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How Is Intraoperative Music Therapy Beneficial to Adult Patients Undergoing General Anesthesia? A Systematic Review

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Abstract

Today's expanding role of technology and the internet-of-things has become an integral aspect of the treatment modalities of health care providers throughout health care systems. With the advent of new devices and online music services, every genre of music is merely a finger touch away for each and every patient. Music therapy has been accepted as a beneficial tool used for the treatment of anxiety and pain relief for the conscious patient. Research has also been conducted to examine the analgesic benefits of music therapy on the patient undergoing general anesthesia. This systematic review focused on answering the aforementioned question regarding the added effects of music therapy. After thorough examination of the literature, it was concluded that the incorporation of volume-protective headphones and patient-chosen music therapy can be an effective and inexpensive intervention during general anesthesia with statistically significant results for decreased pain, decreased opioid needs, and increased patient satisfaction.

INTRODUCTION

The use of music for the treatment of disease processes and ailments can be traced back for millennia. Light et al[1] found evidence of the use of music for medical treatment as far back as 2500 BC. For centuries, the benefits were observational at best, but music remained as an acceptable adjunct therapy for patients in the health care arena. In English hospitals in the 19th century, musicians were hired to play for sick patients.[1] Physicians and scientists began to study the effects on physiology and the benefits of music at the turn of the 20th century. It was then that physicians across the world began to record the changes caused by music on vital signs. Farr[1] pioneered the idea of music in operation suites as early as 1929. In the late 1940s, Pickrell and his research team spent 6 years studying the effects of music therapy on preoperative, intraoperative, and postoperative surgical patients.[2] Their research findings suggest that patients experience decreased fear and apprehension when music is an added element of the surgical experience. Pickrell et al[2] also noted the use of headphones to be beneficial, not only for delivering the intervention but also as a tool for blocking out nonreassuring noise and conversation inside the surgical arena. Theses surgeries were exclusively performed on sedated patients receiving local, spinal, or regional anesthesia. Systematic reviews to date have included regional anesthesia (ie, epidural, spinal, and local anesthesia), monitored anesthesia care, and general anesthesia[3]; however, the present systematic review focused only on those interventions done under general anesthesia.

REVIEW OF THE LITERATURE

Looking at the effects of music during the intraoperative care of the patient under general anesthesia is a subject that has received little scrutiny and study compared with that of patients undergoing regional or spinal anesthesia or sedation. Numerous studies have been completed to show the benefit and perceived benefit of music therapy on the anxiety level of patients preoperatively and intraoperatively, but few have specifically addressed the analgesic effects intraoperatively and under general anesthesia.[4]

Anecdotally, in the 1950s music therapy was believed to have a limited effect on the patient undergoing general anesthesia beyond anxiety relief. Light et al[1] writes of physicians proclaiming that music would have no ability to diminish pain or pain perception. One of the leading pioneers helping to demystify or debunk that concept was composer and researcher Linda Rodgers Emory (professionally: Linda Rodgers). In an interview, Hershenson[5] expresses how Rodgers challenged this theory by writing music designed for patients to listen to via headphones throughout the perioperative period. Patients undergoing general anesthesia or spinal anesthesia showed a decrease in analgesic narcotic intervention compared with patients who did not receive supplemental music therapy during their surgical course.[5]

At least 2 studies have documented the stress responses of sound therapy intraoperatively on patients undergoing general anesthesia. Migneault et al[6] conducted a pilot study of 30 patients that examined the stress response of female patients intraoperatively while listening to their choice of music during the administration of general anesthesia. The patients chose 1 of 4 genres of music in the preoperative department and then had intraoperative blood drawn from an arterial line that had been placed during the induction of anesthesia. Blood samples, collected at timed intervals, measured comparable blood levels of epinephrine, norepinephrine, cortisol, and adrenocorticotropic hormone between a music therapy group and a control group. The second study utilized hemispheric-synchronization (Hemi-Sync; Monroe Products, Lovingston, VA) therapy. Hemi-Sync therapy is the process of listening to sound waves through headphones that theoretically cause the brain to create a third sound, the binaural beat, which synchronizes both sides of the brain and aids in relaxation, pain response, and sleep patterns.[7] The implementation of intraoperative hemispheric-synchronization therapy provided evidence for a reduction in hormonal stress response for patients during surgery.[8] These studies serve as a springboard into the potential benefits of the adjunct, noninvasive, and cost-effective treatment modality of intraoperative music therapy for patients undergoing general anesthesia.

