Doctor of Nursing Practice Project

Titled

Music Listening: An Evidence-Based Approach to Help Manage Postoperative Pain

by

Tammie Ferguson, MSN, RN, DNP Student

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Colleen Taylor, Ph.D., FNP-BC
Doctoral Project, Chair

Kelly Phillips, PhD, APRN-CNS, CNL
Doctoral Project, Committee Member

Greg Shannon, DNP, RN
Doctoral Project, Committee Member

Dedicated to

my project chair for her expertise and never-ending patience

My husband for his continuous support

My parents for their encouragement

In memory of my mom

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Abstract

Purpose: The current standard of practice to manage postoperative pain includes the use of opioids. The purpose of this evidence-based project was to evaluate the effectiveness of music listening as an adjuvant to traditional pain management strategies to relieve postoperative pain and to assess the dosage of opioids used to help manage postoperative pain. Kolcaba's Comfort Theory was used to guide this evidence-based project.

Design/Methods: An experimental with intent to treat design was used to implement a trial of music listening for postoperative pain management by the student investigator within 24 hours of arrival to the Medical Surgical Unit following surgery. After the initial session, music was scheduled three times per day for the duration of the hospital stay. Patients listened to music with a tempo of 60-80 beats per minute on devices provided by the student investigator. The student investigator provided single-patient use earphones to the participants.

Results: The results indicate the subjects in this EBP, who participated in the music listening experienced a decline in pain. However, this effect of the intervention, although clinically significant, was not statistically significant. There were no statistical differences between the music group and control group for Morphine Equivalent Dose (MED) per day ($p=.09$). MED for the music group significantly declined between pre-intervention and post-intervention ($p=.02$).

Conclusion: The EBP had promising results. Due to the small sample size, the results cannot be generalized to the larger population. More studies are needed in small rural hospitals.

Keywords: music therapy; music medicine; music listening; postoperative; pain; postoperative pain, pain management, postoperative pain management.

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Problem Statement

Despite improved understanding of pain mechanisms, increased awareness of the prevalence of postoperative pain, advances in pain management approaches, and other focused initiatives to improve pain-related outcomes, inadequately controlled postoperative pain continues to be a widespread problem (Gan, 2017). Unrelieved postoperative pain can lead to consequences such as increased hospital length of stay, chronic pain, opioid use, and misuse, increased financial burden, respiratory depression, and death (Gan, 2017; Governors Opioid Action Team GOAT), 2011; National Academies of Science (NAS) [formerly known as The Institute of Medicine, 2011], Ohio Academy of Family Physicians, 2017). Soto (2015) emphasizes that postoperative opioid analgesics during the postoperative period can lead to poor long-term health outcomes such as respiratory complications, tolerance, and addiction.

In the late 1990s, pharmaceutical companies provided assured that patients would not become addicted to prescription opioids, and healthcare providers began prescribing them at higher rates (National Institute of Drug Abuse [NIDA], 2020). This increase in prescribing caused widespread diversion and misuse of prescription opioids, which created a clear pathway to the opioid crisis (NIDA, 2020). Soto (2015) cited that the lack of concern about the addictive nature of opioids contributed to the opioid crisis. As time went on, it became clear that opioids were, in fact, addictive (NIDA, 2020).

There are many different gateways to the opioid epidemic. For this evidence-based project, the correlation between the opioid epidemic and post-surgical pain was examined. Fifty million surgical procedures are performed each year in the United States, and of those, approximately 40 million patients receive opioids after surgery to help manage acute

postoperative pain (Soto, 2015). Six and a half percent (6.5 %) of patients who get opioids to manage pain after surgery may become persistent opioid users, representing 2.6 million people (Soto, 2015). This further highlights the role post-surgical care can play in the opioid epidemic, as many people are first exposed to opioids at the time of surgery (Soto, 2015). Thus, each year surgery puts millions of people in the United States at risk for long-term prescription opioid use (healthline.com, 2020). According to a study published in the Journal of the American Medical Association Surgery, approximately six percent of 36,000 adults continued to receive prescription opioids three to six months after surgery (healthline.com, 2020).

In 2001, The Joint Commission (TJC), the accrediting body for healthcare organizations, began to focus on pain as a negative outcome after surgery, and started calling it the "fifth vital sign" (Soto, 2015). This TJC standard, required healthcare providers to ask every patient about their pain, as the perception was that patients' pain was undertreated (TJC, 2017). The "fifth vital sign" standard caused patients to equate postoperative pain control with zero pain, which caused health care providers to increase opioid use in surgical patients which in turn fueled the opioid epidemic even more (Hsu, 2016). Considering research documenting the dramatic rise of opioid addiction and opioid-related deaths, the American Medical Association voted to stop treating pain as the fifth vital sign in 2016 (Scher et al., 2018). The authors added that the belief was that opioids prescribed for pain contributed to the opioid crisis (Scher et al., 2018). Moreover, the lack of communication between surgeons and patients about expectations for postoperative pain control led to patients expecting zero pain after surgery and many surgeons promising "pain-free" procedures (Soto, 2015).

The opioid crisis is widespread across the United States. According to The National Institute of Drug Abuse (NIDA), 21-29 % of patients abuse prescribed opioids for chronic pain.

(NIDA, 2020). Furthermore, 8-12% develop an opioid use disorder, 4-6% percent who misuse opioid prescriptions transition to heroin, and 80% of people who use heroin first misused prescription opioids (NIDA, 2020). Currently, the gold standard to help manage postoperative pain are opioids; however, considering the current opioid crisis, pain management practices are changing with the increased use of non-pharmacological interventions. TJC and the American Pain Society (APS) revised their pain management standards to include non-pharmacologic agents (Chou et al., 2013; TJC, 2018).

Description of the Problem

In 2012, there were 313 million surgeries performed worldwide. Of those, an estimated 9.7 million surgical procedures that required an inpatient stay were performed in the United States [U.S.] (Healthcare Utilization Project, 2015). According to the National Academies of Science (NAS) (2011), 80% of patients who undergo surgery report postoperative pain, with 88% of these patients reporting moderate, severe, or extreme pain (Gan, 2017). Furthermore, the NAS (2011) pointed out fewer than half of the postoperative patients report adequate pain relief. Additionally, 10-50 percent of patients with postoperative pain develop chronic pain (Gan, 2017).

A literature review by Small and Laycock (2020) on postoperative pain strategies discovered adequate perioperative pain management is integral to patient care and patient outcomes. According to the authors, each of the biological, psychological, and social dimensions of the pain experience should be considered and understood to provide optimum pain management for postoperative patients (Small & Laycock, 2020).

According to the National Quality Forum (NQF) (2019), the projected cost of a hospital admission for surgery in 2013, was $22,500. Gan (2017) added that Medicare payments for

inpatient surgery episodes are substantially lower at hospitals with high complication rates inclusive of increased length of stay, time to discharge, readmission rates, and time before ambulation from inadequately controlled postoperative pain. Gan (2017) elaborated that the estimated cost per patient for follow-up management of inadequately controlled pain after surgery to be $1,999.00 per visit. Chronic pain, because of acute postoperative pain, costs the U.S. an estimated 560-635 billion dollars annually (NAS, 2011). The cost of treating chronic pain that evolves from inadequately controlled acute pain is estimated to be as much as one million dollars per patient in a lifetime (Gan, 2017). Garimella (2013) points out that appropriate pain relief leads to shortened hospital stays, reduced hospital costs, and increased patient satisfaction.

According to Gan (2017), inadequately controlled postoperative pain appears to trigger persistent pain that may last for months after surgery. Treatment of acute pain must occur as soon as possible to avoid the development of chronic pain, which is highly prevalent worldwide and is a socio-economic and health problem (NAS, 2011). Chronic pain can contribute to secondary disability and co-morbidities, such as anxiety, depression, and higher rates of dependency on opioids (Gan, 2017). The development of chronic pain syndromes following surgery is becoming more common. According to Kuusniemi and Poyhia (2014), the incidence of chronic pain varies by surgery but may be as high as 85% with amputations, and patients who have undergone mastectomy face 20-50 percent incidence of chronic pain. According to the NAS (2011), 100 million adults suffer from common chronic pain conditions in the U.S. In 2008, the cost to federal and state governments of medical expenditures for pain was $99 billion.

Traditional analgesic management for major surgery relies heavily on opioids. Opioids block pain pathways and depresses the central nervous system (Huizen, 2020). Opioids provide

analgesia but can cause a wide range of severe side effects, including postoperative nausea, vomiting, constipation, ileus, sedation, respiratory depression, and urinary retention, impairing the patient's recovery (Dunkman & Manning 2018). Quinlan et al. (2020) agree the risks associated with opioids include ongoing opioid use, respiratory depression, hypoxia, and even death.

Suboptimal acute pain management in patients undergoing surgery can cause numerous negative consequences, including increased morbidity, impaired physical function, reduced quality of life, slowed recovery, prolonged opioid use during and after hospitalization, and increased cost of care (NAS, 2011). Furthermore, by activating the sympathetic nervous system, unrelieved pain can have adverse cardiovascular, gastrointestinal, and renal effects, predisposing patients to severe complications such as cardiac ischemia, renal dysfunction, and ileus (Whitaker, 2010). Often, patients with postoperative pain avoid activities that induce or aggravate pain and thus avoid coughing and deep breathing, which predisposes them to atelectasis and pneumonia. Patients may also minimize or limit mobility such as position changes in bed or refuse to ambulate, which along with increased platelet aggregation, places them at risk for developing deep venous thrombosis and pulmonary embolism (Gan, 2017). Patients experiencing inadequately controlled postoperative pain may reduce mobility, resulting in loss of strength, sleep disturbances, immune system impairment, increased susceptibility to disease and dependence on medication (NAS, 2011).

Although adequate management of postoperative pain is essential to patient's recovery, the increased use of opioids in postoperative pain management contributed the opioid crisis leading to new prescribing guidelines (Ohio Academy of Family Physicians, 2017). According to a study in the Annals of Internal Medicine, nearly one-third of adults in the U.S. currently use

prescription opioids (Rummans, et al., 2018). Furthermore, The U.S. leads the world in opioid use, consuming roughly 80% of all the world's opioids (Rummans et al., 2018). To address the opioid crisis, federal legislation was introduced in April 2017 to limit the supply of opioid prescriptions for acute pain to seven days (Rummans et al., 2018). By August 2017, 24 states had enacted rules with a limit, guidance, or requirement related to opioid prescribing (Rummans et al., 2018). Following federal recommendations, the state of Ohio implemented the new prescribing guidelines on August 31, 2017. The new guidelines include the use of Morphine Equivalent Dosing (MED) (Ohio Academy of Family Physicians, 2017). MED is an opioid dosing method created to calculate safe opioid doses by putting the many different opioids into one standard value (Centers for Disease Control [CDC], 2020). The total MED of a prescription for acute pain cannot exceed an average of 30 MED per day (Ohio Academy of Family Physicians, 2017). Overprescribing in the hospital setting carries over to patients who are being prescribed opioids when they are discharged home. The use of the MED is a means to help curb overprescribing in the outpatient setting. Most opioids prescribed for surgery remains unconsumed, suggesting broad patterns of over-prescribing (Soto, 2015). Furthermore, up to 90% of these unused opioids remain in unsecured locations in the home, which can make their way to people who are not the intended users and adds to the opioid epidemic (Soto, 2015).

Significance and Prevalence

The National Survey on Drug Use and Health (NSDUH) provides national and state-level data on the use of tobacco, alcohol, illicit drugs (including non-medical use of prescription drugs), and mental health in the United States (Office of National Drug Control Policy, 2009). According to the NSDUH, in 2009, 7.87 percent of Ohio residents reported using illicit drugs in one month, and the national average was 8.82 percent (Office of National Drug Control Policy,

2009). Additionally, 3.48 percent of Ohio residents reported using an illicit drug other than marijuana in one month (the national average was 3.6 percent). Furthermore, as a direct consequence of drug use, 1,340 people died in Ohio in 2009, which is significantly higher than those who died from a motor vehicle accident or firearms: 1,021 and 991 respectively (Office of National Drug Control Policy, 2009).

Every day, more than 128 people in the U.S. die from an opioid overdose. In 2018, Ohio prescribers wrote 53.5 opioid prescriptions for every one hundred persons compared to the U.S. average of 51.4 prescriptions (NIDA, 2019). According to the National Institute of Drug Abuse (NIDA, 2019), Ohio rates second in opioid-related overdose deaths in the United States (NIDA, 2020). In 2017, there were 4,293 opioid-related overdose deaths in Ohio. The rate has tripled from 10 deaths per 100,000 since 2010. In the same period, deaths related to synthetic opioids rose from 175 to 2,296 deaths (NIDA, 2019). Epidemic increases in opioid use highlight the need for effective adjuvant therapies to alleviate pain and the need for non-pharmacological agents (Roelants 2019).

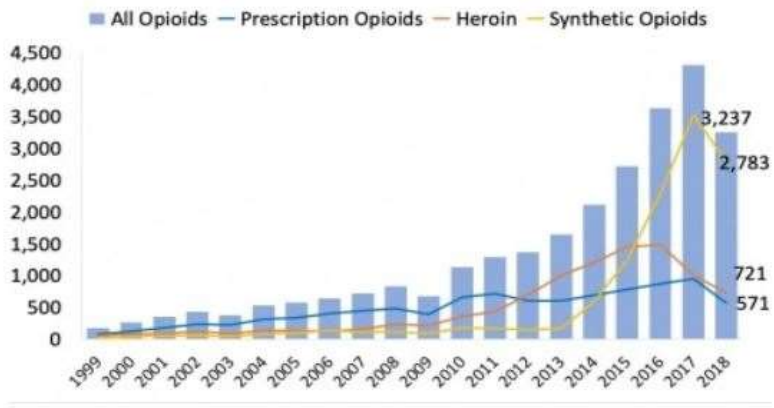
Opioid misuse and addiction to opioids, including prescription pain medications, heroin, and synthetic opioids, such as fentanyl, contribute to this severe national crisis that affects public health and social and economic wellbeing (NIDA, 2019). The Centers for Disease Control (CDC) and Prevention estimates that the total "economic burden" of prescription opioid misuse alone in the United States is $78.5 billion a year, including healthcare costs, lost productivity, addiction treatment, and criminal justice involvement (NIDA, 2021). In response to the opioid epidemic, the Food and Drug Administration (FDA) developed policies related to prescription medications. Changes included clear labeling for immediate release, additional warnings, and safety information; encourage the development of abuse-deterrent formulations of opioids;

improve access to naloxone and medication-assisted treatment options for patients with opioid use disorders; and support better pain management options, including alternative treatments (FDA, 2016).

Figure 1 illustrates the increasing trend of synthetic opioid-related overdose deaths between 1999 and 2018 in Ohio. To date, data is not available after 2018 from NIDA.

Figure 1

Ohio Overdose Deaths 1999-2018



National Institute of Drug Abuse (2021)

Problem Identification

Nurses are the drivers of patient care, including pain management, not only because they spend the most time with patients and have a crucial role in assessing symptoms, but also because nurses are the primary patient educators (Mahoney, 2016). It is generally through the nurse communication with the patient that patient expectations are established. It is also through nurse communication that caregivers can ascertain whether those expectations are being met (Mahoney, 2016).

The standard of practice is the fundamental component of all nursing activity, reflecting the translation of a nurse's knowledge into nursing actions. The American Nurses Association

(ANA) standards of practice align with the nursing process and outline standards of care (ohnurses.org, 2014). Registered Nurses (RNs) in this target organization consistently assessed patients' pain before and after interventions using the numerical rating scale, non-verbal cues and physiological parameters. Once the RNs analyzed assessment data, they were able to identify signs of pain following surgery. The third step of the ANA standards of practice is outcome identification. The student investigator witnessed RNs individualizing the patient's plan of care, which included using non-pharmacological interventions such as ice and heat. With the next step, the RNs began to plan strategies to promote expected outcomes to relieve postoperative pain. However, the first-line treatment of postoperative pain is opioids. The next step of the ANA standards of practice is Implementation. While the Electronic Medical Record (EMR) contained non-pharmacological interventions, the nurses seemed focused on pharmacological interventions within the EMR instead of considering non-pharmacological options. The last step in the ANA standards of practice is Evaluation. The nurses were consistent in the evaluation of interventions for postoperative pain.

Opioid use in the community setting extends to the hospital setting and can impact the Hospital Consumer and Assessment of Healthcare Providers and Systems (HCAHPS) scores. Discharged patients provide feedback to the hospital through the completion of a survey. The HCAHPS survey is the first national, standardized, publicly reported survey of patients' perspectives of hospital care (Center for Medicare and Medicaid Service [CMS], 2020). The survey contains 29 questions with 19 items that address critical aspects to the patient's experience, such as communication with nurses and doctors, the responsiveness of the staff, cleanliness, quietness of the hospital, communication about medications, discharge information, and the overall rating (CMS, 2020). The survey is administered randomly to adult patients six

weeks post-discharge. After the results are analyzed, they are made available to the public on the CMS website.

The specific HCAHP composite for this Evidence-Based Practice (EBP) project is pain management and how well patients' pain is controlled in the organization. Table 1 illustrates the recommended threshold for HCAHP scores for organizations to achieve.

Table 1

Hospital Consumer and Assessment of Healthcare Provider Systems

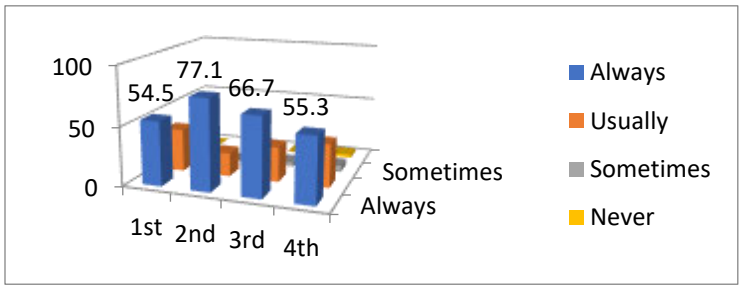
HCAHPS	Floor (Minimum)	Achievement Threshold (50th Percentile)	Benchmark (Mean top of Decile)
Pain Management	52.19	70.20	78.46

hcahpsonline.org

Figure 2 shows the 2017 quarterly HCAHP scores for the medical surgical unit for the institution. As noted from the hospital's HCAHP scores, there is inconsistency, and some scores are well below the achievement threshold, indicating less than optimal management of patient's pain.

