

Music as a Postoperative Pain Management Intervention

Michael J. Poulsen, DNP, RN, FNP-C, Jeffrey Coto, DNP, MS-CNS, RN, CCRN,
Maureen F. Cooney, DNP, FNP-BC

PAIN IS A COMMON and frequently reported effect of surgical intervention. The World Health Organization estimates 266 to 360 million surgeries are performed yearly.¹ Studies have shown that 40% to 65% of postoperative patients report moderate to severe pain.¹ The most common treatment for moderate to severe pain continues to be opioid medications because of immediate effects, multiple delivery forms, and ease of administration. The US Department of Health and Human Services has concerns with increasing opioid-related deaths and opioid use disorder, causing the medical community to rethink the approach to pain management regarding the use of opioid medications.²

For the past several years, opioid reduction has been a major focus in American health care. In 2016, the United States Drug Enforcement Agency started restricting companies from producing opioid medications by 25% and plans to continue these restrictions into 2017 and beyond.³ On January 1, 2018, the Joint Commission implemented new and modified pain standards, which address the need for improvements in pain assessment and management, and include the need to implement measures to improve opioid safety.⁴ The standards include a focus on opioid reduction strategies to minimize risks associated with opioid use. The new standards require accredited hospitals to have policies and pro-

cedures that provide at least one nonpharmacologic pain management approach.⁴

To achieve adequate pain control and opioid reduction, multimodal therapies are essential. Nonpharmacologic pain management approaches may be used as components of multimodal pain management plans of care. One nonpharmacologic approach to pain management includes the use of music during the perioperative process. Music interventions have been shown to result in significant decreases in postoperative pain.⁵⁻¹⁰ When pain is well controlled, there is a significant reduction in anxiety and opioid use during the perioperative period.^{5-8,10} Music is a safe and inexpensive intervention that nursing staff and patients can perform without provider orders.⁵⁻¹⁰ Although music is considered a distraction, a small study using both Positron Emission Tomography (PET) scan and functional magnetic resonance imaging (fMRI) found music activated the caudate and nucleus accumbens regions of the brain.¹⁰ These regions of the brain respond to pleasurable experiences leading to a dopamine release and euphoric state.¹¹ With an understanding of the physical response to pleasurable music, developing protocols for practice utilization is a logical next step.¹⁰

The purpose of this article is to review the current evidence regarding the use of music in perioperative nursing practice and its effect on postoperative pain and opioid use during perioperative recovery. Recommendations for the use of music as an intervention to reduce postsurgical pain and opioid use are deduced and summarized from the review of the evidence.

Literature Review

An extensive review of the literature was completed using PubMed, CINAHL, MEDLINE, Cochrane Library, and Joanna Briggs Institute

Michael J. Poulsen, DNP, RN, FNP-C, St. Joseph Regional Medical Center Mishawaka, IN; Jeffrey Coto, DNP, MS-CNS, RN, CCRN, Valparaiso University, IN; and Maureen F. Cooney, DNP, FNP-BC, Pain Management, Westchester Medical Center, Valhalla, NY.

Conflict of interest: None to report.

Address correspondence to Maureen F. Cooney, Pain Management, Westchester Medical Center, Rm 2108 Macy Pavilion, 100 Woods Road, Valhalla, NY 10595; e-mail address: maureen.f.cooney@gmail.com.

© 2019 by American Society of PeriAnesthesia Nurses

1089-9472/\$36.00

<https://doi.org/10.1016/j.jopan.2019.01.003>

databases. Boolean operators used to narrow the search included music, postoperative, and pain. Search limiters, to narrow the search results, were publication years between 2009 and 2018 and English language. The inclusion criteria for articles in this review included systematic reviews, meta-analysis, and best practice recommendations. This review focuses on the adult patient population aged more than 18 years, any surgical intervention, and therapeutic music interventions used to reduce perioperative pain, anxiety, and opioid use.

A total of 263 titles were identified over the five databases, with 20 meeting the inclusion criteria. After thorough review, four articles were chosen to be critically appraised using the John Hopkins Evidence-Based Practice tool.¹² A quality grade was assigned to each article based on the components of the John Hopkins Evidence-Based Practice tool.