Given the side effects associated with opioids, including nausea, prolonged time to wake up, and decreased respiratory effort, it would be beneficial to add a noninvasive, low-cost, patient-empowering intervention that would significantly increase analgesia while simultaneously decreasing side effects associated with narcotic administration. The aim of this systematic review was to determine whether intraoperative music therapy for adult patients is an effective modality to be used in the practice of general anesthesia. The 2 variables used to measure outcomes were the patient pain score on a visual analogue scale (VAS) and the amount or quantity of pain medicine administered via anesthesia staff or postoperative nurse (as morphine-equivalent dosing).

SEARCH STRATEGY METHOD

A literature search of articles published from January 1980 to January 2016 was performed on the Ovid MEDLINE database (Ovid, New York, NY), the Cumulative Index to Nursing and Allied Health Literature (CINAHL; EBSCO, Ipswich, MA), PubMed (National Library of Medicine, Bethesda, MD), Embase (Elsevier, Amsterdam, Netherlands), and the Cochrane Library (The Cochrane Collaboration, London, United Kingdom). Articles reporting findings from studies on human subjects and written in English were considered. The following search terms were used: music, surgery, therapy, anesthesia, anaesthesia, pain, preoperative, intraoperative, and postoperative. The search was executed with words individually and with combined searches including music/surgery, music/therapy, and music/surgery/therapy to gather the widest range of research articles. Exclusion criteria for articles included patients aged less than 18 years; studies that used regional anesthesia, local anesthesia, or monitored anesthesia care; and any nonrandomized clinical trials as well as studies that only measured anxiety scores as an outcome variable. Inclusion criteria included randomized clinical trials (RCTs) written in English and those whose outcome measures were pain score, narcotic amount received, and/or patient satisfaction. Minimally, studies needed to explicitly include the music therapy intervention during the intraoperative period.

Following the primary search, a secondary search using Scopus (Elsevier, Amsterdam, Netherlands), The Virtual Health Library (World Health Organization, Geneva, Switzerland), and hand searching was conducted. Duplicate articles were removed while studies including RCTs and performed in adult patients were included in the second screening. The remaining articles were analyzed and those measuring only anxiety as an outcome measure were discarded.

Music interventions were limited to those carried out both preoperatively and intraoperatively, intraoperatively alone, intraoperatively and postoperatively together, as well as those RCTs that performed the music interventions throughout the surgical experience.

Quality Appraisal

A quality appraisal of each study was achieved by using the PEDro scale to rate articles. The PEDro scale was established to aid readers in determining the external and internal validity of RCTs, specifically those trials stored on the PEDro database. The scale does not measure the validity of conclusions but does take into account whether an RCT has sufficient statistical data to make interpretations. The PEDro scale questions, which are depicted in Figure 1, are answered on a yes or no basis. Each yes is rewarded 1 point for a total potential score of 10. RCTs that score >6 to 10 are regarded as moderate to high-quality RCTs with respect to methodology. Verhagen and partners at the Department of Epidemiology, University of Maastricht, derived these criteria from the Delphi list.

Figure 1. The PEDro Scale for Determining the External and Internal Validity of Randomized Clinical Trials. Source: Centre for Evidence-Based Physiotherapy (https://www.pedro.org.au).

PEDro scale

1.	eligibility criteria were specified	no ❑ yes ❑ where:
2.	subjects were randomly allocated to groups (in a crossover study, subjects were randomly allocated an order in which treatments were received)	no ❑ yes ❑ where:
3.	allocation was concealed	no ❑ yes ❑ where:
4.	the groups were similar at baseline regarding the most important prognostic indicators	no ❑ yes ❑ where:
5.	there was blinding of all subjects	no ❑ yes ❑ where:
6.	there was blinding of all therapists who administered the therapy	no ❑ yes ❑ where:
7.	there was blinding of all assessors who measured at least one key outcome	no ❑ yes ❑ where:
8.	measures of at least one key outcome were obtained from more than 85% of the subjects initially allocated to groups	no ❑ yes ❑ where:
9.	all subjects for whom outcome measures were available received the treatment or control condition as allocated or, where this was not the case, data for at least one key outcome was analysed by "intention to treat"	no ❑ yes ❑ where:
10.	the results of between-group statistical comparisons are reported for at least one key outcome	no ❑ yes ❑ where:
11.	the study provides both point measures and measures of variability for at least one key outcome	no ❑ yes ❑ where:

The PEDro scale was used to assign each article a total quality score for methodology and was subsequently analyzed for outcome measures. Quality appraisals were completed individually by both the author and the co-author and then compared and discussed to come to a consensus of ratings.