Figure 2

2017 HCAHPS for How well is Pain "Well Controlled?"



In January 2018, the CMS changed the HCAHPS pain composite scores to focus on nurse's communication with patients to avoid equating pain management to having zero pain (CMS, 2019). October 2019 was the target date for the first public reporting. However, to date, the new composites are not available on the CMS website.

Figure 3

2019 HCAHP pain composite scores

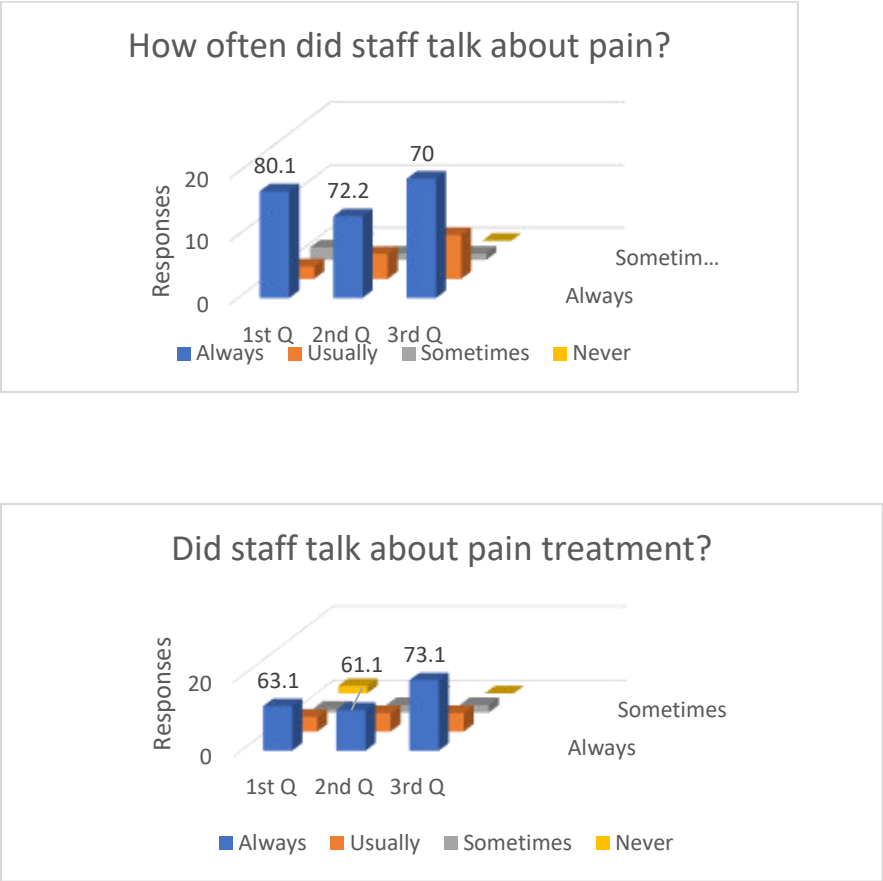


Figure 3 illustrates the outcomes for the changed pain composite scores for the target organization. As noted in the above diagrams, shifting the focus to communication shows nurses are communicating with patients about the adequacy of pain treatment. However, the information

does not indicate how well the patient perceives pain control. Considering the new composite, patient satisfaction needs to be evaluated based on the patient's personal experience.

Purpose and Goals

The purpose of this EBP project was to evaluate the impact of music listening as an adjuvant to traditional pain management strategies to help manage postoperative pain and to assess the amount of opioids used to help manage postoperative pain.

PICOT Question

In patients 18 years and older undergoing surgery requiring an inpatient stay on a Medical-Surgical Unit in a rural Northwest Ohio Hospital (P), does the implementation of music listening as an adjuvant to traditional postoperative pain management strategies (I), compared to current practices (C), help with the management of postoperative pain, and reduce opioid use (O), in a three-month time frame (T).

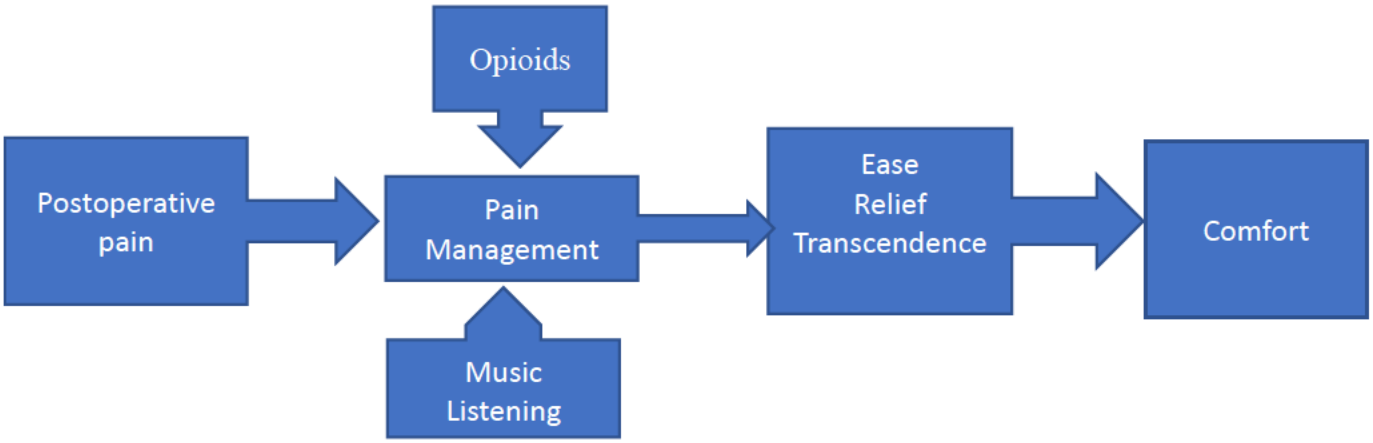
Guiding Framework

Kolcaba's Comfort Theory (1994) was used to guide this (EBP) project. Kolcaba (1994) explains that comfort occurs in the following three states: ease, relief, and transcendence, which occur in the following contexts: physical, sociocultural, psycho-spiritual, and environmental. According to Kolcaba's Comfort Theory, comfort occurs when the patient's pain needs are satisfied in four contexts. Furthermore, when comfort occurs, the outcome of pain relief will be met (Kolcaba, 1994). The rationale for using the Comfort Theory to guide this evidence-based project is under the following premise: Relief from pain is necessary to return to former function; comfort is a desirable outcome and facilitates gains in physical and psychological performance. Comfort also allows earlier activity to decrease postoperative complications. According to the theorist, needs are successfully met with appropriate interventions.

Furthermore, the theorist emphasizes that comfort guides nursing care. Figure 4 illustrates the integration of Kolcaba's Comfort Theory into this evidence-based practice project.

Figure 4

Integration of Kolcaba's Comfort Theory



Literature Review

Search Strategies

Electronic databases for the period between 2010-2020 using PUB Med, EMBASE, CINAHL, and PSYCH Info were searched (Appendix A). Reference lists of selected reviews and original articles were scanned to find additional articles. A grey literature search was used for other documents in journals, professional organizations, websites, and guideline clearinghouses.

Search terms included: music therapy, music medicine, music listening, postoperative, pain, postoperative pain, pain management, and postoperative pain management. Inclusion criteria for the search included: articles written in English, peer-reviewed and published between 2010 and 2020, adult participants (18 years of age and older), titles which included search terms and keywords, articles including acute care inpatient setting, and articles including postoperative patients on a Medical Surgical unit and ICU. Exclusion criteria were articles that included

pediatric participants, non-peer-reviewed articles not written in English, or articles containing cognitively impaired participants.

Appraisal and Synthesis

Appraisal of literature occurred after a PICOT-guided literature search. Rapid Critical Appraisal checklists for Descriptive studies, Randomized Control Trials, Systematic Reviews of Clinical Interventions and Clinical interventions/Treatments, and Qualitative Evidence were used to critically appraise the articles (Melnyk & Fineout-Overholt, 2015). The Appraisal of literature helped to identify high-quality articles supporting this EBP project. Appendix B outlines the evaluation of literature, while Appendix C outlines the synthesis of the literature.

Postoperative pain, while an expected consequence of a surgical procedure, is influenced by psychological factors, such as fear and anxiety. For this reason, some studies included an anxiety variable. Level I and II studies were primarily included in the literature review, except two-level V studies to illustrate the lived patient experience.

Several studies examined whether there was a correlation between the knowledge of RNs regarding pain and overall pain control (Keen et al., 2017). Enhancing provider knowledge, attitudes, and skills can affect the quality of pain treatment delivered to the patient (Keen et al., 2017). Literature suggests that pain education programs for nurses have produced improvements in nurses' knowledge and attitudes regarding pain (Keen et al., 2017).

Nurses tend to overestimate their knowledge regarding pain and underestimate patients' pain. Therefore, improved knowledge by nurses on pain management is an essential target of any attempt to improve pain management (Gretarsdottir et al., 2017). A study conducted by (Gretarsdottir et al. 2017) examined the difference in knowledge between nurses with different levels of education. The author used a descriptive, cross-sectional survey design with 235

participants. In this study, the Knowledge and Attitude Survey Regarding Pain (KASRP) was used to determine the nurse's knowledge about pain. This study concluded that an advanced nursing degree is associated with better overall knowledge on pain management, whereas work experience, age, the level of exposure to patients in pain, or work setting was not associated with knowledge on pain management. The authors did not discuss the specific levels of education.

The Joint Commission (TJC) sets global standards as a symbol of quality care revised its pain management standards in January 2018 (TJC, 2018). The revised standards include identifying pain assessment and pain management strategies, including safe opioid prescribing, and assess and manage the patient's pain and minimize the risks associated with treatment (TJC, 2018).

Music is one of the non-traditional therapies used to relieve pain, decrease anxiety, and improve the patient experience (Schneider, 2018). The American Music Therapy Association (AMTA) (2019) defines Music Therapy as an established health profession in which music is used within a therapeutic relationship to address the physical, emotional, cognitive, and social needs of individuals. Furthermore, music therapy actively engages patients in singing, composing, and instrument playing (AMTA, 2019). Unlike music therapy, music listening is a passive process because the patient listens to live or recorded music, and no music engagement or active participation is involved (Bass Connections, 2019). Schneider (2018) emphasized music is the universal language allowing patients to "escape" negative experiences such as pain. One of the theories as to why this intervention is useful is music acts as a distractor (Schneider, 2018). Another theory to explain music's effects on pain is the gate control theory. The gate control theory works under the premise that non-noxious stimuli help to "close the gate" and prevents pain from traveling to the brain (Schneider, 2018). The music interrupts pain impulses

and decreases pain perception (Sibanda, 2018). Sibanda (2018) reported that music acts as a diversion from painful stimuli or negative thoughts associated with surgery to more pleasant ones.

Additionally, literature has proved that listening to pleasant, familiar, relaxing, and preferred music distracts the prefrontal cortex from painful stimuli (Kusi-Amponsah et al., 2010). Furthermore, the melody and rhythm of the music affect the perimeter system of the brain and hypothalamus, which influences physiological reactions, such as decreased blood pressure, decreased pulse, and pain relief (Schneider, 2018). Music, as an intervention, has existed in various cultures for hundreds of years, and even Florence Nightingale calmed patients using music (Nightingale nd).

The human brain is hardwired to distinguish music from noise and to respond to rhythm and repetition, tones, and tunes (Simon, 2015). Simon (2015) further elaborated that the auditory nerve transmits the electrical signal of music and other sounds to the auditory cortex in the temporal lobe. According to Sibanda et al. (2018), the parasympathetic nervous system is responsible for bringing the body back to its normal state after the action of the sympathetic nervous system by decreasing the adrenergic activity that, in turn, reduces neuromuscular arousal, thus achieving its anxiolytic effect. Sibanda et al. (2018) added that the limbic system could be stimulated by music, resulting in the release of endorphins, a neurotransmitter vital to induce a sense of wellbeing in humans. A systematic review by Sibanda et al. (2018) examined the effectiveness of music as an adjuvant treatment for pain, anxiety, and postoperative delirium for patients undergoing hip or knee surgery. The systematic review concluded that music improved anxiety, pain, and postoperative delirium in six of the ten included studies (Sibanda et al.,2018).

According to Good et al. (2010), pain has a sensory and affective component that, taken together, constitutes pain. The authors emphasized that the sensory component of acute post-op pain is the unpleasant, localized perception of physical hurt associated with surgical tissue damage. Underestimating pain is a common behavior for nurses when they treat adult surgical patients resulting in inadequate pain management (Good et al., 2010). Non-pharmacologic interventions, such as music listening, relaxation, and ice, are valuable, simple, and inexpensive adjuvants to pharmacologic approaches to pain management (Allred et al., 2010).

A Randomized Control Trial (RCT) conducted by (Gallagher et al. 2018) examined 163 patients, 18 years and older, who underwent orthopedic surgery. Following surgery, the patients began their stay in an orthopedic unit. Surgical procedures included those involving the knees, hips, and shoulders. The music group actively participated in music therapy sessions while the control group received the standard of care with analgesics. No other standard of care was identified in the study. The patients received music therapy by a trained music therapist within 24 hours of admission and every day throughout their stay, each session lasting approximately 30 minutes. The patients in the music group could select songs, play instruments, discuss lyrics, and sing. Other interventions used included music-assisted relaxation to facilitate rhythmic breathing, progressive muscle relaxation, imagery, and reminiscence. The study concluded that music therapy consistently produced immediate improvement of pain and anxiety in patients post elective orthopedic surgery, and in some cases, nausea at a statistically significant level compared to the standard of care (Gallagher et al., 2018). The authors did not observe the effects of narcotics and antiemetics. However, the authors discovered no statistically significant difference in the length of hospital stay between the music group and those not in this group. The

researchers attributed the lack of statistical significance to a short three-day length of stay for these orthopedic surgical procedures (Gallagher et al., 2018).

A systematic review by Cole et al. (2014) examined several RCTs regarding music as an adjuvant therapy to control pain and symptoms in hospitalized adults. The RCTs included surgical patients, medical patients, medical-surgical patients, intensive care patients, and pregnant patients. However, the focus was on surgical-related studies since these were pertinent to this evidence-based project. Seven trials evaluated the effect that music had on the surgical population. The first population in the review were patients who underwent intestinal surgery. The interventions included a relaxation technique, a music intervention, and a combination of the two. This study included 167 participants, with 43 in the relaxation group, 49 in the music group, and 37 in the combination of music and relaxation group, and the control group had 38 participants (Cole et al., 2014). The music group received sedating music with 60-80 beats per minute with sustained melodic quality, controlled volume, no lyrics, and strong rhythm or percussion. The music group selected music from five different genres of music. Data were collected four times during ambulation. The control subjects did not listen to a tape and rested quietly for 15 minutes. All patients in the study used a patient-controlled analgesia pump. Data collection included pain sensation and distress, milligrams of morphine equivalent doses, sleep quality, time to recovery, heart, and respiratory rates. Time to recovery was measured by the number of days before bowel sounds returned, removal of a nasogastric tube, the start of a clear liquid diet, discontinuation of the patient-controlled analgesia pump, length of stay, and the number of complications in the first two postoperative days. (Cole et al., 2014). The authors were not clear regarding total amount of time the music group listened to music. The authors concluded that postoperative pain was significantly less in the music group. Subjects in the

combination of relaxation and music intervention group did not report less pain than individuals in the music-only group in this study.

The second study of the systematic review by Cole et al. (2014) included 124 adults who underwent elective hip or knee surgery to evaluate music in a geriatric surgical population ranging in age from 59-82 years. There were 62 subjects in both the music intervention group and the control group. The study group listened to music for one hour for a minimum of four times per day, and the control group received the standard of care only. The standard of care included using a patient-controlled analgesia pump. Confusion, pain, and analgesic medication usage were measured after the patient-controlled analgesia pump was discontinued on postoperative day one. The music group had a reduction in pain on postoperative days 1 to 3 with $p = .001$ (Cole & LoBiondo-Wood, 2014). No data was available after day three. Analgesic medication use was significantly less after surgery in the music group, as well as readiness to ambulate, and distance ambulated (Cole et al. 2014).

Cole et al. (2014) also described a study with 86 participants who underwent coronary artery bypass or valve replacement surgery in one healthcare system. Fifty of these participants were in the study group, and 36 were in the control group. The study group listened to taped music for 20 minutes twice daily on postoperative days one to three. The control group received 20 minutes of bed rest only. Measurements included pain, anxiety, and physiologic data immediately before and after each 20-minute intervention. The administration of analgesics was not included in the study. The study concluded that the intervention group had significantly lower anxiety scores and pain scores. However, there were no differences in blood pressure, heart rate, and opioid use between the groups (Cole et al., 2014).

Additionally, one study with 56 patients aged 46-84 examined patients following total knee arthroplasty. The study included both a music group and a control group. The subjects in the study group listened to 20 minutes of self-directed easy-listening music delivered by headphones and compact disk 20 minutes before the first postoperative ambulation, and during a 20-minute rest period after the first postop ambulation. Subjects in the control group received a 20-minute rest period without music. Data collection took place at four points in time. Data was collected: 1) 20 minutes before the first physical therapy session, 2) immediately before the physical therapy session, 3) immediately after, and 4) 20 minutes after the physical therapy. The study discovered significant differences for pain between data collection time one to two and from time two to three. However, no differences were found between the two groups in pain scores (Cole et al., 2014). Furthermore, there were significant differences in anxiety between the data collection times one to two and from two to three. The investigator did not disclose how anxiety was measured. All patients received opioid analgesics, and their use immediately before initiating the music intervention to six hours after the intervention was calculated (Cole et al., 2014). The study did not identify any differences in analgesic use between the groups.

Allred et al. (2010) examined the effect of music on postoperative pain and anxiety on patients who underwent total knee arthroplasty. The study took place in an orthopedic unit with 50 participants. Measurements included the McGill Pain Questionnaire, the Visual Analog Scale for pain, the Visual Analog Scale for anxiety, blood pressure, heart rate, respiratory rate, and oxygen saturation. The participants listened to soft music for 20 minutes before the first ambulation and a 20-minute rest period after the ambulation (Allred et al., 2010). The study findings by Allred et al. (2010) were consistent with the findings by Cole et al. (2014) that music helps to reduce pain and anxiety after surgery.

