

**Reducing Pain and Anxiety Scores:
Implementation of Recorded Music Therapy as an Adjunct**

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Abstract

Problem: In the Post-Operative Care Unit (PACU) of a large, academic medical center, 70% of adult orthopedic surgery patients experience severe pain and anxiety per a chart audit that was performed on October 2-6, 2023. Anxiety leads to activation of the sympathetic nervous system and alters response to pain management. Currently, the PACU staff do not utilize non-pharmacological interventions as an adjunct, which is a requirement by The Joint Commission (TJC), to address post-operative pain and anxiety. **Purpose:** The purpose of this quality improvement (QI) project is to reduce post-operative anxiety and pain scores among adult post-orthopedic surgery patients and improve compliance with TJC's requirement among nursing staff in the PACU by implementing and measuring the impact of recorded music therapy (MT) as an adjunct to pharmacological interventions. **Methods:** The addition of MT as an adjunct therapy was implemented over 15 weeks in the PACU. Two music channels were created for the purpose of this project. 100%(50/50) bedside nurses were educated regarding the intervention through nursing huddles and weekly emails. Electronic REDCap MT initiation surveys were completed by nursing staff during this period. Weekly chart audits were performed by using the electronic health record (EHR) to determine the MT initiation compliance, pain documentation compliance, average of pain scores and anxiety scores for each week. **Results:** Collected data showed that 34.4% (82/238) of the orthopedic patients received recorded MT as an adjunct therapy, pain documentation compliance was 98.7% (81/82), the average of pain scores for each week was 2-5/10, and the average anxiety scores for each week were 0/4 in patients who received MT. **Conclusion:** Collected results suggest the addition of recorded relaxing music to pharmacological interventions improve postoperative pain and anxiety scores. Perhaps additional strategies need to be implemented to improve staff buy-in. *Keywords: post-op pain and music*

Reducing Pain and Anxiety Scores: Implementation of Recorded Music Therapy as an Adjunct

Despite advances in pain management, post-operative pain is still considered a widespread issue (Gan, 2017). Researchers have found that post-operative follow-up visits due to inadequate pain control have cost patients \$1,999.00 per visit (Gan, 2017). The research has found that 60.9% of patients who undergo orthopedic surgeries report severe postoperative pain within the four hours of surgery and 60-80% of patients report feeling anxious peri-operatively (Ndebea et al. 2020; Akelma et al., 2020). The evidence has shown that orthopedics patients with peri-operative anxiety were 6.42 times more likely to develop moderate to severe postoperative pain compared with those patients who were not anxious (García et al., 2023).

Problem Description

A chart audit was performed at the Post-Operative Care Unit (PACU) in a teaching hospital on 10 adult orthopedic surgery patients through EPIC from October 2- 6, 2023, to collect data regarding pain and anxiety score and management of these patients in the PACU. This method revealed that 7/10 of orthopedic surgery patients in the PACU rated their pain as severe (>7/10) on the numeric pain rating scale (zero no pain and 10 worst pain they have ever had). Also, this audit revealed that all patients were anxious (+1 on the RASS scale), and they received only opioids in the PACU within the first two hours of admission. Five out of these seven patients experienced side effects of opioids such as respiratory depression and nausea.

Root cause analysis of the problem was performed, and four factors were identified as reasons for severe pain and anxiety. These four reasons include intra-operative-related, PACU-related, patient-related, and nurse-related factors. After speaking with stakeholders of the unit, peri-operative anxiety was selected as the main reason for developing severe pain post-

operatively. Anxiety leads to activation of the sympathetic nervous system, alteration in pain perception, and influences response to pain management (Akelma et al., 2020). The evidence has shown that orthopedics patients with peri-operative anxiety were 6.42 times more likely to develop moderate to severe postoperative pain compared with those patients who were not anxious (García et al., 2023). See Figure 1 for the root-cause analysis and Figure 2 for a workflow map of the current process.

The Joint Commission announced new regulations that address pain management that went into effect on January 1, 2018. Based on this new regulation hospitals are mandated to incorporate a nonpharmacological approach such as music therapy (MT) and relaxation techniques into their standard care (The Joint Commission, 2018). Currently, the PACU only utilizes pharmacological interventions such as intra-venous (IV) Dilaudid or/and PO Oxycodone per anesthesia orderset. See Figure 3 for a workflow map of the desired process.

Available knowledge and Specific Aim

An evidence search was conducted to retrieve the current articles to evaluate the effect of a non-pharmacological intervention such as MT as an adjunct on pain and anxiety reduction. The search terms “post-operative pain” and “music” were used in the PubMed, Medline, and Embase databases, which resulted in 330, 125, and 353 articles respectively. All databases were filtered by year of publication, type of article, and age. After review, one article from PubMed (Gallagher et al., 2018), three articles from Medline (Akelma et al. 2020; Sfakianakis et al. 2017; Hole et al. 2015), and three articles from Embase (Kelly-Hellyer et al. 2023; Urso et al. 2022; Aris et al. 2019) were selected. See figure 4 for the Prisma of Medline database, Figure 5 for Prisma of PubMed database, and Figure 6 for Prisma of Embase database.

All seven studies found that the addition of relaxing music to pharmacological interventions significantly reduces postoperative pain in adult patients (Akelma et al. 2020; Aris et al. 2019; Gallagher et al., 2018; Hole et al. 2015; Kelly-Hellyer et al. 2023; Sfakianakis et al. 2017; Urso et al. 2022). Also, all seven studies agreed that this intervention is feasible, safe, and can be implemented in various settings and any patient population. Based on Johns Hopkins Evidence-Based Practice (2020), all articles were level I-A in quality rating (Akelma et al. 2020; Aris et al. 2019; Gallagher et al., 2018; Hole et al. 2015; Kelly-Hellyer et al. 2023; Sfakianakis et al. 2017; Urso et al. 2022). Five studies assessed the effect of MT on pain and anxiety scores and concluded that music therapy is effective in reducing both scores post-operatively (Akelma et al. 2020; Aris et al. 2019; Gallagher et al., 2018; Hole et al. 2015; Urso et al. 2022). There is strong evidence with consistent results to support the implementation of recorded MT as an adjunct to pharmacological interventions as a solution for decreasing post-operative pain and anxiety scores. This intervention is feasible, inexpensive, safe, and can be implemented in various settings and any patient population.

The purpose of this quality improvement (QI) project is to reduce post-operative anxiety and pain scores among adult post orthopedic surgery patients and improve compliance to TJC's requirement among nursing staff in the PACU by implementing and measuring the impact of recorded MT as an adjunct to pharmacological interventions. See Table 1 for the evidence review and Table 2 for the evidence synthesis.

Rationale

The Promoting Action on Research Implementation in Health Services (PARiHS) framework was used to facilitate the development of this QI project (Kitson et al, 1998). This framework consists of three components: Evidence, context, and facilitation. Within the PACU,

the first element was obtained by examining seven research articles (Aris et al. 2019; Akelma et al. 2020; Gallagher et al., 2018; Hole et al. 2015; Kelly-Hellyer et al. 2023; Sfakianakis et al. 2017; Urso et al. 2022). The second element, context, was achieved by utilizing The Organizational Culture Assessment Questionnaire (OCAQ) which showed that the PACU staff welcome any positive changes that can increase patient satisfaction (Sashkin & Rosenback, 2013). The last component, Facilitation, was achieved through identifying champions, educating staff through morning huddles, involving the nurse manager, and sending reminder emails at the beginning of each week. See Figure 7 for the PARiHS framework model.

Methods

Context

The initiation of music therapy was implemented in the PACU of a large academic medical center over a 15-week period from August 2024 through December 2024. Within the PACU, an average of 16 orthopedic surgeries are performed each week, with the majority of them being inpatients. The PACU consists of 22 bays and each bay is equipped with a television (TV) on an adjustable arm. Project participants included patients and PACU staff members, notably registered nurses, who implemented the intervention. The PACU manager and the nurse educator were involved in the training sessions and reminded staff regarding the intervention. Inclusion criteria were as follows: patients who underwent orthopedic surgery, older than 18 years of age, received general anesthesia, and were able to communicate in English. Exclusion criteria included patients younger than 18 years of age, intubated and sedated, visual and hearing deficits, and patients who were not cognitively intact.

Prior to the implementation of the project, a cultural assessment was performed by utilizing the Organizational Culture Assessment Questionnaire (OCAQ). OCAQ is a tool

designed to evaluate and understand the culture within an organization. This 30-item questionnaire assesses four key factors that are necessary for an organization's success: managing change, achieving goals, coordinating teamwork, and building a strong culture (Sashkin & Rosenback, 2013). Managing change assesses how well an organization adapts to changes in its environment. Achieving goals evaluates the clarity and alignment of organizational goals. Coordinated teamwork measures the effectiveness of collaboration and coordination among team members. Building a strong culture looks at the shared values and beliefs that contribute to a cohesive organizational culture (Sashkin & Rosenback, 2013). Based on the responses to all 30 questions, the nursing staff in the PACU describe the culture of the unit as friendly and welcome any positive changes to the unit that could increase patient satisfaction. However, multiple barriers to implementation were identified including high turnover rate of patients in the PACU, newer staff, and some resistance to the change from more experienced nurses. Strategies and tactics used during project implementation to overcome barriers included use of incentives to gain buy-in from staff, recruitment of unit-champions to reinforce the practice change, and visual cues such as QR codes placed on computers in each bay to provide reminders about the project. Every Monday emails were sent to staff members with progress reports providing updates on MT initiation compliance rates and every Friday emails were sent to the staff from the manager of the PACU with a section dedicated to DNP projects to promote further adherence.