RESULTS

The primary search yielded 103 articles, whereas a secondary search using Scopus, the Virtual Health Library, and hand searching yielded an additional 438 articles. After accounting for duplicate articles, a total of 504 articles were screened for eligibility for the review. Of the 504 screened, 426 were excluded, leaving only RCTs for adult patients. The remaining 78 articles were further analyzed and articles that did not meet the inclusion criteria, such as those measuring only anxiety as an outcome measure, were discarded.
As outlined in Figure 2 on the PRISMA flowchart,[9] 8 RCTs met the inclusion criteria following this literature search.[10-17] All of the 8 studies assessed were published between 1995 and 2013.

Figure 2. PRISMA Study Flowchart.

The 8 RCTs differed in patient characteristics and type of surgery. The musical intervention varied by type as well as the timing of the intervention, which included preoperative and postoperative music therapy in addition to the mandated intraoperative period.

Baseline Characteristics

The 8 RCTs appraised included a total of 610 patients. The range of sample sizes for each study was from a study[13] of 10 to the largest study[16] of 151. The mean age of the patients ranged from 35 years in one study[14] to 61 years in the study[11] with the most advanced age. Three[10,14,15] of the studies included only female participants and the remaining 5 RCTs[11-13,16,17] included both men and women as participants.

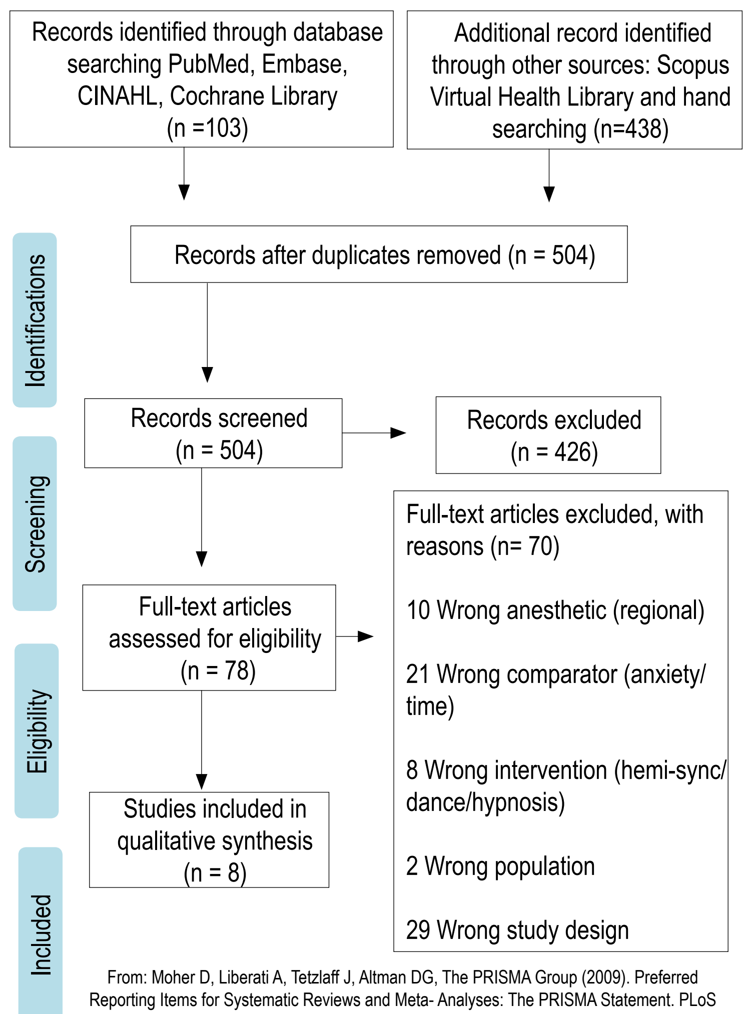
The patients in the RCTs underwent a number of elective surgeries. The variety of surgeries included gynecology, cardiac, abdominal, breast, and orthopedic surgeries. One study of gynecological surgical patients had a broader inclusion criterion for the types of surgeries performed.[14] The other 7 studies had specific criteria for the type of patients within the study so that all participants were undergoing the same surgical procedure.[10-13,15-17]

