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The Implementation of Music Medicine to Reduce Preoperative Anxiety in Adult Patients

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Abstract

David Grant Medical Center seeks a nonpharmacological approach for their patients to attenuate preoperative anxiety. A literature review of nonpharmacological treatments have been narrowed to implementation of music medicine, which has been shown to decrease preoperative anxiety when using the State Trait Anxiety Inventory (STAI). It is a reliable and widely used scale to measure anxiety in various environments and situations. Music medicine was found to be a tangible and relevant treatment to decreasing anxiety.

Introduction

Nearly half of all patients have high levels of anxiety and report it as the worst part of their surgical encounter (Eberhart et al., 2020; Walker et al., 2017). Pharmacological anxiolysis is the most common treatment for preoperative anxiety, but there are unwanted side effects such as excessive sedation and apnea, especially in the elderly population (Sun et al., 2008). Music medicine is an effective non-pharmacological approach to reduce anxiety without the detrimental effects associated with popular pharmacological interventions. Music medicine is the intervention of music by medical personnel versus music therapists who are trained to implement therapy processes in the music domain.

Problem Synthesis

Preoperative anxiety is a human characteristic felt by many patients undergoing surgery. Despite refined surgical techniques and new technology improving operating room safety, anxiety is still common. Studies report conflicting results regarding specific patient predictors that increase preoperative anxiety such as education level, age, grade of surgery, or previous surgeries (Caumo et al., 2001; Goncalves et al., 2016; Kindler et al., 2000; Laufenberg-Feldmann & Kappis, 2013; Moerman et al., 1996). Female gender has been the most consistent predictor of

preoperative anxiety (Eberhart et al., 2020; Kindler et al., 2000).

Anxiety plays a substantial effect on the patient experience. Anxiety is a human reaction alerting the person to an identified threat whether psychologically or physically, which can invoke physiological symptoms such as sweating, tachycardia, and hypertension (Ahmetovic-Djug et al., 2017). Postoperative pain, waking up in the middle of surgery, and death are significant anesthesia related concerns that cause preoperative anxiety for patients (Celik & Edipoglu, 2018).

Preoperative anxiety is linked to an increase in anesthetic requirements intraoperatively and has also been correlated with increased postoperative analgesics (Ahmetovic-Djug et al., 2017; Pan et al, 2005). Higher preoperative anxiety scores are related to increased intensity of pain, total analgesic consumption, and degree of dissatisfaction (Ozalp et al., 2003). Anxiety potentiates pain by inducing parallel responses throughout the body.

The most common pharmacological approach in treating anxiety preoperatively is the administration of midazolam, a benzodiazepine with potent sedative properties and anterograde amnesia. Although midazolam may demonstrate the immediate desired outcome of decreasing anxiety, it also exhibits undesired effects in the form of prolonged amnesia and even agitation and hyperactivity (Bringman, et al., 2009). Midazolam's adverse effects on ventilatory response causes respiratory depression leading to hypoventilation, hypercarbia, and ultimately apnea leading to a series of potential risks, notably in vulnerable populations. (Castro, et al., 2017). Presently, DGMC lacks an evidence-based non-pharmacologic option to treat preoperative anxiety. Current practice is administration of midazolam as the patient is being transferred to the surgical suite.

Relevance to Military Nursing

The U.S. military has leveraged music for over a hundred years. In 1945, the U.S. Army implemented their own policy into a technical bulletin to incorporate music in the overall well-being of soldiers (U.S. War Department, 1945). Music medicine is still relevant to the U.S. military today as it was in the past. The Defense Health Agency (DHA), the sole administrators of all military treatment facilities (MTF), have disseminated their strategy to standardize performance across the MTFs with the Quadruple Aim Performance Plan (QPP) (Defense Health Agency, 2019). This consists of four components: increasing readiness, better health, better care, and lower cost. The implementation of music medicine to decrease preoperative anxiety accomplishes all DHA priorities. It improves readiness by giving the medical warfighter another tool to expand their armamentarium that can be used in the deployed setting. Better health, better care, and lower costs are achieved because it is patient centered, focused on prevention, and reduces unnecessary side effects, while also improving healthcare efficiency.

System or Clinical Question

In adult patients undergoing elective surgery, how does music medicine affect preoperative anxiety scores?

Search Strategy and Results

To guide our literature search, our PICO question was “Do adult surgical patients (P) who listen to music (I) compared to those with no music medicine (C) have lower preoperative anxiety levels (O)? Results were then limited to the past 15 years, English language, and peer reviewed journals. The PubMed search strategy and MESH terms used were variations on “preoperative anxiety” or “anxiety” and “music”. The Powersearch terms utilized were on “preoperative anxiety” and “music therapy” or “music medicine”. As of January of 2021, PubMed yielded 42

results, PowerSearch yielded 30 for a total 72 articles. 14 duplicates were removed leaving 58 for screening of title and abstract.

Inclusion criteria included an adult population, use of STAI, and preoperative setting. Exclusion criteria were pediatric population, quasi experimental studies, and alternate nonpharmacological approaches. Seven articles were utilized for our literature review (Appendix A). Article appraisal was performed utilizing the Johns Hopkins Nursing Quality of Evidence-Based Practice tool to assign a level of evidence and quality rating (Dang & Dearholt, 2017) (Appendix B). One was a high level of evidence at level IA and six articles were level IB (Appendix C). Based on our literature review, music medicine is an effective non-pharmacological technique that can decrease preoperative anxiety.

Solution Synthesis

Mindfulness, acupuncture, and music medicine are potential non-pharmacological treatments for preoperative anxiety. Mindfulness-based strategies decrease anxiety but require multiple sessions over a longer treatment period for greatest benefit (Gonzalez-Valero et al., 2019). There is no literature that specifically addresses the mindfulness approach to treat preoperative anxiety. On the other hand, acupuncture decreases preoperative anxiety (Bae et al., 2014), but requires additional training for health clinicians to become certified. Similar to acupuncture, music medicine also reduces preoperative anxiety (Bradt et al., 2013); however, it does not require advanced training, is simple to apply, and lacks harmful side effects.

Humans have used music as a healing treatment since the dawn of time. Even during Biblical times, David mended Saul's inner "evil spirit" to make him feel better by playing the harp (1 Samuel 16: 14-23, New International Version). During the Early Iron Age, Pathagoras, the father of music therapy, treated psychological disorders with music (Babikian et al., 2013).

Forward to the 20th century, health professionals saw music boost the morale of returning veterans during World War I and II. As a result, this intervention was added to the rehabilitation plans (Music therapy and military populations, 2014).

Listening to music activates several parts of the brain including the auditory cortex, paralimbic, and limbic areas of the brain that are linked to perception, reward, emotional processing, and memories (Silverthorn, 2019; Babikian, 2013). Music is attached to emotions and memories, which elicits a "chills" effect reported as a euphoric experience (Peretz & Zatorre, 2005). Music has distracting capabilities by modulating a patient's attention of anxiety onto something more pleasant and relaxing (Henry, 1995; Nilsson, 2008).

There is a difference between music therapy and music medicine. Music therapy is the use of a trained music therapist that is involved in the therapeutic process and adjusts the care in collaboration with the patient (Bradt et al., 2013). Both listening to music and the therapeutic process decreases a patient's anxiety. Music medicine is the implementation of music by health professionals (Bradt et al., 2013). Therefore, music therapy is an active form of music intervention and music medicine is a passive type of music intervention (Tang & Vezeau, 2010).

The type, length, and tempo of music intervention play an important role in decreasing anxiety preoperatively. In 2016, a study explored various music types along with intervention length and concluded that jazz, religious, classical and natural sounds played 15-30 minutes prior to surgery significantly reduces anxiety (McClurkin et al., 2016). A slow rhythmic tempo of 60-80 beats per minute also provides further relaxation and slows the pace of the heart, normally elevated by anxiety-induced situations (Bringman et al., 2009, Ugras et al., 2018). Additionally, higher success in reducing anxiety was witnessed when patients self-select the music within the

boundaries of slow, soft, relaxing parameters, when compared to researcher selected music (Cooke et al., 2005).

The State Trait Anxiety Inventory (STAI) anxiety scale is widely used in the clinical setting and consists of 20 questions evaluating how a patient 'feels right now' (Bringman et al., 2009). From emergency rooms to real-life stressors, this scale has reliably been the most sensitive indicator of changes in anxiety (Bringman et al., 2009). Scores range from a minimum of 20 to a maximum of 80, with an average preoperative anxiety score of 32.7 (Cooke et al., 2005). Music medicine has consistently demonstrated a decrease in preoperative anxiety by 5 to 6 points with an average of 27.1 on the STAI anxiety scale (Bradt et al., 2013; Kuhlmann et al, 2018; Ni et al., 2009).

Focus Areas

The first goal that we aim to achieve at the conclusion of our evidence-based project is to complete a literature review and uncover the best non-pharmacological approach to decrease preoperative anxiety. Our next goal is to implement music medicine for adult surgical patients. Once data has been collected, the information will then be communicated to the hospital leaders and stakeholders. Lastly, a sustainment plan will be established to continue the music medicine implementation.

Business Case Analysis

Variable costs for this project include office supplies (poster, markers, paper) and the 1-hour training of RNs and Technicians. This would equal an estimate of $940. Fixed costs include over the ear headphones, locked cabinet, headphone holder rack, charging hubs, and disposable ear covers. This would equal an estimate of $3,024. Our projected profit would be $236,036 based on our reimbursement calculations (Appendix D).