Intervention

The implementation of this project involved multiple steps, including the development of goals related to structure, process, and outcomes. The first step was achieved by the end of August 2024 by ensuring functionality of all TVs in each PACU bay (structure goal). Each bay in the PACU has a TV that is on an adjustable arm. The second step was to add two calming and

relaxing music channels (CARE channel and on-demand channel) to the hospital television list (structure goal). This step was achieved in late July 2024 by holding several meetings with the strategic outcomes manager and senior clinical nurse specialist of the hospital.

Next was the facilitation of the structure goal of educating the post-operative care units' nursing regarding the intervention, conducted from the last week of August 2024 to the first week of September 2024. Nursing staff were instructed to complete the regular initial head-to-toe assessment upon admitting orthopedic surgery patients to the PACU. Once the patients' immediate post-operative needs were addressed, staff were to initiate the recorded MT as part of the process goal. Moreover, the PACU nursing staff continued with their regular documentation and PACU pharmacological interventions, as needed, per unit's anesthesia orderset. The PACU nursing staff completed an electronic REDCap survey after completing the intervention (Appendix A- Music therapy initiation survey). To facilitate this step of intervention, champions were identified among nursing staff, reminder emails were sent by the manager of the unit every Friday and every Monday by the project leader. Charge nurses were made aware of the project and the project was discussed during monthly perioperative charge nurses' meetings. Moreover, the project leader created Velcro QR codes for the survey and attached the codes to the computers in each bay to further assist nursing staff with accessing the survey.

Data was collected from the last week of August 2024 till the first week of December 2024 through the electronic health record (EHR) on a weekly basis. The last documentation before discharging the orthopedic patient from phase I of PACU was reviewed during chart audits. Phase I is the period from admission to the PACU from Operating Room (OR) till full recovery from anesthesia and return of vital signs to near baseline. Patients who get signed out of

phase I by an anesthesia resident can graduate to phase II to get discharged or transferred to other units.

Measures

Data collection was initiated in the last week of August 2024 and continued for 15 weeks. The project leader reviewed the PACU orthopedic surgery daily census and performed chart audits on pain score, anxiety score pain documentation compliance and MT initiation compliance through the EHR on a weekly basis (Appendix B- EPIC Chart Audit Form). Within the PACU at this facility, pain and anxiety scores are measured by utilizing the numeric rating scale (NRS) and Richmond Agitation-Sedation Scale (RASS), respectively. Average pain scores and anxiety scores for each week were calculated and put in run charts weekly.

The data was analyzed using descriptive statistics including frequencies, percentages, and means. The compliance rate for MT initiation was determined by dividing the total number of orthopedic patients who received MT in the PACU by the total number of orthopedic patients admitted to the PACU each week. This data was represented in weekly run charts. Similarly, the compliance rate for pain documentation was calculated by dividing the number of orthopedic patients who received MT and had complete pain documentation by the total number of orthopedic patients who received MT, with results also presented in weekly run charts. Site stakeholders and staff were provided with aggregate reports from the project leader to facilitate monitoring, provide feedback, reinforce practices, and encourage discussion. The outcome goals for the project focused on achieving improvements in pain score ($<7/10$) and anxiety score (0= calm).

Ethical Considerations

To ensure privacy protection, the following measures were implemented: using an EHR to collect and enter data instead of paper-based forms, using a side-by-side screen method in a private location at the project site to collect data from the EHR and enter the data to REDCap. Measures to ensure confidentiality protection included the project leader as the sole recorder of data into REDCap, a HIPAA compliant, password protected server, accessible only to the project leader and project faculty; no other hardware device(s) or program(s) will be used for data storage. Protected Health Information (PHI) such as 10-digit MRN numbers are tagged as "identifiers" in REDCap so that if data download is necessary, identifiers will be replaced with a non-identifying code in the downloaded data. Moreover, non-human subject's research determination from the Human Research Protections Office (HRPO) of the University of Maryland School of Medicine (UMSOM) Institutional Review Board (IRB) was obtained prior to project implementation. The author has conflict of interest due to being an employer of this organization and unit.

Results

A total of 100% (50/50) of PACU nurses were educated regarding the intervention. Additionally, 100% (22/22) of the TVs remained operational during the intervention, and two music channels were made available to patients. A total of 34.4% (82/238) of orthopedic patients received recorded music therapy (MT). MT initiation compliance data, collected through a run chart, showed that the compliance rate ranged from 26% (5/19) to 44% (8/18). The lowest compliance rates were 27%, 23%, and 27% during weeks five, 11, and 13, respectively. No significant runs, trends, or outlier data points were noted. See Figure 8 for the run chart outlining Music Therapy Initiation Compliance.

Pain documentation compliance, analyzed through a run chart, showed an increase from 90% during week one to 100% from week two through week 15. The overall pain documentation compliance rate was 98.7% (81/82), improving after the second week of implementation. No significant runs, trends, or outlier data points were observed. See Figure 9 for the run chart outlining Pain Documentation Compliance.

Data regarding the outcome goals of pain scores less than seven out of 10 and anxiety scores of zero out of four were successfully achieved during this intervention. The data were analyzed using bar graphs to assess pain and anxiety scores. Average pain scores ranged from 20-50% (2-5/10), and 100% (82/82) of patients who received MT were calm and cooperative on the RASS scale (0/4). See Figure 10 for the bar graph outlining Average Pain Scores and Figure 11 for the bar graph outlining Average Anxiety Scores.

Discussion

Prior to the implementation of MT, orthopedic patients in the PACU received only pharmacological interventions, such as opioids, for pain management (Akelma et al., 2020). Opioids can cause side effects, including nausea, vomiting, constipation, and respiratory depression. Moreover, TJC has mandated that hospitals incorporate non-pharmacological interventions, such as MT, into standard care (Akelma et al., 2020). Evidence has shown that the addition of MT to pharmacological interventions improves pain and anxiety scores among post-operative patients (Aris et al. 2019).

While 100% compliance with the initiation of MT for orthopedic patients was not attained, the project successfully met its outcome goals of improved pain and anxiety scores among patients who received MT, demonstrating consistency with findings reported in the literature. Nursing staff involved in the MT initiation for orthopedic patients reported that both

patients and nurses expressed positive feedback, highlighting their enjoyment of the music channel. The integration of MT into routine practice proves to be both cost-effective and practical, requiring no additional financial expenditure for the unit.

Data analysis of MT initiation showed a low compliance rate. The project leader reviewed the weekly census of all patients admitted to the PACU during these weeks and concluded that the highest number of patients were admitted during these weeks, likely leading to the highest turnover rate. After reviewing the weekly census and discussing the results with the CSR and nursing staff, the high turnover rate of patients in the PACU was identified as the main reason for the low compliance rate. One strategy to overcome this barrier in the future could be to involve patient care technicians (PCTs) in the project implementation. The PACU at this facility has one to two PCTs per shift who assist with new admissions or patients' needs. Additionally, three to four floater nurses are assigned per shift to assist with admissions and transfers. Both PCTs and floaters could be valuable contributors to the project.

This QI project had a few limitations. Chart audits did not measure the amount of pain medication, especially opioids, administered to these patients. This decision was made to comply with HIPAA and HRPO requirements. Only four bays in the PACU are private, while the rest are separated by walls or curtains without doors. For the purpose of this QI, two relaxing music channels were created and added to the hospital TV channel list. In the future, additional music channels could be introduced, allowing patients to choose their preferred relaxing music in the pre-operative area.

Conclusions

The outcomes of this QI project suggest that the addition of recorded relaxing music as an adjunct to pharmacological interventions improves postoperative pain and anxiety scores.

This QI project demonstrated that the inclusion of recorded relaxing MT was feasible and inexpensive within the PACU environment. This intervention has the potential to be used in other PACUs in this organization with a lower rate of patient turnover.

Further recommendations emphasize the engagement of the nurse manager and the director of peri-operative nursing in weekly nursing huddles to reinforce the critical importance of adherence to The Joint Commission's (TJC) requirements. Additionally, expanding involvement to include patient care technicians (PCTs), floater nurses, and designated champions in the implementation process is advised. Ensuring the sustainability of this practice change is paramount to maintaining improvements in patient outcomes. Recommended strategies include ongoing education for nursing staff, with particular focus on new hires, integration of the intervention into new hire orientation programs and pre-operative education, and consistent communication of results to nursing staff to support adherence and foster accountability.

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Urso, S., Wang, J., Webber, K.M., Pantelyat, A., Kaiser, L., Anicoche, M.L., Bulacan, T., & Mamaril, M. (2022). Music listening as a postanesthesia care unit (pacu) nursing intervention for laparoscopic radical prostatectomy patients: a randomized comparative clinical trial. *Journal of Perianesthesia Nursing*, 37(6), 848-857.e1. Doi: [10.1016/j.jopan.2022.01.006](https://doi.org/10.1016/j.jopan.2022.01.006).