Intervention

The vast majority of RCTs included the musical intervention both intraoperatively and postoperatively (n=7). Of those 7 studies, 3 also included the musical intervention preoperatively.[10,12,14] Only one study placed the musical intervention solely during the intraoperative period.[15]

The type of music varied among the studies. Two of the studies gave participants a choice of the genre of music.[10,13] The choices of genre included classical, easy listening, new age, and inspirational in one study[10] versus classical, country, and instrumental in the other study.[13] The other 6 studies supplied patients with no consistent musical intervention.[11,12,14-17] Despite the differing musical intervention, researchers in each study chose music that had been deemed soothing and calming, from Musicure (Gefion Records, Copenhagen, Denmark)[12] to sea waves and calm sounds to *Dreamflight II* by Herb Ernst.[11]

Figure 2



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta- Analyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit w ww.prisma-statement.org.

The majority of studies used headphones for the participants (n=7). One of the studies used a musical pillow for the participants.[12] The volume of music differed among participants from study to study. Three studies set the audio level at the same level for each participant.[15-17] Two[10,13] studies allowed the patients to set their preferred volume level with only one[10] of these 8 RCTs setting a maximum decibel level (70 dB). The study characteristics are summarized in Table 1.

Table 1. Characteristics of the 8 Studies Included in the Systematic Review[a]

Study Authors, Year, Setting & Study Type	Quality Score	N, Surgery Type & Mean Patient Age (y)	Tool Used to Assess Outcome	Intervention Period	Groups
Binns-Turner et al[10]					
2011, USA Quasi-Experimental Study	10	• N = 30 F (convenience sample) • Mastectomy for breast cancer • Mean Age = 57	VAS for pain	• Preop • Intraop • Postop	1. Music therapy 2. Control
Blankfield et al[11]					
1995, USA Single-Blind Trial	9	• N = 95 (30 F, 65 M) • Coronary artery bypass • Mean Age = 61	Amount of narcotic administered postop	• Intraop • Postop: 30 min twice daily	1. Suggestion therapy 2. Music therapy 3. Control
Graversen & Sommer[12]					
2013, Denmark RCT	9	• N = 75 (55 F, 20 M) • Laparoscopic cholecystectomy • Mean Age = 47	VAS for pain and amount of narcotic administered postop	• Preop • Intraop • Postop	1. Music therapyb 2. Control
Heiser et al[13]					
1997, USA Repeated-Measures Experimental Design	8	• N = 10 (5 F, 5 M) • Lumbar microdiscectomy • Mean Age = 39	VAS for pain	• Intraop • Postop	1. Music therapy 2. Control
Laurion & Fetzer[14]					
2003, USA Experimental Pilot Study	8	N = 84 F Gynecological laparoscopic surgery Mean Age = 35	VAS for pain	• Preop: at least 2 times a day • Intraop • Postop	1. Guided imagery 2. Music therapy 3. Control
Nilsson et al[15]					
2001, Sweden Double-blind RCT	10	• N = 89 F • Hysterectomy • Mean Age = 51	VAS for pain	• Intraop	1. Music therapy 2. Combined: music and therapeutic suggestions 3. Control
Nilsson et al[16]					
2003, Sweden RCT	10	• N = 151 (44 F, 107 M) • Inguinal hernia repair or varicose veins • Mean Age = 54	VAS for pain	• Intraop • Postop	1. Intraop music therapy 2. Postop music therapy 3. Control
Nilsson et al[17]					
2005, Sweden RCT	10	• N = 75 (3 F, 72 M) • Open hernia • Mean Age = 56	VAS for pain	• Intraop • Postop	1. Intraop 2. Postop 3. Control

[a]Abbreviations: F, female; Intraop, intraoperative; M, male; Postop, postoperative; RCT, randomized clinical trial; VAS, visual analogue scale.
[b]Therapy chosen per day and not per patient.

