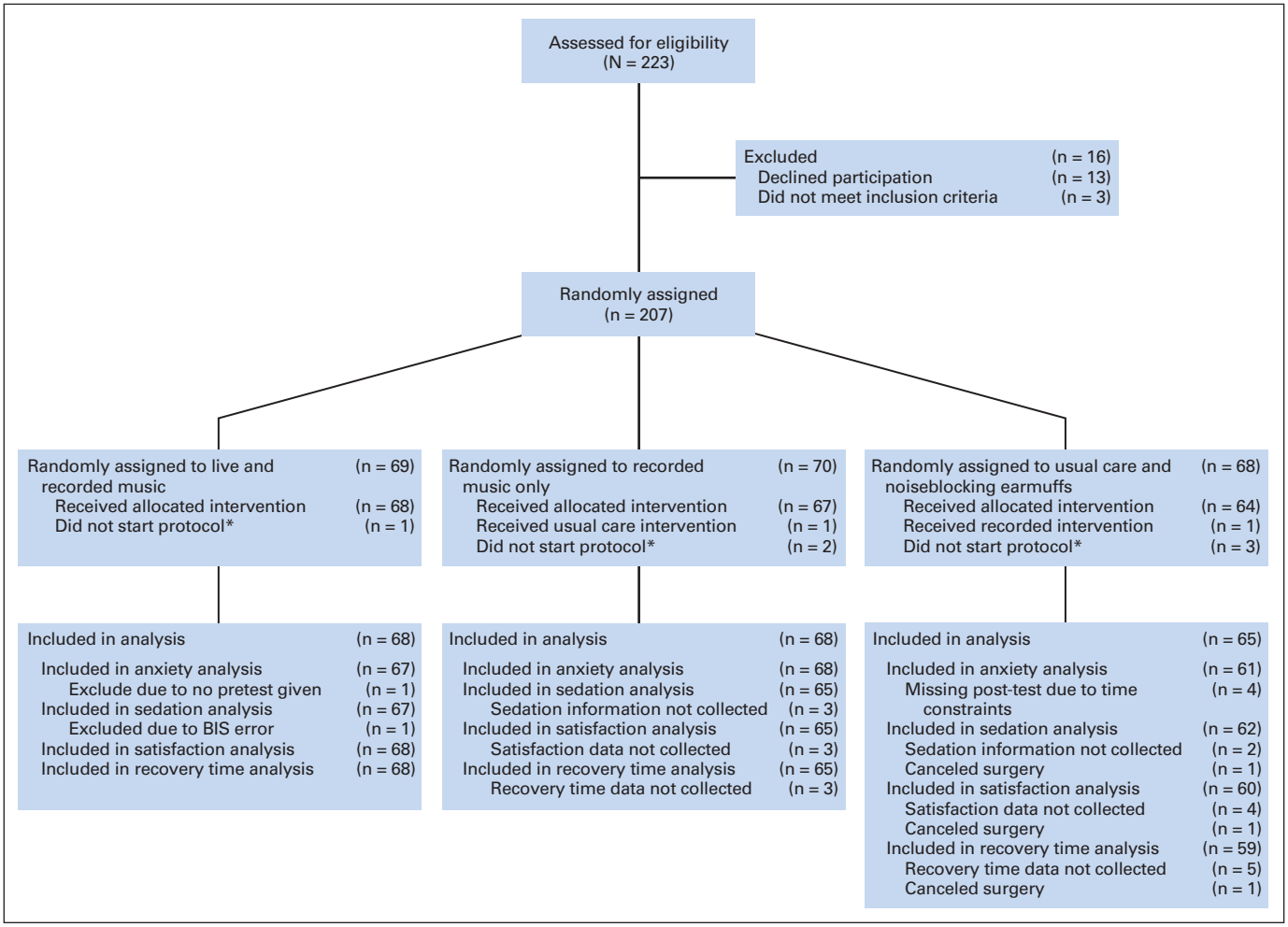

Fig 1. CONSORT diagram. (*) Did not start study protocol as a result of a temporary study hold. BIS, Bispectral Index monitor.

Patient Satisfaction

Mean scores on the five satisfaction questions asked were all above 6.5 on the 1 to 7 scale for all questions and study arms, indicating a high level of satisfaction overall (Table 3). Satisfaction scores did not differ between music and UC groups or between RM and LM groups.