Organizing Framework

The Iowa Model is the framework we utilized to guide our project (Appendix E). It is an adaptable framework that can be utilized by various clinicians to include doctors, practitioners, and overall health care providers. The first step is identifying areas of improvement that help emphasize the purpose of our project. We have identified that preoperative anxiety is the "triggering issue", which orchestrated our PICOT question. It encompasses practical step by step implementation stages with continual feedback loops. With each phase of our project design, the Iowa model will help us refocus and reevaluate our process preventing deviation and solidifying implementation. The feedback loops within this framework works well with our project as it augments sustainability by pinpointing shortcomings with each phase of our project to recalibrate our purpose and objectives.

Project Design

General Approach

Our project is an evidence-based quality improvement initiate by employing music medicine to decrease preoperative anxiety. In order to measure the effectiveness of music medicine at DGMC, we will collect and assess pre and post implementation data.

Setting and Population

DGMC at Travis AFB is the flagship hospital of the U.S. Air Force. It is a 298-bed hospital that provides a full spectrum of healthcare to an area population of 106,000 people encompassing Tricare eligible members in the surrounding San Francisco-Sacramento area (David Grant U.S. Air Force Medical Center (DGMC), 2016). It sees approximately 5000 patients per year. The preoperative unit contains nine beds averaging sixty surgeries per week. There is an average of five registered nurses and four technicians staffed per day.

Procedural Steps

The initial stage of our project is to educate the Preoperative staff:

1. Establish an hour training to be added to their usual training day or staff meeting.
2. A PowerPoint presentation will first be conducted and include:
    a. Our literature review, which will help with buy in from the staff
    b. STAI assessment (Appendix F)
    c. A written script they will verbalize to the patients before conducting the STAI assessment and music medicine to obtain verbal consent (Appendix G).
    d. Steps of implementation on day of surgery:
        i. Admission
        ii. Consent
        iii. Pre-STAI assessment
        iv. Music
        v. Post-STAI assessment
2. There will also be a hands-on component after the PowerPoint presentation on preparation, utilization, cleaning of music devices (Appendix H).
    a. Educate staff on storage, charging, and security of music devices.
        i. Music devices and charging units will be stored inside a locked cabinet in a locked room by the preoperative nurse’s station when not in use. Key will be placed in a drawer in the nurse's station.
        ii. Each staff member will make sure to connect headphones to the appropriate charging unit upon return.

iii. The staff member returning the music devices will be responsible for cleaning the device and disposing of the ear covers before storing them.

iv. RN or technician will complete sign out/sign in sheet (Appendix I).

v. Charge nurse will verify all headphones are accounted for and connected to appropriate charging units at the end of each shift. The ultimate responsibility of the music devices will be accountable by the equipment custodian of the unit.

The second stage of our project is the implementation of music medicine.

1. RN or Technician will obtain verbal consent from the patient after preoperative evaluation by RN and IV placement is complete.
2. RN or Technician will conduct the pre-STAI assessment via paper form once participative consent has been completed. Completed pre-STAI will be placed in the patient's paper chart found at bedside.
3. After completion of the pre-STAI, the patient will be provided with headphone preloaded with their choice of Classical, New Age or Jazz music.
4. RN or Technician will apply non-disposable ear covers, and adjust the music device to fit the patient. Ear covers will be located in the same music cabinet as the music devices.
5. Music medicine will be initiated for at least 15 minutes.
6. The post-STAI assessment will be completed once >15 minutes of music medicine has been established and before the patient is transported to the operating room.
    a. Pre and post-STAI assessments will not include any demographic or personal information of the patient. Both assessments will be on one page front and back for ease of identifying assessments pertaining to the same patient.

7. For infection control measures:
    a. Disposable ear covers will be used on all music devices.
    b. Preoperative staff will clean music devices utilizing non-alcoholic wipes (Appendix H).

1. Exclusion criteria for our data collection includes:

   (All patients will have access to headphones prior to surgery. Exclusion criteria is for data collection purposes which requires pre/post STAI assessment).

    a. First Case of the day
    b. Patient refusal
    c. Younger than 18 years old
    d. Unable to read or understand English
    e. Patients having ear surgery
    f. Emergency surgical procedure
    g. Too sedated to complete post-STAI assessment
    h. Altered mental status (unable to understand verbal commands or give consent)

The third stage is the collection of data:

1. STAI forms and patient satisfaction surveys will be placed in a “music medicine folder” and stored in a locked cabinet located in the preoperative nursing station.
2. Investigators will collect the forms from the music medicine folder weekly and input STAI pre/post results and satisfaction surveys in an Excel document (Paper information will be stored in a locked cabinet in a locked office as a backup).

Data Analysis Plan

Our independent variable in this implementation is music medicine. Our outcome variable of interest is STAI (anxiety) measurements. We will compare the pre and post STAI scores to determine if music medicine reduced preoperative anxiety. We will compile and transfer the patient satisfaction survey into a pie chart for better to help with visualization of data when presenting to stakeholders and hospital leaders.

Potential Barriers

1. Infection control - The staff will use the same headphones between patients and can be a medium of transmission if not disinfected appropriately. We will work with the Infection Control Champion of the hospital to make sure there is a standardized procedure for appropriate cleaning of the headphones that preoperative staff can follow.
2. Music limitations and patient refusal - If this becomes a trend, we will make sure to address our stakeholders and reevaluate our process to add additional music playlists.
3. Staff refusal of implementation - Change to an already established process takes time and effort. We will continue emphasizing the importance of this evidence based project and demonstrate the data collected to support it.
4. Expedited OR time and unable to complete post STAI assessment - pre/post STAI assessments will not be included in data analysis.
5. Less than 15 minutes of music listening - pre/post STAI assessments will not be included in data analysis.
6. Frequent interruptions (anesthesia team, surgical team, OR nurse and tech, pre-procedures) - we understand this will interfere with the implementation but continue for at least 15 minutes and provide post-STAI assessment and survey.

7. Patient consents to music but not to survey - patient will be allowed to utilize headphones but no pre/post STAI assessment will be provided.
8. Patient does not like music selection - this non-pharmacological approach is 100% voluntary, patient can refuse.
9. Patient would like to use their own headphones/music and complete a survey - continue with music medicine but pre/post STAI assessment will not be provided.
10. Patient would like both pharmacological agent and music medicine - continue with data collection unless too sedated to complete the post STAI assessment and satisfaction survey.

Sustainment and Dissemination

To maintain the longevity of this project, standardized procedures and protocols will be placed and agreed by hospital stakeholders. An equipment custodian and music medicine champion will be established and instructed. The champion will be educated on protocol compliance and staff preparation. Another component to sustaining this project is continuous identification of deficiencies in our process by staff feedback. Staff input is a crucial aspect of the project and strengthens cooperation. For dissemination of results, we will disperse the findings of our implementation locally with key stakeholders, leadership, and hospital staff via multiple presentations. We will share the findings of our work at the national level at the USU Research Days in the week prior to graduation via poster and podium presentation.

HIPAA Concerns/Ethical Considerations

We will seek IRB approval/exemption prior to the start of implementation (Appendix K). Patients will receive a full description of the implementation and provide a voluntary consent to participate. Patients may opt out at any time. Our data collection of our STAI assessments will

be deidentified with no collection of protected health information (PHI). All documented data will be stored on an Excel sheet within a military computer secured with a common-access-card (CAC) and maintained in a locked office.

Project Results

Data collected from a total of 58 patients who completed a pre and post survey for a total of 116. A two-sample T-test was utilized with homoscedasticity to compare the mean results of the pre and post-test scores. Mean score for the pre-total and post-total were 35.7 and 29.5 respectively. There was a difference of 6.3 between the mean scores. For the 95% confidence intervals, the pre-total and post-total are 32.8-38.7 and 27.3 and 31.6 respectively. Our standard deviation for the pre-total was 11.1 and the post-total was 8.1. Our standard error was 1.46 and 1.05 respectively. The results exemplified a significant difference $P<.001$ in the pre-test versus post-test scores. STAI scores were significantly lower following the intervention. Our degree of freedom was 57. P50 pre-test was 35.5 and post-test was 28.5.

Analysis of the Results

Our results demonstrated similar results from the literature we reviewed. The average STAI survey decrease was 5-6 from our literature review. The mean post result was 27.1 and our results showed 29.4. One finding we did not expect was the higher anxiety score before the intervention at 35.7 versus the anxiety score in the literature at 32, which correlated to a higher post anxiety score. Based on the results, it shows that music medicine can be a practical application to lower preoperative anxiety.

Organizational Impact / Implications to Practice & Policy

As described previously, preoperative anxiety is an experience perceived by many patients. According to the results, usage of music medicine intervention has decreased preoperative anxiety for patients at DGMC. It is noninvasive, inexpensive, and easy to implement. Some implications to practice and policy include an emphasis on training. In our experience, we set up a one hour slot with the staff during their already scheduled training day. This alleviated some burden onto the staff so they did not have to come in for additional training. We discussed the procedural steps and pertinent forms to complete. Another implication to practice when implementing this project that we came across was the need for continuous "buy in" from the staff. Initially, we had great endorsement by the staff. As the project continued there were less and less surveys being completed. We continued to do some on the spot training with individual staff. In hindsight, possibly more group training may have helped.

Future Directions for Research and Practice

In this evidence-based project, we sought to see if preoperative anxiety can be modulated with music medicine. Future directions for research can include studies to investigate the use of personal music selection versus a set playlist, different music tempo speeds, lyrical music, or music tailored to someone's spoken language. The dwell time of music implementation can be another variable to measure. Another possible area of research is continuing the use of music through the perioperative period. Lastly, other modalities to decrease anxiety such as acupuncture or prayer can be researched in conjunction with music medicine to attain a possible synergistic effect.