Quality

Four of the 8 RCTs were evaluated to have the maximum quality methodology score of 10 as measured by the PEDro scale.[10,15-17] The range of scores was from 8 to 10 with a mean score of 9. Two[11,12] studies received a 9 and the two[13,14] remaining studies received an 8.

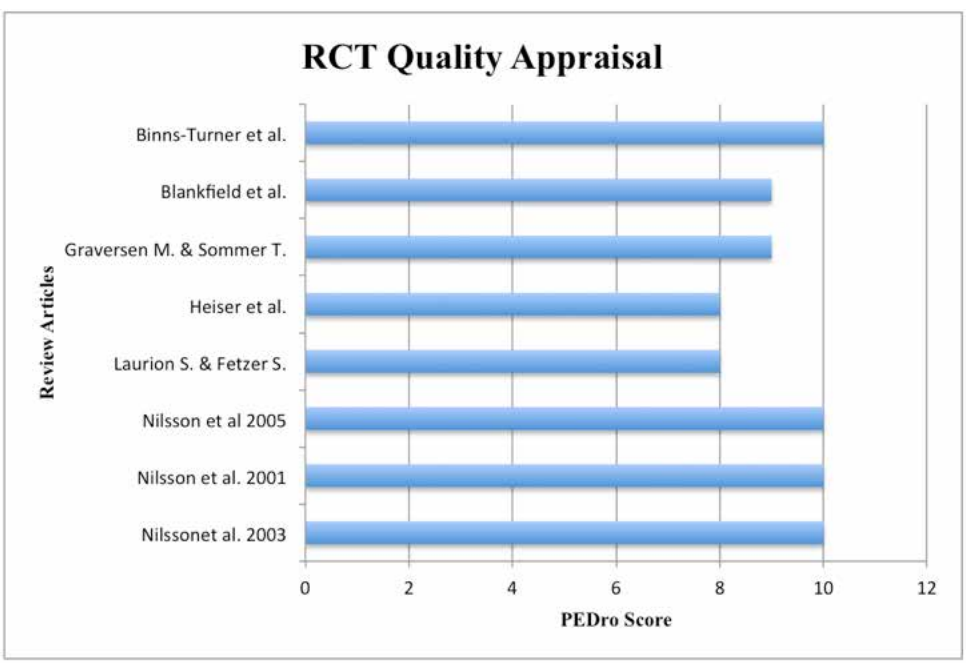
The majority of the included studies (n=7) utilized a valid and reliable measurement for the outcome measures. These 7 studies all used a VAS in order to measure the level of pain of each participant.[10,12-17] The one[11] remaining study used continuous measurements in order to measure the overall quantity of narcotics administered for comparison.

Blinding

Six of the studies were single-blind studies.[10,11,13,14,16,17] These studies placed headphones on all participants. Researchers would then provide the intervention group with the music therapy CD or tape and the control group listened to a blank tape or CD. One study was double-blinded for the patients and the researchers, as headphones were placed on the participants intraoperatively.[15] Neither the researcher nor the participant knew to which group the participant was ascribed. One study had no blinding as the therapy was provided aloud without headphones compared with the control group without any music.[12]

Three of the 8 studies had true computer-generated randomization to groups for participants.[15-17] Another 3 of the RCTs did not offer specific terms for randomization.[11,13,14] These studies did mention that patients were randomly assigned to groups. The remaining 2 studies drew numbers from resalable bags.[10,12] One study[10] drew numbers for group determination, whereas the other study[12] drew numbers for that day's intervention (music therapy day vs control or non-music-therapy day). The quality appraisal results are graphed in Figure 3.

Figure 3. Randomized Clinical Trial Quality Appraisal According to PEDro Score.



Outcome Measures

All of the 8 articles reviewed had the common outcome measure of pain. Pain was measured in 2 different ways, either with a VAS or by the amount of analgesic administered.

Seven of the RCTs used a VAS to measure the pain of the participants at various stages during the study.[10,12-17] One study showed a significantly greater decrease in pain levels for the intervention group and a lower pain score postoperatively.[10] In another study, half of patients who listened to the music stated that it was helpful and these same satisfied participants also received fewer analgesics than did the control group.[11] In one article, the participants of the music group had less pain on postoperative day 7.[12]

When comparing analgesic use, 6 articles reviewed used morphine equivalents as the outcome measure of pain.[11-13,15-17] Two studies showed no difference in the amount of morphine equivalents.[11,12] It is important to note that general anesthesia can induce physiological fluctuations that require immediate and active intervention. Opioid analgesics, such as morphine or hydromorphone hydrochloride (Dilaudid, Purdue Pharma), are administered when pain is considered a differential diagnosis. Studies are lacking regarding treatment thresholds in managing the patient's hemodynamic status intraoperatively when treating pain. However, 4 studies showed that the music therapy group required less analgesic medicine after discharge.[13,15-17] Table 2 highlights the data collection measures and results of each study.