Cole and LoBiondo-Wood⁵ conducted an extensive systematic review, which included a search of CINAHL, MEDLINE, Natural Standard, and Scopus for evidence-based articles. Seventeen articles met inclusion criteria and examined the effect of music and several other nonpharmacologic interventions on pain in different patient populations. The review included seven studies that examined the effects of music on pain in postsurgical patients who had undergone intestinal surgery, orthopaedic surgery, cardiac surgery, neurologic surgery, and abdominal surgery.⁵ The studies also examined the effects of other nonpharmacologic interventions including relaxation exercises and patient teaching on pain and other outcomes (opioid consumptions, vital signs, anxiety scores, and cortisol levels). Most music interventions were 20 to 30 minutes long and consisted of 60 to 80 beats per minute. The music interventions varied from patient choice from a provided list to instrumental only. In some studies, music was provided by a music therapist. Outcomes in the music intervention groups were compared with control groups that included usual care or 20-minute rest periods without music. Music intervention groups reported significantly less pain in five of the seven studies compared with control groups. In the two studies where music did not significantly impact pain, positive outcomes were reported for anxiety, relaxation, stress, and perception of hospitaliza-

tion. The authors concluded music could positively impact pain and other variables such as anxiety, muscle tension, and mood in hospitalized patients. The results of the systematic review provide support for the use of music as an independent nursing practice in the postoperative setting.⁵

Hole et al⁸ completed an extensive systematic review analyzing the effect of music on acute postoperative pain and other outcomes. The authors searched MEDLINE, Embase, CINAHL, and Cochrane Central search engines and identified 72 randomized control trials (RCTs) that met inclusion criteria. The RCTs involved the effects of the use of any type of music played preoperatively, intraoperatively, or postoperatively on postoperative pain, anxiety, analgesia use, and patient satisfaction. The comparators included routine care, white noise, headphones without music, and uninterrupted bed rest. The types of music interventions varied in the different studies. In many RCTs, varying types of music were played 20 to 60 minutes during the preoperative, intraoperative, and postoperative periods. The authors noted music was predominately classical, relaxing, or calming. A standardized mean difference (SMD) score was calculated to standardize the outcomes of the various results. Music was associated with reduced postoperative pain scores (SMD -0.77 , 95% confidence interval) in 45 RCTs. An average pain score reduction of 23 mm on a 100 mm visual analog scale was reported. A reduction in analgesic use (SMD -0.37) was found in 34 RCTs. Music played preoperatively was more effective in reducing pain and analgesic use than music played intraoperatively or postoperatively. Music was also shown to increase patient satisfaction and decrease anxiety. Using music during the entire perioperative process shows the most positive results when compared with single phases of the perioperative process. The authors recommend the use of music as an independent nursing intervention because of the safety and noninvasive nature of the therapy.⁸

Kuhlmann et al¹ also completed a systematic review in which the effect of music on pain and anxiety in adult patients during the preoperative, intraoperative, and postoperative periods compared with control groups was examined.

Control groups were standard care with or without a resting period, or with sham sounds or headphones without music. The systematic review included 91 RCTs with 7,385 postoperative patients; 46 of the RCTs included analysis of the effects of music on pain.¹ Most studies (42 RCTs) involved the use of recorded music whereas four involved live music therapy provided by a music therapist.¹ Music in the RCTs was provided at different times: preoperatively, intraoperatively, postoperatively, and at multiple times, or unspecified times. An SMD was used to calculate the effect size between variables.

Pooling of the different outcome measures of pain in this systematic review resulted in findings that music interventions were found to have a moderate effect on pain reduction (SMD -0.50 , $P < .001$) and a moderate to large statistically significant reduction in anxiety (SMD -0.69 , $P < .001$). On average, pain was reduced by 10 mm on a 100 mm visual analog scale. Multiple music interventions were more effective than a single music intervention. Greater effects were noted when patients selected music from a list, compared with those who individually selected their own music. In eight of 14 studies in which music was used during regional anesthesia, a moderate and statistically significant effect on pain reduction was noted. Music played during the postoperative period had the largest effect on pain reduction, whereas preoperative music had the largest effect on anxiety reduction. However, it was reported that pain and anxiety were both reduced when music was used at any point during the perioperative process. The greatest benefit on both pain and anxiety reduction was noted when patients selected music from a list that was provided and the smallest benefit was realized when patients freely chose their own music.¹