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Tables

Table 1.
Evidence Review Table

<p>Citation #1: Kelly-Hellyer, E., Siguez, A.L., Pestritto, M., & Clark-Cutaia, M.N. (2022). The analgesic properties of a music intervention in the post anesthesia care unit. <i>Jourlnla of Perianesthesia Nursing</i>, 38(5), 763-767. Doi: 10.1016/j.jopan.2022.12.007.</p>					
<p>Level:IA</p>					
Purpose or Hypothesis	Type of Evidence and Research Design	Sample (population, size, setting)	Intervention Procedures	Primary Outcome/Measures	Results/Conclusions
<p>The purpose of this article was to determine if implementation of music therapy in addition to pharmacological interventions could assist with reducing pain in adult patients in the post-anesthesia care unit (PACU).</p>	<p>Research: A prospective, pilot, randomized controlled trial (RTC).</p>	<p>Sample Technique: Convenience</p> <p>Participants: Post-operative patients older than 18 years of age underwent orthopedic surgeries.</p> <p>Setting: PACU in a 515-bed urban teaching hospital, PA, U.S.</p> <p>Excluded: Not being able to rate the pain on the numeric rating pain scale (NRS), hearing difficulties.</p> <p>Accepted: 134 patients.</p> <p>Control: 66 patients.</p>	<p>Control Group: Patients received only pharmacological interventions after initial assessment.</p> <p>Intervention Group: Patients received pharmacological interventions plus music therapy, 60-80 beats per minute (BPM), after initial assessment until pain was tolerable.</p> <p>Recruitments of patients happened in the pre-operative area on the day of the surgery.</p>	<p>Primary Outcome: Pain- Physiological and psychological changes that increase individual's susceptibility for developing persistent post-operative pain.</p> <p>Measures: -NRS: A scale from zero to 10 with zero being no pain and 10 being the worst pain they have ever had.</p>	<p>Statistical Results: Paired t-test indicated that pain scores in the control group were significantly increased overtime ($p < 0.001$), while intervention group reported less pain over time ($p = 0.314$).</p> <p>Conclusions: This study showed that implementation of music therapy as an adjunct to pharmacological interventions significantly lowers pain score.</p>

		<p>Intervention: 68 patients.</p> <p>Power Analysis: ANOVA with alpha 0.05.</p>			
<p>Citation #2: <u>Urso, S., Wang, J., Webber, K.M., Pantelyat, A., Kaiser, L., Anicoche, M.L., Bulacan, T., & Mamaril, M. (2022). Music listening as a postanesthesia care unit (pacu) nursing intervention for laparoscopic radical prostatectomy patients: a randomized comparative clinical trial. <i>Journal of Perianesthesia Nursing</i>, 37(6), 848-857.e1. Doi: 10.1016/j.jopan.2022.01.006.</u></p>					
<p>Level: IA</p>					
Purpose or Hypothesis	Type of Evidence and Research Design	Sample (population, size, setting)	Intervention Procedures	Primary Outcome/Measures	Results/Conclusions
<p>The purpose of this article was to determine if implementation of different music therapies in the PACU was effective in reducing post-operative pain and anxiety.</p>	<p>Research: Prospective randomized comparative mixed method.</p>	<p>Sample Technique: Randomized</p> <p>Participants: Post-operative male patients older 45 to 80 years of age underwent laparoscopic radical prostatectomy surgeries.</p> <p>Setting: PACU and pre-operative area Mid-Atlantic academic medical center, U.S.</p> <p>Excluded: Patients with cognitive or hearing disorder.</p> <p>Accepted: 77patients.</p>	<p>Group 1: Patients listened to the music of choice on Spotify and were offered warm blankets. Standard PACU care was performed as well.</p> <p>Group 2: Patients listened to calming pre-recorded music and guided imagery and were offered warm blankets. Standard PACU care was performed as well.</p>	<p>Primary Outcome: Pain- Physiological and psychological changes that increase individual’s susceptibility for developing persistent post-operative pain.</p> <p>Measures: -NRS: A scale from zero to 10 with zero being no pain and 10 being the worst pain they have ever had. -Anxiety: Spielberger State-Trait Anxiety Inventory (STAI) questionnaire with 20-item questions.</p>	<p>Statistical Results: Both group showed a significant decrease in pain level after implementing music therapy (p=0.04). Both groups had significant decrease in their anxiety score (p<0.001).</p> <p>Conclusions: This study showed that implementation of music therapy post-operatively significantly lowers pain score and anxiety level.</p>

		<p>Group 1: 37 patients. Group 2: 40 patients. Power Analysis: PASS13 with 2-sided power analysis.</p>			
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Citation #3: Akelma, K., Altinsoy, F., & Arslan, S. (2020). The effect of favorite music on postoperative anxiety and pain. *Anaesthesia*, 69, 198–204. <https://doi.org/10.1007/s00101-020-00731-8>

Level: IA

Purpose or Hypothesis	Type of Evidence and Research Design	Sample (population, size, setting)	Intervention Procedures	Primary Outcome/Measures	Results/Conclusions
<p>The aim of this study is to examine the effect of music therapy in addition to standard care on post-operative pain and anxiety.</p>	<p>Research: A prospective randomized single blinded controlled trial.</p>	<p>Sample Technique: Randomized</p> <p>Participants: Post-operative patients older than 18 years of age and younger than 70 years of age, underwent inguinal hernia surgery.</p> <p>Setting: PACU in a training and research hospital in Ankara, Turkey.</p> <p>Excluded: Dementia, active opioid use, hearing deficit.</p>	<p>Control Group: Patients received only standard care in the preop area.</p> <p>Intervention Group: Patients received standard care and listened to classical and calming music for 15 minutes in the pre-op area and PACU.</p> <p>Intervention group received the music of their choice.</p>	<p>Primary Outcome: Pain- Physiological and psychological changes that increase individual’s susceptibility for developing persistent post-operative pain.</p> <p>Measures:</p> <p>-NRS: A scale from zero to 10 with zero being no pain and 10 being the worst pain they have ever had.</p> <p>-Anxiety: Spielberger State-Trait Anxiety Inventory (STAI)</p>	<p>Statistical Results: Anxiety score was significantly lower in the music therapy group (p=0.025). However, the pain score was not significantly lower than the control group (p= 0.07).</p> <p>Conclusions: This study concluded that implementation of music therapy as an adjunct to standard care from the time that patient is in the pre-op area significantly</p>

		<p>Accepted: 117</p> <p>Control:59 patients.</p> <p>Intervention: 58 patients.</p> <p>Power Analysis: SPSS software version 24.</p>		questionnaire with 20-item questions.	lowers the anxiety score and improves patient satisfaction.
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Citation #4: Aris, A., Sulaiman, S., & Che Hasan, M.K. (2019). The influence of music therapy on mental well-being among postoperative patients of total knee arthroplasty (TKA). *Enfermeria Clinica*, 29 (2), 16-23.DOI:10.1016/j.enfcli.2019.04.004.

Level:IA

Purpose or Hypothesis	Type of Evidence and Research Design	Sample (population, size, setting)	Intervention Procedures	Primary Outcome/Measures	Results/Conclusions
The purpose of this study was to examine the effect of music therapy on anxiety and pain in the PACU.	Research: Randomized Controlled Trial	<p>Sample Technique: Randomized</p> <p>Participants: Post-operative patients older than 18 years of age underwent total knee arthroplasty.</p> <p>Setting: PACU in a hospital in Malaysia.</p> <p>Excluded: Use of antipsychotic drugs, hemodynamically unstable, and allergy to opioids.</p> <p>Accepted: 56 patients.</p> <p>Control: 28 patients.</p> <p>Intervention: 28 patients.</p>	<p>Control Group: Patients received only standard care based on the unit policy.</p> <p>Intervention Group: Patients received standard care plus music therapy. Patients were provided headphones and were allowed to listen to music for up to 60minutes, 60-80BPM.</p> <p>Recruitments of patients happened in the anesthesia clinic or pre-operative area.</p>	<p>Primary Outcome: Pain- Physiological and psychological changes that increase individual's susceptibility for developing persistent post-operative pain.</p> <p>Measures: -NRS: A scale from zero to 10 with zero being no pain and 10 being the worst pain they have ever had. -Visual analog scale to score anxiety. This scale is a 10 cm horizontal line with a right angle at each</p>	<p>Statistical Results: Mann-Whitney U tests revealed that the intervention group had a significantly lower pain score after 60 minutes compared to the control group (p=0.045). Moreover, anxiety score was significantly lower in the intervention group (p=0.001).</p> <p>Conclusions: This study showed that implementation of music therapy as an adjunct to pharmacological</p>

		<p>Power Analysis: ANOVA with alpha 0.05. Mann-Whitney test was also used to analyze the differences in the pain and anxiety scores between the groups.</p>		<p>end of the link indicating “no concern” on the left-most part shown “very concerned” at the far right.</p>	<p>interventions is safe and inexpensive. Moreover, music therapy is helpful in reducing pain score among orthopedic surgery patients in the PACU.</p>
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Citation #5: Sfakianakis, M., Karteraki, M., Panayiotou, K., Christaki, O., Sorrou, E., Chatzikou, V., & Melidoniotis, E. (2017). Effect of Music Therapy Intervention in Acute Postoperative Pain among Obese Patients. *International Journal of Caring Science*, 10(2), 937. DOI:10.1007/s00101-020-00731-8