Conclusion

Our evidence-based project has shown music medicine to be a tangible and effective option to decrease preoperative anxiety, which was demonstrated in previous studies. The project was made possible through funding received from TSNRP.

References

A descriptive, statistical profile of the 2016 AMTA membership & music therapy community. (2016). American Music Therapy Association. https://www.musictherapy.org/assets/1/7/16WorkforceAnalysis.pdf.

AhmetovicDjug, J., Hasukic, S., Djug, H., Hasukic, B., & Jahic, A. (2017). Impact of preoperative anxiety in patients on hemodynamic changes and a dose of anesthetic during induction of anesthesia. *Medical Archives, 71*(5), 330-333.

Babikian, T., Zeltzer, L., Tachdjian, V., Henry, L., Javanfard, E., Tucci, L., Goodarzi, M., & Tachdjian, R. (2013). Music as medicine: A review and historical perspective. *Alternative and Complementary Therapies, 19*(5), 251-254.

Bae, H., Bae, H., Min, B., & Cho, S. (2014). Efficacy of acupuncture in reducing preoperative anxiety: A meta-analysis. *Evidence-Based Complementary and Alternative Medicine, 2014*, 1-12.

Barash, P. G., Cullen, B. F., Stoelting, R. K., Cahalan, M. K., Stock, C., Ortega, R., … Holt, N. F. (2017). Clinical anesthesia (8th ed.). Wolters Kluwer.

Bradt, J., Dileo, C., & Shim, M. (2013). Music interventions for preoperative anxiety. *Cochrane Database of Systematic Reviews*, (6).

Bringman, H., Giesecke, K., Thörne, A., & Bringman, S. (2009). Relaxing music as pre-medication before surgery: A randomised controlled trial. *Acta Anaesthesiologica Scandinavica, 53*(6), 759–764.

Castro, L. N. G., Mehta, J. H., Brayanov, J. B., & Mullen, G. J. (2017). Quantification of respiratory depression during preoperative administration of midazolam using a non-invasive respiratory volume monitor. *Plos One, 12*(2).

Caumo, W., Schmidt, A. P., Schneider, C. N., Bergmann, J., Iwamoto, C. W., Bandeira, D., & Ferreira, M. B. (2001). Risk factors for preoperative anxiety in adults. Acta Anaesthesiologica Scandinavica, 45(3), 298-307.

Celik, F., & Edipoglu, I. S. (2018). Evaluation of preoperative anxiety and fear of anesthesia using APAIS score. *European Journal of Medical Research, 23*(1).

Cooke, M., Chaboyer, W., Schluter, P., & Hiratos, M. (2005). The effect of music on preoperative anxiety in day surgery. *Journal of Advanced Nursing, 52*(1), 47–55.

Dang, D., & Dearholt, S. (2017). Johns Hopkins nursing evidence-based practice: model and guidelines. 3rd ed. Indianapolis, IN: Sigma Theta Tau International.

David Grant U.S. Air Force Medical Center (DGMC). (2016, January 20). *MyBaseGuide*. https://mybaseguide.com/installation/travis-afb/community/david-grant-u-s-air-force-medical-center-dgmc/

Defense Health Agency. (2019, February 11). Quadruple aim performance process: Transforming performance improvement. https://health.mil/Reference-Center/Presentations/2019/02/11/Quadruple-Aim-Performance-Process-Transforming-Performance-Improvement

Digital products: for medical facilities. (2016, July 9). Surgical Serenity Solutions. https://www.surgicalserenitysolutions.com/for-medical-facilities/

Eberhart, L., Aust, H., Schuster, M., Sturm, T., Gehling, M., Euteneuer, F., & Rüsch, D. (2020). Preoperative anxiety in adults - a cross-sectional study on specific fears and risk factors. *BMC Psychiatry, 20*(1), 1-14.

Goncalves KKN, Silva JI, Gomes ET, Pinheiro LLS, Figueiredo TR, Bezerra. (2016). Anxiety in the preoperative period of heart surgery. Rev Bras Enferm. 2016;69(2), 374-380.

González-Valero, G., Zurita-Ortega, F., Ubago-Jiménez, J. L., & Puertas-Molero, P. (2019). Use of meditation and cognitive behavioral therapies for the treatment of stress, depression and anxiety in students. A systematic review and meta-analysis. *International Journal of Environmental Research and Public Health, 16*(22), 4394.

Henry, L. L. (1995). Music therapy: A nursing intervention for the control of pain and anxiety in the ICU: A review of the research literature. *Dimensions of Critical Care Nursing, 14*(6), 295-304.

Inouye, S. K., Robinson, T., Blaum, C., Busby-Whitehead, J., Boustani, M., Chalian, A., … Richter, H. (2015). Postoperative Delirium in Older Adults; Best Practice Statement from the American Geriatrics Society. Journal of the American College of Surgeons, 220(2).

Kindler, C. H., Harms, C., Amsler, F., Ihde-Scholl, T., & Scheidegger, D. (2000). The visual analog scale allows effective measurement of preoperative anxiety and detection of patients' anesthetic concerns. *Anesthesia & Analgesia, 90*(3), 706-712.

Kuhlmann, A. Y., De Rooij, A., Kroese, L. F., Van Dijk, M., Hunink, M. G., & Jeekel, J. (2018). Meta-analysis evaluating music interventions for anxiety and pain in surgery. *British Journal of Surgery, 105*(7), 773-783.

Laufenberg-Feldmann, R., & Kappis, B. (2013). Assessing preoperative anxiety using a questionnaire and clinical rating. European Journal of Anaesthesiology, 30(12), 758-763.

Mcclurkin, S. L., & Smith, C. D. (2016). The duration of self-selected music needed to reduce preoperative anxiety. *Journal of PeriAnesthesia Nursing, 31*(3), 196–208.

Marcantonio, E. R., Goldman, J., Mangione, C. M., Ludwig, L. E., Lind, L., Katz, N., Cook, E. F., Orav, E. J., & Lee, T. H. (1994). The relationship of postoperative delirium with psychoactive medications. JAMA: The Journal of the American Medical Association, 272(19), 1518.

Moerman, N., Van Dam, F. S., Muller, M. J., & Oosting, H. (1996). The Amsterdam preoperative anxiety and information scale (APAIS). Anesthesia & Analgesia, 82(3), 445-451.

Music therapy and military populations. (2014). American Music Therapy Association. https://www.musictherapy.org/assets/1/7/MusicTherapyMilitaryPops_2014.pdf

New International Version. (2011, May 4). BibleGateway.com. https://www.biblegateway.com/passage/?search=1+Samuel+16%3A+14-23&version=NV

Ni, C., Tsai, W., Lee, L., Kao, C., & Chen, Y. (2011). Minimising preoperative anxiety with music for day surgery patients: A randomised clinical trial. *Journal of Clinical Nursing, 21*(5-6), 620-625.

Nilsson, U. (2008). The anxiety- and pain-reducing effects of music interventions: A systematic review. *AORN Journal, 87*(4), 780-807.

Ozalp, G., Sarioglu, R., Tuncel, G., Aslan, K., & Kadiogullari, N. (2003). Preoperative emotional states in patients with breast cancer and postoperative pain. *Acta Anaesthesiologica Scandinavica, 47*(1), 26-29.

Pan, P. H., Coghill, R., Houle, T. T., Seid, M. H., Lindel, W. M., Parker, R. L., Washburn, S. A., Harris, L., & Eisenach, J. C. (2006). Multifactorial preoperative predictors for postcesarean section pain and analgesic requirement. *Anesthesiology, 104*(3), 417-425.

Peretz, I., & Zatorre, R. J. (2005). Brain organization for music processing. *Annual Review of Psychology, 56*(1), 89-114.

Shilter-Lowe, M. DGMC achieves third meritorious distinction. (2018). 60th Air Mobility Wing Public Affairs. https://www.travis.af.mil/News/Article/1688087/dgmc-achieves-third-meritorious-distinction/#:~:text=DGMC%20performs%20about%205%2C000%20surgeries,inpatient%20and%20same%2Dday%20surgery.

Silverthorn, D. U. (2019). *Human physiology: An integrated approach* (8th ed.). Pearson Education Limited.

Sun, G., Hsu, M., Chia, Y., Chen, P., & Shaw, F. (2008). Effects of age and gender on intravenous midazolam premedication: A randomized double-blind study. *British Journal of Anaesthesia, 101*(5), 632-639.

Tang, H., & Vezeau, T. (2010). The use of music intervention in healthcare research. *Journal of Nursing Research, 18*(3), 174-190.

The Anecare ANEclear Economic Benefits. http://www.anecare.com/Products/QED-100-Economic-Benefits.html.

Uğraş, G. A., Yıldırım, G., Yüksel, S., Öztürkçü, Y., Kuzdere, M., & Öztekin, S. D. (2018). The effect of different types of music on patients preoperative anxiety: A randomized controlled trial. *Complementary Therapies in Clinical Practice, 31*, 158–163.

U.S. War Department. (1945). Technical Bulletin 187: Music in reconditioning in American Service Forces convalescent and general hospitals. *War Department Technical Bulletin, TB Med,* (187), 1-10.

Walker, E., Bell, M., Cook, T., Grocott, M., & Moonesinghe, S. (2017). Patient reported outcome of adult perioperative anaesthesia in the United Kingdom: A cross-sectional observational study. *British Journal of Anaesthesia, 119*(3), 758-766.