Van der Wal-Huisman et al⁹ published a systematic review, which included 17 studies that examined the effects of music on postoperative recovery of older adults (aged 60 years or older). Eleven of the 17 studies described the effects of music on postoperative pain, and in all the studies, the effects were positive, although the timing of music introduction and frequency varied.⁹ Five of the studies examined analgesic use, and in three of the five studies, although there were lower pain scores, there was no significant

difference in opioid consumption between the music intervention group and the control group.⁹

Poulsen and Coto¹⁰ conducted an in-depth literature review of the use of music as an intervention to reduce postsurgical pain. As a result of their literature search, they retrieved seven large systematic reviews, meta-analyses, and RCTs, which the authors used to develop best practice recommendations for a perioperative music protocol. To optimize analgesia and reduce opioid use, the authors recommended the following:

1. Music should be used consistently throughout the perioperative process from preoperative through intraoperative and maintained in postoperative periods.
2. The most beneficial effect was noted when patients were provided with lists of available music that included calming, relaxing, and mostly instrumental choices.
3. Therapeutic music should be of a calming nature with rhythms played at 60 to 80 beats per minute to best synchronize with preferred heart rates.
4. Music should be played at least two times daily and throughout the entire perioperative process for at least 15 to 30 minutes each session.
5. No specific music delivery system improves outcomes; however, MP3 or compact disc players were most widely used.
6. Music should be a nursing led intervention as it is a safe, cost effective, and individualized to each patient.¹⁰

Clinical Applications of Research

This review identified the need for additional research, as there are a limited number of studies measuring the correlation between music and opioid use. The large systematic reviews summarized in this article report less than 50% of articles addressed the relationship between music and opioid use. As shown in this review, music can significantly reduce reported pain scores in the perioperative patient.⁵⁻¹⁰ These systematic reviews have found if pain is appropriately controlled, reductions are seen in anxiety^{1,5,8-10} and opioid use.^{1,5,8,10} Medical professionals

have a duty to protect their patients from harm and adverse effects of medications. It is necessary to assure a balance between the benefits of opioids for pain relief and the reduction of risks of misuse, opioid use disorder, accidental death, and other serious consequences. Music is only one of many complimentary and alternative medicine therapies that can be used in nursing practice to promote opioid reduction. The use of therapeutic tools such as music by nursing staff and patients has led to good outcomes in the postoperative period and may lead to an overall significant opioid reduction after discharge.^{1,5,8,10}

Some reasons for success of music and other complimentary and alternative medicine therapies are their low cost, low risk for adverse effects, and ease of administration.^{5,8-10} Music can be used at the discretion of nursing staff and patients. For music interventions to be effective, it is important for nurses to understand the therapy and educate patients about its purpose and benefits. The use of music does not replace the need for oral or intravenous analgesic therapy.^{1,5,8,10} Analgesic medication may be necessary for music to be effective.^{1,5,8,10}

The challenges of inadequate postoperative pain control and the continued opioid crisis continue to increase risks of life-threatening opioid-related adverse effects.² Although many national and local initiatives may eventually prove beneficial, it is critical to offer nursing interventions that offer nonopioid and nonpharmacologic options for acute postoperative pain management. Music is one intervention that can be easily put into practice.

Implications for Nursing

Nurses are the front-line professionals delivering care to patients around the clock. Providing therapies and tools for nurses to use in their practice is important for timely relief of symptoms. Music and complimentary therapies create opportunities for nurses to directly impact and shape opioid reduction policy. Also, these therapies may help build the nursing and patient relationship, as music preferences become commonalities for nurses and their patients. Music is cost effective and can be provided in multiple forms such as radio, MP3 player, CD player, or live performance. Music is a common experience shared by most cultures and access to personal preferences is easier than ever with on-demand streaming and widely available Internet access.