Level: IA

Purpose or Hypothesis	Type of Evidence and Research Design	Sample (population, size, setting)	Intervention Procedures	Primary Outcome/Measures	Results/Conclusions
<p>The aim of this purpose is to examine the effect of music therapy on pain among obese patients in the PACU.</p>	<p>Research: A prospective randomized clinical trial.</p>	<p>Sample Technique: Convenience Participants: Post-operative patients between 18 and 70 years old with BMI>25 underwent major abdominal surgeries. Setting: PACU in a teaching hospital, Greece. Excluded: BMI less than 25. Accepted: 87 patients. Control: 42 patients.</p>	<p>Control Group: Patients received only pharmacological interventions after initial assessment. Intervention Group: Patients received pharmacological interventions plus music therapy. Patients were provided with earphones, and they listened to classical music, 60-80 BPM, for 30 minutes.</p>	<p>Primary Outcome: Pain- Physiological and psychological changes that increase individual’s susceptibility for developing persistent post-operative pain. Measures: - Visual Analogue Scale (VAS) for pain assessment. It consists of a 10-cm horizontal line, is quick, easy to use and score, and provides a method in order to</p>	<p>Statistical Results: The results showed that pain scores in the intervention group decreased more and faster than the control group (p<0.001). Conclusions: This study concluded that nurses need to implement music therapy as an adjunct to standard care to provide more comfort and pain relief.</p>

		<p>Intervention: 45 patients.</p> <p>Power Analysis: ANOVA with alpha 0.05 and SPSS.</p>		compare the findings to previous results	
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Citation #6: Hole, J., Hirsch, M., Ball, E., & Meads, C. (2015). Music as an aid for postoperative recovery in adults: a systematic review and meta-analysis. *Lancet*, 386(10004), 1659-71. [Doi: 10.1016/S0140-6736\(15\)60169-6](https://doi.org/10.1016/S0140-6736(15)60169-6).

Level: IA

Purpose or Hypothesis	Type of Evidence and Research Design	Sample (population, size, setting)	Intervention Procedures	Primary Outcome/Measures	Results/Conclusions
The purpose of this article was to assess the effectiveness of music therapy in reducing pain and anxiety and improving patient satisfaction during post-operative care.	Quantitative Systematic review of RTC with meta-analysis.	<p>Sample Technique: Searching</p> <p>Articles: Full text, RTC, patients older than 18 years of age who underwent any type of surgeries.</p> <p>Setting: The electronic databases.</p> <p>Excluded: Studies that included surgeries on central nervous system or head and neck and were published in any language.</p> <p>Accepted: 260 RCT articles.</p>	The electronic databases searched MEDLINE, Embase, CINAHL, and Cochrane Central were searched. Studies were performed on different patient populations, different settings, and procedures. Setting including pre-op, intra-op, and post-operative areas. All studies had a control group who received standard care, and intervention group who received standard care in addition to music therapy. Various	<p>Primary Outcome: Pain- Physiological and psychological changes that increase individual's susceptibility for developing persistent post-operative pain.</p> <p>Measures: -Pain: VAS or NRS. -Anxiety: STAI</p>	<p>Statistical Results: Music intervention significantly reduced post-operative pain score (SMD -0.77) and anxiety score (SMD -0.68) and improved patient satisfaction (SMD 1.09).</p> <p>Conclusions: This systematic review study showed that implementation of music therapy in addition to standard care, is inexpensive, non-invasive, and safe. Moreover, this study concluded that</p>

		<p>Power Analysis: RevMan (version 5.2), with standardized mean differences (SMD)</p>	<p>types of soothing music were offered to the patients. Duration of the music was from several minutes to a few days.</p>		<p>implementation of music therapy is effective in reducing peri-operative pain and anxiety and improves patient recovery.</p>
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Citation #7: Gallagher, L.M., Gardner, V., Bates, D., Mason, S., Nemecek, J., DiFiore, J.B., Bena, J., Li, M., Bethoux, F. (2018). Impact of music therapy on hospitalized patients post-elective orthopaedic surgery: A randomized controlled trial. *Orthopedic Nursing*, 37(2):124-133. [Doi: 10.1097/NOR.0000000000000432](https://doi.org/10.1097/NOR.0000000000000432).

Level: IA

Purpose or Hypothesis	Type of Evidence and Research Design	Sample (population, size, setting)	Intervention Procedures	Primary Outcome/Measures	Results/Conclusions
<p>The purpose of this article was to evaluate the effect of music therapy as an adjunct to standard care on post-operative pain, anxiety, and length of stay in adult patients.</p>	<p>Research: RTC</p>	<p>Sample Technique: Randomized</p> <p>Participants: Patients older than 18 years of age who underwent orthopedic surgeries, English speaker, cognitively intact.</p> <p>Setting: Orthopedic unit or approved overflow unit in a hospital in Helsinki.</p>	<p>Control Group: Patients received only standard care based on the unit policy.</p> <p>Intervention Group: Patients received standard care plus music therapy. Patients were provided iPads or listened to live music that was played by a board-certified music therapist. The music</p>	<p>Primary Outcome: Pain- Physiological and psychological changes that increase individual’s susceptibility for developing persistent post-operative pain.</p> <p>Measures: -NRS: A scale from zero to 10 with zero being no pain and 10</p>	<p>Statistical Results: The results showed that 41% of patients in the control group reported an improvement in pain and anxiety pre- to posttherapy, while 73% of experimental patients reported improvement in pain and anxiety ($p < .001$). The length of</p>

		<p>Excluded: Patients on contact precaution and emergency surgeries.</p> <p>Accepted: 163 patients.</p> <p>Control: 79 patients.</p> <p>Intervention: 84 patients</p> <p>Power Analysis: G Power analysis for medium effect size with a size of 79 patients.</p>	<p>therapy session was started within 24 hours of admission.</p>	<p>being the worst pain they have ever had.</p> <p>-Rogers Happy/Sad Faces Assessment Tool: Mood and anxiety. A scale of zero to four with zero being happy and four being sad and anxious.</p>	<p>stay was not statistically significant.</p> <p>Conclusions: This study showed that implementation of music therapy in addition to standard care is safe and inexpensive. Moreover, music therapy is helpful in reducing pain and anxiety scores among post-operative orthopedic surgery patients.</p>
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Table 2.

Evidence Synthesis Table

Project Title: The Effect of Recorded Music Therapy as an Adjunct to Pharmacological Interventions on Pain Reduction in Adult Orthopedic Surgery Patients in Post-Anesthesia Care Unit (PACU).			
PICOT: In orthopedic surgery patients 18 years and older in the PACU (P), does the implementation of recorded music therapy as an adjuvant to traditional postoperative pain management strategies (I), compared to current practices (C), improve the management of postoperative pain (O), in a three-month time frame (T)?			
JHNEBP Model Level	Total Number of Sources	Author and Quality Rating of each study	Synthesis of Findings
Level 1 Experimental study · Randomized Controlled Trial (RCT) · Systematic review of RCTs with or without meta-analysis	-RTC:6 studies (Akela et al; Aris et al; Gallagher et al., 2018; Kelly- Hellyer et al; Sfakianakis et al; Urso et al)	-Akela et al: A -Aris et al: A - Gallagher et al: A - Kelly-Hellyer et al: A - Sfakianakis et al: A - Urso et al: A	All five studies found that addition of a non-pharmacological intervention such as music therapy significantly reduces postoperative pain in adult patients. Moreover, all five studies played calming and relaxing music such as classical genre for patients. Four studies measured both pain and anxiety scores and found that music therapy reduces both scores (Akelma et al. 2020; Aris et al. 2019; Gallagher et al: Urso et al. 2022). Three studies focused on orthopedic surgeries (Aris et al. 2019; Gallagher et al: Kelly-Hellyer et al. 2023), while study abdominal surgery (Akelma et al. 2020), inguinal hernia repair (Sfakianakis et al. 2017), and radical prostatectomy (Urso et al. 2022)
	-Systematic review of RTC with meta-analysis: 1	- Kühlmann et al: A - Hole et al: A	This study concluded that implementation of music therapy is effective in reducing pain and anxiety in adult patients post-operatively. It showed that implementation of music therapy is

	study (Hole et al)		inexpensive, safe, and can be implemented in various settings, patient populations, and surgeries.
Level II Quasi-experimental studies · Systematic review of a combination of RCTs and quasi-experimental studies, or quasi-experimental studies only, with or without meta-analysis			
Level III Non-experimental study · Systematic review of a combination of RCTs, quasi-experimental, and non-experimental studies, or non-experimental studies only, with or without meta-analysis · Qualitative study or systematic review of qualitative studies with or without meta-synthesis			
Level IV Opinion of respected authorities and/or reports of nationally recognized expert committees/consensus panels based on scientific evidence			
Level V Evidence obtained from literature reviews, quality improvement, program evaluation, financial evaluation, or case reports · Opinion of nationally recognized expert(s) based on experiential evidence			
Overall Quality Rating w/rational and Recommendation: A, strong, compelling evidence with consistent results. Literature recommends implementation of music therapy as an adjunct to pharmacological interventions in adult post-operative patients. This intervention is inexpensive, safe, and results in a decrease in pain and anxiety score.			

Figure 1.