Appendix A

Literature Review

Bibliographic Citation	Purpose	Sample & Research Design	Relevant Results	Level of Evidence
Bradt et al., 2013 Music interventions for preoperative anxiety	1. To identify randomized controlled trials examining the effects of music therapy or music medicine interventions on preoperative anxiety in surgical patients. 2. To compare the efficacy of participation in standard care combined with music therapy or music medicine interventions with standard care alone. 3. To compare the efficacy of patient-preferred music with researcher-selected music. 4. To compare the efficacy of different types of music interventions (music therapy versus music medicine).	Sample: 26 studies; 2051 total participants Design: Systematic Review- They included all randomized controlled trials and controlled clinical trials with quasi-randomized or systematic methods of treatment allocation in any language, published and unpublished. They conducted a sensitivity analysis to assess the impact of the randomization method. They entered all trials included in the systematic review into Review Manager (RevMan 5.1). They anticipated that some individual studies would have used final scores whereas others might have used change scores. They combined these different types of analyses as mean difference. They calculated pooled estimates using the more conservative random-effects model. They determined the levels of heterogeneity by the I2 statistic (Higgins 2002).	Results suggested that music listening may have a beneficial effect on preoperative anxiety. When using the STAI anxiety inventory, there was an average of 5.72 unit decrease in anxiety.	I
Bringman, et al., 2009. Relaxing music as pre-medication before surgery: a randomized controlled trial.	Investigated whether relaxing music has a greater effect than a standard dose of midazolam before surgery.	Sample size: 372 initally, 45 excluded, 327 Final total Design: RCT	Music group had a decrease in STAI-state anxiety score between 3.8 to 5.2. The decline in STAI-state anxiety score was significantly greater in the music group compared with midazolam group.	I
Cooke et al., 2005	Investigated if patients who listened to music during their preoperative wait will	Sample size: Initial: 248 pts eligible. Final analysis: 180 pts. No drop outs. 19 declined to participate. 49	Listening to music was statistically significant compared to no listening to	I

The effect of music on preoperative anxiety in day surgery	have lower levels of anxiety than patients who receive routine care.	did not meet inclusion criteria Design: RCT	music when comparing mean anxiety scores.	
Kuhlmann et al., 2018 Meta-analysis evaluating music interventions for anxiety and pain in surgery	This study aimed to evaluate anxiety and pain following perioperative music interventions compared with control conditions in adult patients.	Sample size: Records identified through database searching 7809, records screened after duplicates removed 4891, records excluded 4513, full text articles assessed 378, studies included in qualitative synthesis 92. RCTs 92 - 7395 patients Design: Meta-Analysis according to PRISMA statement 11. Review was registered in the PROSPERO database.	Demonstrated that music interventions led to a mean 6.3-point decrease on the 20–80-scale of the STAI and a mean 21-mm decrease on a 100-mm VAS for anxiety, and to a mean 10-mm decrease on a 100-mm VAS for pain.	I
McClurkin & Smith, 2016 The duration of self-selected music needed to reduce preoperative anxiety	Explored the impact of self-selected music, 15min or 30 min music intervention on anxiety in preoperative patients compared to same population who did not listen to music.	Sample size: Initial: 134, Final: 103, 28 were dropped due to pt needing to go to OR before completion of experiment. 3 refused to participate because they preferred Rock & Roll music. Design: RCT	State anxiety (STAI) was lower after listening to either 15 or 30 minutes of music. 30 minute classical music intervention group had more impact on state anxiety (STAI) vs 15 minute classical intervention group.	I
Ni et al., 2010 Minimising preoperative anxiety with music for day surgery patients—a randomized clinical trial	Evaluated the effects of musical intervention on preoperative anxiety and vital signs in patients in day surgery setting using State Trait Anxiety Inventory (STAI).	Sample size: Initial Size:183 Final Analysis: 172. 3 pts did not meet criteria. 6 pts did not have enough time to complete questionnaire. 2 pts withdrew. Design: RCT	STAI score decreased by means of 5.83 and 1.72 in music & control groups, respectively.	I

Ugras et al., 2018	Determine the effect of three different types of music on pt's preoperative anxiety. SBP, DBP, HR, & cortisol levels were also assessed.	Sample size: Initial: 217 Final analysis: 180. 32 pts were excluded from sample-were taken to OR before preoperative data can be collected. Also, 5 pts were excluded from sample for unwillingness to participate. Design: RCT	STAI results were decreased in the music group while the control group (no music played) increased.	I

Appendix B

Johns Hopkins Nursing Evidence-Based Practice

Appendix D

Evidence Level and Quality Guide

Evidence Levels	Quality Ratings
Level I Experimental study, randomized controlled trial (RCT) Explanatory mixed method design that includes only a level I quaNtitative study Systematic review of RCTs, with or without meta-analysis	**QuaNtitative Studies** **A High quality**: Consistent, generalizable results; sufficient sample size for the study design; adequate control; definitive conclusions; consistent recommendations based on comprehensive literature review that includes thorough reference to scientific evidence. **B Good quality**: Reasonably consistent results; sufficient sample size for the study design; some control, fairly definitive conclusions; reasonably consistent recommendations based on fairly comprehensive literature review that includes some reference to scientific evidence. **C Low quality or major flaws**: Little evidence with inconsistent results; insufficient sample size for the study design; conclusions cannot be drawn.
Level II Quasi-experimental study Explanatory mixed method design that includes only a level II quaNtitative study Systematic review of a combination of RCTs and quasi-experimental studies, or quasi-experimental studies only, with or without meta-analysis	**QuaLitative Studies** No commonly agreed-on principles exist for judging the quality of quaLitative studies. It is a subjective process based on the extent to which study data contributes to synthesis and how much information is known about the researchers' efforts to meet the appraisal criteria. *For meta-synthesis, there is preliminary agreement that quality assessments of individual studies should be made before synthesis to screen out poor-quality studies*[1]. **A/B High/Good quality** is used for single studies and meta-syntheses[2]. The report discusses efforts to enhance or evaluate the quality of the data and the overall inquiry in sufficient detail; and it describes the specific techniques used to enhance the quality of the inquiry. Evidence of some or all of the following is found in the report: • Transparency: Describes how information was documented to justify decisions, how data were reviewed by others, and how themes and categories were formulated. • Diligence: Reads and rereads data to check interpretations; seeks opportunity to find multiple sources to corroborate evidence. • Verification: The process of checking, confirming, and ensuring methodologic coherence. • Self-reflection and scrutiny: Being continuously aware of how a researcher's experiences, background, or prejudices might shape and bias analysis and interpretations. • Participant-driven inquiry: Participants shape the scope and breadth of questions; analysis and interpretation give voice to those who participated. • Insightful interpretation: Data and knowledge are linked in meaningful ways to relevant literature. **C Low quality** studies contribute little to the overall review of findings and have few, if any, of the features listed for high/good quality.
Level III Nonexperimental study Systematic review of a combination of RCTs, quasi-experimental and nonexperimental studies, or nonexperimental studies only, with or without meta-analysis Exploratory, convergent, or multiphasic mixed methods studies Explanatory mixed method design that includes only a level III quaNtitative study QuaLitative study Meta-synthesis	