Conclusions

Music can play an effective role in the perioperative process. Music is effective in reducing pain and anxiety, which may lead to effective and significant opioid reduction. Reducing the potential adverse effects of opioids and the risks of misuse are outcomes that can be impacted by nurses. Giving nursing staff the proper tools to provide symptom relief will not only improve patient satisfaction, but also reduce patients' opioid requirements. Offering music throughout the perioperative experience continues to yield positive results for reducing pain and opioid use for postoperative patients. There is a need for more RCTs to confirm the magnitude of the effect on opioid reduction. However, as the benefits far outweigh risks, the present is an optimal time to implement music interventions into practice.

References

1. Kuhlmann A, de Rooij A, Kroese L, van Dijk M, Hunink M, Jeekel J. Meta-analysis evaluating music interventions for anxiety and pain in surgery. *Br J Surg.* 2018;105:773-783.
2. Health and Human Services. What is the opioid epidemic? Available at: <https://www.hhs.gov/opioids/about-the-epidemic/index.html>. Accessed June 6, 2018.
3. United States Drug Enforcement Administration. DEA reduces amount of opioid controlled substances to be manufactured in 2017. Available at: <https://www.dea.gov/divisions/hq/2016/hq100416.shtml>. Accessed May 20, 2016.
4. The Joint Commission. Pain Management. Available at: https://www.jointcommission.org/topics/pain_management.aspx. Accessed December 28, 2018.
5. Cole L, LoBiondo-Wood G. Music as an adjuvant therapy in control of pain and symptoms in hospitalized adults: A systematic review. *Pain Manag Nurs.* 2014;15:406-425.

6. Crowe L, Chang A, Fraser J, Gaskill D, Nash R, Wallace K. Systematic review of the effectiveness of nursing interventions in reducing or relieving post-operative pain. *Int J Evid Based Healthc (Wiley-Blackwell)*. 2008;6:396-430.
7. Economidou E, Klimi A, Vivilaki V, Lykeridou K. Does music reduce postoperative pain? A review. *Health Sci J*. 2012;6:365-377.
8. Hole J, Hirsch M, Ball E, Meads C. Music as an aid for postoperative recovery in adults: A systematic review a meta-analysis. *Lancet*. 2015;386:1659-1671. North American Edition (10004).
9. van der Wal-Huisman H, Dons KS, Smilde R, Heineman E, van Leeuwen BL. The effect of music on postoperative recovery in older patients: A systematic review. *J Geriatr Oncol*. 2018;9:550-559.
10. Poulsen M, Coto J. Nursing music protocol and postoperative pain. *Pain Manag Nurs*. 2018;19:172-176.
11. Salimpoor V, Benovoy M, Larcher K, Dagher A, Zatorre RJ. Anatomically distinct dopamine release during anticipation and experience of peak emotion to music. *Nat Neurosci*. 2011;14:257-262.
12. Johns Hopkins Nursing Evidence-Based Practice. *Johns Hopkins nursing evidence-based practice: Models and guidelines*, 2nd ed. Available at: https://www.hopkinsmedicine.org/evidence-based-practice/ijhn_2017_ebp.html. Accessed June 19, 2018.

Calendar of Events

October 5, 2019. The Pennsylvania Association of PeriAnesthesia Nurses (PAPAN) invites you join them for the annual PRIDE Conference in King of Prussia, Pennsylvania at the Crowne Plaza, 260 Mall Boulevard. Save the Date for Saturday, October 5th, 7:30 am to 5:00 pm and Sunday, October 6th, 7:30 am to 12:45 pm! Topics include Medical Marijuana (featuring a nationally recognized speaker), Ethical Dilemmas in the PACU, Postop Urinary Retention, and many more. The Saturday evening fun event is Painting With A Twist. For more information contact the Nurse Planner, Susan Erwine, RN, BSN at serwine@verizon.net.

October 19, 2019. The Illinois Society of PeriAnesthesia Nurses (ILSPAN) invites you to join them for the 2019 ILSPAN Fall Conference in Peoria, Illinois at the Parliament room, at Methodist College of UnityPoint Health, 7600 N. Academic Drive, Peoria, IL 61615. The conference objective is to discuss clinical priorities for the perianesthesia nurse. More information is coming soon. For more conference information contact Liz White, BSN, RN, CAPA at elizabeth.white@unitypoint.org or 309-208-6932.