Fishbone diagram

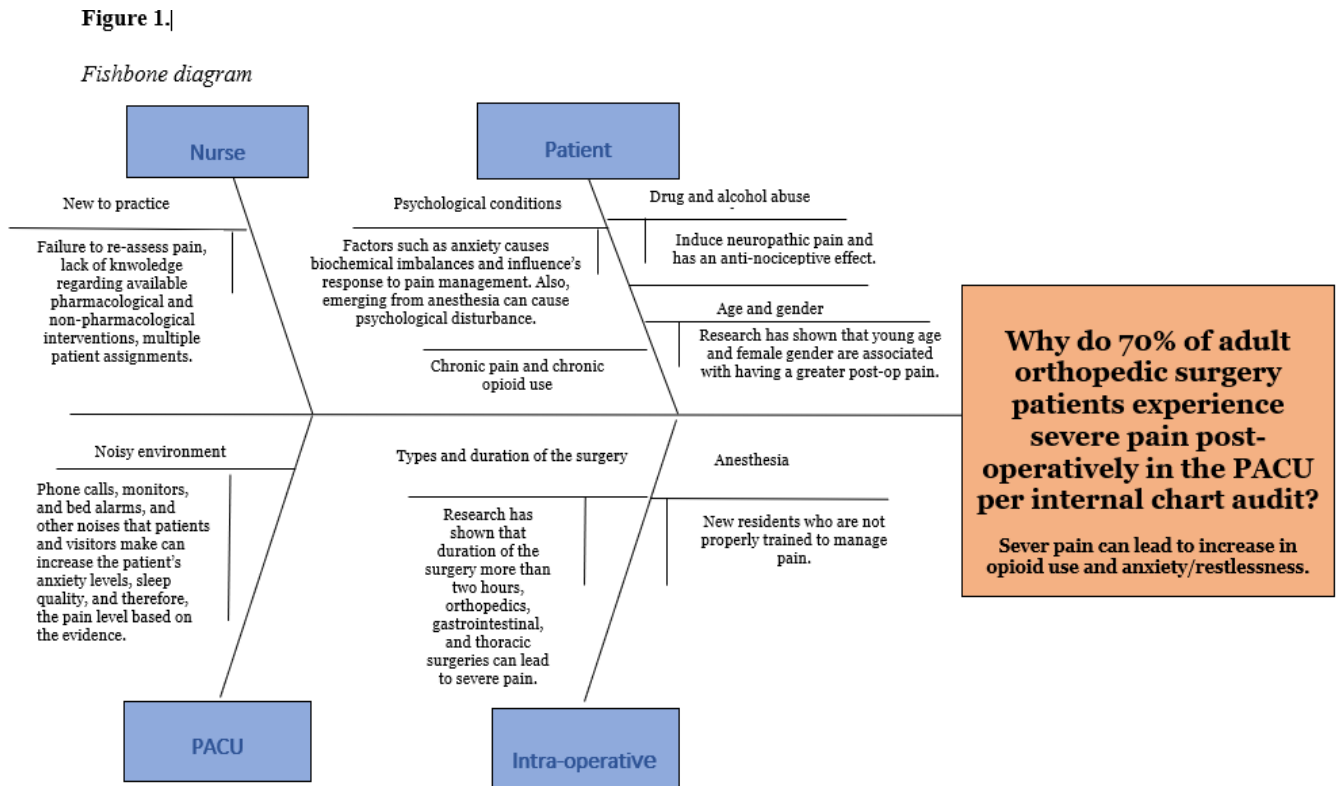


Figure 1. A Fishbone diagram which depicts factors that lead to inadequate pain management in adult orthopedic surgery patients in the PACU.

Figure 2.
Current Process Map

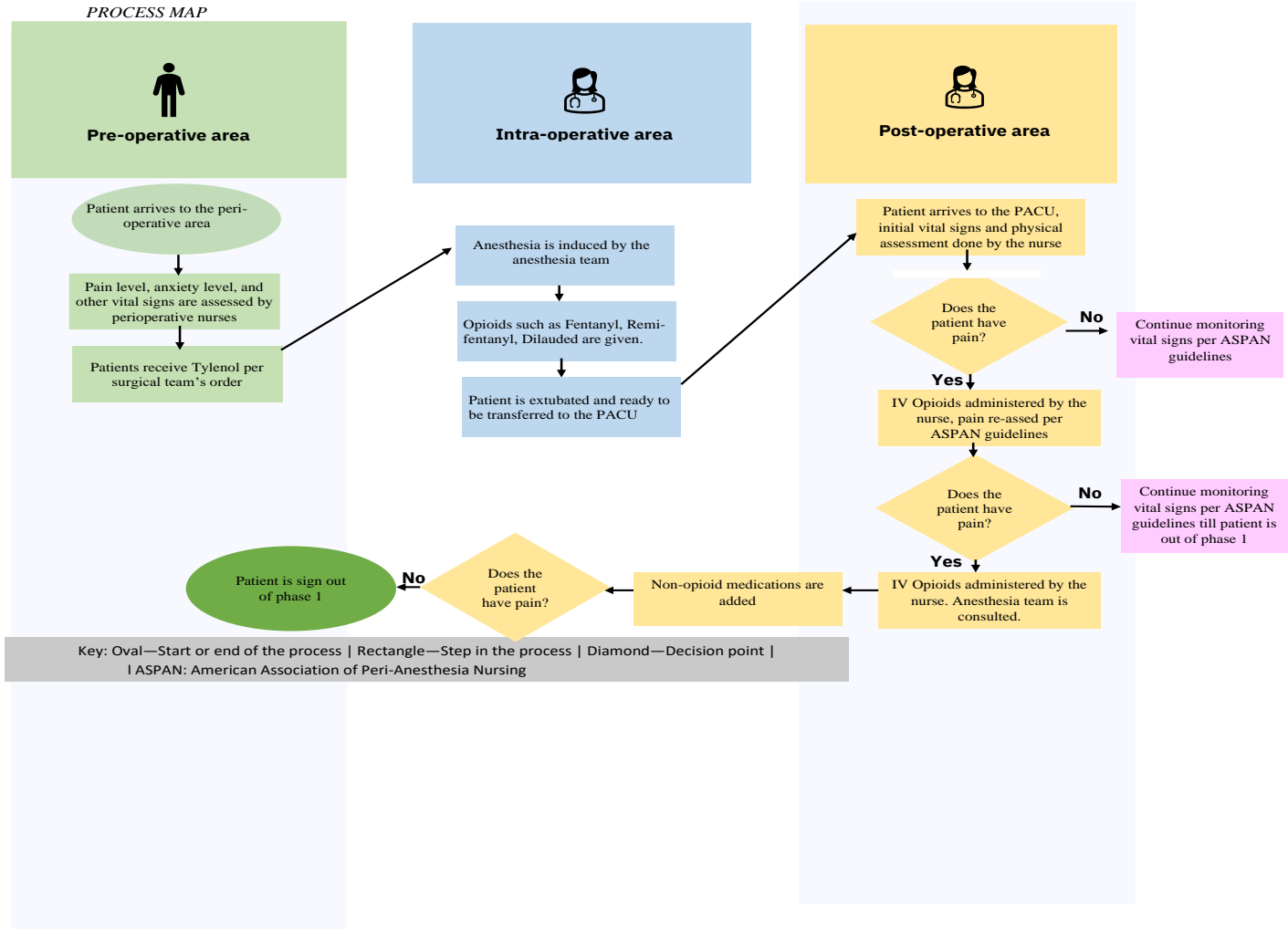


Figure 3.

Desired Process Map

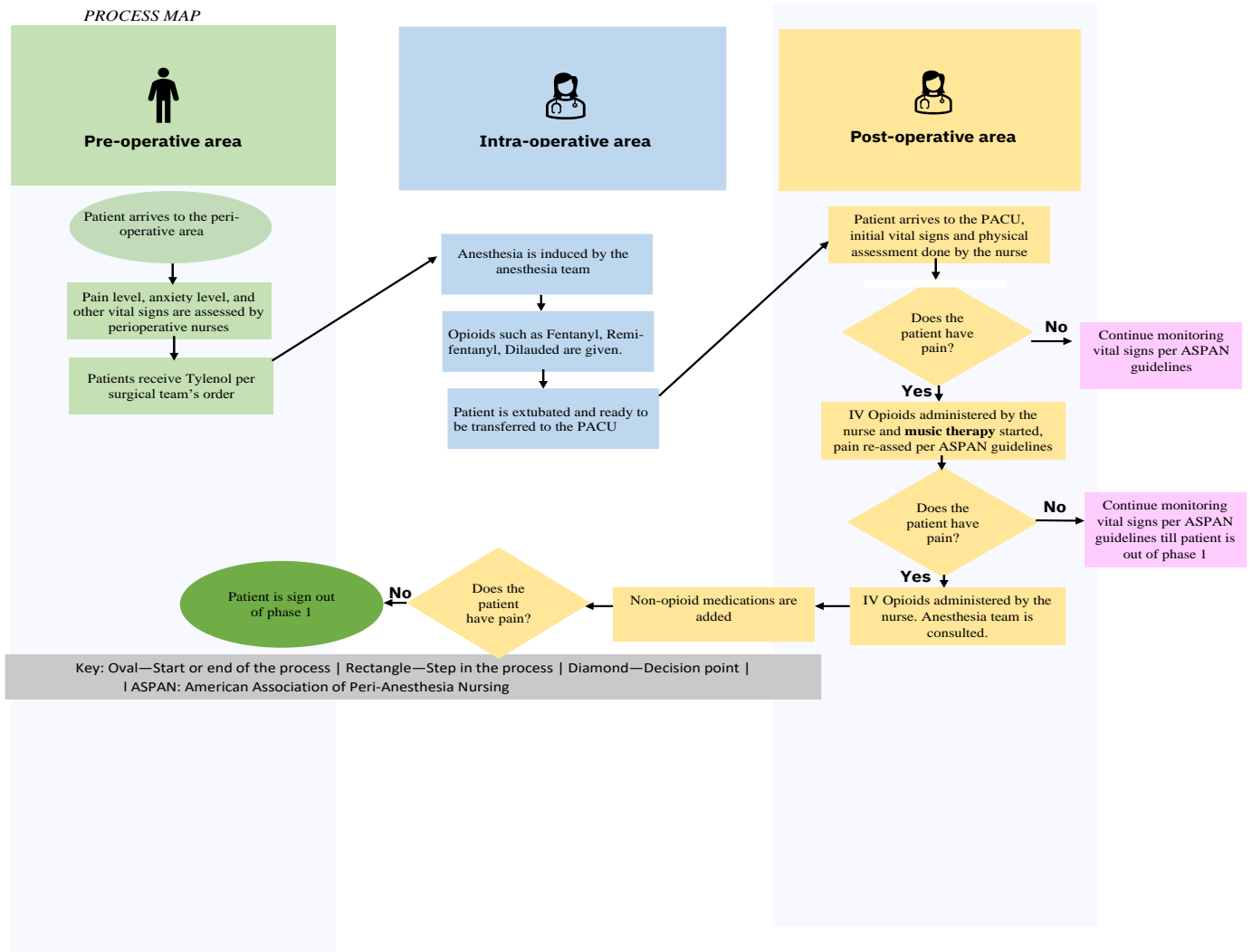


Figure 4.