Johns Hopkins Nursing Evidence-Based Practice

Appendix D

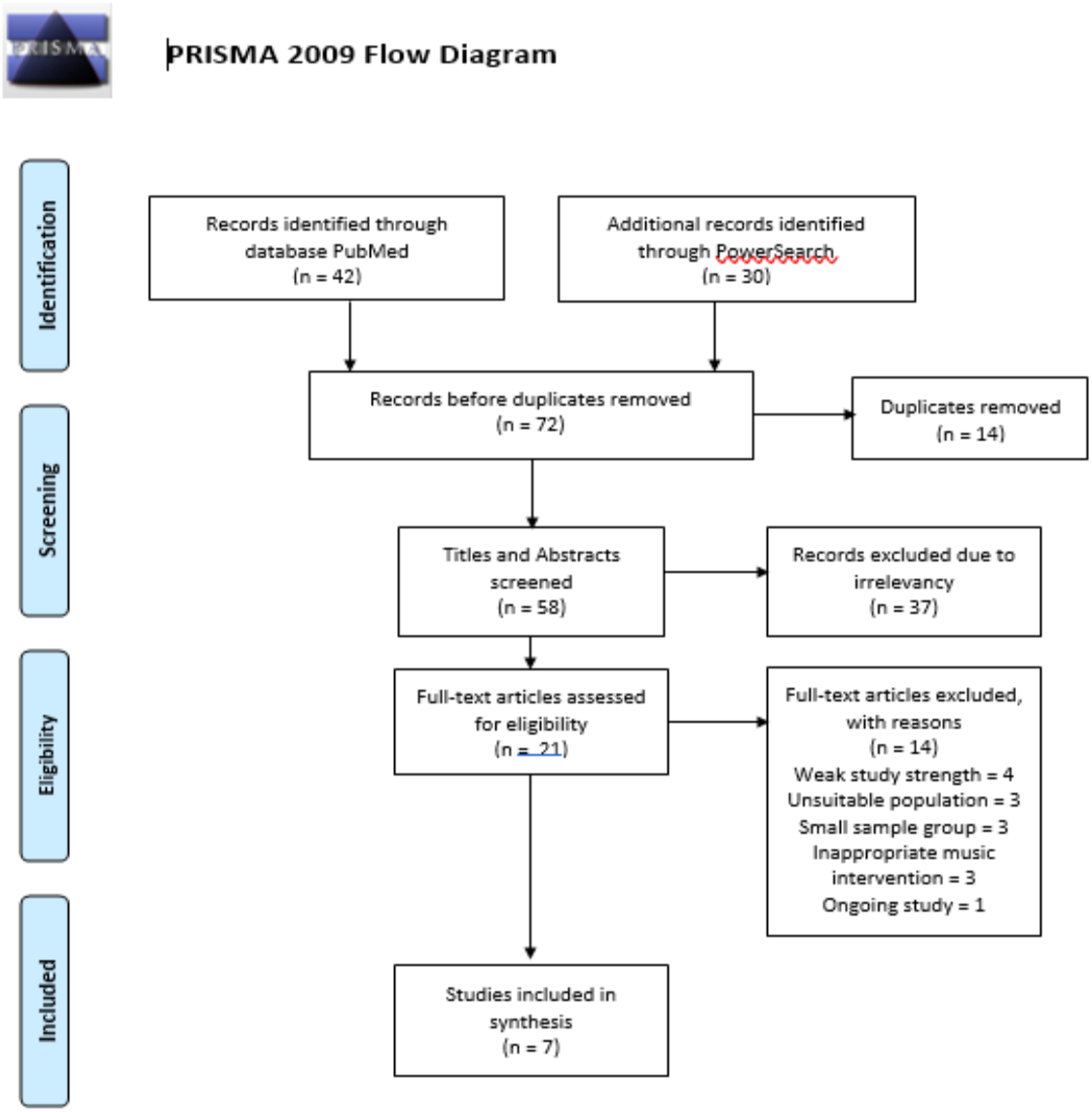
Evidence Level and Quality Guide

Evidence Levels	Quality Ratings
Level IV Opinion of respected authorities and/or nationally recognized expert committees or consensus panels based on scientific evidence Includes: • Clinical practice guidelines • Consensus panels/position statements	**A High quality:** Material officially sponsored by a professional, public, or private organization or a government agency; documentation of a systematic literature search strategy; consistent results with sufficient numbers of well-designed studies; criteria-based evaluation of overall scientific strength and quality of included studies and definitive conclusions; national expertise clearly evident; developed or revised within the past five years **B Good quality:** Material officially sponsored by a professional, public, or private organization or a government agency; reasonably thorough and appropriate systematic literature search strategy; reasonably consistent results, sufficient numbers of well-designed studies; evaluation of strengths and limitations of included studies with fairly definitive conclusions; national expertise clearly evident; developed or revised within the past five years **C Low quality or major flaws:** Material not sponsored by an official organization or agency; undefined, poorly defined, or limited literature search strategy; no evaluation of strengths and limitations of included studies, insufficient evidence with inconsistent results, conclusions cannot be drawn; not revised within the past five years
Level V Based on experiential and nonresearch evidence Includes: • Integrative reviews • Literature reviews • Quality improvement, program, or financial evaluation • Case reports • Opinion of nationally recognized expert(s) based on experiential evidence	**Organizational Experience (quality improvement, program or financial evaluation)** **A High quality**: Clear aims and objectives; consistent results across multiple settings; formal quality improvement, financial, or program evaluation methods used; definitive conclusions; consistent recommendations with thorough reference to scientific evidence **B Good quality**: Clear aims and objectives; consistent results in a single setting; formal quality improvement, financial, or program evaluation methods used; reasonably consistent recommendations with some reference to scientific evidence **C Low quality or major flaws**: Unclear or missing aims and objectives; inconsistent results; poorly defined quality improvement, financial, or program evaluation methods; recommendations cannot be made **Integrative Review, Literature Review, Expert Opinion, Case Report, Community Standard, Clinician Experience, Consumer Preference** **A High quality**: Expertise is clearly evident; draws definitive conclusions; provides scientific rationale; thought leader(s) in the field **B Good quality**: Expertise appears to be credible; draws fairly definitive conclusions; provides logical argument for opinions **C Low quality or major flaws**: Expertise is not discernable or is dubious; conclusions cannot be drawn

1 https://www.york.ac.uk/crd/SysRev/!SSL!/WebHelp/6_4_ASSESSMENT_OF_QUALITATIVE_RESEARCH.htm
2 Adapted from Polit & Beck (2017).

Appendix C

Prisma Flow Diagram



Appendix D

Business Case Worksheet

BUSINESS CASE with VALUE BASED CARE ASSESSMENT

Proposed Title for Project/Initiative/Opportunity to Improve

The implementation of music medicine to reduce preoperative anxiety in adult patients.

Opportunity Statement

The utilization of a non-pharmacologic preoperative intervention will reduce anxiety and enhance the perioperative surgical experience, improve satisfaction, reduce postoperative length of stay, and reduce costs.

Business Opportunity/Objectives

- **Macro objectives**: The general goal of this business case analysis is to decrease preoperative anxiety for surgical patients at David Grant Medical Center.
- **Micro objectives**: The micro objective includes gathering evidence, gaining stakeholders, developing policies/procedures and educating hospital staff.

Potential Impact of the Initiative/Project

The DHA is utilizing a four prong attack to address standardization across all DOD MTFs. The four entities include increasing readiness, better health, better care, and lower cost. Implementing music medicine to decrease preoperative anxiety accomplishes all DHA priorities. It expands on readiness by giving the medical warfighter another tool to increase their skill set in the deployed setting. Better health is reflected through a more positive patient surgical experience. Better care is emphasized as medical medicine has no side effects compared to pharmacological treatments, which can lead to lowered costs.

Alternatives (courses of action) chosen for Analysis

1. Implement music medicine by hospital staff for patients preoperatively to reduce anxiety.

2. Hire a music therapist that can work with the patient.

3. *"Status Quo"*: Pharmacological IV by anesthesia staff - midazolam

Analysis of Alternatives

Alternative 1:	Implement music medicine by hospital staff for patients preoperatively to reduce anxiety

Pros	Cons
No side effects Most cost-effective Noise cancelling Works immediately Convenient, quick intervention by staff	Implement policy change and protocol Infection control risk

Alternative 2:	Hire a music therapist to work with patient

Pros	Cons
Individualized music plan Therapist with music background	Least cost-effective alternative ($75 per hour, American Music Therapy Association, 2016) Time constraint for patient and therapist to formulate music plan prior to day of surgery

Alternative 3:	*"Status Quo"*: Midazolam IV administration to decrease anxiety

Pros	Cons
Works quickly with short term relief Proven to reduce anxiety No need to compose new protocols and procedures Relatively cost-effective	Side effects: Increased sedation, prolonged amnesia, postoperative delirium Increased delayed emergence (Barash et al., 2017)

Assumptions

-Reducing preoperative anxiety improves patient satisfaction. (McClurkin et al., 2016)

- 40% of all surgical patients experience high anxiety. (Eberhart et al., 2020)

- PACU costs $4-8/minute (The Anecare ANEclear Economic Benefits)

- Preoperative sedatives such as Midazolam increases delayed emergence (Barash et al., 2017)

Recommendation and Rationale *Make a choice*

Recommendation *Make a choice*

Proposal to recommend alternative #1: implement music medicine by hospital staff for preoperative anxiety.

Rationale *Make a choice*

A systematic review encompassing results of 20 trials has shown music medicine to modulate anxiety levels with an average of 6 units as measured by the State Trait Anxiety Inventory (STAI). (Bradt et al., 2013)

Value Based Care - Investment Required by the Organization and the Associated "VALUE" or $ GAINED.

Volume projection based on:

Number of surgeries annually at DGMC	5000
Total	**5000**

II. *Reimbursement calculated for:*

40% (5000 surgeries per year) = 2,000 pt experience anxiety. 50% administered midazolam (1000 patients). 30 min x $8 = $240 (pacu cost per pt with delayed emergence). 1000 x $240 = $240,000 the "reimbursement" or savings	$240,000	**For this BCA we will assume 50% o patients experiencing anxiety receive midazolam. Delayed emergence >30 min. PACU cost $8/per minute**
	$240,000	

Costs:

Variable Costs:

Office Supplies (poster boards, paper, markers, etc.)	$200
1 hour training of Preop RN staff (20 RNs) $30 and Medical Technicians (10 med techs) $14 per Salary.com	$740

Total	**$940**

Fixed Costs:

Disposable head (100 pieces) and ear covers (100 pieces), Cabinet, charging hub, headphone rack	$1304
Music device $125 $125 x 12 headphones	$1720
Total	**$3024**

Forecasted P&L statement:

Revenues:

Reduction in pacu delayed emergence	$240,000
Total revenues	**$**240,000

Costs:

Variable costs	$940
Fixed costs	$3024
Total costs	**$3964**

PROJECTED PROFIT $236,036

Implementation Plan *Implementation plan*

Phase 1:	Gather, appraise, and synthesize the evidence
Milestone Description:	Gathering metrics from the surgical unit, identifying leadership and stakeholders, establishing a baseline patient surgical experience, identifying current protocols and procedures.