DISCUSSION

The study aim was to determine if music therapy affected anxiety levels, anesthesia requirements, recovery time, and satisfaction in ambulatory breast surgery patients. To our knowledge, this randomized controlled trial is the first to test the anxiety-reducing effects of music therapy in women undergoing ambulatory surgery for the diagnosis or treatment of breast cancer and is the largest study of its kind to use live music therapy in the surgical arena. This research supports the body of literature that suggests that music therapy may aid in preoperative anxiety management[27] and may be especially beneficial in cases of high baseline anxiety.

In this trial, both live and recorded preoperative music-therapy interventions reduced anxiety significantly more than did the usual preoperative management (−27.5 [95% CI, −33.8 to −21.2] and −26.7 [−31.9 to −21.5] points, representing percent reductions of 42.5% [32.8% to 52.2%] and 41.3% [33.2% to 49.3%], respectively). Results of analyses with and without model-based adjustment for baseline anxiety level were consistent. While hypnosis produced higher effect sizes in comparable studies,[27-29] music therapy produced significant anxiety reduction in only 5 minutes as compared with the reduction achieved with 15 to 30-minute hypnosis interventions — an important consideration in a busy clinical setting.

To understand the possible mechanism behind the success of the preoperative intervention, it is important to consider music alone, which may produce a physiologic state in which anxiety is likely to diminish. Anxiety often results when an actual event conflicts with what was anticipated,[36] thus activating the sympathetic branch of the autonomic nervous system. When unexpected surgery and fear of cancer are the cause of this incongruence between what is expected and what is real, symptoms of anxiety may justifiably surface. Conversely, because it delivers what is expected, preferred music may stimulate the relaxation response through activation of the parasympathetic branch of the autonomic nervous system. Familiar melodies, rhythmic patterns, and song lyrics may provide a welcome contrast to distress by delivering the predictable in an unpredictable environment, thus restoring balance to the autonomic nervous system.

Table 2. Analysis of GA-VAS Anxiety Scores and Propofol Required to Reach 70 on BIS Monitor

Amount/Score	LM Group n = 67	RM Group n = 65	UC Group n = 62
Propofol			
Amount to reach BIS 70, mg			
Mean (SD)	67.2 (53.7)	61.9 (34.1)	70.5 (35.2)
Difference in means compared with UC group			
Estimate (95% CI)	−3.3 (−19.0 to 12.4)	−8.6 (−20.8 to 3.5)	
Effect size*	−0.09	−0.24	
	n = 67	n = 68	n = 61
GA-VAS Anxiety Scores			
Pretest			
Mean (SD)	71.7 (44.0)	64.8 (43.1)	57.0 (48.2)
Post-test			
Mean (SD)	40.7 (36.7)	38.0 (32.5)	57.0 (46.9)
Change (post-test score minus pretest score)			
Mean (SD)	−30.9 (36.3)†	−26.8 (29.3)†	0.0 (22.7)
Estimate (95% CI)‡	−27.5 (−33.8 to −21.2)	−26.7 (−31.9 to −21.5)	−1.0 (−7.4 to 5.4)
Difference in mean change compared with UC group			
Estimate (95% CI)§	−26.5 (−35.5 to −17.5)	−25.7 (−33.9 to −17.4)	
Effect size‖	−0.57	−0.55	

Abbreviations: BIS, Bispectral Index; GA-VAS, Global Anxiety-Visual Analog Scale; LM, live music; RM, recorded music; SD, standard deviation; UC, usual care.
*Effect size is defined as the difference in means divided by the standard deviation of the UC group.
†Differs from the usual care group ($P < .001$, Wilcoxon rank sum test).
‡Adjusted for pretest GA-VAS. Estimates the mean change in GA-VAS when baseline GA-VAS equals 64.7 (the pretest mean GA-VAS for all groups combined).
§Difference in group means, adjusted for pretest GA-VAS.
‖Effect size is defined as the difference in adjusted means, divided by standard deviation of the post-test measurement for the usual care group.

Satisfaction scores were universally high. Although no significant differences were seen among groups for satisfaction items, effect sizes for LM and RM groups versus the control group were mostly positive, ranging from −0.06 to 0.30. Subjective reactions to surgery that includes listening to LM and RM illustrate that music therapy may be an enjoyable addition to surgery (Appendix, online only).