Prisma of PubMed Database

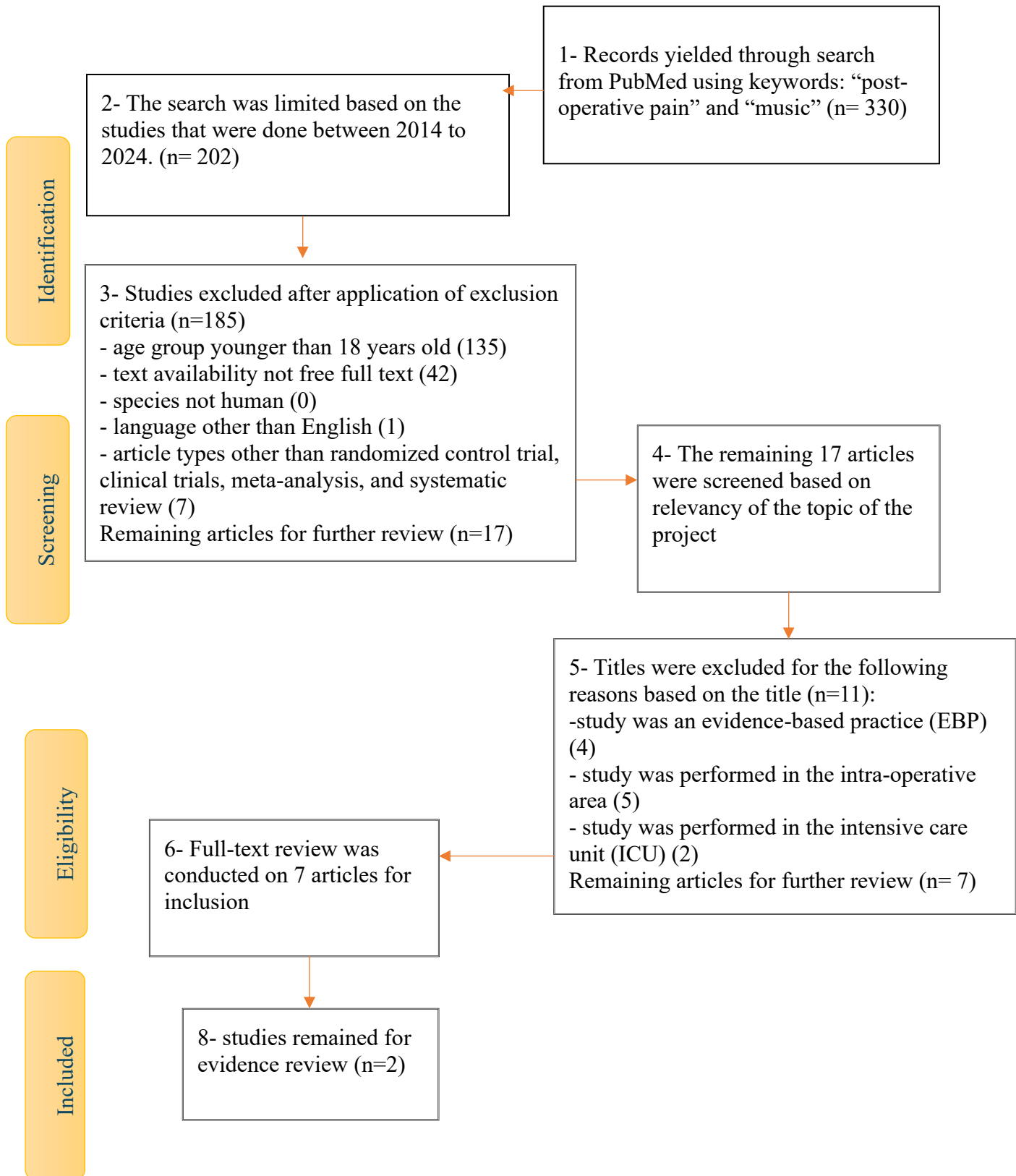


Figure 5.

Prisma of Medline Database

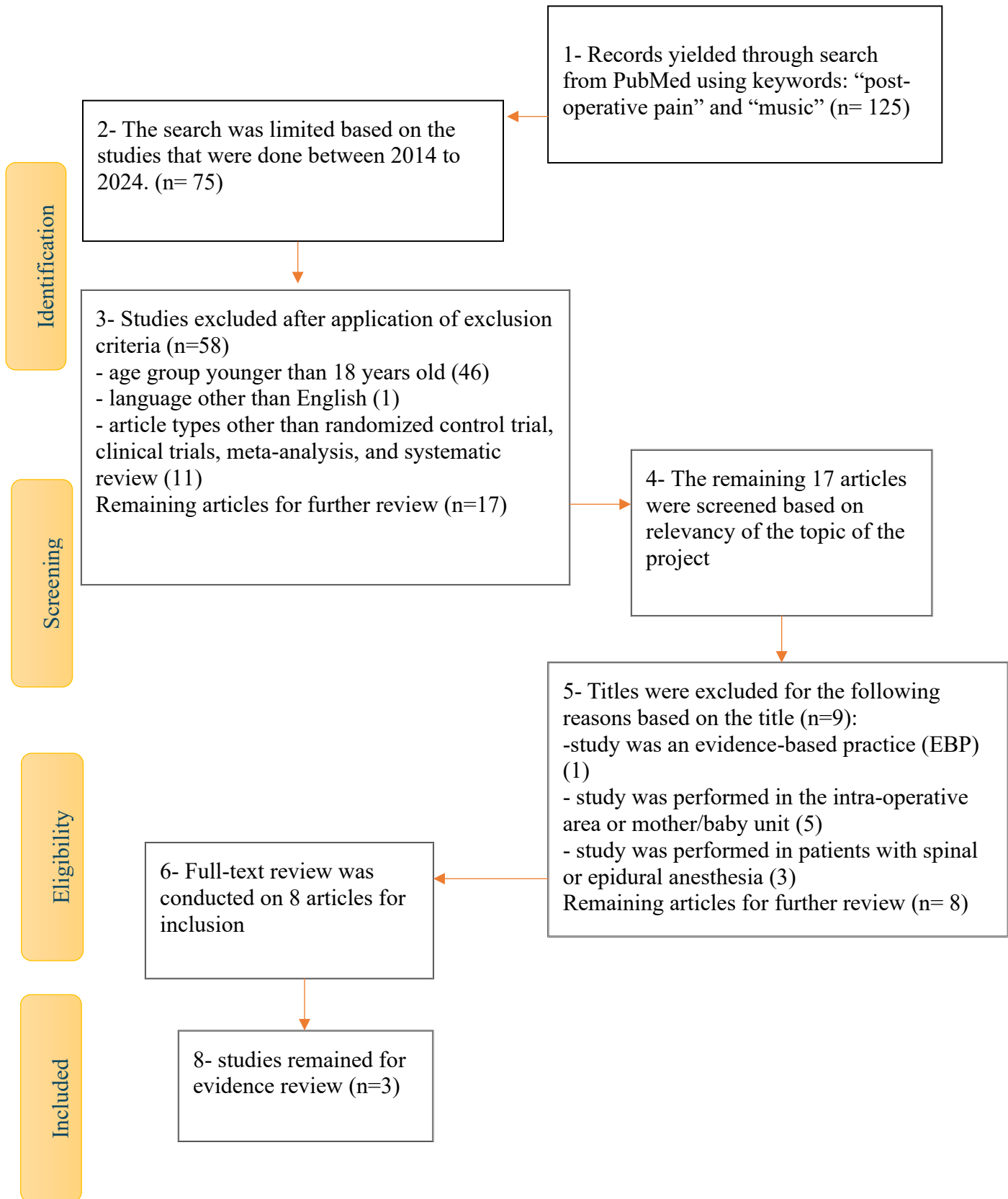


Figure 6.