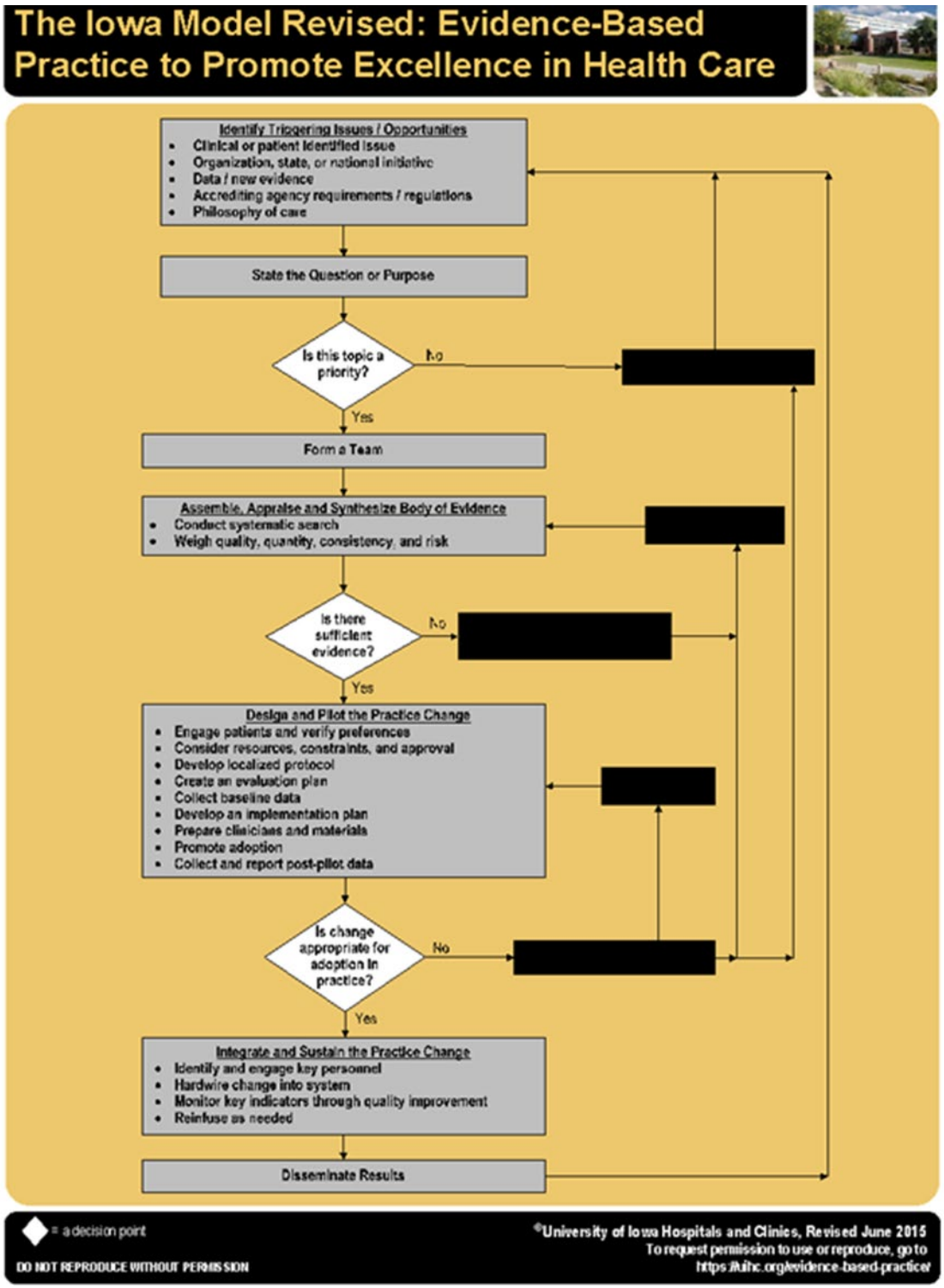
Deliverables	Due Date	Accountable Person

Measuring Goal: Establish a baseline that incorporates the pt experience, the current metrics, and tangible expectations of leadership and stakeholders.	Two Months	DNP Students
Resources Needed		
Meetings with leadership, mentors and unit representatives to identify metrics and established protocols and procedures.		
Expected Level of Benefit		
This will be the foundation of the project and solidifying this phase will gain interest by stakeholders.		
Phase 2:	Presentation/dissemination of current literature to leadership and stakeholders	
Milestone Description:	Establish work groups and panels to assist in distribution of key information regarding project such costs and benefits.	
Deliverables	Due Dates	Accountable Person
Measuring Goal: Approval of leadership to proceed with evidence-based project	One Month	DNP students
Resources Needed		
Construction of a poster board and PowerPoint to utilize as a visual aid.		
Expected Level of Benefit		
Completing this phase will establish buy in from leadership.		
Phase 3:	Identify specific goals of the surgical unit in relation to music implementation.	
Milestone Description:	Establish the appropriate metrics as a baseline prior to music implementation to help quantify the data.	
Deliverables	Due Dates	Accountable Person
Measuring Goal: Create 2-3 realistic data sets to evaluate the effectiveness of the music program.	Two Weeks	DNP students
Resources Needed		
Effective communication is needed with leadership to organize realistic goals that can be reached.		

Expected Level of Benefit		
This helps quantify the data and provides a starting point for continued reevaluation of the program.		
Phase 4:	Develop policy and procedures for institutional approval and inaugurate new procedures to staff.	
Milestone Description:	Conduct staff training. Establish equipment custodian position. New procedures have been disseminated to staff through email, flyers in breakroom, and staff meetings.	
Deliverables	Due Dates	Accountable Person
Measuring Goal: Reach 100% for trained staff in unit.	One month	DNP students
Resources Needed		
PowerPoint presentation. Request time to speak with pre-operative staff.		
Expected Level of Benefit		
Establish a baseline understanding by staff for implementing data collection.		
Phase 5:	Reevaluate and update metrics to better suit the unit needs and/or goals.	
Milestone Description:	Data collection has been done. Evaluate buy in from staff using surveys. Improving upon gaps identified by the staff.	
Deliverables	Due Dates	Accountable Person
Measuring Goal: Reviewing the initial metrics and compare them to the expected outcomes.	Three to six months	DNP students
Resources Needed		
Meeting with surgical leadership to evaluate initial metrics and discuss the best metric moving forward. Continued education of the program throug monthly/bi-monthly staff meetings as needed.		
Expected Level of Benefit		
Identifying and correcting deficiencies overall process will help in longevity of the program.		

Appendix E

IOWA Model



Appendix F

State-Trait Anxiety Inventory for Adults™

Instrument and Scoring Key

Developed by Charles D. Spielberger
in collaboration with R.L. Gorsuch, R. Lushene, P.R. Vagg, and G.A. Jacobs

Published by Mind Garden, Inc.

info@mindgarden.com
www.mindgarden.com

Appendix G

Written Script

Hello, my name is (RN or Technician's name). We are establishing an evidence-based project here at our Preoperative Unit that implements music medicine to decrease preoperative anxiety. The information you share with us will be of great value in helping us collect important data, which will enhance our patient's surgical experience in the future.

There is no risk of a breach of confidentiality. I will not link your name to anything you write or to any publications. Your de-identified information may be used or shared with other researchers without your additional informed consent. There are no costs to you for your participation in the study except your time. There is no monetary compensation to you for participation.

Participation is voluntary. It is up to you to decide whether or not to take part in this study. If you decide to participate, you are still free to withdraw at any time and without giving a reason. If you decide not to participate, there will be no penalty or loss of benefits to which you are otherwise entitled.

Do you agree to participate?

Appendix H

SURGICAL SERENITY SOLUTIONS
a sound approach to recovery

Procedure for cleaning headphones between patients

Besides their normal duties anesthetizing patients for procedures, administering various nerve blocks, and managing pain for a variety of patients, anesthesiologists have other responsibilities that must receive consistent attention. Federal regulations and health-care accreditation programs require awareness of infection risk, and cleaning common equipment used in patient care areas, including headsets, can introduce risks of its own.

With regard to infection control standards, direct contact of the pinnae (outer ears) with the headset ear cushions is of particular concern. Since the cushions are placed over the ear, they may serve as potential carriers of microorganisms (from the air, skin contact, draining ears, etc.) when in contact with the pinnae and the ear canal opening (Bankaitis, 2012).

The Surgical Serenity Solutions Wireless headsets are comprised of a headband, two transducers with plastic foam cushions, and a cable to connect to the left and right sides hidden in the headband. While the headsets have advantages in low cost and ease of use, they can present challenges when cleaning and disinfection is necessary. It is entirely within the realm of possibility to inadvertently damage headset transducers due to improper cleaning of the earphone/transducer cushion.

A common cause of transducer failure occurs when nurses or other healthcare workers disinfect ear cushions and inadvertently introduce cleaning fluid into the earphone. Transducers and their filters make up the earphone, which is very close to the ear cushions and should not come into contact with liquid of any kind. Kathy Parks from Telephonics, a manufacturer of transducers, indicated that attempting to clean or disinfect the transducer itself (as opposed to the ear cushion) can "damage the filter cloth" and "force the patient's" skin oils into the filter, thus breaking down the adhesives in the transducer (Parks, 2010).

This leaves a few options open when dealing with earphone cushions:

1. Use disposable earphone covers made of anti-viral, acoustically transparent material (Parks, 2010)
2. Take off the ear cushions before disinfecting them
3. Ensure that the transducer does not get wet when disinfecting the ear cushions

If a facility decides not to use earphone covers and goes with options 2 and 3 above, there are three strategies that have been used in the past to try to disinfect ear cushions:

1. Alcohol wipes
2. Baby wipes
3. Non-alcohol disinfectant towelettes

First, we have the option of alcohol wipes. Alcohol wipes are recommended by Lee Grason of Grason & Associates, a manufacturer of ear cushions used with TDH-style headsets. Grason recommended the use of medical-grade alcohol wipes because this solution was tested on the earphone cushions with virtually no degradation until one to two (and sometimes even three) years later. According to Grason, alcohol kills most pathogens (Grason, 2012).