Table 2. Study Interventions, Results, and Limitations for the 8 Studies Included in the Systematic Review[a]				
Study	**Data Collection**	**Intervention**	**Results**	**Limitations**
Binns-Turner et al[10]				
2011, USA	Preop and discharge	• Music selection: participants chose between classical, easy listening, inspirational, or new age • Headphones: Yes • Limited volume 70 dB • Double-blind	• Women in intervention group reported significantly greater decrease in pain levels • Pain significantly lowered and improved postoperatively in intervention group	1. Type II error (need larger sample size) 2. Hawthorne effect: patients knew pain was being measured
Blankfield et al[11]				
1995, USA	Discharge and 1 mo after discharge	• Music selection: patient had no choice; Dreamflight II by Herb Ernest • Headphones: Yes • No mention of volume • Double-blind	• No significant difference in amount of morphine equivalents	1. Suggestion group had background music (music vs. suggestion) 2. Patients only listened for a short period 3. No preop listening
Graversen & Sommer[12]				
2013, Denmark	1 h postop, 3 h postop, 1 d postop, and 7 d postop	• Music selection: patient had no choice; Musicure • Headphones: no (musical pillow) • No mention of volume • Single-blind	• No significant difference in amount of morphine in recovery • No difference at primary endpoint at 3 h • Music group reported less pain at day 7	1. Minimally invasive surgery not painful enough to show difference at end of surgery 2. Music could be heard from small distance 3. Participants could not shut out external sounds of unit 4. Study design did not allow blinding 5. Patient personal music selection
Heiser et al[13]				
1997, USA	1 h in PACU and 24 h after surgery before discharge	• Music selection: participant chose between country, instrumental, classical • Headphones: Yes • Patient chose preferred volume level • Single-blind	• Music group required less analgesic medications after discharge	1. Type II error (need larger sample size) 2. No preop/baseline for pain levels
Laurion & Fetzer[14]				
2003, USA Experimental Pilot Study	On arrival to PACU, 1 h, and discharge	• Music selection: participant had no choice (piano); Naparstek "Health Journeys for People Undergoing Surgery" • Headphones: Yes • No mention of volume • Double-blind	• Control group had higher pain score at discharge to home	1. Type II error (need larger sample size) 2. Patient personal music selection 3. Ethnically homogeneous sample (all white)
Nilsson et al[15]				
2001, Sweden	Every hour for 1st 24 h, then every 3 h until no pain	• Music selection: participants had no choice; sea waves and calm sounds • Headphones: Yes • Same audio levels for each patient • Double-blind	• Day of surgery: music/therapeutic suggestions group required less analgesic medication than control group • First day after surgery, music group had more effective analgesia with less pain and less pain medication administered • Although not statistically significant, total dose of pain meds was lower in music group	1. Music better than soothing message (no difference added with combined verbal message) 2. Patient personal music selection
Nilsson et al[16]				
2003, Sweden	Every 0.5 h for 2 h postop, every 1 h for 1st 24 h, then every 3 h until no pain	• Music selection: participants had no choice; instrumental • Headphones: Yes • Same audio levels for each patient • Double-blind	• Intraop group and postop group both had significantly lower pain scores at 1 h and 2 h postop • Postop music group required less morphine at 1 h • No difference in music intraop vs postop (but beneficial)	1. Patient personal music selection
Nilsson et al[17]				
2005, Sweden	Data collection: 30 min before anesthesia, 1 h after in PACU	• Music selection: participants had no choice; soft new age synthesizer • Headphones: Yes • Same audio levels for each patient • Double-blind	• Both groups had lower pain scores than control group at 1 h in PACU • Postop group: less pain and required less morphine after 1 h in PACU • Total morphine requirement was significantly lower than control group (intraop morphine requirement was lower as well but not significantly so) • Increased pain relief and decreased morphine consumption	1. Subcutaneous local anesthesia infiltration at end of surgery 2. Patient personal music selection
[a]Abbreviations: intraop, intraoperative; PACU, post-anesthesia care unit; postop, postoperative; preop, preoperative.				