A systematic review and meta-analysis by Hole (2015) examined 73 RCTs in a qualitative synthesis and 72 RCTs in the quantitative synthesis on music as an aid for postoperative recovery in adults. The number of participants varied from 20 and 458 subjects across studies and contained both a music group and a control group. The surgical procedures ranged from minor endoscopic interventions to transplantation surgery. Most studies included only elective procedures. The patient or researcher selected the music. Patients chose a wide variety of music styles while researchers identified single types of music, such as Chinese classical music, or gave patients a choice from a list of six or more styles. Most styles were soothing. The timing of music listening could be before, during, or after surgery, or a combination of these timing. The duration of music varied between a few minutes to several days.

The timeframe for music listening in these studies was between 20 minutes and one hour, two to eight times daily across reviews. The author did not explain the wide variations of timing. Music was initiated before, during, or after surgery, and the control group received standard of care, including headphones with no music, white noise, and undisturbed bed rest. Outcomes included postoperative pain, analgesia, anxiety, length of stay, and satisfaction with care. Anxiety was measured using the State-Trait Anxiety Inventory, Ten-Point Likert scale, or questionnaire. The pain was measured using a Visual Analog Scale or Numerical Rating Scale, and analgesia was measured in mg per drug. The systematic review concluded music reduced postoperative pain, anxiety, and analgesia use and increased patient satisfaction. Hole (2015) elaborated that the timing and delivery of the music can be adapted to individual clinical settings and medical teams.

A RCT by Jafari et al. (2012) examined 60 patients scheduled to undergo Coronary Artery Bypass Graft (CABG) and valvular surgery. The study used two groups, of which 30 patients were in both the intervention and control groups. The intervention group listened to their preferred music on the evening of their surgery. Pain intensity was measured: 1) before the music intervention, 2) immediately after, 3) 30-minutes after, and 4) one hour after the intervention. Patients received narcotics for pain management; however, they were excluded from the study if they received narcotics within four hours of the music intervention. Jafari et al. (2012) concluded that postoperative pain was significantly decreased in patients after CABG and valvular surgery who were in the music group.

A study by Bojorquez et al. (2020) examined the effect of music therapy on surgical patients. The study consisted of two phases. The first phase involved educating inpatient care providers about music therapy. The nurses and social workers were educated on the use of music therapy for patients exhibiting pain or anxiety symptoms and on those referred for music therapy. Referrals were made to the music therapist one day a week for 12 consecutive weeks; 42 patients participated in the study. The music therapist, along with the patient, determined the appropriate music therapy intervention. The individual needs of the patient guided the frequency of the music intervention. The standard of care was not specified, and it is not known if the subjects were given analgesics in conjunction with music therapy. Bojorquez et al. (2020) found a statistically significant reduction in patients' pain after listening to music in this study.

Another study supporting music to help manage postoperative pain was done by Vaajoki et al. (2012). The design was a prospective clinical study with two parallel groups and a sample of 168 patients. A pool of those scheduled for abdominal surgery was placed into a music group (n=83) and a control group (n=85). The music group listened to music seven times for 30

minutes at a time during the first three postoperative days. Participants could choose which type of music they wanted to listen to. The investigator visited on the third postoperative day. Participants completed a questionnaire consisting of questions about the patient's music exposure frequency, musical background, favorite music, postoperative pain experiences before the surgery, and pain management experiences after the abdominal surgery. All patients were given analgesia via epidural after surgery and analgesia during the music intervention if needed. The study concluded using patient-preferred music could be beneficial in improving the quality of hospital stay and recovery in patients undergoing major abdominal surgery. However, the study indicated more research was needed for a definitive conclusion about music listening to help manage postoperative pain (Vaajoki et al., 2012).

Literature supports calming-relaxing music with a tempo of 60-80 beats per minute to help manage pain after surgery. A systematic literature review by Poulsen (2018) examined ten studies to develop a nursing music protocol for postoperative pain. Poulsen (2018) described a best practice protocol by the Joanna Briggs Institute that used flowing and non-lyrical music with 60-80 beats per minute, low tones, and minimal brass percussion. The music intervention lasted 15-30 minutes during the postoperative period. The study concluded that patients reported a 0.9-unit reduction in pain intensity on a ten-point Likert scale. Additionally, patients in the music group were 70 percent more likely to have a 50 percent pain reduction following the music intervention.

Another study in the systematic review by Poulsen (2018) evaluated the effects of music on pain control in postoperative patients during their inpatient hospital stay. The population consisted of a total of 1,937 participants from five continents. Music was generally 20-30

minutes long and included music that was 60-80 beats per minute. The study concluded that music significantly reduced pain levels after surgery.

Poulsen (2018) described another systematic review of 72 RCTs that examined the effect of music on acute postoperative pain. The systematic review focused on pain, analgesia needs, and satisfaction of care. The music intervention was delivered for 20-60 minutes and was predominantly classical, relaxing, calming music. The authors reported that music reduced postoperative pain in 45 RCTs. Furthermore, the authors concluded that music reduces anxiety in 43 RCTs and opioid use in 34 of the RCTs. Additionally, 16 studies found that when listening to music following surgery, patient satisfaction was significantly improved. The authors of this systematic review also concluded that analgesic use was significantly reduced in the studies included in this RCT.

Clinical Practice Guidelines

The American Pain Society (APS) released the following guidelines for the management of postoperative pain: Provide patient and family-centered education, individually tailored to the patient (or responsible caregiver), including information on various treatment options for the management of postoperative pain, and document the plan and goals for postoperative pain management (Chou et al., 2016). According to the APS, individually tailored educational programs, and support for patients with complex needs associated with psychological co-morbidities, who undergo surgery, are associated with reduced postoperative opioid consumption, as well as reduced length of stay following surgery (Chou et al., 2016). Additional recommendations from the APS, related to postoperative pain management, include the use of multimodal analgesia, or the use of a variety of analgesic medications and techniques combined with non-pharmacological interventions such as transcutaneous electrical nerve stimulation,

acupuncture, massage, cold therapy, heat, continuous passive motion, and immobilization or bracing (Chou et al., 2016). The American Pain Society (APS) defines multimodal analgesia as the use of a variety of analgesic medication and techniques which target different mechanisms of action in the peripheral and central nervous system (Chou et al., 2016). Literature suggests that combining more than one pain management method may have an additive or synergistic effect and more effective pain relief compared to a single modality and will also reduce the consumption of opioids (Chou et al., 2016). Furthermore, the APS recommends that facilities should have an organizational structure in place to oversee the development, implementation, and evaluation of policies and practices to assure safe, evidence-based, and effective post-op pain control (Chou et al., 2016).

Clinical Knowledge Gap

There is limited literature on the use of non-pharmacologic pain management for postoperative pain, and most of the literature focuses on specific surgical cohorts, such as total joint replacements and abdominal surgeries, instead of combining multiple types of surgeries (Buyukyilmaz, 2014; Gallagher et al., 2018; Komann, et al. 2019). Studies found took place in large metropolitan hospitals and did not include small rural health care settings (Cole et al., 2014; Engwall & Duppils, 2009). Table 2 outlines practice recommendations for this EBP project.

Table 2

Summary of Practice Change Recommendations

PICOT Question	In patients 18 years and older undergoing surgery requiring an inpatient stay on a Medical-Surgical unit in a rural Northwest Ohio Hospital (P), does the implementation of music listening as an adjuvant to traditional postoperative pain management strategies (I) compared to current practices (C) help with the management of postoperative pain and reduce opioid use (O) in a three-month time frame (T).
Practice Change Recommendation	1. Add questions on admission assessment to identify a patient's willingness to try music listening – triggers the addition of intervention on the care plan. 2. Add music listening as a non-pharmacological pain management strategy in the EMR. 3. Educate RNs on music listening as a non-pharmacological pain management strategy 4. Implement music listening 20-30 minutes within 24 hours following surgery and then three times/day.
Level of Effectiveness	Guidelines on the Management of Post-op Pain is an evidence-based practice approach that is Level I evidence. Of 32 recommendations, four recommendations supported high-quality evidence, and 11 recommendations were of low-quality evidence. However, the panel came to a near-unanimous consensus on almost all the recommendations.
References in support of Recommendation	Twenty-three studies demonstrate enough evidence to support the assimilation of the utilization of music as an adjuvant to manage postoperative pain.

Methods

Setting and Population

This EBP project took place in the Medical Surgical Unit in a rural Northwest Ohio hospital. This medical surgical unit has 32 beds. Staff included 25 RNs), two nursing assistants, and two ward secretaries. The target population included participants who were 18 years of age and older and who underwent a surgical procedure requiring an inpatient stay in the medical-surgical unit. Using Erdfelder, Faul, & Buchner (1996) as a reference, a sample calculation for this EBP project concluded using a two-tailed test with an alpha of 0.05, a power of 0.80, and a medium effect size, 35 patients was a sufficient sample size for this EBP project. This project's goal was to recruit 35 participants for the study and 35 patients who would serve as control subjects. Subjects in the control group received the standard of care for postoperative pain management within this institution. However, recognizing the right of patients to opt-out before completion, a sample of 100 patients was requested from the University of Toledo Institutional Review Board (IRB) to allow for subject attrition. The use of nerve blocks to control pain in patients undergoing surgical procedures on upper and lower extremities limited acceptable subjects for this EBP project because they were not prescribed opioids. Twenty-five subjects met the inclusion criteria for the music group, and twenty-four subjects met inclusion criteria for the control group. The student investigator obtained approval from the University of Toledo IRB and the hospital administration before implementing this project.

Exclusion criteria for this EBP project included patients who were under the age of 18 years of age, patients who were hearing or cognitively impaired, and patients receiving continuous administration of analgesics or nerve blocks. The patients who were considered

outpatient or observation status, post-cesarean section or vaginal delivery, chronic pain conditions, and non-English speaking patients were also excluded from participating.

Human Subject Protection

Literature has acknowledged the benefits of music listening in the management of postoperative pain. However, participants can experience negative emotional responses, which may cause emotional distress (D. Bates, Personal Interview, October 2019). No adverse emotional responses occurred throughout this EBP project. If adverse emotional reactions were to occur, a plan was in place to immediately stop the music intervention and provide support to the participant. Furthermore, if emotional reactions were to occur, a referral would be made to social service or pastoral care. The student investigator completed Collaborative Institutional Training Initiative (CITI Program) to ensure the protection of human subjects (Appendix D). The student investigator obtained written consent from patients who agreed to participate (Appendix E).

Implementation guide

The Johns Hopkins Nursing Evidence-Based Practice (JHNEBP) model guided the implementation of this evidence-based project. Dang and Dearholt (2018) explained that this model is a problem-solving approach to clinical decision-making, focusing on scientific evidence with the best available patient and practitioner experiential evidence.

An inquiry is the first component of the JHNEBP model that launches the EBP process (Dang & Dearholt, 2018). An inquiry is the foundation of nursing practice and comprises a dedicated effort to question, examine, and collect information about a problem, an issue, or a concern. The National League for Nursing (2014) described a spirit of inquiry as "a persistent sense of curiosity that informs both learning and practice (p. 1). A nurse who is motivated by a

spirit of inquiry will raise questions, challenge traditional and existing practices, and seek creative approaches to problem-solving" (Dang & Dearholt, 2018). Furthermore, a nurse's commitment to generate and apply new knowledge in practice promotes a culture of inquiry to achieve quality patient outcomes.

The JHNEBP model uses the PET process. PET consists of three phases: Practice Question, Evidence, and Translation. Within the three phases are 18 prescriptive steps (Dang et al., 2015). The JHNEBP model was selected to facilitate the translation of evidence of the effects of music listening on postoperative pain management.

Step 1: Practice Question

The practice question phase of the PET process includes six operational steps. The first step is to recruit an interprofessional team. The interprofessional team in the target organization included department leaders, pharmacists, RNs, Social Workers, and Case Managers. The second step is to define the problem, which is the management of postoperative pain solely using pharmacological agents, such as opiates. The third is to develop and refine the EBP question. The fourth step is identifying stakeholders, which for this project included patients, administration, nursing staff, surgeons, pharmacists, family, and community members. The fifth step is to determine the responsibility for project leadership, and the sixth step is to schedule team meetings. The practice question was shared with hospital leadership and nursing staff.

Step 2: Evidence

The second phase (Steps 7-11) of the PET process addresses the search for, appraisal of, and synthesis of the best available evidence. Based on the results, the team makes recommendations regarding practice changes (Dang et al., 2018). Step 7 is to conduct an internal

and external search for evidence; step 8 is to appraise the level and quality of each piece of evidence; step 9 involves summarizing the individual evidence; step 10 is to synthesize the overall strength and quality of evidence and step 11 focuses on developing recommendations for change based on the evidence synthesis (Dang et al., 2018).

Step 3: Translation

In the third phase (Steps 12-19), the EBP team determines whether the practice changes are feasible, appropriate, and a good fit given the target setting. If it appears that a good fit exists, the team creates an action plan, implements, and evaluates the change after implementation. Once the evaluation is complete, the EBP team communicates the results to appropriate individuals that are internal and external to the organization (Dang et al., 2018). The hospital leadership agreed that the implementation of music to help manage postoperative pain was a valuable asset to current pain management strategies and will extend the intervention in the future to all patients undergoing surgical procedures that require an inpatient hospital stay.

Limitations

Several limitations were noted in this EBP project. The first was that the patients were not blinded to the interventions as this was not possible due to the small size of the hospital and limited pool of subjects. Therefore, it was necessary to use a convenience sample. Randomly selecting the participants would have helped to overcome the limitation of convenience sampling and provide rigor to the project. However, it is challenging to find participants by random selection blinded in a small rural hospital. The limitation of being non-blinded may have caused study bias in this EBP project. In a systematic review by Hrobjartsson et al. (2014), there was empirical evidence of pronounced bias due to lack of patient blinding in complementary/alternative randomized clinical trials with patient-reported outcomes. According

to Hrobjartsson et al. (2014), in trials with patient-reported outcomes, bias due to the lack of patient blinding is mainly caused by a combination of response bias (i.e., a tendency for patients to report symptoms in the most desirable way) or with a placebo effect. It is recommended that further studies should be blinded to avoid study bias.

Secondly, the sample recruited for this study was less than the recommended sample size resulting in underpowered statistics to test the effect of the intervention. To address this threat to internal validity, future researchers may wish to consider implementing the intervention in multiple rural hospitals to increase the likelihood of securing an adequate sample size.

The third limitation was a lack of diversity among participants in the control group compared to the music group. Conducting this EBP project in multiple rural hospitals could potentially increase the likelihood of the project recruiting and enrolling a more culturally diverse group of patients.

The fourth limitation was the inconsistent documentation of offering the music intervention, and the pre and post-intervention pain levels by the RN staff in the EMR. Due to the inconsistent documentation of the pre and post-intervention pain levels, data was only collected at one time point during the intervention phase. For this reason, an intent to treat design was used in this project. According to the intent to treat design, subjects allocated to a treatment group should be followed, assessed, and analyzed as members of the treatment group irrespective of their compliance with the planned course of treatment. The principle of intention to treat is meant to prevent bias caused by the loss of trial participants, which may reflect non-adherence to the protocol and disrupt baseline equivalence established by random assignment (McCoy, 2017). The intent to treat principle can be applied to this EBP project because subjects in the music group may have had varying degrees of adherence to the music treatment. All subjects in the

music group were included regardless of their adherence to the prescribed treatment (R. Topp, personal communication, March 19, 2021).

The fifth limitation was that the time point for assessing pain took place at various times before and after the intervention. This inconsistency in data collection times could affect results based on activities the patient participated in and possibly caused increased pain. Lastly, there were various types of surgical procedures included in both the music and control groups which resulted in varying degrees of pain. Most of the evidence from the published literature that has examined the effect of music therapy or music listening on pain control has been focused on a specific surgical cohort. Therefore, future researchers may wish to focus on a single surgical procedure. A longer recruitment period is also recommended to help with the recruitment and enrollment of an adequate number of surgeries in the surgical cohort because of the small size of the rural hospitals.

Roles and Responsibilities

This project required collaboration with several disciplines. First, the student investigator sought assistance from the director of the pharmacy. The director of the pharmacy provided resources to calculate the MED for data collection. Secondly, the hospital social worker provided resources to the student investigator to address potential negative emotional responses from any participant who was in the music listening group. The social worker also agreed to be available for consultation with patients if needed. The third discipline that assisted in the project was the department leader, who acted as the liaison between the student investigator and the RNs to ensure the MP3 players and directions for use were distributed to the participants on arrival to the medical surgical unit. Additionally, the director of perioperative services helped to facilitate the communication between the student investigator and the PACU nurses. The unit director

helped to facilitate communication between the student investigator and the medical surgical unit staff. Lastly, the RNs assisted in reminding the patients to listen to the music and assessed the patient's pain before and after the intervention.

Facilitators

The hospital administration demonstrated support for the implementation of music listening (Appendix F) to help manage post-operative pain, which helped to facilitate the implementation of the project. Other facilitators included support from hospitalists, surgeons, and nursing staff. However, it was essential to provide education to these stakeholders to facilitate support for the project. Talking points with a brief overview were created and presented to the hospitalists by the Vice President of Clinical Services and to the surgeons by the Director of Perioperative Services.

Barriers

Despite efforts by the student investigator to educate nurses in remembering to offer and document the music intervention and assess pain before and after the intervention, there was a lack of documentation in the EMR. The lack of documentation resulted in the omission of data and a limited sample size. The lack of documentation made it difficult to extract data to analyze results.

Another barrier was that the implementation of this EBP project took place during a worldwide pandemic. The SARS-CoV-2 pandemic resulted in the cancellation of surgeries and an increase in Covid-19 admissions. At one point, 75% of the census on the Medical Surgical Unit was COVID related. The increased number of patients with COVID 19, resulted in increased stress and anxiety among nurses, which might have contributed to the nurse's lack of offering the music and documenting the pain level before and after the patient listened to the

music. To help overcome this limitation placed by the reduction in surgeries and therefore a reduction of postoperative patients, this EBP project was extended to be completed over five months instead of the originally planned three months.

Implementation process

An experimental with intent to treat design was used to examine the effect of music on postoperative pain. This evidence-based project was approved by the Institutional Review Board (IRB) at the University of Toledo. This EBP project took place over five months in a Medical Surgical unit in a rural Northwest Ohio hospital. The project involved having subjects listen to music within 24 hours following surgery that require an inpatient stay. Music listening sessions were scheduled 20-30 minutes three times a day throughout the patient's inpatient hospital stay. Media player (MP3) devices were preloaded with a variety of music with a tempo of 60-80 beats per minute and provided to the subjects. The student investigator also provided participants with single-patient use earphones. Additionally, the patients could opt-in or opt-out of the project.

Critical stakeholders for this EBP project were identified and included patients, hospital \administration, department leaders, RNs, Pharmacists, Health Information Technology (HITT) employees, marketing specialists, social workers, pastoral services, case managers, hospitalists, and surgeons. Before implementing this EBP project, meetings were held with these critical stakeholders, and they were thoroughly briefed about the project. Subsequent to these meetings, approval and support was obtained by the student investigator from these institutional partners to proceed with the implementation of the EBP project. Once approval was received from the IRB of the University of Toledo, the student investigator met with patients in the hospital Pre-Admission Testing (PAT) area where the student investigator explained the project, answered questions, and allowed patients to either participate or opt-out. The student investigator also

explained possible emotional responses to the patient, such as tearfulness and anger, and resources available if such responses occurred. Upon their agreement to participate, the patients were given a cover letter explaining the project, and the student investigator obtained informed consent (Appendix E). Furthermore, the patients were provided both verbal and written instructions on how to use the MP3 player. An informational flyer about music listening, as a pain management strategy, was created and printed by the student investigator and given to the patients in PAT.

Once approval was obtained from the University of Toledo IRB, and before implementing this EBP project, education about the project was provided to the nurses in the Medical Surgical Unit and the Post Anesthesia Care Unit (PACU). Education was also provided to the nurses in the Intensive Care Unit (ICU) and the Ambulatory Care Unit because these nurses often float to the Medical-Surgical unit. Education was also provided to the nurses in surgery because these nurses may float to the PACU. A voiceover PowerPoint was used for educating these nurses. The PowerPoint was posted on the hospital's learning management system and assigned by the clinical education director to nurses working in the Medical Surgical Unit, ICU, and PACU. The education included evidence-based benefits of music listening in the management of postoperative pain, frequency, duration of the music, discontinuing the session if the patient experienced any negative emotional responses, and to provide emotional support to the patient. Additionally, the nurses were informed to educate the patient to call the RN if negative emotions occurred, such as tearfulness or anger. Education also included about consulting social services or pastoral care for patient support or a behavioral health referral if any negative emotional responses occurred.

The staff was educated on using standardized language for the Numerical Rating Scale (NRS) to ensure verbal consistency among nursing staff when assessing the patient's pain. Education also included assessing pain immediately before the music session and 60 minutes after completing the music session. Nurses who viewed the educational module, were tracked on the learning management system at the institution. The director of clinical education at the institution provided the student investigator a list of nurses who viewed the module to confirm that nurses received the education for this EBP project. The percentage of nurses who viewed the educational module are as follows: Family Birthing Center - 61%; ICU - 88%; medical surgical unit - 66%; Ambulatory Surgery Unit - 100%; and 80% of the nurses in Perioperative Services, which includes Preadmission testing, PACU and the operating room viewed the educational modules. The student investigator met one-on-one with nurses who were not able to view the educational module.

Before implementation, the EMR was enhanced to include an item in the admission assessment acknowledging the patient's willingness to try music to help manage postoperative pain. Music was added to the interventions in the EMR to provide an additional non-pharmacological option to help manage pain after surgery. On the day of surgery, the PACU nurse completed the admission assessment, which included a question referencing the patient's agreement to participate in music listening after surgery. The patient's response to participate triggered the PACU nurse to assign a random number to the patient. The student investigator provided pre-printed labels for the PACU nurses to assign to each patient. The random number was placed in the medical record to alert the student investigator of the patient's agreement to participate. The medical record accompanied the patient from the PACU to the medical surgical unit after surgery and recovery were completed and was integrated into the electronic medical

record. Once on the nursing unit, each participant's nurse proceeded with post-surgical nursing care per unit or hospital protocol. Nurses providing care for patients in this EBP were alerted on the home screen when a music intervention was due. This alert was embedded in the patient's EMRs by the HIT specialists for this institution. Once the nurse acknowledged the music listening intervention on the patient's care plan, the alert was eliminated and was not included in the permanent part of the medical record.

Music listening as an adjuvant to pain medications for the management of postoperative pain was implemented by the student investigator within 24 hours following surgery. Literature supports music listening within 24 hours after surgery, so the student investigator used this timeframe as the time to implement the music listening. Music was scheduled 20-30 minutes three times per day for the duration of their hospital stay. The length of time for the music listening for this project was chosen based on findings in the literature. A systematic review and meta-analysis by Hole (2015) examined 145 RCTs (73 qualitative and 72 quantitative) studies regarding the impact music has on postoperative recovery in adults. The review included groups preoperatively, intraoperatively, and postoperatively. For this EBP project, the postoperative studies were the primary focus. Of all the postoperative studies, 15 out of 20 recommended 20-30 minutes of music following surgery (Hole, 2015). Likewise, a systematic review by Cole et al. (2014) suggested that 20-30 minutes of music listening is beneficial to help reduce pain after surgery and decrease analgesic use. However, the frequency of music varied among studies. Hole (2015) described one study recommending the delivery of music two times daily, while other studies recommended eight times per day and a minimum of four hours daily. Additionally, the systematic review by Cole et al. (2014) suggested using music two times a day to four times daily helped to manage postoperative pain.

For this EBP project, when the student investigator was not available, nurses caring for patients in this EBP project reminded patients to listen to music. The nurses assessed pain immediately before and 60 minutes after the music listening session, according to the hospital's pain assessment policy. The student investigator provided MP3 players to subjects that contained a variety of music with a tempo of 60-80 beats per minute. Genre included Christian, Country, Pop, Rock, Jazz, and soft music downloaded to the MP3 players by the student investigator before implementing this EBP project. The student investigator provided written and verbal directions to subjects in preadmission testing on how to use the MP3 players. MP3 players were secured through an online retail store for $33.00 per device. To ensure infection control principles were maintained, devices were cleaned with disinfectant wipes which were recommended by the Center for Disease Control and the hospital's Infection Control Coordinator, between patients. As an added infection control precaution, devices were placed in small zip-lock bags when the patients were using them. Additionally, zip-loc bags were changed between patients. The devices were kept in the hospital unit for easy access. Approval was obtained from Health Information Technology (HITT) to charge the devices on the unit. The devices were paid for by the student investigator.

Single-patient use earphones were also purchased by the student investigator, which the patient could keep or discard when they were discharged from the hospital. A pack of 100 earbuds was obtained through Amazon for $60.00 (Amazon, 2020).

On the day of discharge, patients who participated in the EBP project were asked to complete a survey about music listening to help manage pain after surgery. The survey collected data related to the patient's overall music experience. Survey items included confirmation that the patient listened to music to help manage pain after surgery, type of music, length of listening,

and frequency of listening (Appendix G). Participants in the music group, who completed the study, were given a $25.00 visa gift card. Nurses who assisted with offering the music intervention and assessing the patient's pain level before and after the intervention were given a $10.00 visa gift card.

Data for opioid use and pain scores for participants in this EBP project were collected (Appendix H) after each participant completed the study by the student investigator via a retrospective chart review. Even though MED are guidelines to measure opioid use in the outpatient setting, literature cited the use of MED to measure amounts of opioids consumed (Cole et al., 2014). Data was collected and analyzed for the five months of the project implementation. Additionally, to assess opioid use and the efficacy of this implementation project, data was collected from the medical record of 24 randomly selected postoperative patients. These patients had surgery in the same institution that required an inpatient stay during the time that the project was being implemented. Patients who did not participate in the music intervention served as controls for the patients who participated in the project and received the standard medical care for inpatient postoperative pain management. Pain assessment took place immediately before and 60 minutes after each music listening session using a ten-point Likert scale used by the hospital. An independent sample t-test with repeated measures of Analysis of Variance (ANOVA) was used to analyze the pretest and posttest evaluation of pain in the intervention group. The t-test was also used to analyze MED to assess opioid consumption in the control group and the music intervention group.

Project Implementation Timeline

Following the successful defense of the proposed evidence-based project and approval from IRB, the education of the nursing staff occurred over a two-week period. During these two

weeks, the student investigator conducted a retrospective chart review to collect data for participants in the control group. Once staff education ended, the recruitment process for participants for the music group was to continue until 35 participants were recruited over three months. However, due to subject attrition and surgeries being canceled due to the COVID-19 19 pandemic, the project timeline was extended to five months. A detailed plan for the timeline is referenced in Appendix I.

Outcome Measures

Data Collection and Analysis

Data was collected and analyzed from the EMR over five months to assess pain level immediately before the intervention and 60 minutes after the intervention and assess opioid use. The nurses assessed pain using standardized language for the Numerical Rating Scale (NRS), and MED was used to assess opioid consumption. When the student investigator began to collect data for this EBP project, it was noted that some patients received non-opioid medications before and during the intervention which could have an effect on the results. Therefore, data collection also included non-opioid medication that the patients received within four hours of the music intervention and during the music intervention. Data for non-opioid medications was collected for the control group within four hours of receiving opioid medications and between the time of the assessment of the patient's pain level before the opioid medication was administered and 60 minutes after the opioid medication was administered. At the completion of the EBP and data collection, data was entered into Statistical Package for the Social Sciences (SPSS) software and analyzed using the t-test. Findings were disseminated to hospital staff and administration through scheduled meetings. Since the hospital is not conducting face-to-face meetings with the staff, the student investigator created talking points and posted findings of this EBP project on

the unit for the nurses to review. The student investigator also created a video outlining the project's findings. The video was uploaded to the hospital's learning management system by the Director of Clinical Education. Also, the Director of Clinical Education assigned the video to the RNs to view the video at their convenience.

Evaluation Process

This EBP project's outcomes were evaluated by assessing the patient's pain before the intervention and 60 minutes after the intervention. Pain was assessed by RNs and the student investigator using the Numerical Rating Scale (NRS). Opioid consumption was evaluated using total MED. The total MED per day was calculated starting from the time of the intervention for a 24 period or until discharged from the hospital if the discharge was sooner than 24 hours. Data was collected using a tool that was developed by the student investigator and included the following information: Patient's age, gender, race, surgical procedure, the postoperative day in which data was collected, pain level before the intervention and 60 minutes after the intervention, MED within four hours of the intervention, MED during the intervention phase and total MED/day. Additional information that was collected included: Other non-opioid pain medications that were administered to the patient within four hours of the intervention and during the intervention phase. A questionnaire was given to patients after they completed the EBP project to collect qualitative data (Appendix I). Qualitative data collected included whether the patient listened to music, length of time that they listened, number of times per day they listened to music, type of music, as well as any other comments or feedback that patients wished to share with the student investigator.

Evaluation

Results

Demographic Data

A total of 34 patients agreed to participate in the music intervention for this EBP project. Nine patients were removed from the music group for a variety of reasons. One patient left the hospital the day of surgery against medical advice and therefore did not complete the project. Other reasons patients who initially agreed to participate in the music intervention but were not included in the analysis include: one patient was discharged the day of surgery, one patient had a continuous pain medication administration device, one patient had their surgery completed on an outpatient basis, two patients were removed due to refusing to listen to the music, and three patients were removed due to no documentation of the music intervention in the electronic medical record. After subject attrition, 25 patients, who agreed to participate in the music intervention, were included in the analysis of this EBP project. There were 24 participants in the control group selected from a convenience sample during a retrospective chart review. Only those patients who had complete data were included in the control group.

Table 3 describes the demographic characteristics of the sample. The mean age of the music group was 44.80 (SD +/- 12.61) years and was not significantly different (p=.05) from the mean age of 53.17 (SD +/- 16.52) years of the control group. No significant differences were found between the music group and control group when compared to any other demographic characteristics, including ethnicity (p=.32) and gender (p=.14). There were 22 (88%) females and three (12%) males in the music group, and the control group consisted of 17 (70.8%) females and seven (29.2%) males. The music group consisted of 24 (96%) white, non-Hispanic participants

and one (4%) African American participant, while the control group consisted of 24 (100%) white, non-Hispanic participants.

Table 3

Demographic Characteristics

Characteristic	Music (n=25)	Control (n-24)	Total (n-49)	Statistical test: p-value, total (n=49)
Age				t-test = 2.0
Mean	44.00	53.00		p=0.52
SD	12.61	16.521		
Gender				Chi Square=2.22
Female	22(88%)	17(71%)	39 (79%)	p=.1
Male	3(12%)	7 (29%)	10 (21%)	
Race				
Caucasian	24	24	48	p=.32
African American	1	0	1	

Pain Scores

For most participants, the music intervention was introduced on postoperative day (POD) one. Data collection for both the music group and control group took place on POD one (17 for the control and 18 for the music group). However, due to the lack of documentation on POD one, each group included 7 subjects having their data collected on the day of surgery. Table 4 shows there is no significant differences in the proportion of patients within each group that participated in the study on the day of surgery or on POD one ($X2=0.01$, $p = .93$)

Table 4

Post-operative Day (POD)

			Day of Surgery	Day 1 Post Op	Total	Statistical test: p-value total (n=49)
Group	Control	Count	7	17	24	Chi Square=.01 p=.93
		% within Group	29.2%	70.8%	100.0%	
	Music	Count	7	18	25	
		% within Group	28.0%	72.0%	100.0%	

Pain was assessed prior to the beginning of the intervention and during the intervention phase of the study. The intervention phase consisted of the hour following the initial pain assessment where participants in the music group received the music intervention, and participants in the control group received standard of care with no music intervention. The mean pain level for the music group prior to the music intervention phase was 4.52 (SD +/-.2.29), while the mean pain level for the control group prior to the intervention phase was 6.26 (SD +/-1.29). After the intervention phase, the music group reported a mean pain score of 3.28 (SD +/-.2.69), and the mean pain score for the control group following the standard of care postoperative pain management was 3.14 (SD +/-.2.68). The mean pain scores and standard deviation for the music group and the control group are provided in Table 5. A repeated-measures ANOVA revealed a significant group by time interaction effect on pain $F=40.94$, $p<.05$ between the two groups. Post hoc testing indicated that the music group (4.52 [SD+/-.2.29]) reported significantly less pain than the control group (6.26 [SD+/-1.29]) before the intervention phase of

the study (p=01). Further post hoc testing indicated that the control group's pain scores significantly declined from the time the pain was assessed prior to receiving the opioid medication (6.26 [SD+/-1.29]) to the time pain was assessed 60 minutes after the opioid medication (3.14 [SD +/- 2.69]) (p=.00). The music group's pain did decline but not to the level of statistical significance between the pre-intervention phase and during the intervention phase of the study (4.52 [SD +/-2.29] vs 3.28 [SD +/-2.69]) (p=.09). Figure 5 illustrates a decline in pain for both the music and control groups.

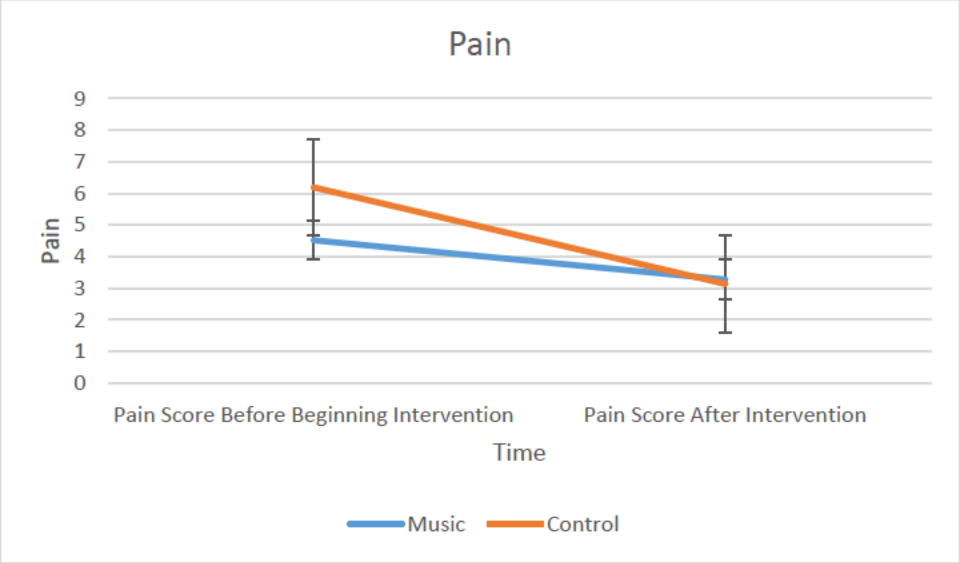
Table 5

Mean pain scores and standard deviation

Group	Time	Mean +/- SD	95% Confidence Interval for Difference Lower Boundary	Upper Boundary	Sig before intervention	Sig during intervention	Test
Control	1	6.26+/1.29	5.35	7.03			RANOVA
	2	3.14+/- 2.69	1.95	4.34		.00	
Music	1	4.52+/- 2.29	3.75	5.29	.01		
	2	3.28+/- 2.69	2.19	4.38			

Figure 5

Pain levels over time between groups



Opioid Consumption

All participants were prescribed opioids (most commonly oxycodone and hydromorphone) during the study period to manage their pain. The independent t-test indicated no statistical difference between the music (12.64 [SD+/-16.59]) and control groups (20.58 [SD +/-14.91]) for total morphine equivalent doses (MED) per day (p=.09) (Table 6). However, clinically, the music group consumed 40% less MED per day than the control group (Figure 6). The total MED per day was calculated beginning prior to the intervention phase and ending 24 hours later unless the patient was discharged from the hospital sooner than 24 hours. Figure 7 illustrates a decline by the music group in total MEDs during the intervention phase. A repeated-measures ANOVA was conducted with the groups (music vs control) by time (before vs during the intervention phase) and the interaction of group and time as independent factors and MED as the dependent variable. The group (F=5.0, p=.03) and interaction factors (F=8.6, p=.01) indicated statistical significance. Post-hoc comparison revealed MED for the music group significantly

declined between the pre-intervention period 3.84 (SD+/- 7.10) and post-intervention period (.00 [SD +/- .000]) (p=.01) (Table 7). Table 7 also indicates that the MED among the control group did not significantly change over the duration of the project from the pre-intervention phase (.35 [SD +/-1.54]) to the post-intervention phase (.17 [SD +/-.82]). Figure 7 illustrates a significant decline of opioids by the music group during the intervention. However, the music group consumed significantly more MED within the four hours prior to the intervention (p=.02) (Table 8).

Table 6

Morphine Equivalent Dose per day among groups

	Group	N	Mean	Std. Deviation	Sig (2-tailed)	t-test
MED/Day	Control	24	20.58	14.91	.09	1.76
	Music	25	12.64	16.59		

Note. MED – Morphine Equivalent Dose
MED/Day – Total Morphine Dose Equivalent/Day from the time of the intervention for 24 hours or if discharged from hospital (if the discharge occurs sooner than 24 hours)

Table 7

Morphine Equivalent Dose by groups during the intervention

	Group	Mean +/-SD	Sig (2-tailed)
MED during intervention	Control	.	
	1	35+/-1.54	
	2	.17 +/-.82	
	Music		
	1	3.84+/-7.10	
	2	.00+/-.000	.01

Note. MED – Morphine Equivalent Dose

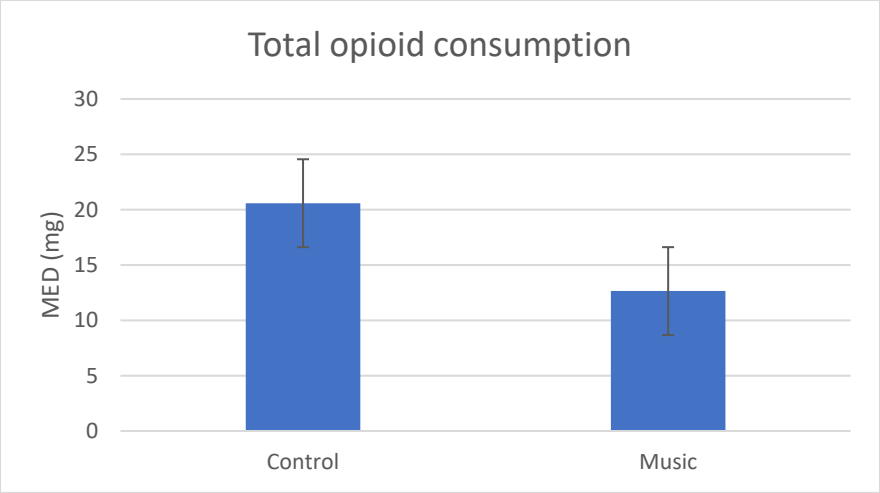
Table 8

Morphine Equivalent Dose by groups before the intervention

	Group	Mean +/-SD	Sig
MED before intervention	Control	.35+/-1.54	
	Music	3.84 +/-7.10	p=.02

Figure 6

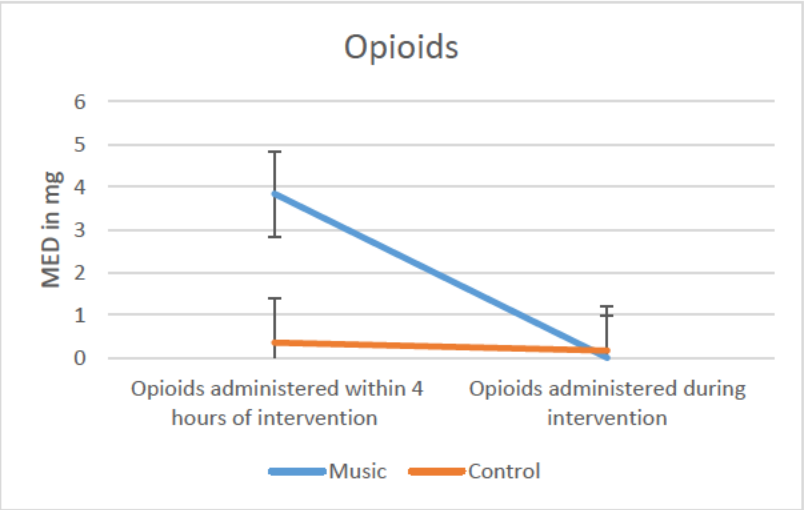
Total Opioid consumption per day beginning prior to intervention phase and ending 24 hours later unless the patient was discharged sooner than 24 hours.



Note. MED – Morphine Equivalent Dose

Figure 7

Opioids administered before and during the intervention period



Note. MED – Morphine Equivalent Dose

Non-opioid pain medication consumption

Some patients received non-opioid medications to manage their pain before and/or during the intervention phase (most commonly, Ibuprofen and Ketorolac). Table 9 shows that there was no statistical difference in the proportion of subjects in the control (2, 8.3%) or music group (4, 16%) who received non-opioid pain-relieving medications during the four hours before the intervention (p=.41). However, there was a greater proportion of the music group (7, 28%) who received other non-opioid pain-relieving medication compared to the control group during the intervention phase (1, 4.2%, p=.02) (Table 10). Figure 8 illustrates the number of subjects in the music and control groups who did and did not receive non-opioid pain medications before and during the intervention.

Table 9

Other pain medication administered before the intervention

Group	Received other medication before the intervention	Did not receive other medication before the intervention	Statistical test	p-value
Music	4 (16.0%)	21(84%)	Chi Square = .67	.41
Control	2 (8.3%)	22(91.7%)		

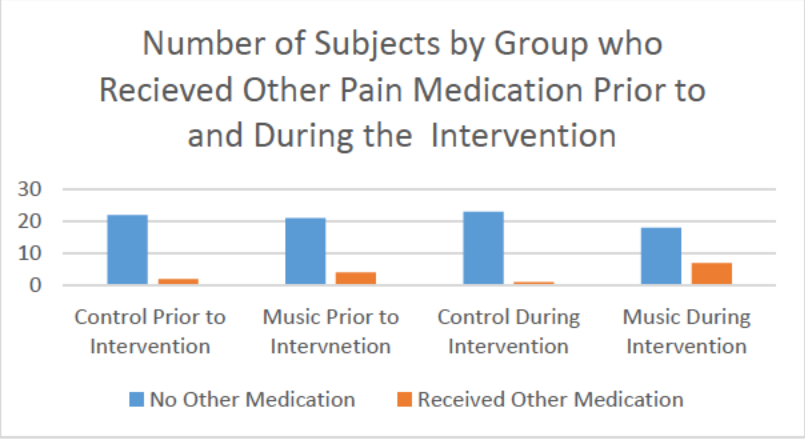
Table 10

Other pain medication administered during the intervention

Group	Received other medication during the intervention	Did not receive medications during the intervention period	Statistical test	p-value
Music	7 (28%)	18 (72%)	Chi Square = 5.09	.02
Control	1 (4.2%)	23(95.8%)		

Figure 8

Number of subjects who received other pain medication before and during the intervention



Lived Experience

To capture the lived pain experience of participants in the music group, 25 questionnaires were distributed to these participants. All questionnaires were returned to the student investigator for a 100% response rate. Information extrapolated from the discharge questionnaire illustrated that listening to music was an overall positive experience for participants in the music group. Most respondents (17) agreed that the music helped them relax and distracted them from the pain. Comments from participants included: "A variety of music is the key", "helped me to fall asleep", "music helped manage the pain", "calming feeling after having surgery", "helped ease my mind and not to think about the pain", "helped me to fall asleep and take my mind off of the pain," "I plan to implement music at home for continued pain management," "I highly recommend using music in this manner," "It helps control pain at the time of listening," "makes me feel happy."

Discussion

Most studies examined indicate music can be implemented to manage pain or complement traditional pharmacological management of pain in post-surgical patients. The results of this EBP indicate that subjects in this study who were exposed to the music experienced a decline in pain, although this effect was not found to be statistically significant. Both the music group and control group had a decline in pain during the study. However, the pain reduction by the music group, although clinically significant, was not statistically significant. These findings differ from those reported by Gallagher et al. (2018), who found that music consistently produced immediate improvement of pain among postoperative patients. It is important to recognize that Gallagher et al. (2018) implemented music therapy, not music listening, which could account for the difference in results. The therapeutic relationship that is an

integral part of music therapy may account for the difference in outcomes in Gallagher et al.'s study.

There are several other possible explanations for the lack of statistical significance of music listening on postoperative pain levels. First, the sample recruited for this study was less than the proposed sample size resulting in underpowered statistics to test the effect of the intervention. Second, subjects were not randomly assigned to the control and music intervention group, which may have introduced a selection bias into the findings. Third, the control and music intervention groups received varying doses of opioids and non-opioid pain relief medications prior to and during the intervention phase of the study, which likely affected their reports of pain over the duration of the study. Fourth, the subject's included in this EBP project underwent a variety of surgical procedures that may have resulted in varying degrees of pain. These threats to the internal validity of the findings may have affected the results. Future researchers may choose to address these threats by including multiple rural hospitals in the study to obtain the desired sample size; randomly assigning subjects to either the control group or music group and focusing on one specific type of surgical procedure. Most of the literature supports using music to help manage pain after surgery in a specific surgical procedure cohort. This was not possible due to the hospital's small size and a limited number of procedures compared to larger hospitals.

Nurses assessed the patient's pain level at varying times before and after the intervention. This threat to the internal validity could have also affected the results. Future researchers may choose to address this threat by providing additional education to nurses regarding inconsistent documentation, which can affect the results.

There were no statistical differences between the music group and control group for morphine dose equivalents (MED) per day. However, clinically, the music group consumed 40%

less MED per day. There are a variety of possible explanations for this lack of statistical significance. First, MED was calculated from the time of the intervention for 24 hours unless the patient was discharged from the hospital sooner than 24 hours. Therefore, this variation lacks statistical power for equality. Second, subjects studied submitted for a variety of surgical procedures that may have resulted in varying degrees of pain requiring different amounts of opioids to help manage their pain. Third, the non-significance of MED per Day (p-=.09) may be attributed to the large standard deviation for MED per day. Fourth, the non-significance of MED per day may be due to varying doses of non-opioid pain medications given to the music group compared to the control group and resulting in the music group experiencing less pain before the music intervention. Future researchers may choose to address these threats by collecting MED data earlier in the postoperative period. Collecting data earlier can provide a baseline for data and additional time to evaluate any changes in opioid consumption during the intervention period.

There were no statistical differences in the control or music group who received other non-opioid pain-relieving medications during the four hours before the intervention. However, there was a greater proportion of the music group who received other non-opioid pain-relieving medications compared to the control group during the intervention (p=.02). Receiving other non-opioid medications before or during the intervention likely affected the reports of pain prior to the intervention and after the intervention.

Previous authors have discussed music's benefits as an adjuvant therapy to help manage pain after surgery (Allred et al., 2010; Gallagher et al., 2018; Poulsen & Coto, 2018). Literature has supported the positive results that music brings to help manage pain and opioid use postoperatively. However, there have been few studies conducted in small rural hospitals; most have been in large metropolitan hospitals.

Plan for Sustainability

To ensure the sustainability of this EBP project, the student investigator facilitated several initiatives. First, an informational flyer was created by the student investigator and printed by the hospital's marketing department and placed in the hospital admission packets for all patients. Music listening will also be extended to all hospitalized patients scheduled to undergo a surgical procedure as a treatment option to help manage their postoperative pain. Secondly, the EMR will be enhanced to include the music listening option to prompt nurses to offer music to all patients that undergo surgical procedures while hospitalized. Third, the student investigator donated the MP3 players to the hospital to continue the music option. Fourth, the unit director agreed to adjust the budget to include more devices, and HITT has agreed to download music to additional purchased devices.

Cost Consideration

Appendix J outlines the actual costs associated with this evidence-based project. There were no additional costs to make changes to the EMR. HITT can add or alter documentation to suit the organization’s needs. The Doctoral of Nursing Practice (DNP) student investigator provided electronic devices and earphones. There was no cost to download music to the MP3 players used for this EBP project.

Conclusion and Future Recommendations

Implications for future practice

Music is an integrative, complementary modality that could provide a safe and simple intervention to patients undergoing a surgical procedure that requires a hospital stay. In this EBP project, most patients enjoyed the music and felt it was able to assist them with remaining calm, relaxed, and distracted after their surgery. Because music listening is such a subjective

experience, a larger sample size from multiple hospitals may help with generalizing results to the rural population. At the present time, offering patients music as part of their standard postoperative care is not done in most rural hospitals.

A review of the literature confirmed listening to music has a positive effect on patients' pain levels postoperatively. The literature supports the use of listening to music during the recovery process. Music has been found to profoundly impact pain control, reduce opioid consumption, increase patient satisfaction, increase environmental noise satisfaction, and decrease physiological parameters such as blood pressure and pulse (Ikonomidou, & Rehnstrom, 2004; Comeaux & Steele-Moses, 2013).

Since most studies that examine the effects of music on pain after surgery are performed in larger hospitals, it is recommended more studies be completed in small hospitals. As pointed out previously, the opioid crisis extends to the hospital setting, and rural areas are not exempt to these challenges. Even though mortality rates are not disproportionately higher in rural parts of the United States, rural areas face unique infrastructural, social, and economic challenges when dealing with the crisis. Infrastructural challenges include disproportionately fewer clinics and hospitals and less access to mental health treatment, drug opioid treatment, and prevention (Monnat & Rigg, 2018). Although overall rates are higher in urban than in rural counties, opioid mortality rates increased more in rural than in urban counties across all regions over the last two decades (Monnat & Rigg, 2018). Between 1999 and 2016, the rate increased by 158 percent in large central metro counties, 507 percent in large fringe metro counties, 429 percent in medium/small metro counties, and 740 percent in nonmetro counties. The most significant increases occurred in the rural Midwest (1,600 percent) and rural Northeast (1,141 percent) (Monnat & Rigg, 2018).

DNP Essentials

A thorough understanding of nursing theory provides a solid foundation for advanced nursing practice. The Doctoral Education for Advanced Nursing Practice prepares graduates to integrate nursing science with organization, biophysical, psychological, and analytical sciences (AACN, 2006). The DNP essentials focus on advanced nursing practice and include eight outcomes associated with successful completion of Doctoral Education in nursing practice. Furthermore, DNP essentials guide advanced nursing practice and are integrated into this EBP project as outlined below.

DNP Essential I: Scientific Underpinnings for Practice

Music listening to help manage postoperative pain is based on EBP principles. The literature explains that listening to pleasant, familiar, relaxing sounds distracts the prefrontal cortex from painful stimuli (Kusi-Amponsah et al., 2010). Furthermore, melody and rhythm of music affect the perimeter system of the brain and hypothalamus, which influences physiological reactions, such as decrease blood pressure and pulse and pain relief (Schneider, 2018). As pointed out earlier, literature also supports calming-relaxing music with a tempo of 60-80 beats per minute (Poulsen, 2018).

DNP Essential II: Organizational and Systems Leadership for Quality Improvement and Systems Thinking

In assessing the need for change, HCAHP scores indicated pain management rates in the target institution were well below the achievement threshold. CMS recommends an achievement threshold of 70.20. However, when examining the results, some scores for this institution were well below the desired threshold for the medical surgical unit, indicating a gap in pain management. The student investigator met with hospital leadership regarding music listening to

help manage postoperative pain. Furthermore, the student investigator discussed the possibility that music may contribute to better patient satisfaction scores.

DNP Essential III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice

The student investigator conducted an in-depth literature review and appraisal, and synthesis of evidence. The synthesis of evidence confirmed music could decrease pain and opioid consumption following surgery. Furthermore, the student investigator used various theories to guide project planning and implementation.

DNP Essential IV: Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care

The student investigator collaborated with Health Information Technology, PACU, and the department leader to enhance the EMR to include music as an intervention to help manage postoperative pain. Furthermore, the EMR was enhanced to include a question on the admission assessment to capture those patients admitted explicitly for surgery and confirming their willingness to try music to help manage pain after surgery. Additionally, the music question will be added to the daily assessment to capture those patients who are already in the hospital but require surgery during their hospitalization.

DNP Essential V: Health Care Policy for Advocacy in Health Care

The student investigator met with critical stakeholders within the institution to develop and implement the current plan to manage postoperative pain. Stakeholders included the Vice President of Clinical Services, the department leader, the unit director, surgeons, hospitalists, nursing staff in the medical surgical unit, PACU, and PAT to discuss the advantages of using

music to help manage pain after surgery. Once they were thoroughly briefed, they agreed to the implementation of this EBP project.

DNP Essential VI: Interprofessional Collaboration for Improving Patient and Population Health Outcomes

This project required collaboration with several disciplines. The first group that the student investigator collaborated with included the hospitalists and surgeons. Education was provided to hospitalists and surgeons, and they agreed to the project. Next, the student investigator collaborated with the director of the pharmacy. The director of pharmacy provided resources to calculate the MED for data collection. Secondly, the hospital social worker provided resources to the student investigator if any participant exhibited negative emotional responses from listening to the music. Furthermore, the social worker agreed to consultation if needed. Next, the student investigator collaborated with Health Information Technology to enhance the EMR to reflect music as an intervention to help manage pain after surgery. The next person who assisted in the project is the department leader, who acted as the liaison between the student investigator and the RNs to ensure the MP3 players and directions for use were distributed to the participants on arrival to the floor. Next, the RNs assisted in reminding the patients to listen to the music. Furthermore, the nurses assessed the patient's pain before and after the intervention. Additionally, the student investigator collaborated with the marketing department to develop an informational flyer to be placed in the hospital admission packets that explain the benefits of music in managing postoperative pain. Interprofessional collaboration also took place with the social worker. The social worker provided resources to the student investigator in the event participants experienced negative emotional responses from listening to music. A process was

also developed in the event negative emotional responses occurred. Collaboration also occurred with the nurses in PACU and PAT.

DNP Essential VII: Clinical Prevention and Population Health for Improving the Nation's Health

The literature supports the belief that opioid consumption may contribute to the opioid epidemic. Data analysis for this EBP project revealed a significant decline in opioid use during the music intervention. However, there was no statistically significant difference in pain before or after the music intervention. Post hoc testing indicated that the control group's pain scores significantly declined over the duration phase of the project from 6.26+/-1.29 to 3.14 +/- 2.69. The music group's pain did decline but not to the level of statistical significance between the pre-intervention phase and during the intervention phase of the study (4.52+/-2.29 vs. 3.28 +/-2.69).

DNP Essential VIII: Advanced Nursing Practice

First, the student investigator assessed the need for an alternative method of non-pharmacological pain management. The hospital currently has limited non-pharmacological strategies to help manage pain. An in-depth literature search revealed music is a safe and inexpensive method to help control pain. Once the music was implemented, a process was developed by the student investigator and social worker to address negative emotional responses that the music may trigger. If negative emotional responses occurred, the RNs were educated to immediately stop the music and notify the unit director or department leader. The social worker agreed to consultation and to provide behavioral medicine resources to the patient if warranted. Furthermore, the student investigator designed, implemented, and evaluated the music intervention based on EBP. Doctorally prepared nurses use EBP to advance nursing practice. The literature supports the concept that music may decrease opioid use for postoperative patients.

Appendices

Appendix A

Table 11

Search Strategy

Date of Search	Keyword Used	Database/Source Used	# of Hits		
			Listed	Reviewed	Used
10/25/2018	Music Therapy & Postoperative Pain	CINAHL	137	22	2
10/27/2018	Music Therapy; Postoperative Pain	Psych INFO	2	3	1
10/27/2018	Music Therapy; Postoperative Pain	Cochrane/Embase	93	5	4
9/2018	Acute Pain, Surgical Procedures	PUB MED	58	21	8
9/2018	RN Attitude and Knowledge	CINAHL	40	6	2
10/5/2019	Music Listening Postoperative pain	CINAHL	28	9	2
10/13/2019	Music Listening	Cochrane Systematic Review	15	0 NA	0
10/14/2019	Music Medicine	Cochrane Systematic Review	11	0 NA	0
10/14/2019	Music Therapy	Cochrane Systematic Review	48	0 NA 3 were withdrawn	0
10/14/2019	Music Medicine & Postoperative Pain	Embase	161	5	3
11/25/19	Knowledge and attitude	CINAHL	155	3	2

	regarding pain				
3/26/20	Music listening & postoperative pain	CINAHL	98	4	2 (ILL request for 3 articles)
3/26/20	Music Listening and Postoperative pain	CINAHL (OVID)	53	3	0

Appendix B

Table 12

Evaluation of Evidence

Date: 11/112019	In patients, 18 years and older undergoing surgery requiring an inpatient stay on a Medical-Surgical unit in a rural Northwest Ohio Hospital (P), does the implementation of music listening as an adjuvant to traditional postoperative pain management strategies (I) compared to current practices (C) help manage postoperative pain and reduce opioid use (O) in a three-month time frame (T).						
Article Number	Author and Date	Evidence Type Design	Sample, Sample Size, Setting	Findings	Observable Measures	Limitations	Evidence Level, Quality
1	Allred, Byers &Sole (2010)	Quantitative Experimental Design Controlled trial without Randomization	TKA N=56 (25 men & 31 women)	Music & Pain: p=.001 measured over time Music & Opioid consumption: No SSD between the pain and rest group	Pain – VAS Anxiety – Anxiety McGill Pain Questionnaire BP, P, O2 Sat, RR	No risks or Limitations identified	Level1 Quality B

Notes:
SSD – Statistically Significant Difference
TKA – Total Knee Arthroplasty
VAS -Visual Analog Scale
BP – Blood Pressure
P – Pulse
O2 Sat – Oxygen Saturation
RR – Respiratory Rate

The Individual Evidence Summary Tool. Adapted from Dearholt, S. & Dang, D. 2018. John Hopkins of Nursing Evidence-Based Practice: Model and Guidelines (3rd ed.), p. 298.

Date: 11/112019		In patients, 18 years and older undergoing surgery requiring an inpatient stay on a Medical-Surgical unit in a rural Northwest Ohio Hospital (P), does the implementation of music listening as an adjuvant to traditional postoperative pain management strategies (I) compared to current practices (C) help manage postoperative pain and reduce opioid use (O) in a three-month time frame (T).					
Article Number	Author and Date	Evidence Type Design	Sample, Sample Size, Setting	Findings	Observable Measures	Limitations	Evidence Level, Quality
2	Ames et al. (2017)	Randomized Control Trial	N=59 screened preoperatively N = 41 – randomized postoperatively n=20 intervention group n=21 control group 17-83 years of age 83% white	Positive comments regarding stress, anxiety, pain reduction, sleep. Negative comment – fell asleep and did not push PCA and woke up in more pain. No SSD in opioid doses, pain during first 4 time points; pre and post-intervention at first time point – SSD in NRS for pain between groups P=.037	NRS	Limited Sample size	Level 2 Quality B Future mixed methods studies are needed to examine qualitative patient perspectives and methodology in critical care units

Notes: SSD – Statistically Significant Difference
NRS – Numerical Rating Scale

The Individual Evidence Summary Tool. Adapted from Dearholt, S. & Dang, D. 2018. John Hopkins of Nursing Evidence-Based Practice: Model and Guidelines (3rd ed.), p. 298.

Date: 11/112019		In patients, 18 years and older undergoing surgery requiring an inpatient stay on a Medical-Surgical unit in a rural Northwest Ohio Hospital (P), does the implementation of music listening as an adjuvant to traditional postoperative pain management strategies (I) compared to current practices (C) help manage postoperative pain and reduce opioid use (O) in a three-month time frame (T).					
Article Number	Author and Date	Evidence Type Design	Sample, Sample Size, Setting	Findings	Observable Measures	Limitations	Evidence Level, Quality
3	**Briggs (2011)**	**Systematic Review**	**42 studies on anxiety and/or pain of patients Elective surgery (gynecological, abdominal, ear, nose and throat, cardiac, urological, ophthalmological, orthopedic and breast biopsy**	**59% of studies showed reduced pain 47% reduced analgesics**	**VAS, NRS, McGill Pain Questionnaire**	**No limitations Identified**	**Level 1 Quality A**

Notes:
VAS – Visual Analog Scale
NRS – Numerical Rating Scale

The Individual Evidence Summary Tool. Adapted from Dearholt, S. & Dang, D. 2018. John Hopkins of Nursing Evidence-Based Practice: Model and Guidelines (3rd ed.), p. 298.

Date: 11/112019	In patients, 18 years and older undergoing surgery requiring an inpatient stay on a Medical-Surgical unit in a rural Northwest Ohio Hospital (P), does the implementation of music listening as an adjuvant to traditional postoperative pain management strategies (I) compared to current practices (C) help manage postoperative pain and reduce opioid use (O) in a three-month time frame (T).						
Article Number	Author and Date	Evidence Type Design	Sample, Sample Size, Setting	Findings	Observable Measures	Limitations	Evidence Level, Quality
4	**Buyukyilmaz (2014)**	**Systematic Review**	**Acute pain – 7 articles (1 study on pain management; 6 studies non-pharmacological interventions 2 studies – music intervention Medline, CINAHL, PubMed and Cochrane databases 56 TKR Chronic pain – 10 articles**	**16-20 minutes listening to music, relaxation techniques, guided imagery or 1-minutes back massage decreased intensity of pain and anxiety; improved vital signs after orthopedic surgery**	**VAS; Melzack pain questionnaire**	**Reflects the results of articles last 10 years; only nursing journals were reviewed**	**Level 1 Quality A**
5	**Cole & LoBiondo-Wood (2014)**	**Systematic Review Studies from 1966-2004 Cochrane, Medline, CINAHL, Scopus and Natural Standard databases**	**n=2 pregnant women; n=4 ICU n=2 (CABG/Valve replacement exp group n=53 and control group n=51); Medical Surgical patients n=3 (n=53 neuro surgical diagnosis or neuro-medical)**	**SSD in pain between music and control groups**	**HR, BP, RR, oxygen saturation, UCLA Universal pain scale, VAS, Mood states**	**Limited types of surgical procedures (does not reflect all inpatient surgical procedures**	**Level 1 Quality A Sufficient Sample sizes**

Date: 11/112019		In patients, 18 years and older undergoing surgery requiring an inpatient stay on a Medical-Surgical unit in a rural Northwest Ohio Hospital (P), does the implementation of music listening as an adjuvant to traditional postoperative pain management strategies (I) compared to current practices (C) help manage postoperative pain and reduce opioid use (O) in a three-month time frame (T).					
Article Number	Author and Date	Evidence Type Design	Sample, Sample Size, Setting	Findings	Observable Measures	Limitations	Evidence Level, Quality
		17 trials met inclusion criteria of RCT in inpatient setting 2005-2011 Published in English	**Medical patients; n=3 (Cardiac) surgical patients n=7 (intestinal surgery n=167 – n=43 in relaxation group, n=49 in music group n=37 combination of music and relaxation n= 38 in control group**				

Notes: RCT – Randomized Control Trial **The Individual Evidence Summary Tool. Adapted from Dearholt, S. & Dang, D. 2018. John Hopkins of Nursing Evidence-Based Practice: Model and Guidelines (3rd ed.), p. 298.**

VAS -Visual Analog Scale
HR – Heart Rate
RR – Respiratory Rate
BP – Blood Pressure
CCU – Critical Care Unit
CABG – Coronary Artery Bypass Graft

Date: 11/112019	In patients, 18 years and older undergoing surgery requiring an inpatient stay on a Medical-Surgical unit in a rural Northwest Ohio Hospital (P), does the implementation of music listening as an adjuvant to traditional postoperative pain management strategies (I) compared to current practices (C) help manage postoperative pain and reduce opioid use (O) in a three-month time frame (T).						
Article Number	Author and Date	Evidence Type Design	Sample, Sample Size, Setting	Findings	Observable Measures	Limitations	Evidence Level, Quality
6	**Comeaux & Steele-Moses (2013).**	**Quantitative**	**Surgical Unit with 3-day hospital stay; Alert & Oriented; 18 years or older Able to read and write; hematology and oncology diagnosis Convenience Sample n=41**	**Time one – no significant difference between state anxiety, trait anxiety or pain management or environmental noise satisfaction between groups Time two – reduced pain Increased environmental noise satisfaction No change in state anxiety No change in trait anxiety**	**Pain Environmental noise satisfaction**	**Insufficient sample size Convenience sample No Randomization**	**Level 1 Quality C**

Notes: **The Individual Evidence Summary Tool. Adapted from Dearholt, S. & Dang, D. 2018. John Hopkins of Nursing Evidence-Based Practice: Model and Guidelines (3rd ed.), p. 298.**

Date: 11/112019	In patients, 18 years and older undergoing surgery requiring an inpatient stay on a Medical-Surgical unit in a rural Northwest Ohio Hospital (P), does the implementation of music listening as an adjuvant to traditional postoperative pain management strategies (I) compared to current practices (C) help manage postoperative pain and reduce opioid use (O) in a three-month time frame (T).						
Article Number	Author and Date	Evidence Type Design	Sample, Sample Size, Setting	Findings	Observable Measures	Limitations	Evidence Level, Quality
7	**Gallagher et al. (2018)**	**Randomized Controlled Trial**	**N=163** **Control group: n=79** **Experimental group n=84** **27-bed Orthopedic Unit** **18 years of age or older** **Inpatient elective orthopedic surgery**	**SSD in pain after music intervention** **No SSD in total doses of narcotics.**	**NRS**	**Limitations:** **No other studies to compare on post elective orthopedic surgeries**	**Level 1** **Quality A**

Notes:
SSD – Statistically Significant Difference
NRS – Numerical Rating Scale

The Individual Evidence Summary Tool. Adapted from Dearholt, S. & Dang, D. 2018. John Hopkins of Nursing Evidence-Based Practice: Model and Guidelines (3rd ed.), p. 298.

Date: 11/112019	In patients, 18 years and older undergoing surgery requiring an inpatient stay on a Medical-Surgical unit in a rural Northwest Ohio Hospital (P), does the implementation of music listening as an adjuvant to traditional postoperative pain management strategies (I) compared to current practices (C) help manage postoperative pain and reduce opioid use (O) in a three-month time frame (T).						
Article Number	Author and Date	Evidence Type Design	Sample, Sample Size, Setting	Findings	Observable Measures	Limitations	Evidence Level, Quality
8	**Good et al. (2000)**	**Systematic Review Descriptive Study**	**Convenience Sample in 5 studies 4 Midwestern USA and 1 study in Taiwan**	**Choice of Music varied within cultures**	**Interview**	**Convenience Sample**	**Level V Quality C**
9	**Good et al. (2001)**	**Quantitative Repeated Measures design**	**Convenience Sample N=468 5 US Midwestern hospitals**	**Pain decreased significantly P<.001 Relaxation, music, and their combination reduce pain similarly on day 1 and 2 and during ambulation and rest**	**Pain – VAS (adapted from Johnson 1973) Sensory component –the perception of hurt) VAS sensation pain scale**	**None identified**	**Level I Quality A Enough sample; generalizable results; Comprehensive literature review**

Notes:
VAS – Visual Analog Scale

The Individual Evidence Summary Tool. Adapted from Dearholt, S. & Dang, D. 2018. John Hopkins of Nursing Evidence-Based Practice: Model and Guidelines (3rd ed.), p. 298.

Date: 11/112019	In patients, 18 years and older undergoing surgery requiring an inpatient stay on a Medical-Surgical unit in a rural Northwest Ohio Hospital (P), does the implementation of music listening as an adjuvant to traditional postoperative pain management strategies (I) compared to current practices (C) help manage postoperative pain and reduce opioid use (O) in a three-month time frame (T).						
Article Number	Author and Date	Evidence Type Design	Sample, Sample Size, Setting	Findings	Observable Measures	Limitations	Evidence Level, Quality
10	**Good et al. (2005)**	**Randomized Control Trial**	**N=167** **Intestinal Surgery 2 Medical centers and 2 Community hospitals 95% Caucasian; 60% female; 63% married; 52% Protestant and 62% employed. Abdominal surgery: Ulcerative colitis 28%; Crohn's disease 28%; Colon Cancer 10%; Diverticulosis 6%; Rectal cancer 5%; adhesions 4% or other intestinal conditions 19%**	**Significantly less pain in the music group and SSD in the combination group**	**VAS**	**None Identified**	**Level 1** **Quality A**

Notes:
SSD – Statistically Significant Difference
VAS – Visual Analog Scale

The Individual Evidence Summary Tool. Adapted from Dearholt, S. & Dang, D. 2018. John Hopkins of Nursing Evidence-Based Practice: Model and Guidelines (3rd ed.), p. 298.

Date: 11/112019	In patients, 18 years and older undergoing surgery requiring an inpatient stay on a Medical-Surgical unit in a rural Northwest Ohio Hospital (P), does the implementation of music listening as an adjuvant to traditional postoperative pain management strategies (I) compared to current practices (C) help manage postoperative pain and reduce opioid use (O) in a three-month time frame (T).						
Article Number	Author and Date	Evidence Type Design	Sample, Sample Size, Setting	Findings	Observable Measures	Limitations	Evidence Level, Quality
11	**Good et al. (2010)**	**Quantitative** **Experimental design** **2x2 factorial design with pretest and post-test**	**Purposive Sample** **N= 571**	**No immediate effects on pain** **Pulse and respiration rates were significantly lower**	**Pain –sensation and distress VAS (Johnson, 1972)** **Opioid intake recorded from the chart** **BP, P, RR**	**None Identified**	**Level I** **Quality A** **Sufficient sample size** **Future studies are necessary to determine the time to listen**

Notes:
VAS – Visual Analog Scale
BP – Blood Pressure
P - Pulse
RR – Respiratory Rate

The Individual Evidence Summary Tool. Adapted from Dearholt, S. & Dang, D. 2018. John Hopkins of Nursing Evidence-Based Practice: Model and Guidelines (3rd ed.), p. 298.

Date: 11/112019	In patients, 18 years and older undergoing surgery requiring an inpatient stay on a Medical-Surgical unit in a rural Northwest Ohio Hospital (P), does the implementation of music listening as an adjuvant to traditional postoperative pain management strategies (I) compared to current practices (C) help manage postoperative pain and reduce opioid use (O) in a three-month time frame (T).						
Article Number	Author and Date	Evidence Type Design	Sample, Sample Size, Setting	Findings	Observable Measures	Limitations	Evidence Level, Quality
12	**Gretarsdottir et al. (2017)**	**Descriptive Cross Sectional**	**n=235** **Selected medical, surgical, and gynecological inpatient units**	**Advanced degree Associated with knowledge of pain management p=.01**	**KASRP (Knowledge, Attitude Survey Regarding Pain)**	**None Identified**	**Level 5** **Quality A**

Notes:
KASRP – Knowledge and Attitude Survey Regarding Pain

The Individual Evidence Summary Tool. Adapted from Dearholt, S. & Dang, D. 2018. John Hopkins of Nursing Evidence-Based Practice: Model and Guidelines (3rd ed.), p. 298.

Date: 11/112019	In patients, 18 years and older undergoing surgery requiring an inpatient stay on a Medical-Surgical unit in a rural Northwest Ohio Hospital (P), does the implementation of music listening as an adjuvant to traditional postoperative pain management strategies (I) compared to current practices (C) help manage postoperative pain and reduce opioid use (O) in a three-month time frame (T).						
Article Number	Author and Date	Evidence Type Design	Sample, Sample Size, Setting	Findings	Observable Measures	Limitations	Evidence Level, Quality
13	**Hole, Hirsch, Ball & Meads (2015)**	**Quantitative** **Systematic Review and meta-analysis**	**RCTs of adult patients undergoing surgical procedures excluding CNS and head and neck surgeries** **N=458**	**Music played in the perioperative setting can reduce postoperative pain, anxiety, and analgesia needs and improved patient satisfaction.** **No difference in LOS**	**VAS, Length of stay, Analgesic use, Timing of music** **Searched MEDLINE, Embase, CINAHL, and Cochrane**	**No Limitations identified** **Insufficient details to assess all aspects of quality**	**Level I** **Quality B**

Notes:
LOS – Length of Stay
VAS – Visual Analog Scale
RCT- Randomized Control Trial

The Individual Evidence Summary Tool. Adapted from Dearholt, S. & Dang, D. 2018. John Hopkins of Nursing Evidence-Based Practice: Model and Guidelines (3rd ed.), p. 298.

Date: 11/112019	In patients, 18 years and older undergoing surgery requiring an inpatient stay on a Medical-Surgical unit in a rural Northwest Ohio Hospital (P), does the implementation of music listening as an adjuvant to traditional postoperative pain management strategies (I) compared to current practices (C) help manage postoperative pain and reduce opioid use (O) in a three-month time frame (T).						
Article Number	Author and Date	Evidence Type Design	Sample, Sample Size, Setting	Findings	Observable Measures	Limitations	Evidence Level, Quality
14	**Kankkunen & Vaajoki (2019)**	**Systematic Review RCTs**	**Studies conducted in the USA, Asia, and Europe Adult patients Elective laparoscopic or abdominal surgery, thoracic or heart surgery, total knee replacements, or lung cancer**	**The intensity of pain was lower in the music group**	**Not specified**	**Limited studies**	**Level I Quality C**
15	**Kuhlmann et al. (2018)**	**Systematic Meta-analysis of RCTs**	**MEDLINE, OvidSP, Web of Science, Scopus, Psych INFO, CINAHL, Cochrane, PubMed, Google Scholar Mean age of participants 18 years 92 RCT**	**Pain and anxiety significantly reduced with p<.001**	**STAI VAS NRS**	**Pain reduction after the preoperative intervention may be the result of decreased anxiety High to Moderate risk of Bias**	**Level1 Quality A**

Date: 11/112019		In patients, 18 years and older undergoing surgery requiring an inpatient stay on a Medical-Surgical unit in a rural Northwest Ohio Hospital (P), does the implementation of music listening as an adjuvant to traditional postoperative pain management strategies (I) compared to current practices (C) help manage postoperative pain and reduce opioid use (O) in a three-month time frame (T).					
Article Number	Author and Date	Evidence Type Design	Sample, Sample Size, Setting	Findings	Observable Measures	Limitations	Evidence Level, Quality
						Many studies did not adequately address methodological considerations (randomization, techniques, and power)	

Notes:
STAI – State-Trait Anxiety Inventory
VAS – Visual Analog Scale
NRS- Numerical Rating Scale
RCT – Randomized Control Trial

The Individual Evidence Summary Tool. Adapted from Dearholt, S. & Dang, D. 2018. John Hopkins of Nursing Evidence-Based Practice: Model and Guidelines (3rd ed.), p. 298.

Date: 11/112019	In patients, 18 years and older undergoing surgery requiring an inpatient stay on a Medical-Surgical unit in a rural Northwest Ohio Hospital (P), does the implementation of music listening as an adjuvant to traditional postoperative pain management strategies (I) compared to current practices (C) help manage postoperative pain and reduce opioid use (O) in a three-month time frame (T).						
Article Number	Author and Date	Evidence Type Design	Sample, Sample Size, Setting	Findings	Observable Measures	Limitations	Evidence Level, Quality
16	**McNamara et al. (2012)**	**Mixed-methods experimental**	**n=59 100% female**	**SSD in pain knowledge, skills, and attitude towards patients' experience of pain after the educational program**	**Questionnaire**	**small sample size Nurses need further educational support**	**Level 1 Quality B**
17	**Poulsen & Coto (2018)**	**Quantitative Systematic Review**	**CINAHL-52 and 1 used Medline- 15/77 used Cochrane Library produced 1 result 43 results, and 2 used Joanna Briggs Institute 240 results and 10 articles used**	**Music should be included before, during, and after surgical interventions. Therapeutic music should be calming and played 15-30 minutes during the pre and postoperative period. effective if used 2 times daily and consistently**	**Analgesic use Reduced pain scores -10-point Likert Scale Anxiety - STAI Patient satisfaction scores**	**None Identified**	**Level I Quality B Music is inexpensive, Noninvasive and well-tolerated Recommend playing music throughout perioperative experiences**

Notes:
STAI – State-Trait Anxiety Inventory

The Individual Evidence Summary Tool. Adapted from Dearholt, S. & Dang, D. 2018. John Hopkins of Nursing Evidence-Based Practice: Model and Guidelines (3rd ed.), p. 298.

Date: 11/112019		In patients, 18 years and older undergoing surgery requiring an inpatient stay on a Medical-Surgical unit in a rural Northwest Ohio Hospital (P), does the implementation of music listening as an adjuvant to traditional postoperative pain management strategies (I) compared to current practices (C) help manage postoperative pain and reduce opioid use (O) in a three-month time frame (T).					
Article Number	Author and Date	Evidence Type Design	Sample, Sample Size, Setting	Findings	Observable Measures	Limitations	Evidence Level, Quality
18	**Schneider (2018)**	**Quantitative** **Quasi-experimental design**	**Convenience Sample in 55-bed acute care hospital with orthopedic and trauma patient population** **N=42** **44 signed consents**	**Pain scores reduced** **Increased patient satisfaction** **Length of listening had no effect**	**Pain Scores – 10-point Likert Scale NRS** **Satisfactory survey at discharge**	**Small Sample Size** **Convenience Sample** **Participants recruited at a single hospital on one unit** **Difficult to generalize**	**Level II** **Quality C** **May be beneficial to reduce opioid use; prevent complications related to immobility**

Notes: NRS – Numerical Rating Scale **The Individual Evidence Summary Tool. Adapted from Dearholt, S. & Dang, D. 2018. John Hopkins of Nursing Evidence-Based Practice: Model and Guidelines (3rd ed.), p. 298.**

Date: 11/112019	In patients, 18 years and older undergoing surgery requiring an inpatient stay on a Medical-Surgical unit in a rural Northwest Ohio Hospital (P), does the implementation of music listening as an adjuvant to traditional postoperative pain management strategies (I) compared to current practices (C) help manage postoperative pain and reduce opioid use (O) in a three-month time frame (T).						
Article Number	Author and Date	Evidence Type Design	Sample, Sample Size, Setting	Findings	Observable Measures	Limitations	Evidence Level, Quality
19	**Sebastian & Martin-Saavedra (2018)**	**Quantitative Systematic Review**	**128 articles 19 reviews evaluated Included RCTs 6 reviews performed a meta-analysis**	**Evidence supports the use of music as a complementary therapy for acute surgical pain**	**Pain Scores**	**Insufficient sample size**	**Level 1 Quality C**
20	**Sibanda et al. (2019)**	**Quantitative systematic review**	**Sample size 13-124 3 studies - anxiety Adults – Rehab unit**	**3 of 7 studies reported lower pain levels 6 of 10 studies reported positive effects of music on anxiety, pain, or delirium outcomes**	**VAS (3 of 7 studies) McGill pain questionnaire**	**Mixed results Limitations: Small inconsistent sample size**	**Level 1 Quality C**

Notes: RCT – Randomized Control Trial The Individual Evidence Summary Tool. Adapted from Dearholt, S. & Dang, D. 2018. John Hopkins of
VAS – Visual Analog Scale Nursing Evidence-Based Practice: Model and Guidelines (3rd ed.), p. 298.

Date: 11/112019		In patients, 18 years and older undergoing surgery requiring an inpatient stay on a Medical-Surgical unit in a rural Northwest Ohio Hospital (P), does the implementation of music listening as an adjuvant to traditional postoperative pain management strategies (I) compared to current practices (C) help manage postoperative pain and reduce opioid use (O) in a three-month time frame (T).					
Article Number	Author and Date	Evidence Type Design	Sample, Sample Size, Setting	Findings	Observable Measures	Limitations	Evidence Level, Quality
21	**Sin & Chow (2015)**	**Quantitative Systematic Literature Review**	**1352 potentially relevant articles 492 duplicate articles removed; 7 articles Kept**	**Reduced postoperative pain**	**Pain**	**insufficient sample size)**	**Level 1 Quality C**
22	**Sfakianakis et al. (2017)**	**Quantitative Prospective RCT in Tertiary university hospital Study group and control group**	**n=87 music group (n=45) control group (n=42)**	**Pain decreased MAP decreased**	**Physiological parameters HR, RR, SPO2, MAP, VAS**	**None Identified**	**Level 1 Quality A (high quality)**

Notes: MAP- Mean Arterial Pressure
HR- Heart Rate; RR – Respiratory Rate
SPO2 – Oxygen saturation
VAS – Visual Analog Scale

The Individual Evidence Summary Tool. Adapted from Dearholt, S. & Dang, D. 2018. John Hopkins of Nursing Evidence-Based Practice: Model and Guidelines (3rd ed.), p. 298.

Date: 11/112019		In patients, 18 years and older undergoing surgery requiring an inpatient stay on a Medical-Surgical unit in a rural Northwest Ohio Hospital (P), does the implementation of music listening as an adjuvant to traditional postoperative pain management strategies (I) compared to current practices (C) help manage postoperative pain and reduce opioid use (O) in a three-month time frame (T).					
Article Number	Author and Date	Evidence Type Design	Sample, Sample Size, Setting	Findings	Observable Measures	Limitations	Evidence Level, Quality
23	**Vaajoki et al. (2013)**	**Quasi-experimental repeated measure, pretest-posttest design**	**Abdominal surgery n=166**	**28 patients said music was lovely; 20 patients fell asleep 17 patients – excellent experience 16 patients relaxed 16 patients distracted from the pain 10 patients time passes quickly 7 patient's environment disturbed music listening 2 patients said the pain was too severe to focus on music**	**VAS NRS**	**No randomization Researcher and participants not blinded**	

Notes:
VAS – Visual Analog Scale
NRS – Numerical Rating Scale

The Individual Evidence Summary Tool. Adapted from Dearholt, S. & Dang, D. 2018. John Hopkins of Nursing Evidence-Based Practice: Model and Guidelines (3rd ed.), p. 298.

Appendix C

Table 13

Synthesis of Evidence

Studies	Design	Sample	Outcome
1	**Quantitative Experimental Design Controlled trial without Randomization**	**N=56 Men – 25 Women 31**	**Pain decreased**
2	**Randomized Control Trial**	**N=59 screened preoperatively N = 41 – randomized postoperatively n=20 intervention group n=21 control group 17-83 years of age 83% white**	**Positive comments regarding stress, anxiety, pain reduction, sleep. Negative comment – fell asleep and did not push PCA and woke up in more pain.**
3	**Systematic Review**	**42 studies on anxiety and/or pain of patients Elective surgery (gynecological, abdominal, ear, nose and throat, cardiac, urological, ophthalmological, orthopedic and breast biopsy**	**Reduced Pain Reduced Anxiety**

Notes:

Studies	Design	Sample	Outcome
4	**Systematic Review**	**Acute pain – 7 articles (1 study about pain management; 6 studies non-pharmacological interventions** **Two studies – music intervention**	**Reduced Pain** **Reduced Anxiety** **Improved Vital Signs**
5	**Systematic Review**	**Music Group n=53 (ICU and CABG)** **Control Group n=51** **Medical/Surgical Patients**	**SSD in pain between music and control group**
6	**Quantitative**	**N=41** **Convenience Sample** **Alert & Oriented;** **18 years or older** **Able to read and write; hematology and oncology diagnosis**	**reduced pain** **Increased environmental noise satisfaction** **No change in state anxiety** **No change in trait anxiety**
7	**Randomized Controlled Trial**	**N=163** **Control group: n=79** **Experimental group n=84** **27-bed Orthopedic Unit** **18 years of age or older** **Inpatient elective orthopedic surgery**	**Reduced Pain** **No SSD in total doses of narcotics**

Studies	Design	Sample	Outcome
8	**Descriptive Study**	**Convenience Sample in 5 studies** **4 The midwestern USA and 1 study in Taiwan**	**Choice of music varied within cultures**
9	**Quantitative** **Repeated Measures design**	**Convenience Sample** **468 participants** **5 US Midwestern hospitals**	**Reduced pain**
10	**Quantitative** **Experimental design** **2x2 factorial design with pretest and post-test**	**Purposive Sample** **N=571**	**No immediate effects on pain** **Pulse and respiration rates were significantly lower**

Studies	Design	Sample	Outcome
11	**RCT**	**N=167** **Intestinal Surgery** **2 Medical centers and 2 Community hospitals 95% Caucasian; 60% female; 63% married; 52% Protestant and 62% employed.** **Abdominal surgery: Ulcerative colitis 28%; Crohn's disease 28%; Colon Cancer 10%; Diverticulosis 6%; Rectal cancer 5%; adhesions 4% or other intestinal conditions 19%**	**Reduced Pain**
12	**Descriptive Cross Sectional**	**n=235** **Selected medical, surgical, and gynecological inpatient units**	**Advanced degree Associated** **with knowledge of pain** **management**

Notes:

Studies	Design	Sample	Outcome
13	**Quantitative Systematic Review and meta-analysis RCTs**	**N= 458**	**Reduce post-op pain, anxiety, and analgesia needs and improved patient satisfaction. No difference in Length of Stay**
14	**Systematic Review RCTs**	**Studies conducted in the USA, Asia, and Europe Adult patients Elective laparoscopic or abdominal surgery, thoracic or heart surgery, total knee replacements or lung cancer**	**Reduced Pain**
15	**Systematic Meta-analysis of RCTs**	**MEDLINE, OvidSP, Web of Science, Scopus, Psych INFO, CINAHL, Cochrane, PubMed, Google Scholar Mean age of participants 18 years 92 RCT**	**Pain and anxiety Reduced**

Notes:

RCT- Randomized Control Trial

Studies	Design	Sample	Outcome
16	**Mixed-methods experimental**	**n=59** **100% female**	**improved knowledge, skill** **and attitude with an** **education program**
17	**Quantitative** **Systematic Review**	**CINAHL-52 and 1 used** **Medline- 77 and 15 articles used** **Cochrane Library produced 1 result 43 results and 2 used** **Joanna Briggs Institute 240 results and 10 articles met inclusion criteria and 1 critically appraised and used**	**Reduced Pain**
18	**Quantitative** **Quasi-experimental design**	**Convenience Sample in 55-bed acute care hospital with orthopedic and trauma patient population** **N=42** **44 signed consents**	**Pain scores reduced** **Increased patient satisfaction** **Length of listening had no effect**
19	**Quantitative and Qualitative Systematic Review**	**128 articles** **19 reviews evaluated** **Included RCTs** **6 reviews performed a meta-analysis**	**Reduced Pain**
20	**Quantitative systematic review**	**10 RCTs (8 RCT and 2 Quasi-experimental)**	**Mixed Results**

Studies	Design	Sample	Outcome
		Sample size 13-124 **3 studies measured anxiety** **Adult years of age or older**	**3 out of 7 patients – reduced pain**
21	**Quantitative** **Systematic Literature Review**	**1352 potentially relevant articles** **492 duplicate articles removed;** **7 articles Kept**	**Reduced Postoperative pain**
22	**Quantitative** **Prospective RCT in Tertiary university hospital**	**N=87** **music group (N=45)** **control group (N=42)**	**Reduced Pain** **Reduced MAP**

Notes:

RCT – Randomized Control Trial
MAP – Mean Arterial Pressure

Studies	Design	Sample	Outcome
23	**Quasi-experimental repeated measure, pretest-posttest design**	**Abdominal surgery n=166**	**28 patients said music was lovely; 20 patients fell asleep 17 patients – excellent experience 16 patients relaxed 16 patients distracted from the pain 10 patients time passes quickly 7 patient's environment disturbed music listening 2 patients said the pain was too severe to focus on music**

Notes

Appendix D

Figure 9

Citi Training

Department Name: College of Nursing

3000 Arlington Ave.

Toledo, Ohio 43614

Phone: 419-383-5850

Appendix E

Figure 10

Informed Consent

ADULT RESEARCH SUBJECT INFORMATION AND CONSENT FORM and AUTHORIZATION FOR USE AND DISCLOSURE OF PROTECTED HEALTH INFORMATION

MUSIC LISTENING: AN EVIDENCE-BASED APPROACH TO POSTOPERATIVE PAIN MANAGEMENT

Principal Investigator:	Dr. Colleen Taylor, Ph.D., RN
	Tammie Ferguson, MSN, RN, CNE
Other Staff	Doctor of Nursing Practice Student Student Investigator

Contact Phone number(s):

Key Study Information:

You may be eligible to take part in a research study at The Bellevue Hospital. This form contains important information that will help you decide whether to join the study. Take the time to review this information carefully. You should talk to the researchers about the study and ask them any questions you have. You may also wish to talk to others, such as

your family, friends, or other doctors about joining this study. If you decide to join the study, you will be asked to sign this form before you can start study-related activities.

Before you do, be sure you understand what the research study is about. A research study is different from the regular medical care you receive from your doctor. Research studies hope to make discoveries and learn new information about diseases and how to treat them. You should consider the reasons why you might want to join a research study or why it is not the best decision for you at this time.

NO TEXT ON THIS PAGE

Research studies do not always offer the possibility of treating your disease or condition.

The purpose of this study is to examine how effective listening to music after your surgery, when used along with pain medications, is in helping with your pain control.

There can be risks associated with joining any research study. The type of risk may impact whether you decide to join the study. For this study, some of these risks may include the possibility of some strong emotional responses when you listen to the music, as well as a very low risk of your private health information being seen or becoming available to people who should not have access to this information (loss of confidentiality). More detailed information about these risks will be provided later in this document.

This study may offer some benefit to you now or others in the future by managing surgical pain and decreasing opioid use. More information will be provided later in this document.

We expect the amount of time that you will take part in the study to be about 20-30 minutes 3 times/day during your hospital stay (up to 90 mins each day). During each music session that you take part in the study, you will be listening to music of your choice on a device that will play the music for you.

Your participation in this study is voluntary. You can decide not to be in this study or agree to take part now and change your mind later. If you decide to take part in this research or not, or if you decide to take part now but change your mind later, your decision will not affect the usual (routine) care that you will receive from your doctor and other members of your health care team after your surgery.

Alternatives to joining this study include being offered the treatment that is routinely offered in this hospital for pain management following surgery. You may change your mind later about being in the study.

PURPOSE (WHY THIS RESEARCH IS BEING DONE)

You are being asked to take part in a research study that will look into how effective listening to music after your surgery, when used along with pain medications, is in helping with your pain control. The purpose of the study is to examine the effectiveness of listening to music, when used with pain medications, in helping to manage pain after surgery. You will receive the standard routine medical care that is offered by The Bellevue Hospital for your pain after surgery. Music is something new to The Bellevue Hospital and is being done as a part of this research study, and not a part of the standard routine medical care that is offered after surgery.

You were selected as someone who may want to take part in this study because you are undergoing surgery that will require you to stay in the hospital after your surgery. Up to 100 patients are expected to participate.

DESCRIPTION OF THE RESEARCH PROCEDURES AND DURATION OF YOUR INVOLVEMENT

- Music will be downloaded to media devices called MP3 players.
- The Hospital will give you (or a family member) disposable earphones on admission to the hospital unit following surgery for you to use while listening to the music.
- You will listen to 20-30 minutes of your preferred music within 24 hours following surgery. Your total time listening to music could be up to 90 minutes each day that you are in the hospital.
- You will be given a list of songs that you can choose your preferred music from.
- Your nurse will ask you about your pain level before and after listening to each music session.
- There will be No change in the amount and type of pain medications that are ordered by your health care provider for your pain control after your surgery.
- On the day you are discharged from the hospital, you will be given a questionnaire to complete describing your pain control experience while you were in the hospital.
- The pain level results from the patients who listen to the music will be compared to pain levels of a group of patients who did not listen to the music.

RISKS AND DISCOMFORT, YOU MAY EXPERIENCE IF YOU TAKE PART IN THIS RESEARCH

- Risks of participation include
    - Triggering of emotional responses to music resulting in emotional distress (music intervention will be immediately stopped)
    - Breach of confidentiality
        - With this project, something out of the ordinary is being done in your Hospital. It is possible that if others in the community are aware that you are participating, they may ask you questions. We will not be sharing the identity of those participating in the research. It is also possible that your protected health information may be seen by some people who would not normally see this information.

POSSIBLE BENEFIT TO YOU IF YOU DECIDE TO TAKE PART IN THIS RESEARCH

Your pain may be better controlled than traditional pain management measures such as getting only pain medications when you are in pain that are part of the routine standard of care that is

ordered by your healthcare providers and offered by the Bellevue Hospital. We cannot and do not guarantee or promise that you will receive any benefits from this research.

COST TO YOU FOR TAKING PART IN THIS STUDY

- There will be no cost for taking part in this research
- The headphones and MP3 players that you will use during the time that you are in this study will be supplied to you free of cost by the people who are doing the study.
-

PAYMENT OR OTHER COMPENSATION TO YOU FOR TAKING PART IN THIS RESEARCH

If you decide to take part in this research, you will receive a $25.00 Visa gift card after you are done with the study, completed and returned the questionnaire that you will be given when you are ready to leave the hospital. No other payment will be offered or given to you if you decide to take part in the study.

ALTERNATIVE(S) TO TAKING PART IN THIS RESEARCH

If you decide that you do not want to take part in this study, you will get the usual care that your doctor and the hospital provides to patients who have the same surgery as you. This is called routine medical care or standard of care.

CONFIDENTIALITY OF SUBJECT RECORDS AND AUTHORIZATION TO RELEASE YOUR PROTECTED HEALTH INFORMATION

The information below describes how the confidentiality of your research records will be protected in this study, and any sub-studies described in this document.

How will researchers protect my information?

Your research information will be stored in a locked cabinet in the Principal Investigator's office and will not be made a part of your regular medical record. Research records will be kept in a separate research file that does not include names, registration numbers, or other information that is likely to allow someone other than the researchers to link the information to you.

If you agree to allow us to use and/or share your de-identified information for future research purposes, please place your initials here:_____(opt-in); if not_____(opt-out)

What protected health information (PHI) about me could be seen by the researchers or by other people? Why? Who might see it?

Signing this form gives the researchers your permission to obtain, use, and share protected health information about you for this study and is required for you to take part in the study.

What else should I know about the use and disclosure of my health information?
Participation in research involves using and sharing your health information to conduct the research. We will do our best to make sure that information about you is kept confidential, but we cannot guarantee total privacy. By agreeing to take part in this research study, you give to The University of Toledo (UT), the Principal Investigator and all personnel associated with this research study your permission to use or disclose health information that can be identified with you that we obtain in connection with this study. Medical information and billing records are protected by the privacy regulations of the federal Health Insurance Portability and Accountability Act of 1996 (HIPAA). This type of information is called protected health information (PHI). PHI about you may be obtained from any hospital, doctor, and other health care provider involved in your care, including:

- Demographic information
- Age
- Race
- Gender
- Surgical procedure
- Pain level
- Opioid medication amount
- Music listening survey
- Personal identifiers such as medical record number

There are many reasons why information about you may be used or seen by the researchers or others during or after this study. Examples include:

- The researchers may need the information to make sure you can take part in the study.

- The researchers may need to use the information to create a databank of information about your condition or its treatment.
- Information about your study participation may be included in your regular Bellevue Hospital medical record.
- Federal or State law may require the study team to give information to government agencies. For example, to prevent harm to you or others, or for public health reasons.

The results of this study could be published in an article, but the publication would not include any information that would let others know who you are

We will use this information for the purpose of conducting the research study as described in the research consent/authorization form.

The information that will be used or disclosed includes the name, dose, frequency, and specific times pain medication was administered, pain level before and after pain medication is given.

We may also use your information to contact you after this study is closed to update your contact information should we decide it is important to continue following your progress or to open a new study to follow-up on people who take part in this study.

To authorize research staff from The University of Toledo to contact you to update your information or invite you to participate in a new follow-up study, place your initials here:

_____(opt-in); if not_____(opt-out). Under some circumstances, the Institutional Review Board, or the Research and Sponsored Programs of the University of Toledo or their designees may review your information for compliance audits.

The University of Toledo is required by law to protect the privacy of your health information and to use or disclose the information we obtain about you in connection with this research study only as authorized by you in this form. However, the information we disclose with your permission may no longer be protected by privacy.

laws. This means your information could be used and re-disclosed by the persons we give it to without your permission.

Your permission for us to use or disclose your protected health information as described in this section is voluntary. However, you will not be allowed to participate in the research study unless you give us your permission to use or disclose your protected health information by signing this document.

Your access to your own protected health information *[medication administration record, nurses progress notes and nursing assessments]* may be denied during the term of the research study, but you can access your information once the research study is completed**.**

You have the right to revoke (cancel) the permission you have given to us to use or disclose your protected health information at any time by giving written notice to Dr. Colleen Taylor, Ph.D., RN, 3000 Arlington Avenue, Toledo, Ohio 43614. However, a cancellation will not apply if we have acted with your permission, for example, information that already has been used or disclosed prior to the cancellation. Also, a cancellation will not prevent us from continuing to use and disclose information that was obtained prior to the cancellation as necessary to maintain the integrity of the research study.

Except as noted in the above paragraph, your permission for us to use and disclose your protected health information has no expiration date. If you withdraw your permission, you may no longer be eligible to participate in this study.

A more complete statement of University of Toledo's Privacy Practices is set forth in its Joint Notice of Privacy Practices. If you have not already received this notice, a member of the research team will provide this to you. If you have any further questions concerning privacy, you may contact the University of Toledo's Privacy Officer at 419- 383-6933.

What happens to information about me after the study is over or if I cancel my permission to use my PHI?

As a rule, the researchers will not continue to use or disclose information about you but will keep it secure until it is destroyed. Sometimes, it may be necessary for information about you to continue to be used or disclosed, even after you have canceled your permission, or the study is over. Examples of reasons for this include:

- To avoid losing study results that have already included your information
- To provide limited information for research, education, or other activities. (This information would not include your name, social security number, or anything else that could let others know who you are.)
- To help University and government officials make sure that the study was conducted properly.

As long as your information is kept at the Bellevue Hospital, it is protected by the hospital privacy policy. You may access the notice of privacy practices at https://www.bellevuehospital.com/privacy-policy. Note that once your information has been shared with others as described above, it may no longer be protected by the privacy regulations of the federal Health Insurance Portability and Accountability Act of 1996 (HIPAA).

IN THE EVENT OF A RESEARCH-RELATED INJURY

If you suffer a research-related injury, medical treatment is available, and you can choose where you want to go for treatment.

The University of Toledo and The University of Toledo Medical Center do not offer reimbursement for medical expenses or other compensation for research-related injuries. In the event that any medical expenses are not reimbursed by your insurance, they will be billed to you.

By signing this form, you do not give up any of your legal rights if you are injured.

In the event of a research-related injury, contact the Principal Investigator, Colleen Taylor at 419-383-5850 or colleen.taylor@utoledo.edu.

VOLUNTARY PARTICIPATION

Taking part in this study is voluntary. You may refuse to participate or discontinue participation at any time without penalty or a loss of benefits to which you are otherwise entitled. If you decide not to participate or to discontinue participation, your decision will not affect your future relations with The University of Toledo or The University of Toledo Medical Center or the Bellevue Hospital.

NEW FINDINGS

You will be notified of new information that might change your decision to be in this study if any becomes available

POST-STUDY COMPLETION PERMISSION TO CONTACT

Participation in **this** study includes permission to contact you after the study ends monthly to update your contact information so we know how to reach you should we decide that it is important to continue following your progress or open a new study to follow-up on people who take part in this study. We may also ask questions about your continued use of music and your pain control.

OTHER IMPORTANT INFORMATION ADDITIONAL ELEMENTS

If you withdraw from the study, you will be offered the same standard of care as other patients.

If, for any reason, you are discharged the same day as surgery and status changed to outpatient or observation, you will be removed from the study. You will also be removed from the study if you receive opioid pain medication that is administered on a scheduled basis (around the clock) or are receiving self-administered opioid medication known as Patient Controlled Analgesia.

The student investigator claims no conflict of interest

CONTINUED ON NEXT PAGE

OFFER TO ANSWER QUESTIONS

Before you sign this form, please ask any questions on any aspect of this study that is unclear to you. You may take as much time as necessary to think it over. If you have questions regarding the research at any time before, during or after the study, you may contact Dr. Colleen Taylor at
or Tammie Ferguson, student investigator at

If you have questions beyond those answered by the research team or your rights as a research subject or research-related injuries, please feel free to contact the Chairperson of the University of Toledo Biomedical Institutional Review Board at 419-383-6796.

SIGNATURE SECTION (Please read carefully)

YOU ARE MAKING A DECISION WHETHER OR NOT TO PARTICIPATE IN THIS RESEARCH STUDY. YOUR SIGNATURE INDICATES THAT YOU HAVE READ THE INFORMATION PROVIDED ABOVE, YOU HAVE HAD ALL YOUR QUESTIONS ANSWERED, AND YOU HAVE DECIDED TO TAKE PART IN THIS RESEARCH.

BY SIGNING THIS DOCUMENT, YOU AUTHORIZE US TO USE OR DISCLOSE YOUR PROTECTED HEALTH INFORMATION AS DESCRIBED IN THIS FORM.

The date you sign this document to enroll in this study, that is, today's date, MUST fall between the dates indicated on the approval stamp affixed to the bottom of each page. These dates indicate that this form is valid when you enroll in the study but do not reflect how long you may participate in the study. Each page of this Consent/Authorization Form is stamped to indicate the form's validity as approved by the UT Biomedical Institutional Review Board (IRB).

Name of Subject (please print)	Signature of Subject or Person Authorized to Consent	Date
Relationship to the Subject (Healthcare Power of Attorney authority or Legal Guardian)		Time a.m. p.m.
Name of Person Obtaining Consent (please print)	Signature of Person Obtaining Consent	Date
Name of Witness to Consent Process (when required by ICH Guidelines) (please print)	Signature of Witness to Consent Process (when required by ICH Guidelines)	Date

YOU WILL BE GIVEN A SIGNED COPY TO KEEP

Appendix F

Figure 11

Letter of Support

The Bellevue Hospital
EST. 1917
Quality Care, Close To Home

April 15, 2020

University of Toledo, IRB
2801 W. Bancroft
Toledo, Ohio 43606-3390

Dear Sir or Madam:

I would like to thank Tammie Ferguson for her music project proposal entitled "Music Listening: An Evidence-Based Approach to Help Manage Postoperative Pain." I would like this to serve as notification that we support her proposal and give our approval to implement the plan.

We believe that this is a beneficial endeavor that will help to improve post-operative pain for our patients. Thank you again and we look forward to working with Tammie on her project.

Sincerely,

Sara Brokaw
V.P. Patient Care Services

SB/fw

Figure 12 **Appendix G**

Discharge Survey

ID_____

Music Listening Patient Discharge Survey

1. Did you use music to help manage your pain after surgery? □ Yes □ No (check one)
2. What kind of music did you listen to? □ Country □ Pop □ Rock □ Christian □ Soft □ Jazz □ Other_____ □ NA (check one)
3. How long did you listen to music? □ 5 min □10 min □15 min □20 min □30 min □ Other_____ □ (check one)
4. How many times a day did you listen to music? □ Once □ Twice □ Three □ Four □ Other_____ (check one)
5. Do you feel music helped to manage your pain? □ Yes □ No (check one)
6. How did the music help to control your pain? □ NA □ By helping me to relax □ By distracting me □ By making me feel happy □ By helping the time to go by more quickly

   (check one)
7. How would you rate your overall experience with listening to music in managing your pain after surgery?

   □ Highly Dissatisfied □ Dissatisfied □ Neutral □ Satisfied □ Highly Satisfied) (check one)
8. Were there other types of music that should have been included in the music choices? If so, which ones?

   □ Rhythm & Blues □ Reggae □ Other_____ (check one)
   _____ _____
9. Any additional comments about your music listening experience?
   _____
   _____
   _____
10. Any additional comments about your music listening experience and how it helped or did not help with your pain control after surgery?
    _____
    _____
    _____

End of Survey 300729-UT Approved 09/08/20200

Figure 13

Appendix H

Data Collection Tool

I.D.	Age	Inclusion criteria met√	Race	Gender	Group	Surgical Procedu	PostOpDay	PreTime	PrePain	PreMED	PreMEDTime	PreMedOther	PreMedOtherT	PostTime1	PostPain1	PostMED	PostMEDTin	PostMedOt	PostMEDOtI	MED/Day
1																				
3																				
4																				
5																				
8																				
9																				
11																				
12																				
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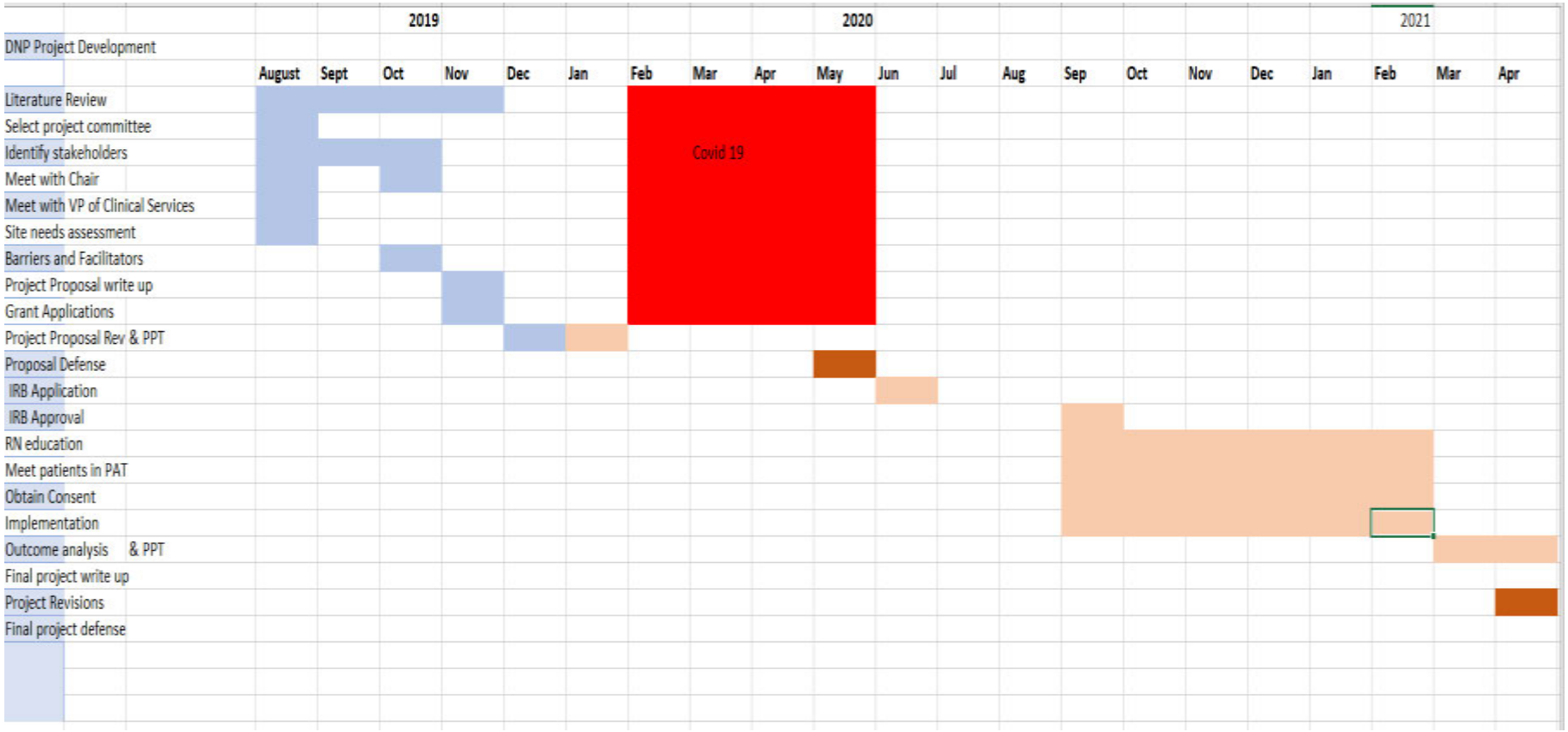
55																				
56																				
57																				

Pre Time – Time that pain was assessed prior to the intervention
Pre-MED – Morphine Equivalent Dose (opioid) administered within four hours of the intervention
Pre-MED time – Morphine Equivalent Dose Time (opioid) was administered prior to intervention
Pre-Med Other – Other pain medications (non-opioid) administered within four hours of the intervention
Pre-Med Other Time – Time other pain medications (non-opioid) were administered prior to intervention
Post-Time1 – Time that pain was assessed after the intervention
Post-Pain1 – Pain level after the intervention
Post-MED – Morphine Equivalent Dose (opioid) administered between Pre-Time and Post-Time
Post-MED Time – Time Morphine Equivalent Dose (opioid) was administered between Pre-Time and Post-Time
Post-Med Other – Other pain medications (non-opioid) administered between Pre-Time and Post-Time
Post-Med Other Time – Time that other pain medications (non-opioid) were administered between Pre-Time and Post-Time
MED/Day- Morphine Equivalent Doses administer per day (from the time of the intervention until 24 hours unless patient was discharged prior to 24 hours

Figure 14

Appendix I

Implementation Timeline



Appendix J

Table 14

Cost Analysis

Item	Cost
Printing – Consents, cover letters, song list, directions for MP3 players	$39.00
Earphones (pack of 100)	$60.00
MP3 Players	$33.00 x 8 = $264.00
Visa gift card – Participants	$25.00 x 25 = $625.00
Visa gift card – Nurses	$10.00 x 22 = $220.00
Total	**$1,208**

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