Next is the troublesome utilization of baby wipes. Use of baby wipes has been shown to be detrimental to ear cushions' lifetime. Grason also stated operators should never use baby wipes to clean the earphone cushions. Some baby wipes contain scents, oils (where the active ingredient is usually chloride), lanolin, or disodium EDTA (an oxidizer also used in gasoline), and when these ingredients are used the outer surface of the cushion will prematurely age and harden as a result. Those doing mobile testing in hot climates will find that heat plus baby wipes equals disaster, because usage leads to a hardened outer surface and cracking after prolonged use. In any case, baby wipes are not designed to disinfect surfaces, including audiometric headsets.

The third option involves using a non-alcohol disinfectant. A.U. Bankaitis, vice president of Oaktree Products, Inc., a company which manufactures hearing health-care products, indicated that while alcohol is a disinfectant, it "chemically denatures acrylic, rubber, silicone and plastic." Bankaitis recommends a non-alcohol-based disinfectant, such as one with the active ingredient quaternary ammonium, because it doesn't have the drawbacks of alcohol but retains the benefit of being a wide-range disinfectant.

So where do governmental and non-governmental regulatory agencies stand regarding the cleaning of headsets?

The Occupational Safety & Health Administration (OSHA) does not have any specific standards for cleaning audiometric equipment, but a representative stated unofficially in an e-mail message that any employee who has contact with potentially infectious material should be covered under OSHA's Blood borne Pathogen standard 1910.1030.

Since it is not always clear from a visual inspection of cerumen whether it contains blood or other pathogens, the OSHA standard of 1910.1030(d)(1) would apply in taking precautionary measures. The standard states:

"Universal precautions shall be observed to prevent contact with blood or other potentially infectious materials. Under circumstances in which differentiation between body fluid types is difficult or impossible, all body fluids shall be considered potentially infectious materials."

Cerumen tends to reside in the ear canal and it is highly unlikely that an over-the-head ear cushion will come in contact with cerumen (although it can), but most experts agree that precautionary measures should be taken.

Another relevant consideration is noted in 1910.1030(d)(4)(ii):

"All equipment and environmental and working surfaces shall be cleaned and decontaminated after contact with blood or other potentially infectious materials."

A representative of the Joint Commission (formerly the Joint Commission on Accreditation of Healthcare Organizations) stated that the Joint Commission does not provide any specific guidelines, but, instead, defers to the Center for Disease Control's (CDC) standards of infection control. The CDC recommendation directive is titled the "Guideline for Disinfection and Sterilization in Healthcare Facilities, 2008," where headsets fall under the noncritical items list, since they are placed over the pinnae on presumably intact skin (i.e., not broken or open).

Additionally, the "CDC Isolation guideline recommends that noncritical equipment contaminated with blood, body fluids, secretions, or excretions be cleaned and disinfected after use." One reason it is necessary to clean the noncritical environmental surfaces is that "surfaces may contribute to transmission of epidemiologically-important microbes (e.g., vancomycin-resistant Enterococci, methicillin-resistant S. aureus, viruses)." (CDC, 2008)

More specifically, the operator should "ensure that, at a minimum, noncritical patient-care devices are disinfected when visibly soiled and on a regular basis (such as after use on each patient or once daily or once weekly)." (CDC, 2008) The CDC advises as well that disinfectants should be nontoxic, fast-acting, and environmentally-friendly (meaning that the product shouldn't damage the environment on disposal) (CDC, 2008).

But while the CDC recommends that equipment be cleaned on-site with such low-level disinfectants as ethyl or isopropyl alcohol (CDC, 2008), elsewhere, the guideline contradicts the aforementioned statement by stating that an ideal disinfectant should have surface compatibility, that is, the substance shouldn't cause the deterioration of "rubber, plastics, and other materials." (CDC, 2008) Since there is concern that alcohol can dry out the cushion, thus causing deterioration, one is left to wonder what can be used to sufficiently disinfect the cushion.

From a nongovernmental standpoint, the *Hearing Conservation Manual* published by the Council for Accreditation on Occupational Hearing Conservation states that hand washing before and after examining someone's ears is the "most important" way to reduce the risk of contamination (CAOHC, 2010). Earphone cushions should also be cleaned before handling or re-use, according to both the American Academy of Audiology and the Navy and Marine Corps Public Health Center, with disinfectant towelettes (not full-strength pharmaceutical-grade "rubbing" alcohol) so as to avoid cross-contamination among patients (CAOHC, 2010).

Because of the aforementioned varying guidelines, there are unfortunately no hard and fast rules on how to clean or protect ear cushions from possible contamination. The best method for compliance would be to consider the following suggestions when thinking about cleaning headsets to minimize contamination risk and ensure a long life for the equipment.

What to Do

- **Use single use disposable earphone covers** made of anti-viral, acoustically transparent material and available separately from Surgical Serenity Solutions (Parks, 2010)
- If headset and/or earphone cushion becomes visible soiled with any human contaminant, using gloves, take off the ear cushions to clean ear cushions separately (the back edge rotates off) and wipe down the entire headset with non-alcohol based disinfectant towelettes being careful not to get the transducers wet.
- Use disposable gloves when handling ear cushions, and dispose of the gloves when cleanliness is compromised (1910.1030(d)(3)(ix)(A))
- Clean the cushions with disinfectant (non-alcohol) towelettes (Bankaitis, 2005) or alcohol wipes (Grason, 2012) (CDC, 2008)
- Make sure to let earphone cushions dry while headset recharges before placing them back onto the headset

What NOT to Do

- Do not get the earphone/transducer filter wet
- Do not allow excessive cleaning fluid to pool around buttons, seeping into the electronic housing
- Do not use baby wipes

By following the above guidelines, clinical staff can feel secure knowing they've done their part to curb the risk of infection among their patients.

References:

"Academy of Audiology Guideline". Infection Control in Audiological Practice. *Audiology Today*. Vol. 15:5, p. 17.

Bankaitis, AU (2005). "Hearing Aids: Lick Em and Stick Em?" Audiology Today 17 (6): 2.

CDC (2008). "Guideline For Disinfection and Sterilization in Healthcare Facilities", pp. 30, 84, 104-5, 106, 107.

Hawke, M (2002). "Update on Cerumen and Ceruminolytics." *Ear Nose Throat J*. Aug;81(8 Suppl 1):23-4.

MedlinePlus (2012): Ear infection-Acute. Retrieved fromhttp://www.nlm.nih.gov/medlineplus/ency/article/000638.htm.

Navy and Marine Corps Public Health Center (2012). "The Audiometer & Test Environment" Power Point presentation. Retrieved from http://www.nehc.med.navy.mil/.../audiometerandthetestenvironment.ppt.

Suter, Alice H. *Hearing Conservation Manual, CAOHC*, 4th ed., 2010, pp. 19, 24, 66, 69.

Appendix I

Sign off sheet

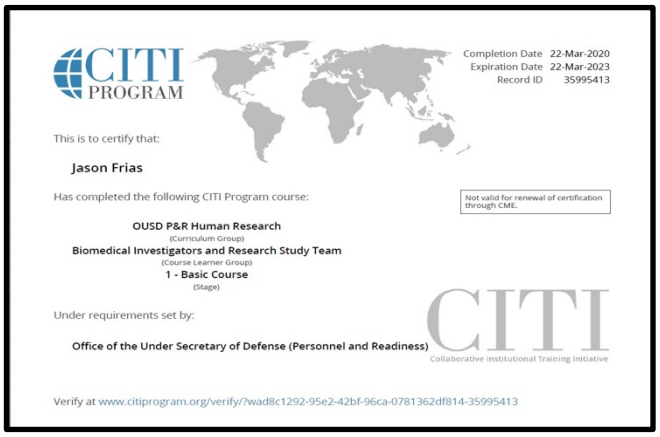
Nurse/Tech	Headphone #	Bay #	Time Check Out	Time Returned

Appendix J

Timeline

	OCT 2020	NOV-DEC 2020	JAN-FEB 2021	MAR-APR 2021	MAY-JUN 2021	JUL 2021 - MAY 2022
Submission and approval for TSNRP EBP mini award						
Submission and approval of IRB						
Attain supplies for the project. Train Staff.						
Implement project and data collection.						
Analyze data and interpret results.						
Prepare manuscript.						
Gain PAO Clearance. Disseminate results.						

Appendix K



CITI PROGRAM

Completion Date 22-Mar-2020
Expiration Date 22-Mar-2023
Record ID 35995413

This is to certify that:

Jason Frias

Has completed the following CITI Program course:

Not valid for renewal of certification through CME.

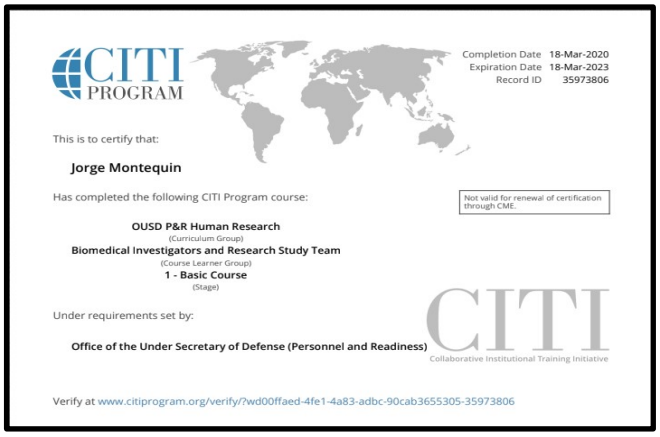
OUSD P&R Human Research
(Curriculum Group)
Biomedical Investigators and Research Study Team
(Course Learner Group)
1 - Basic Course
(Stage)

Under requirements set by:

Office of the Under Secretary of Defense (Personnel and Readiness)

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wad8c1292-95e2-42bf-96ca-0781362df814-35995413



CITI PROGRAM

Completion Date 18-Mar-2020
Expiration Date 18-Mar-2023
Record ID 35973806

This is to certify that:

Jorge Montequin

Has completed the following CITI Program course:

Not valid for renewal of certification through CME.