Almost 90% (7 of 8) of the articles reviewed showed a lower pain score for the music intervention group after arrival in the post-anesthesia care unit (PACU) or during the subsequent recovery period.[10,12-17] One study measured both a preoperative pain score and a postoperative pain score.[10] The participants in the music therapy group experienced a 41.4% smaller increase in pain compared with the pain levels of the women in the control group. Six studies compared the total quantity of opioids needed to achieve pain relief between the control group and the intervention group. Four of the 6 studies (67%) showed a decrease in morphine-equivalent dosing for patients in the music intervention groups.[13,15-17] The other 2 studies showed no difference in the amount of dosing between control and intervention groups.[11,12] Even when the dose of narcotics did not change, the pain perception was lowered as evident in the lowered pain scores recorded. In the 3 studies that used questionnaires to measure patient satisfaction with the surgical experience, all 3 studies (100%) showed a higher patient satisfaction score for the music intervention groups than for the control groups.[11,13,16]

DISCUSSION

The results of this systematic review show that intraoperative music therapy for the patient receiving general anesthesia can reduce pain during the perioperative period as well as increase patient satisfaction with the surgical experience. By far, the most important finding among the 8 studies is that 5 studies resulted in significantly decreased pain scores in the music therapy groups who received intraoperative interventions.[10,14-17] As an inexpensive intervention, with controllable volume-limiting damage perimeters, ie, the ability to increase the volume up or down to acceptable levels, intraoperative music has been shown to be beneficial for pain control and the overall surgical experience of patients.

This review shows the importance of music delivery as well as music selection on the outcomes of a music intervention for patients undergoing general anesthesia. Two studies allowed the participants in the intervention group to choose their type of music.[10,13] The patients in these studies showed decreased pain and expressed positive surgical satisfaction. Patient music selection did not have a profound effect on the success of the music intervention nor a direct correlation to increased patient satisfaction, but it did allow control and autonomy in an otherwise unfamiliar, outsider-controlled environment. Allowing patients to choose their music empowers them with a sense of autonomy and control previously lost when entering the surgical suite.

Patient safety, both short- and long-term consequences, was regarded in the application of the music therapy. The Occupational Safety and Health Administration (OSHA) reports that sustained sounds above 70 dB can cause permanent hearing damage in humans.[18] With operating room sounds easily reaching levels greater than 70 dB, various hazards associated with unsafe decibel levels are heard during surgery by staff and even worse, the anesthetized patient, who cannot attenuate audible sounds due to the muscle-relaxing effect of the anesthetic agents or drugs.[19] Headphones are the best means of blocking out ambient operating room sound while also supplying the patient with a sustained safe decibel volume of music therapy. The majority of the studies, 5, either used devices with limits on volume output or allowed the participants to choose a suitable volume for their comfort level.[10,13,15-17] The device that supplies the music should have a maximum volume <68 dB to prevent the risk of permanent hearing damage. With the National Institute for Occupational Safety and Health having declared that sound exposure to 90 dB for greater than 8 hours has the potential to cause irreversible hearing damage, OSHA[18] concludes that a 25% decrease in volume ensures a healthy listening experience for the patient. Any music therapy implemented would need to ensure no harm to the patient and providing volume-limiting headphones resolves this issue. Given the results of this systematic review showing the benefits on patient pain scores, decreased narcotic use, and increased patient satisfaction of intraoperative music therapy for the patient under general anesthesia, Figure 4 outlines 5 major components to ensure the success of an intraoperative music therapy intervention.

Figure 4. Five Components of a Successful Intraoperative Music Therapy Intervention.

Checklist for Music Therapy in General Anesthesia

- **Headphones (as procedure permits)**
- **Adjustable Volume not to exceed <68 dB**
- **Patient chosen genre**
- **Application upon OR entry (prior to induction)**
- **Discontinue >1 hour after PACU admission**

At the forefront of this discussion on music therapy and patient selection is an area for improved medical care. As a complementary method of improving pain control, patient-chosen music therapy offers the advantage of patient empowerment and patient-centered care. In the new landscape of medical access and knowledge, patients expect autonomy and decision-making authority from medicine as a service industry. Patient empowerment is a leading care model used throughout the health system and offers numerous benefits, including but not limited to patient satisfaction and patient accountability.[20] Giving the patient the option to choose both empowers and increases patient satisfaction scores, and music therapy with its limited cost and additional analgesic benefits offers an inexpensive patient-centered solution for patient care, comfort, and pleasure.