Compared with NBE, music therapy was not found to reduce sedative requirements according to BIS monitor indications. This result may be the result of ineffectiveness of the intervention on this particular variable, or it may be due to the limitations of the BIS monitor.[37] Although the BIS monitor has been suggested as a possible tool to evaluate the effect of music on the level of sedation or

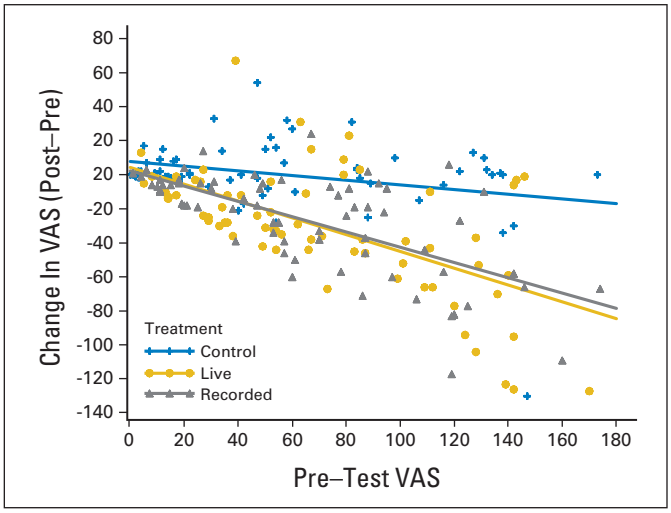

Fig 2. Plot of change in post-test Global Anxiety Visual Analog Scale (GA VAS) versus pretest GA VAS, by treatment arm. Lines are separate regression lines to fit the three treatment arms. Post-Pre, change in post-test scores as compared with pretest scores.

Table 3. Analysis of Time to Discharge Readiness and Patient Satisfaction Scores

Outcome	LM Group	RM Group	UC Group
Time to discharge readiness (min)			
Mean (SD)	52.4 (21.6)*	64.8 (35.3)	57.3 (27.5)
Effect size†	−0.18	0.27	
Satisfaction scores			
Helped feel calm			
Mean (SD)	6.75 (0.58)	6.66 (0.67)	6.65 (0.71)
Effect size	0.14	0.01	
Controlled pain			
Mean (SD)	6.78 (0.79)	6.71 (0.82)	6.75 (0.68)
Effect size	0.04	−0.06	
How treated			
Mean (SD)	6.85 (0.50)	6.88 (0.41)	6.67 (0.71)
Effect size	0.25	0.30	
Overall experience			
Mean (SD)	6.84 (0.51)	6.77 (0.77)	6.63 (1.10)
Effect size	0.19	0.13	
Personal attention			
Mean (SD)	6.87 (0.52)	6.92 (0.27)	6.80 (0.58)
Effect size	0.12	0.21	

Abbreviations: LM, live music; min, minutes; RM, recorded music; SD, standard deviation; UC, usual care
*Differs from RM group ($P = .018$).
†The effect size is defined as difference in means between the LM or RM group and the UC group, divided by the UC group standard deviation.

anesthesia,[38] researchers may wish to investigate alternate methods of evaluating the effect of music on staff-administered anesthesia requirements in the future.

Preoperatively, those who received LM met discharge readiness criteria 12 minutes earlier than did those who listened to RM. This unexpected finding cannot be considered a definitive discovery, because of multiple secondary comparisons that were not adjusted for multiple comparisons, and will require verification in a future study. Although neither music group met discharge readiness criteria more rapidly than the control group did, the information remains pertinent, because the addition of music therapy did not significantly increase patient time commitment.

The trial was not void of limitations. Finding the ideal time to introduce the music therapy intervention in a fast-paced preoperative environment was a notable logistical challenge. Although patients completed their own assessments, participants, investigators, and nurses could not be blinded due to the nature of the treatment, which may have introduced bias into the anxiety portion of the study. In addition, while personal contact cannot be separated from music therapy, the fact that we did not employ an attention control group raises the question as to whether the effect was due to the additional presence of a caring professional. It must be noted that all participants received the extra personalized care of a preoperative phone call, special welcome, and anxiety assessments.