OUSD P&R Human Research
(Curriculum Group)
Biomedical Investigators and Research Study Team
(Course Learner Group)
1 - Basic Course
(Stage)

Under requirements set by:

Office of the Under Secretary of Defense (Personnel and Readiness)

CITI
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Appendix L

Appendix C: Daniel K. Inouye Graduate School of Nursing
DNP Project Team Mentor (Committee Membership) Agreement Form

DOCTOR OF NURSING PRACTICE PROJECT
DNP Project Clinical Question and Team Mentor (Committee Membership) Agreement Form

Graduation Year: 2022

Name(s) of DNP Project Student Team:

1.	Jason E. Frias	Phase II Site:	AGCNS ☐ FNP ☐ PMHNP ☐ RNA ✓ WHNP ☐
2.	Jorge Montequin	Phase II Site:	AGCNS ☐ FNP ☐ PMHNP ☐ RNA ✓ WHNP ☐
3.		Phase II Site:	AGCNS ☐ FNP ☐ PMHNP ☐ RNA ☐ WHNP ☐
4.		Phase II Site:	AGCNS ☐ FNP ☐ PMHNP ☐ RNA ☐ WHNP ☐
5.		Phase II Site:	AGCNS ☐ FNP ☐ PMHNP ☐ RNA ☐ WHNP ☐
6.		Phase II Site:	AGCNS ☐ FNP ☐ PMHNP ☐ RNA ☐ WHNP ☐

The tentative title of the DNP Project Proposal for this student group is:

Improving Preoperative Anxiety Through Utilization of Music Medicine at Travis AFB

Committee Approved DNP Project Clinical Question:

In patients (>18 years old) undergoing elective surgery, how does music medicine affect preoperative anxiety scores?

Names of DNP Project Team Mentors *(type the name and obtain signatures)*:

I agree to serve as a member of the DNP Project Team (Team Mentors) for the above DNP Student Project Team. As a Project Team Mentor, I agree to the duties and responsibilities outlined within the DNP Project Manual which include but are not limited to the provision of consultation and guidance supporting the entire DNP project journey and to ensure the DNP project is of sufficient rigor and demonstrates doctoral level scholarship to meet the requirements for USUHS GSN graduation.

NOTE: You may have 3-4 DNP Team Mentors [committee members including your DNP Senior Mentor (Chair)]. The Phase II Site Director may also be a member of the group, as well as other USUHS faculty or others who may serve as content experts. All non-USUHS faculty selected as a Team Mentor must be approved by the DNP Project Director.

Senior Mentor (Chair):	Maj Laura Ransom	Signature: [redacted]	Date: 27 Jan 21
Team Mentor (Committee):	Maj Julie Petsche	Signature: [redacted]	Date: 26 Jan 21
Team Mentor (Committee):		Signature:	Date:
Team Mentor (Committee):		Signature:	Date:

Form Version: 4 Sept 2016

Appendix M

USU
Uniformed Services University

OFFICE OF RESEARCH
4301 JONES BRIDGE ROAD
BETHESDA, MAYLAND 20814
PHONE: (301) 295-3303; FAX: (301) 295-6771

NOTICE OF PROJECT APPROVAL
Change Number: Original

VPR Site Number:	GSN-61-11759
Principal Investigator:	Frias, Jason
Department:	Graduate School of Nursing
Project Type:	Student
Project Title:	The Implementation of Music Medicine to Reduce Preoperative Anxiety in Adult Patients
Project Period:	2/17/2021 to 2/17/2022

Assurance and Progress Report Information:

Name	Sup	Approval Type	Status	Approved On	Forms Received
Progress Report	0			To be Submitted	N/A

Remarks:
This Notice Of Project Approval has been reviewed and approved. Please remember that you must submit a final Progress Report (Form 3210) upon completion of this project.

Questions regarding this approval should be directed to the following person in the Office of Research:
Sharon McIver, (301) 295-9814.

RANDOLPH.TOYA.V.1242107698 Digitally signed by RANDOLPH.TOYA.V.1242107698
Date: 2021.08.10 12:39:49 -04'00'

Mark G. Kortepeter, MD, MPH Date
FACP, FIDSA, FASTMH
COL (R) MC US Army
Vice President for Research
Uniformed Services University of the Health Sciences

cc: File
Dr. Kennett Radford
Laura Taylor

Appendix N

DEPARTMENT OF THE AIR FORCE
59TH MEDICAL WING (AETC)
JOINT BASE SAN ANTONIO - LACKLAND
TEXAS

February 12, 2021

FINAL DETERMINATION – NOT RESEARCH

Determination Date: 02/12/2021

Project Lead: Laura Ransom/P and R - Uniformed Services University of the Health Sciences (USUHS)

Reference Number: FWH20210066N

Project Title: Implementation of Music Medicine to Reduce Preoperative Anxiety in Adult Patients

You may begin your project, as you would any other clinical or operational activity, with the approval and sponsorship of your leadership.

Your activity was determined on 02/12/2021 to be considered **not research** as defined by DoD regulation 32 **CFR 219 and FDA regulation 21 CFR 56**. Continued IRB oversight for this activity is not required. The proposed activity is not funded by DHHS/DoD as research; is not a systematic investigation to test a hypothesis and permit conclusions to be drawn; is not designed to develop or contribute to generalizable knowledge; and the purpose is not to investigate the safety or effectiveness of a drug, medical device or biologic.

Since the IRB does not have regulatory oversight for your study, it is the investigator's responsibility to validate the study's scientific merit and research design and to ensure the conduct of the study is upheld by the highest ethical standards, as required by the Wing. Should you require assistance in reviewing the scientific merit and research design of your study, please contact the Office of Clinical Research Support. Protection of subjects' rights safety and welfare and the responsibility for protecting PHI/PII and research data, now fall on the investigator and their commander.

In accord with DoDI 6000.08 any intramural funding of this study as research or as a clinical investigation may continue to be received or sought regardless of this IRB determination.

Your study has received a one-time research determination. If the goals and/or activities of the project change during the course of the project, or if new activities are proposed that would constitute human subjects research, re-contact the Office of Clinical Research Support, so that a regulatory expert may determine whether or not the revised plan involves human subject research activities.

GRANT.EARL.JR.1126544380 Digitally signed by GRANT.EARL.JR.1126544380 Date: 2021.02.12 13:48:39

Earl Grant, Jr., PhD
Designated Exempt Reviewer

Appendix O

Approval request for "Music_Medicine_USU_PAO_08Apr22.pdf" Inbox ×

USU Pub Clearance (via Google Workspace Approvals) <approvals-noreply@google.com>
to me

Apr 12, 2022, 5:19 AM

Approval Complete

USU Pub Clearance (usupubclearance@usuhs.edu) approved the file

Music_Medicine_USU_PAO_08Apr22.pdf

Open

Google

Google LLC 1600 Amphitheatre Parkway, Mountain View, CA 94043. You received this email because you are involved in an approval on a file in Google Drive.

Music_Medicine_U...

Appendix G: Daniel K. Inouye Graduate School of Nursing
DNP Project Completion Verification Form

DOCTOR OF NURSING PRACTICE PROJECT
Completion Verification Form

The DNP Project titled: The Implementation of Music Medicine to Reduce Preoperative Anxiety in Adult Patients

was completed at David Grant Medical Center by the following student(s):

(Student Name)	*(Digital Signature)*
Jason E. Frias	FRIAS.JASON.E.1165175561 Digitally signed by FRIAS.JASON.E.1165175561 Date: 2022.04.08 12:01:41 -07'00'
Jorge Montequin	MONTEQUIN.JORGE.1506050681 Digitally signed by MONTEQUIN.JORGE.1506050681 Date: 2022.04.08 12:02:22 -07'00'

The DNP Practice Project Team verifies that the following components of the DNP project, accomplished by the above students, is of sufficient rigor and demonstrates doctoral level scholarship to meet the requirements for USUHS GSN graduation:

- Presentation of DNP project to the leadership/stakeholders at the Phase II Site,
- Abstract/Impact Statement (*Appendix F*), and
- DNP Project written report (*Appendix E*).

Verified by:

(type name)	*(Digital Signature)*	
		Senior Mentor
		Team Mentor
		Team Mentor
Maj Julie Petsche	PETSCHE.JULIE.LENORE.1147499333 Digitally signed by PETSCHE.JULIE.LENORE.1147499333 Date: 2022.04.08 12:06:06 -07'00'	Team Mentor & Phase II Site Director

For RNA Students only - add the following additional signature for final verification of project completion:

LCDR Kenneth Barber	BARBER.KENNETH.DOUGLAS.1177263644 Digitally signed by BARBER.KENNETH.DOUGLAS.1177263644 Date: 2022.04.12 10:30:44 -04'00'
RNA Project Director *(type name)*	*(Digital Signature)*