Prisma of Embase Database

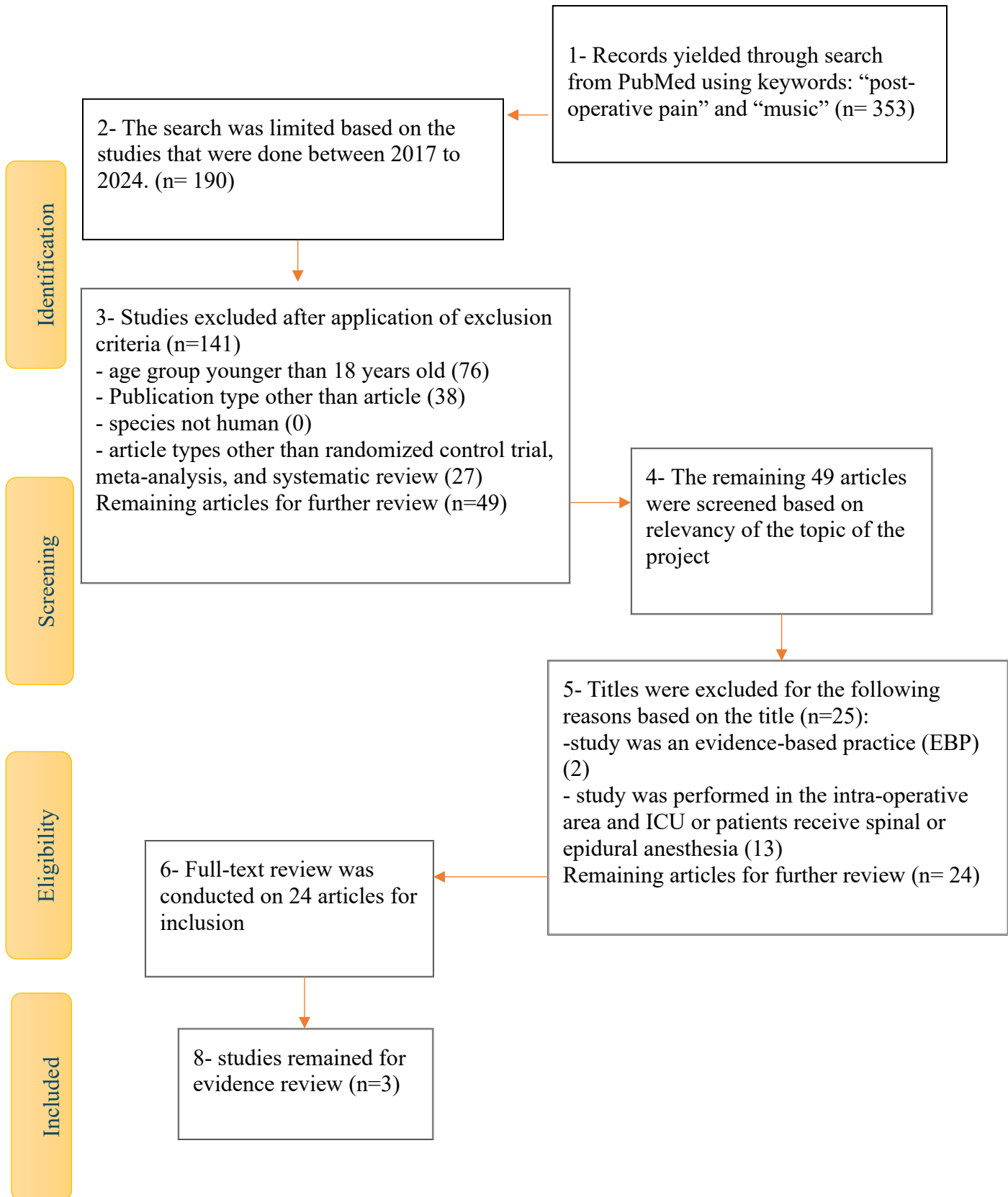


Figure 7.

Promoting Action on Research Implementation in Health Services (PARIHS)

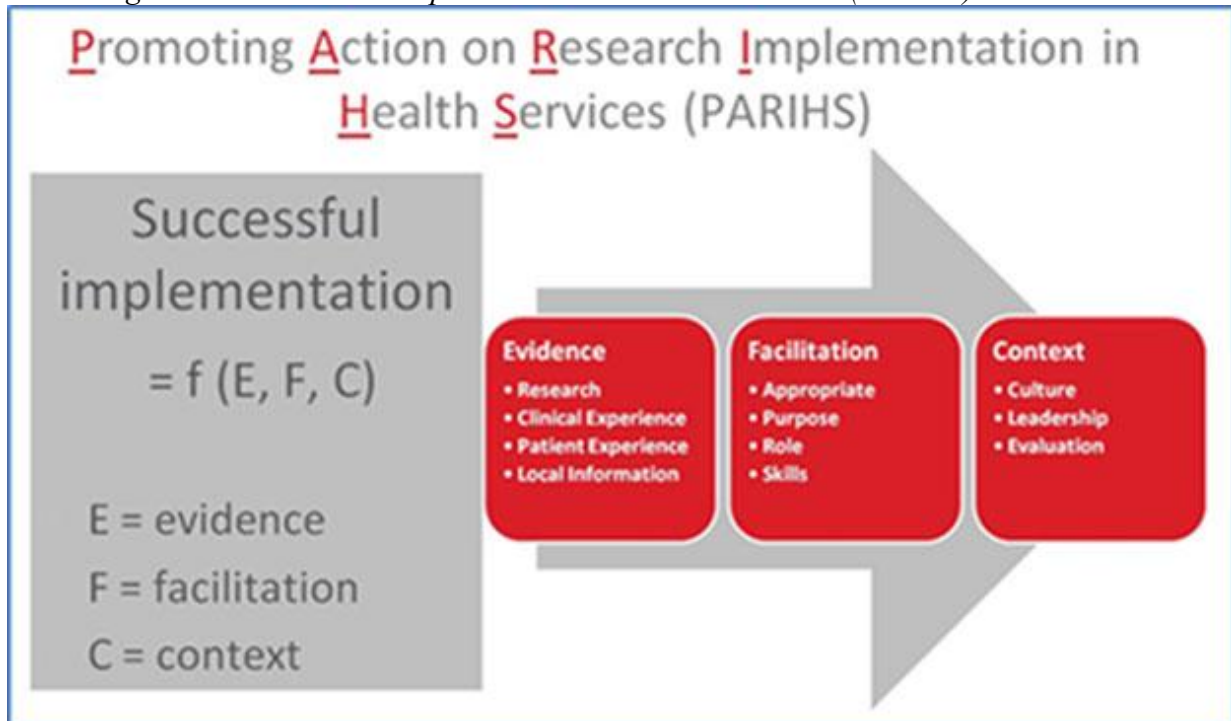


Figure 8.

Music Therapy Initiation Compliance

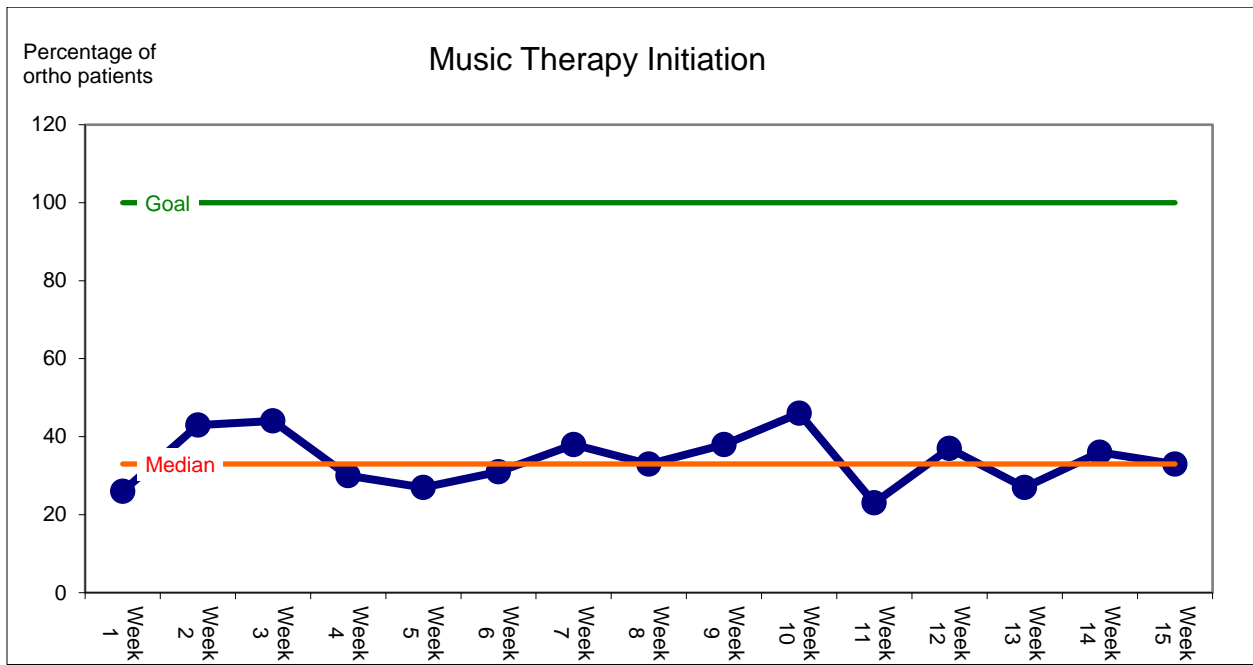


Figure 9.