Clearly, further quantitative research is necessary to fortify current evidence regarding the therapeutic value of music therapy,[39] particularly in the perioperative setting. The findings here may provide a basis for future research with regard to evaluating the use of music therapy in the management of anxiety in various surgical populations. In a setting in which anxiety can lead to increased pharmacologic intervention,[5] canceled procedures,[40] and dissatisfaction,[41] these findings support the use of music therapy facilitation in the surgical arena. In this trial, both LM and RM are considered music therapy as a result of the therapeutic relationship that is formed and the patient-tailored interventions that are implemented by a board-certified music therapist (ie, MT-BC). While it is optimal to have music therapists serve surgical patients directly, board-certified music therapists may also create programs and train staff on RM implementation practices so that many patients may benefit.

AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

Disclosures provided by the authors are available with this article at www.jco.org.

AUTHOR CONTRIBUTIONS

Conception and design: All authors
Financial support: Deforia Lane
Administrative support: Deforia Lane, Rosemary Leeming
Provision of study materials or patients: Deforia Lane
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Data analysis and interpretation: Mark Schluchter
Manuscript writing: All authors
Final approval of manuscript: All authors

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AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

Effects of Music Therapy on Anesthesia Requirements and Anxiety in Women Undergoing Ambulatory Breast Surgery for Cancer Diagnosis and Treatment: A Randomized Controlled Trial

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Appendix

Materials

MP3 players. Apple iPod touch (2 units; Foxconn, New Taipei, Taiwan)

Headphones. Sony MDR-NC7 noise canceling headphones (2 units; Sony, Tokyo, Japan)

Noise blocking earmuffs. Sperian Howard Leight Thunder T3s (2 units; Howard Leight, San Diego, CA); used with Aearo Company's classic chorded earplugs (65 total earplugs; Aearo EAR, Indianapolis, IN)

Acoustic guitar. Breedlove Passport Plus C250/SRe steel six-string acoustic (1 guitar; Breedlove Guitar Company, Bend, OR)

Keyboard. Yamaha YPG-235 76-key portable grand piano, battery operated, on transportable cart with wheels (1 keyboard; Yamaha Corporation of America, Buena Park, CA)

Recorded music downloads. Apple iTunes (68 downloads via prepaid gift cards; Apple, Cupertino, CA)

Harp music. Written and performed by Christina Tourin (Emerald Harp Productions, Mount Laguna, CA). Music was downloaded with permission from the artist for use in the study. For the sake of ethics, music was copied to Innovera compact discs (Innovera Technology Essentials, Chicago, IL) and given to control participants after discharge, so that they, too, could share in any potential benefit during home recovery.

Selected Summary Representative of Music Therapy Patients' Postoperative Comments

Live and recorded music group.

- I was really happy when I got called about the music. If I didn't have the music, I'm sure I would've been very anxious. I felt very special, like a celebrity.
- I heard the music when I woke up. It was beautiful; I wasn't afraid at all.
- I loved the music. I think it was great. It was the best part of this whole thing — I think everyone should have it.
- I loved the music part. It was very distracting, you didn't really think about the surgery to get nervous.
- The song was really nice. This is the best I've had with all my surgeries.
- No nausea like last time. When I woke up, I heard the music and it was comforting.
- I loved the music. It made me relax while they were working on me.
- How attentive they were here compared with the other place. I loved the music. It really helped to give you something else to concentrate on other than feeling helpless.
- This really changes the mood before surgery. I felt very well taken care of.
- That was the most wonderful experience. The music is a good idea, it helps with stress relief. Best place I've been.
- The headphones were wonderful. I feel amazingly honored and blessed to have had music therapy as part of my experience.

Recorded music only group.

- It took my anxiety down a notch. . .I'll recommend you and this to everyone.
- This really helped. All I remember is going down there, moving to the bed, and the music. The music was relaxing and I didn't worry about what they were doing.
- In a place where everyone has control over you and everything is a question mark, this gave me the power.
- The music was nice. I heard it through the whole procedure and it blocked out the talking, which was helpful.
- The music worked for me, I loved it. I had surgery six weeks ago and this really helped me to be more calm.
- The music was amazing. It made everything else go away. . . it was so soothing.
- The nicest thing about music therapy is it was the most personal.
- Very positive. A lot of concern with my feelings of well-being. Music was a great distraction.
- I really enjoyed the music therapy. I could hear and it was calming and less fearful — it was like being at the spa. It seemed to really help anxiety.
- The harp music is great stuff. I hope they keep this.
- I think the music really helped. If I have to go through it again, I would request music therapy.