Future Research

As Zusman[21] details, given the reimbursement change under the Patient Protection and Affordable Care Act, value-based patient care, measured by patient satisfaction scores, has taken a larger role in the management of care within American health care systems. The Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey is the national standard by which hospitals and patient experiences are measured and has become one of the elements that determine how much reimbursement facilities receive from the Centers for Medicare and Medicaid Services (CMS).[22] As reimbursement changes, the effectiveness of intraoperative music therapy can prove very beneficial for increased reimbursement numbers for facilities throughout the health care system. With the decreased pain scores and added patient satisfaction, it will be important to dissect more details of the music therapy intervention.

These 8 studies included various types of music genres and selections as well as variously timed implementations. As more research is carried out, more details should emerge adding more validity to the specific genre of music that should be most beneficial to the patient. However, as the battle continues between patient-centered care and patient empowerment, surveys should be administered regarding the preferences of the patient themselves. If patients were actually given the choice of genre supplied during music therapy, would more satisfaction be obtained from the choice of "medically appropriate compositions" or a patient's individual preference? Does the evidence outweigh the broad spectrum of music in a way that limiting options to "medically appropriate compositions" would suffice for patient satisfaction and adequate analgesic benefit? These are questions that need to be explored with future research.

The delivery and supply of safe headphones should be investigated further as well. Many hospitals have protocols in place that require materials management to inspect every piece of electrical equipment brought forth by a visitor for use within the hospital setting. Because of the effectiveness of intraoperative music therapy on the patient receiving general anesthesia, systems should be designed and studied to determine best practices for safe, uncontaminated headphones to be used in the operating room. These options vary immensely from patients supplying their own headphones to the facility providing a pair of sealed and clean headphones to each patient upon arrival in the operating room. These are just a few of the logistical concerns that must be further investigated to move forward with the implementation of music therapy across all facility platforms.

Limitations

This systematic review included only articles published in English. This could have introduced a language bias for the assessed outcomes. Publication bias is also a risk because not all RCTs are published owing to a lack of significant conclusions.[23] This systematic review examined 3 divisions of the surgical process with a focus on the intraoperative period. The review is limited in its conclusion of which time period of the music therapy intervention provided the best success. There were no direct comparisons between the 5 possible combinations of when the music therapy could be applied in relation to the intraoperative period (ie, preoperative vs postoperative or intraoperative exclusively or any combination of the 3). Another limitation was that the 8 reviewed studies were not evaluated on the basis of sample size nor respective sample size calculations. At least 2 of the 8 studies included sample sizes of 30 or fewer owing to convenience sampling and the subtraction of excluded participants and data. Decreased sample sizes have the potential of creating a type 2 error as well as drawing conclusions that are nongeneralizable. Nilsson et al[3] used the explanation and inclusion of sample size calculations as an aspect of the quality appraisal of research assessed in a past systematic review.

CONCLUSION

As clinicians search for ways to improve outcomes while satisfying the needs, wants, and expectations of their consumers, music therapy is one of the simplest and least expensive avenues for success that both benefits the patient by decreasing pain while also potentially increasing revenue for clinicians. In this setting, music therapy is an underused technique that has demonstrated numerous patient benefits as well as positive effects on the patient experience and that could lead to increased government reimbursement. Hospitals and clinicians wishing to improve the surgical experience for consumers, while being innovative leaders in the modalities of pain management, should consider adopting intraoperative music therapy as an option for surgery.

Summary of Key Points

Music therapy with headphones under general anesthesia is effective in reducing pain, reducing narcotic needs, and increasing patient satisfaction scores. Allowing patients to choose the genre of music increases autonomy and is a way to empower patients in an otherwise irrepressible situation.

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- Headphones (as procedure permits)
- Adjustable Volume not to exceed <68 dB
- Patient chosen genre
- Application upon OR entry (prior to induction)
- Discontinue >1 hour after PACU admission

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