Pain Documentation Compliance

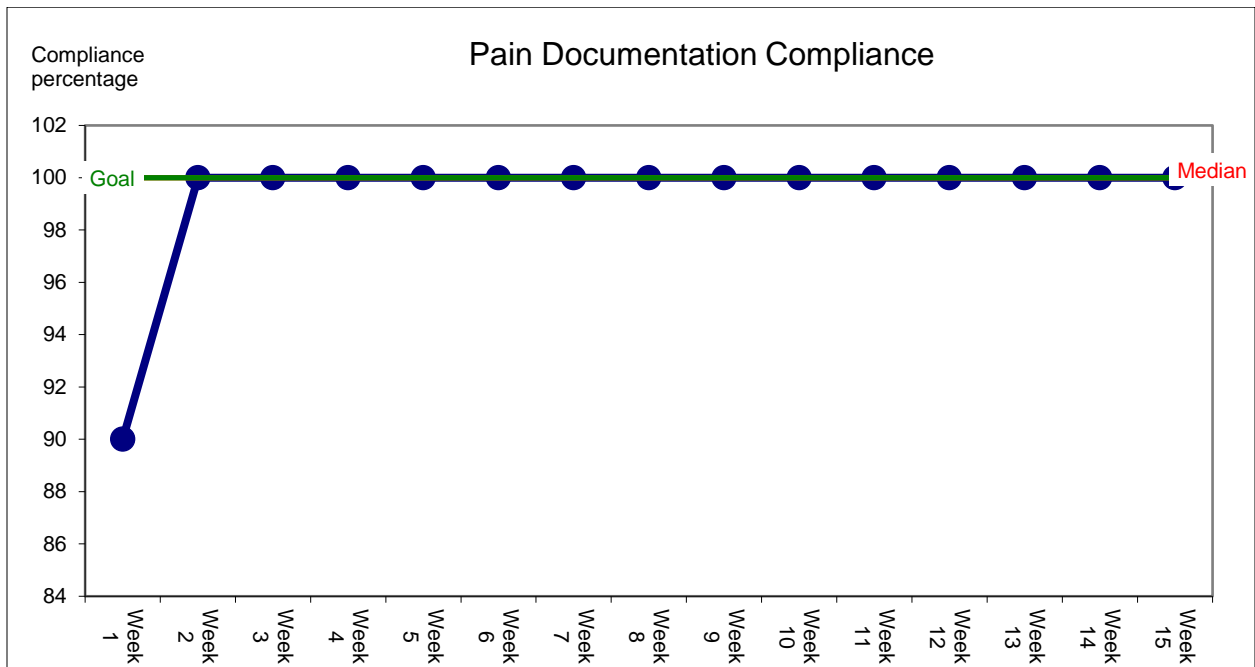


Figure 10.

Average Pain Score

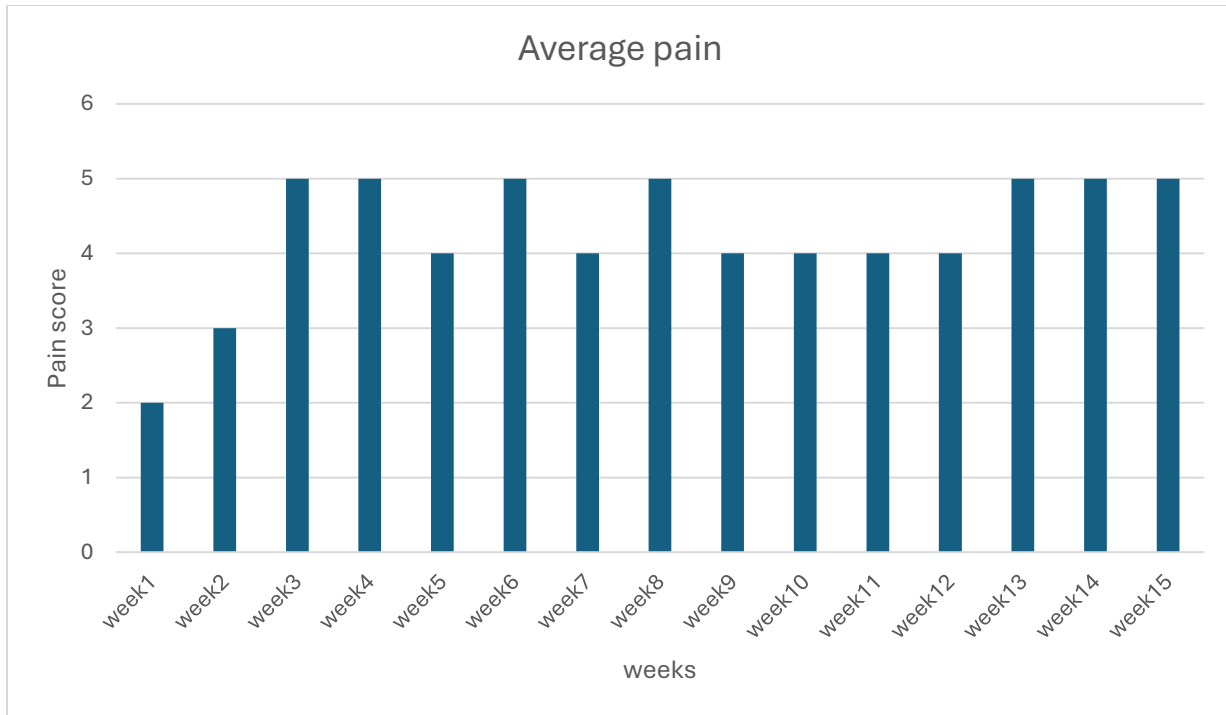
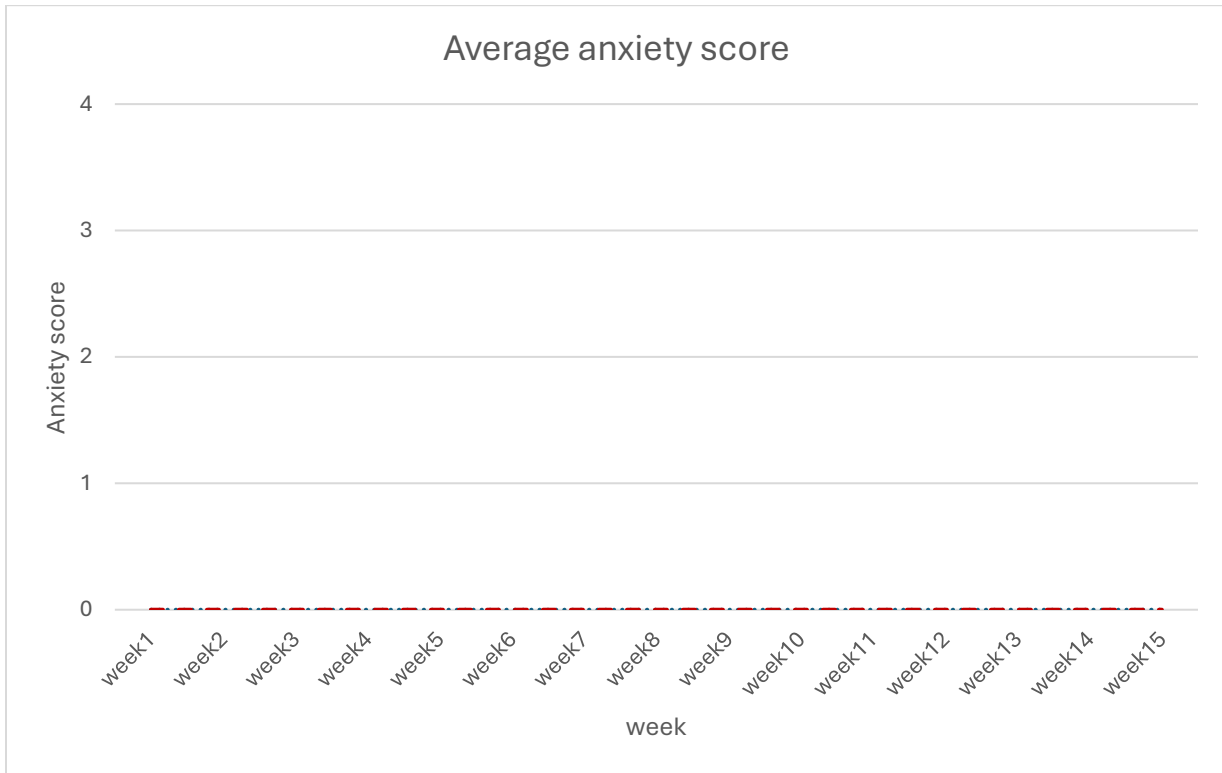


Figure 11.

Average Anxiety Score



Appendix A*Music Therapy Initiation Survey*

Music therapy		Page 1
Please complete the DNP survey below.		
Thank you!		
1) Admission date	_____	
2) MRN number (10 digit)	_____	
3) Were you educated regarding the intervention?	<input type="radio"/> Yes <input type="radio"/> No	
4) Is there a working TV in the bay?	<input type="radio"/> Yes <input type="radio"/> No	
5) Was music therapy initiated?	<input type="radio"/> Yes <input type="radio"/> No	
6) Duration of music therapy	<input type="radio"/> 5-30minutes <input type="radio"/> 30-60 minutes <input type="radio"/> N/A	

Appendix C

GANNT Chart

DNP Project Title: The Effect of Music Therpay as an Adjunct to Pharmacological Interventions on Pain and Anxiety reduction among Adult Orth

Student: Hoorra Zargar

Project Site: GPACU-UMMC

Project Start:
 Display Week:

