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Age-Appropriate Video Distraction for Pediatric Surgical Patients: Assessing the Process of Reducing Operating Room Delays

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Table of Contents

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Abstract

Phase II Site: Naval Medical Center San Diego (NMCSD)

Project Title: Age-Appropriate Video Distraction for Pediatric Surgical Patients: Assessing the Process of Reducing Operating Room Delays

Authors: Nunez, J.M. & Snyder, M.R.

Background or Problem/Issue: Common practice to relieve pediatric preoperative anxiety is oral midazolam, which requires 15-30 minutes to onset and peak. This causes delays in operating room turnover times. Non-pharmacological video distraction does not require time to onset, thus shortening turnover times.

Clinical Question or Purpose: Does a non-pharmacological age-appropriate video distraction intervention reduce operating room turnover times compared to oral benzodiazepine administration in pediatric surgical patients ages 2-12 years old?

Project Design: A retrospective review to determine mean turnover time between pediatric surgical cases that used oral midazolam was completed. Video distraction as an alternative form of preoperative anxiolysis was implemented. Anesthesia providers presented an iPad to patients which accompanied the child up to induction of anesthesia. Mean turnover time was recorded with the non-pharmacological intervention. A Likert survey was conducted among staff to analyze perceptions on video distraction as an alternative.

Analysis of the Results: Results reflected an average turnover time of 34.0 minutes with oral midazolam use. Post-implementation via iPad intervention yielded a 2-minute reduction in average turnover time. Likert scale comparison showed satisfaction and a likelihood of continued iPad usage for the future.

Organizational Impact/Implications for Practice: Reduction in surgical turnover time was clinically significant. This reduction in turnover minutes translates to savings of up to $8,000 per year. Moreover, video distraction reduces unnecessary medication exposure with similar results and further reduces costs from not purchasing oral midazolam to the same extent. Further studies are needed to control for confounding variables and ensure preoperative anxiety was in fact reduced with the administration of iPads.

Age Appropriate Video Distraction for Pediatric Surgical Patients: Assessing the Process of Reducing Operating Room Delays

The surgical experience can be a frightening event for any individual, especially children. According to the latest National Health Statistics Report issued by the Centers for Disease Control (2017), children under the age of 15 make up approximately 6% of the total surgical cases within the United States of America. It is reported that 40-60% of children are anxious throughout the preoperative to induction phase (Aytekin et al., 2016). Anxious children are more likely to be agitated, sad, emotional, and less cooperative, all of which can extend operating room (OR) turnover times (Eijlers et al., 2017). Currently, at NMCSD, the operating rooms are experiencing delays in surgical cases due to the usual care for treatment of child anxiety during the preoperative phase. A common usual care procedure is the utilization of oral benzodiazepines, such as midazolam to reduce the anxiety children experience during the perioperative process (Barash et al., 2017), but it has a slow time of onset. As a result, NMCSD encounters longer OR turnover times, prolonging the induction of anesthesia time, to allow midazolam to take effect. Fortunately, there are non-pharmacological methods to relieve preoperative anxiety in children, specifically video distraction (Stewart et al., 2019).

Problem Synthesis

Excessive anxiety in pediatric patients will often cause an increase in the sympathetic nervous system (SNS) response leading to marked shifts in hemodynamics. The increased SNS response from anxiety may manifest as physical symptoms of tenseness, hyperalgesia, tachycardia, hypertension, and tachypnea (McCance et al., 2019). As a result, delivery of anesthetics is often challenging, requiring additional steps during the induction process. For instance, anesthesia providers may need to administer medication to control blood pressure and

heart rate to stabilize vital signs prior to induction of anesthesia. Furthermore, increased doses of analgesia are often needed, leading to an increased duration of sedation, and extended postoperative recovery times (Barash et al., 2017).

The preoperative anxiety experienced by children may not only affect them physically but have lasting psychological consequences as well. Children are psychologically more susceptible to the stress of surgery owing to their limited cognitive capabilities, age, lack of self-control, and dependence on others (Inan & Inal, 2019). Long term effects of nervous children undergoing surgery include the development of separation anxiety, poor performance in school, and having a negative outlook on any future medical exposure (Sola et al., 2017). Children may also develop post-traumatic stress disorder from their lived experience, resulting in hallucinations, fear, and flashbacks (Eijlers et al., 2019). These psychosocial concerns may even continue throughout their adult years.

The conventional method of alleviating child anxiety during the preoperative phase is administering an oral dose of a benzodiazepine, specifically midazolam (Stewart et al., 2018). Oral midazolam at a dose of 0.25-0.8mg/kg is administered on arrival to the preoperative holding area. Undesirable aspects of oral midazolam administration include unpleasant taste leading to rejection of ingestion, hypoventilation, and hangover effects after recovery, and emergence delirium (Stewart et al., 2018). However, the most critical drawback of oral midazolam administration is the prolonged time to onset to establish effective anxiolysis. The onset for oral midazolam is 15- 20 minutes and it peaks in 30-45 minutes (Barash et al., 2017), which is generally not effective to mitigate agitation with parental separation since the usual time from medication administration to entering the operating room occurs much sooner. With the

prolonged time to effectiveness and insufficient reduction in anxiety, the child is not easily separated from their parents, leading to delays in OR entry times.

Delays in the OR have a negative effect on its efficiency and the working environment, affecting patient flow and resource utilization. Preoperative wait times have been associated with adverse consequences attributed to human errors and system deficiencies. According to a study from the Division of Neurosurgery at Toronto Western Hospital, of the 1,531 elective surgical cases performed, delays were the most common type of error (33.6%), and more than half of all cases had at least one delay. During the study's cost analysis, it was estimated that each 10-minute case delay cost $18 based on the current hourly pay rate for both nursing and operating room staff. During the study, there were about 135 delays per year (May 2000-February 2009) which translated to $2,430 annually (Wong et al., 2010). In conclusion, ineffective preoperative anxiolysis has negative physiological and psychological effects on pediatric patients. Traditional pharmacological methods of achieving adequate preoperative anxiolysis leads to delayed OR times due to its prolonged time of onset, ultimately causing a negative financial impact.

Relevance to Military Nursing

NMCSD is one of the three largest Military Health Systems (MHS) within the U.S. Navy. On average, there are 50 surgical cases performed daily (Naval Medical Center San Diego, 2020). Any potential cause of OR delays can hinder the operating room flow of patient throughput. The surgical services department has identified that among the pediatric population, the prolonged time to onset and peak of oral midazolam used for preoperative anxiolysis, is delaying the time to induction of anesthesia and is a major cause of these OR delays. Currently at NMCSD, a delay is considered a time lapse of greater than 30 minutes between surgical cases. NMCSD has aligned their healthcare goals to that of the Defense Health Agency's (DHA)

Quadruple Aims: improved readiness, improved population health, better experience of care, and reducing per capita costs (Military Health System, 2017). Reducing OR delays directly correlates with all four of these aims and will result in a better patient experience, better care, and a healthier population of active duty and beneficiary surgical patients who will be receiving necessary surgeries in a timely fashion. This will ensure an increase in mission readiness and decrease the cost associated with prolonged time for surgical procedures.

Clinical of Systems Question

Does a non-pharmacological age-appropriate video distraction intervention reduce operating room turnover times compared to oral benzodiazepine administration in pediatric surgical patients ages 2-12 years?

Literature Review of Solution

Search Strategy and Results

To guide the literature search, the following PICOT question was developed: "In pediatric surgical patients (ages 2-12) [P] how does preoperative handheld video distraction [I] compared to oral midazolam administration [C] affect operating room turnover times in minutes [O]?" PubMed, Science Direct, and Cumulative Index to Nursing and Allied Health Literature were the databases used to search and gather relevant articles to the PICOT question. Key terms used to search the databases were "preoperative anxiety" OR "pediatric anxiety" OR "pediatric surgical patients" OR "children" OR "pediatrics" OR "ages 2-12 years" AND "non-pharmacological intervention" OR "video distraction" OR "cartoon" OR "parental presence" OR "game-based distraction" OR "induction of anesthesia" AND "operating room turnover times" AND "room delays". The strict search criteria entailed peer reviewed articles, relevant data within 10 years, and the English language. Results as of August 2020, yielded a total of 49

articles that met the inclusion criteria to screen. Seven articles were duplicates and, therefore, removed. Covidence, a web-based software platform that supports citation screening, full-text review, risk bias assessment, extraction of study characteristics and outcomes, was utilized to perform the screening of titles and abstracts from the remaining 42 articles.

The title and abstract screening were completed with inclusion criteria that contained non-pharmacological interventions for a reduction in preoperative anxiety in pediatric surgical patients. Exclusion criteria included interventions within the wrong setting, such as an emergency room, or interventions that were conducted during an incorrect time frame of the perioperative experience. Moreover, exclusions included articles that contained parental presence or oral midazolam as the main focus for the treatment of pediatric preoperative anxiolysis. Covidence screening resulted in nine articles that were included for literature review and incorporated as current evidence for best practice. See Appendix E: Figure 1 for the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram.

The critical appraisal of the selected literature was conducted using the Johns Hopkins Evidence Based Practice Tool. This tool incorporates a series of rigor when evaluating articles and provides a roman numeral and alphabetical letter assigned to the strength of the evidence (Dang & Dearholt, 2017). As seen in the evidence table in Appendix E: Figure 2, of the nine screened articles, there were four IA, three IB, one IIA, and one IIIA/B. The IIIA/B article was included as it demonstrates the financial cost of operating room delays, which is discussed in the Business Case Analysis (BCA). Upon reviewing the literature, a conclusion was drawn that the best practice non-pharmacological intervention for preoperative anxiolysis among pediatric surgical patients is a video distraction technique.

Solution Synthesis

According to Chaurasia et al. (2019), pediatric anesthetists have utilized both pharmacological and non-pharmacological options to reduce preoperative anxiety. There are several non-pharmacological interventions to assist in reducing anxiety, to include clowns, parental presence, the use of a virtual environment that simulates the OR, and visual distraction. While the use of clowns has shown to effectively decrease the anxiety of children from the preoperative holding area to the OR, the advantage of this intervention is lost during the mask induction phase of anesthesia. In fact, increased anxiety scores are reported at the time of induction among children accompanied by a clown (Chaurasia et al., 2019). Although there is some support for perioperative clown presence, most OR staff disagree since it can interfere with OR procedures**.**

Parental presence is another non-pharmacological intervention described in the literature to effectively reduce pediatric anxiety prior to surgery. An adult caregiver (parent or guardian) will accompany their child throughout the perioperative process, from the preoperative holding area to induction of anesthesia in the OR. Once the patient is anesthetized, the child's caregiver will exit the OR and rejoin their child in the postoperative recovery unit after surgery. Although this option may reduce time delays due to immediate relief of anxiety, there are prohibitive factors to consider. First, not every facility allows for caregiver presence in the OR during anesthesia induction. Secondly, caregiver presence presents concerns for contamination of the sterile environment. Finally, additional staff are required to escort the family member out of the OR (Kim et al., 2015). Therefore, parental presence as a means of reducing child anxiety and preventing operating room delays is not the best non-pharmacological option.

Virtual reality exposure (VRE) offers the possibility to expose pediatric patients of different ages to a highly realistic virtual environment that imitates the operating environment of

a hospital. Children are accustomed to not only the operating environment, but also to the processes associated with anesthesia (Eijlers et al., 2019). While VRE proved effective in reducing anxiety prior to medical procedures, the added benefit over simpler forms of video distraction, such as television, are unknown at this time (Eijlers et al., 2019).

Another non-pharmacological option to reduce preoperative anxiety is the use of video as a form of distraction. Observing video distracts children from the OR environment by engaging their minds in a familiar made-up world. In contrast, parental presence simply alleviates the distress related with separation from parents while not providing the element of distraction (Kim et al., 2015). Another form of video distraction is gaming. Playing age-appropriate interactive games on a hand-held tablet drastically reduced anxiety scores at both parent separation and mask induction for children compared with those who received oral midazolam (Stewart et al., 2019). Incentive-based game therapy reduces anxiety scores and improves compliance with facemask induction for pediatrics as well. (Chaurasia et al., 2016). Non-pharmacological interventions, such as video and gaming distractions, can provide a safer and more efficient alternative to reduce preoperative anxiety in children. Video distraction is quick, easy to implement, and does not require long-term training of staff members. These qualities make it an appropriate implementation for pediatric preoperative anxiolysis (Inan & Inal, 2019).

Preoperative anxiety in children is prevalent and there is a necessary demand to develop more applicable anxiety reduction strategies. Ineffective preoperative anxiolysis can have lasting physiological and psychological effects on pediatric patients, leading to delayed OR times as well as a negative financial impact on the surgical facility. The use of age-appropriate visual distractions, such as age-appropriate cartoons or video games, is effective, simple to implement, and cost effective. It is anticipated that video distraction will be a reasonable solution to improve

OR delays for pediatric cases at NMCSD while not reducing the quality of care for this vulnerable population.

Focus Area

There are several desired goals to accomplish at the conclusion of this project. The first goal is to implement video distraction as a non-pharmacological intervention for preoperative anxiety in pediatric patients. Secondly, and related to the first goal, by utilizing a non-pharmacological intervention, operating room turnover time in minutes for children ages 2 - 12 years old will be reduced, thus decreasing OR delays. Ages outside of that range, however still considered pediatrics, will also be collected for completeness of data analysis. Lastly, by changing the culture of practice to reflect the best evidence-based clinical options, NMCSD will maintain their alignment with the DHA's quadruple aims of improved readiness, improved population health, better experience of care, and reducing per capita costs.

Business Case Analysis

As referenced in the BCA in Appendix E: Figure 3, the current cost of oral midazolam is $0.69- $2.16 per ml. Each ml contains 2mg of the medication and the standard pediatric dose is 0.5- 0.7mg/kg (Lexicomp, 2020). Each OR delay per minute at NMCSD amounts to $8.24 for labor costs, with an estimated additional $2.08 per minute for overtime. Pediatric surgeries make-up 4.1% of first case OR delays and account for a total of 1,549 minutes per year. This amounts to $15,986 dollars spent just on first case delays over the course of one year (Hicks et. al., 2020). With a conservative approach to reduce OR delays by 75% through implementation of video distraction, the total savings per year would be $11,992, representing first cases only. NMCSD has 5 dedicated pediatric anesthesiologists; however, all anesthesia providers can provide care to this population. For the purposes of this project, initial training will be focused on

the pediatric anesthesiologists first. The approximate total cost for training per anesthesiologist is $203/hour ("Get Pay Right," 2020), so educational variable costs total would be 5 X $203 = $1,015. The fixed cost for 3 iPad purchases would be 3 X $599 = $1,797 for a total estimated cost of $1,015 + $1,797 = $2,812. The annual savings would be roughly $11,992 - $2,812 = $9,180 for the first year. However, this data above only reflects the first-year expenses. Once the iPads are purchased and staff is trained, it is expected that there will be a complete profit in subsequent years, minus the training costs for new staff. As previously mentioned, the estimated annual cost per delay in minutes is only for first case OR scenarios. It is evident that there are several additional delays with subsequent pediatric cases throughout the anesthesia surgical workday, thus, that figure is approximated low.

Organizing Framework

The Iowa Revised Model for Evidence Based Practice, listed in Appendix E: Figure 4, was selected as the guiding framework for this project. Several key factors are appreciated within this concept: a non-linear movement throughout the plan, identifying the problem and stating the question first before conducting research, the ability to conduct a smaller pilot study to determine efficacy, and the interdisciplinary involvement of various team members (Buckwalter et al., 2017). The Iowa model begins by discovering a trigger area within the healthcare forum and then, conducting a literature review. Once the literature review is completed, a study is designed and implemented. If the results of the study are promising, recommendations for a change to the current practice will be made. As stated above, an advantage of the Iowa model is the nonlinearity sequence that allows for a redesign without complete overhaul of the project focus. If, for example, the study results do not demonstrate favorable outcomes, re-engagement of the

model in the preceding steps will allow redesign without a complete overhaul of the original focus.

Project Design

General Approach

This project was a process improvement measure that collected concurrent implementation data with a goal of reducing operating room delays at NMCSD. After stakeholder buy-in, video distraction as a non-pharmacological means of preoperative pediatric anxiolysis was implemented as an alternative to the current practice of pharmacological means. Over the course of six months, data from OR turnover times was compared between operating rooms in which the pediatric patients received oral midazolam and operating rooms in which the pediatric patients received video distraction. Once enough data was collected, the results were evaluated and disseminated.

Setting and Population

Naval Medical Center San Diego is a military medical treatment facility with 18 main operating suites and has a 272-bed capacity that serves approximately 250,000 beneficiaries (active-duty military, dependents, and retirees) in and around San Diego, CA. The staff consists of approximately 1,200 military officers, 2,000 enlisted personnel, 2,100 civilian employees, and 300 contract civilians. There are roughly 400 physicians of various specialties and 760 registered nurses. There are 11 primary care clinics that fall under NMCSD with the farthest located almost 2 hours east in El Centro, California. On any given day, there are an average of 45 new patients admitted, 10 babies born, 50 surgical cases, and over 4,000 medical and dental visits (Naval Medical Center San Diego, 2020). Within the anesthesia department, there are a total of 28 Anesthesiologists (13 active duty and 15 general schedule (GS) employees) and 30 Certified

Registered Nurse Anesthetists (24 active duty and 6 GS). The target population is pediatric surgical patients 2-12 years old. Children outside of these ranges will also be included in data analysis. There are 5 dedicated pediatric anesthesiologists, however, all providers can and do perform cases involving children. Throughout any month there are approximately 80 pediatric cases. Most often, the cases performed are magnetic resonance imaging and other surgical procedures, such as, hernia repairs, dental corrections, genitourinary, and ear, nose, and throat surgeries.

Procedural Steps

The first step was an extensive literature review, which occurred during the spring semester of the 2020 evidence-based research course. Available literature was analyzed, and it was concluded that video distraction as a means of non-pharmacological preoperative anxiolysis in children was the most efficacious and would benefit both the patients and the facility. Key departmental stakeholders were engaged to obtain buy-in to the process improvement recommendations prior to implementation (September-December 2020). Buy-in was accomplished through staff briefings during morning surgical department meetings explaining the benefits of video distraction. A sign-up sheet was provided to solicit anesthesia providers who are willing to provide video distraction in place of oral benzodiazepine administration to their pediatric surgical patients. Institutional Review Board (IRB) at NMCSD for a research exemption was approved. The project was implemented with the support of interested anesthesia providers January-June 2021 (Appendix E: Figure 5).

The implementation process began January 2021. A retrospective chart review of pediatric surgical patients for the past 1-3 months, totaling the OR turnover times in minutes between the end of one pediatric surgical case to the start of the next was conducted. The data set

measurement was collected through the anesthesia intraoperative record. NMCSD typically schedules pediatric cases for the same OR which allowed for delineation as to the patient population. Simultaneously, implementation of the video distraction intervention began and OR turnover times were totaled the same as above. Furthermore, to keep the intervention data separate and as accurate as possible, it was recommended that scheduled pediatric operating rooms either received the standard practice of oral midazolam or video distraction preoperatively for the entire day. This was ensured by confirming the anesthetic plan with the anesthesia provider the evening before. For those staff who insisted on providing their patients with a combination of interventions, data was collected and analyzed as well for completeness.

To begin this study, two hospital owned iPads were acquired for use, one from mental health and one from the obstetrics anesthesia department. The iPads were stored in a locked room and had media for ages 2-5 years old on one, and ages 6-12 years old on the other. The media included interactive educational applications, games, and puzzles. Assessment of the next day's surgical schedule revealed upcoming pediatric cases for a particular OR. As such, the participant anesthesia provider was provided the iPad for their cases the following day. Upon a preoperative encounter with the patient, the anesthesia provider gave the child the device with a brief explanation of the option for its use. No headphones were necessary for the iPad's use. The device was not able to be utilized for non-appropriate media, as the access to web browsers were disabled by the investigator team. Children with disabilities were also provided the device with their parent or guardian present to assist as necessary. The tablet accompanied the child into the OR and remained with them up to induction of anesthesia. Once the patient was anesthetized, the anesthesia provider sanitized and kept the iPad until the next encounter. The process repeated itself for the next scheduled case that day. Following data collection, the information was

analyzed with the aid of a biostatistician from July-September 2021. The process improvement project was conducted over six months, and the amount of cases performed during this time represented the total number for analysis. See Appendix E: Figure 5 for timeline details.

Data Analysis Plan

The data collected was analyzed using descriptive and inferential statistics where appropriate. The independent variable (preoperative anxiolysis) is a nominal category. Each patient assessed was assigned a "0," "1," "2," "3," or "4," designating the type of preoperative anxiolysis they received ("0" for oral midazolam, "1" for video distraction, "2" no treatment, "3" alternative interventions which included nasal dexmedetomidine, intramuscular ketamine, and intravenous midazolam, or "4" a combination of oral midazolam / video distraction with the iPad). We used descriptive statistics in the form of percentages to represent how many patients received other preoperative interventions. Comparison of the outcome variable of pediatric OR turnover time in minutes was conducted under a ratio level of measurement by coding with "time 0" and "time 1" ("time 0" being the end time of one pediatric case and "time 1" being the start of the next pediatric case in the same room). The mean OR turnover time in minutes was analyzed via an independent T Test. In addition to the above measurements, the pediatric anesthesiologist who provided their patients with video distraction were given a questionnaire allowing them to provide feedback on their perception of the intervention. The questionnaire was in the form of a Likert scale survey presented in Appendix E: Figure 6. It contained questions that assessed their preference or non-preference of video distraction as a means of preoperative anxiolysis. It also contained a question geared toward their likelihood of utilizing video distraction in their future practice. The responses were tallied and compared to their colleagues who participated in this

process improvement project and reported as necessary. See Appendix E: Figure 7 for details on the data analysis plan.

Potential Barriers

Various barriers were a challenge during this process improvement project. One such barrier was the unwillingness of staff to change their current practice of providing pharmacological means of preoperative anxiolysis, such as oral midazolam. To overcome this potential challenge, a clear and concise explanation of the most current evidence-based literature stating the efficacy and the benefits of video distraction were provided during departmental muster. Most parents or guardians were amenable to these interventions; however, some were reluctant. Similarly, to the above, an explanation of the current evidence-based literature was presented in the preoperative holding area and eased their concerns. During implementation there were adequate iPads available for use. We consulted with the obstetrics department to use one of theirs, ensuring a backup device was readily available. As a back-up, we also consulted with the Information Technology Department to rent one if need be.

Dissemination Plan

Since the results of the study demonstrated an improvement in OR turnover times, funding has been requested to purchase, at minimum, two iPads that will be designated for the anesthesia department to be utilized for pediatric patients. Implementing a practice/policy change at NMCSD is also imperative. To ensure its successful implementation, a written standard operating procedure will be created and submitted to the anesthesia department chair for review and finalization. Additionally, the results have been presented to the staff in person at departmental meetings via a power point presentation. An anesthesia departmental champion was appointed to investigate pediatric surgical cases quarterly and review which type of preoperative

anxiolysis was utilized. If the use of pharmacological preoperative anxiolysis, such as oral midazolam, is still predominantly utilized resulting in OR delays, email reminders of the newly written policy will be emailed to the anesthesia staff. For a larger audience, the study findings were presented via poster and oral presentations during "Research Days" at the Uniformed Services University in the spring of 2022. An abstract was submitted to the annual Tri-Service Nursing Research Program Evidence-Based Practice and Research Dissemination Course as well as the American Association of Nurse Anesthetists in the spring of 2022. This creates an opportunity to share the results with a national audience of medical professionals.

HIPPA Concerns

This project has undergone IRB review and has received an exemption. To ensure the safeguarding of patient information, all data collected does not contain any personally identifiable information. All paper documents are stored in a locked office and all electronic data are stored on government secure Common Access Card computers only, which are also maintained in a locked office.

Project Results

A retrospective review of pediatric cases was conducted from October 2020 through December 2020. Overall, there were 93 pediatric cases and 54 turnovers within the operating room that fit our inclusion criteria. There were 57 male and 36 female patients making up 61.3% and 38.7% respectively of the total population. The average age was 7.7 years old for those over 1 year, with 22 patients under 1 year of age. The most common procedures conducted were hernia repair, eye surgery, and genitourinary surgeries.

The interventions performed were 21 (22.5%) cases “0” oral midazolam, 61 (65.6%) cases “2” no therapy, and 11 (11.9%) cases “3” alternative preoperative interventions which included nasal dexmedetomidine, intramuscular ketamine, and intravenous midazolam.

Of the 93 cases and 54 turnovers mentioned above, the total turnover time was 2,018 minutes. The average time from the patient out of the OR to the subsequent patient in the OR was 37.3 minutes. Broken down further, the average turnover time for intervention “0” oral midazolam was 34 minutes, for intervention “2” the patient who received nothing was 36.8 minutes, and finally intervention “3” alternative methods were 45 minutes.

Post-implementation data was collected separately, and the evidenced-based intervention was conducted between April 2021 and August 2021. Data was collected on 70 pediatric cases with 45 turnovers in total. The patient population consisted of 48 males and 22 females making up 68.5% and 31.5% of the cases. The average age over 1 year old was 7.2 with 8 patients under the age of 1. The most common procedures conducted were eye and genitourinary surgeries.

The interventions performed were similar to the pre-implementation phase with the addition of our iPad video distraction. There were 36 (51.4%) cases of “1” iPad solely, 6 (8.6%) cases “2” no preoperative intervention, 8 (11.5%) cases of “3” an alternative measure, and 20 (28.5%) cases “4” a combination of oral midazolam and video distraction with the iPad.

Of the 70 cases and 45 turnovers conducted post-implementation, the total turnover time was 1,553 minutes. The average OR turnaround time was 34.5 minutes. The specific turnover time average of each category are as follows: 32.2 minutes for “1” iPad only, 41 minutes for “2” no intervention, 31 minutes for “3” other, most notably IV midazolam, and 46 minutes for “4” a combination of oral midazolam and iPad therapy.

A subjective measurement of provider satisfaction was also conducted among 5 pediatric anesthesiologist staff. They were chosen to answer the survey because they are most often the providers performing these cases. Results revealed positive responses on a Likert scale. Questions inquired about satisfaction vs. dissatisfaction with video distraction, and the likelihood of continuing video distraction as a means of non-pharmacological preoperative anxiolysis methods for pediatric surgeries, were asked. 100% "Agreed" responses in support of both interventions were expressed.

Analysis of the Results

Data results were analyzed via the NMCSD biostatistics department. First performed was the distribution of values across all categories. The descriptive statistics were broken down by intervention, gender, age, operating room procedure, and operating room number. Of note, the data analysis portion conducted was an accumulation of all the collected information consisting of both pre and post implementation.

The mean, median, and modes were calculated among the different groups. It was discovered that there were overlapping 95% confidence levels (CL) of the two most investigated topics; turnover time for iPad vs. oral midazolam for preoperative anxiolysis. As such, drawing a direct statistical association between the reductions in turnover time with the use of video distraction vs. oral midazolam, was unable to be determined, as confounding variables were present. The 95% CL for the iPad group was 27.75, 36.68 (mean 32.2, median 29.5, mode 22) and the oral midazolam group 29.50, 38.66 (mean 34.0, median 36, mode 39). To confirm the presence of confounding variables and rule out if there was statistical significance, the results were examined via an independent T test. The T test validated that there was no statistically significant difference with a p value exceeding >0.05 respectively. The group of patients who

received no intervention also had an overlapping 95% CL of 33.25, 39.81 (mean 36.5, median 37, mode 41). Moreover, the combination group of iPad plus oral midazolam had a 95% CL turnover time of 28.27, 63.73 (mean 46, median 38, mode 38) which overlapped with other groups as well and showed no statistically significant results on their respective T tests. Though results of all independent T tests showed no statistical significance, there was however a clinically significant reduction in overall turnover time.

Organizational Impact/Implications to Practice and Policy

Though the null hypothesis was not able to be rejected and reflect statistical significance, there is clinical significance to be had within this evidence-based project. Reduction in turnover time and thus saved costs, limiting unnecessary anesthetic medication exposure, increasing the scalability to NMCSD's anesthesia department, and minimizing infection transmission are all clinical impacts that emerged. Therefore, we recommend NMCSD implement this process and clinical practice change to all pediatric surgical patients once they arrive in the preoperative hold area. The impact of doing so supports the DHA's quadruple aim goals of lower cost, better health, better care, and improved readiness (Military Health System, 2017).

The reduction experienced in OR turnaround time between pediatric cases from the administration of video distraction coincides with current literature. With the average time of two minutes saved per turnover from iPad administration alone compared to oral midazolam, results in approximately $16.48 per case, multiplied by the 480 (40 per month) estimated pediatric surgical turnovers conducted yearly at NMCSD, would yield a possible cost savings of $7,910.40. Moreover, this cost savings does not include the amount in funds saved ($0.69-$2.16 per 2mg) from not utilizing oral midazolam to the same extent (Lexicomp, 2020).

Cost savings alone is not the only beneficial impact of video distraction for preoperative anxiolysis. When children receive just an iPad before surgery, they decrease their exposure to benzodiazepines that could potentially cause adverse effects. Limiting the number of medications patients receive in general seeks to improve better health, especially if similar efficacy is achieved via non-pharmacological means (Stewart et al., 2019). Though the level of anxiolysis was not measured in this project, the anesthesia provider deemed the patients to be sufficient to bring back to the OR for surgery thus insinuating that the patient was comfortable enough to be separated from their caretaker. This too correlates with the current literature that reveals non-pharmacological video distraction for pediatric anxiolysis is as effective as oral midazolam (Marechal et al., 2017).

A systems improvement with the application of video distraction for pediatric surgery patients that leads to better care is increasing throughput efficiency at NMCSD. This occurs as there is virtually no waiting period for oral midazolam to onset and thus the patient can be taken back to the OR once the room is ready (Barash et al., 2017). Reducing turnover times not only saves money but allows for a smoother process of patient movement and theoretically as delays are reduced more surgeries can be conducted.

Lastly, it was noted during the implementation phase that many of the pediatric anesthesia providers were already conducting a similar process of anxiolysis in the preoperative hold area. Before the patient was taken to the OR, the anesthesia provider for would supply the child with their personal cell phone as a distraction measure. To improve readiness, we recommend that the NMCSD anesthesia unit purchase, or borrow from the IT department, 3 iPads that would be dedicated to the preoperative hold area. These can be utilized and given to the patient upon first encounter by the preoperative staff. This provides an advantage that no

personal electronics would need to be used, and the video distraction iPad would be a useful tool as the child is waiting to go back to surgery, helping to curb their boredom. Finally, with a standardized dedicated device that is sanitized after each use, the possibility of transmitting microorganisms from staff to patient and vice versa could be lessened.

Future Directions for Research and Practice

Future directions included delivering a PowerPoint presentation to the anesthesia department at NMCSD with key stakeholders. Highlighting the statistical evidence as well as the clinical significance of the results showing that OR turnover time was reduced during video distraction methods was demonstrated. The largest barrier to this will be a culture change from anesthesia providers as evidenced by some utilizing only oral midazolam or a combination of both. To help aid in this we have appointed a champion to kindly encourage the staff about the recommendation for best practices. That individual will be at NMCSD for an additional 3 years post-graduation. To reach our larger audience we also provided an oral presentation and poster during USU's research week. We also submitted the manuscript in an attempt to publish the project within a scholarly peer-reviewed journal.

As with most evidenced-based projects, further investigation is needed to explore results. Research is a cyclical process and doesn't stop with just one finding. One limitation question after project implementation was if the clinical impact of decrease in turnover time minutes with video distraction, but lack of statistical significance, were impacted from outside sources in addition to the intervention. For example, this project was not blinded for the patient nor the anesthesia provider. Could the reduction in turnover time have been because the individual staff was attempting to move quickly and get the patient back to the OR in due time? Was it the confounding variables that influenced the data making this project not statistically significant?

Or was it because the intervention and data collection involved a small percentage of the population sample of patients outside of the 2–12-year-old range? To investigate this concept more clearly, scrutinizing and controlling for all outside factors may display more detailed results.

In addition, further investigation would need to be conducted to identify if combination methods of preoperative anxiolysis could be beneficial in reducing OR turnover times. The post implementation data collection didn't include other anesthetics such as nasal dexmedetomidine and intramuscular ketamine used in combination with video distraction. The only combination method used during this period was oral midazolam and video distraction which those results were not promising and had the longest average. However, the use of ketamine and dexmedetomidine in conjunction with video distraction could provide shorter times with an additive effect and needs to be looked at further in future studies.

Finally, to help in the understanding of the state of anxiolysis the child was in before surgery also needs to be studied. For example, the project strictly looked at turnover times, the amount of time from one patient leaving the OR to the next arriving assuming that preoperative anxiolysis was fully achieved. However, this is not to say that the child was sufficiently comfortable to be separated from their caretakers. To improve the project design, incorporating a pediatric anxiolysis comparison between oral midazolam and video distraction would provide the most useful information.

Conclusion

The project's goal was to determine if a non-pharmacological method such as video distraction, provided enough anxiolysis in pediatric surgical patients preoperatively thus allowing them to be brought back to the OR more quickly reducing overall room turnover times.

A clinically significant reduction in mean time between room turnovers resulted with the implementation of an iPad for video distraction. These findings are streamlined with the current literature available. With the detailed benefits of this manuscript, we strongly recommend NMCSD to utilize iPads for video distraction in pediatric surgical patients during the preoperative phase.

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Appendix A

CITI Certificates

CITI PROGRAM

Completion Date 16-Mar-2020
Expiration Date 16-Mar-2023
Record ID 35964706

This is to certify that:

Jeffery Nunez

Has completed the following CITI Program course:

Not valid for renewal of certification through CME. Do not use for TransCelerate mutual recognition (see Completion Report).

OUSD P&R Human Research (Curriculum Group)

Biomed Research Coordinators, Clinical Coordinators, Study Coordinators & Research Administrators (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/?w26456ce2-94c9-4132-ab6f-32c4398d6a2c-35964706

CITI PROGRAM

Completion Date 05-Apr-2020
Expiration Date 05-Apr-2023
Record ID 36171514

This is to certify that:

Meaghan Snyder

Has completed the following CITI Program course:

Not valid for renewal of certification through CME. Do not use for TransCelerate mutual recognition (see Completion Report).

OUSD P&R Human Research (Curriculum Group)

Biomed Research Coordinators, Clinical Coordinators, Study Coordinators & Research Administrators (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/?wc08341fd-6942-4830-88ed-0bf2e5d61474-36171514

Appendix B

USU Form 3202N

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-61-12075
Principal Investigator:	Snyder, Meaghan
Department:	Graduate School of Nursing
Project Type:	Student
Project Title:	Age Appropriate Video Distraction for Pediatric Surgical Patients: Assessing the Process of Reducing Operating Room Delays
Project Period:	8/9/2021 to 4/1/2022

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: 2021.08.11 14:57:00 -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 C

MTF IRB/PI Letter of Determination

Clinical Investigation
Department Naval Medical
Center, San Diego 34800 Bob
Wilson Drive, Suite 5 San Diego,
CA 92134-1005
Tel: (619) 532-8125
E-mail: Johanna.peterson2.civ@mail.mil

9 November 2020

From: NMCSD IRB, Clinical Investigation Department

To: LT Jeffery Nunez, NC, USN

Subj: REVIEW AND RESEARCH DETERMINATION OF SUBMITTED QUALITY IMPROVEMENT / PROCESS IMPROVEMENT PROJECT: QI # NMCSD.QI.2020.110903, Entitled: "Age appropriate video distraction for pediatric surgical patients: Assessing the process of reducing Operating Room delays."

Ref: (a) Part 219 of Title 32 Code of Federal Regulations (CFR) Protections of Human Subjects (32 CFR 219)
(b) Department of Defense Instruction 3216.02
(c) Deputy Assistant Secretary of Defense for Health Affairs Operating Instruction for the Research Regulatory Oversight Office (3 October 2019)

Review Date: 9 November 2020
Review Type: Exempt Determination Review
Determination: Quality Improvement Project, Not Human Subject Research
EIRB Ref: 932979

All research projects are required to be reviewed by the NMCSD Human Research Protection Program whether or not the protocol is Human Subject Research or a Quality Improvement/Process Improvement Project. All research involving human subjects is required to be reviewed and approved by the Institutional Review Board (IRB) before research activities begin. Quality Improvement/Process Improvement (QI/PI) Projects are required to be reviewed and issued a formal determination by an appointed Exempt Determination Official before publication and or presentation of QI/PI Projects.

Summary of Review and Determination: NMCSD Human Research Protection Program, Exempt Determination Official(s) performed a review of the above entitled project and determined it does not qualify as Human Subject Research (either exempt or non-exempt) and therefore is not subject to IRB review and approval, nor Human Subject Research Protections and IRB Oversight.

Please retain this determination outcome letter for your records. Public Affairs Office (PAO) may request documentation of review for this project.

Naval Medical Center San Diego holds Office of Human Research Protections Federal Wide Assurance number **FWA00002342, IRB #IRB00002061** and **DOD Navy Assurance number P60022**.

Please contact the IRB Research Administration Division (RAD) if you have any questions regarding this determination.

[redacted]

Robert M. Marks, MD
CDR, MC, USN
Chairman, Institutional Review Board
Naval Medical Center San Diego

Appendix D

PAO Clearance

NAVY MEDICINE CLEARANCE OF AUTHORED WORKS FORM

DATE FORM COMPLETED: 3/23/2022

Authors	Rank/CIV/CTR	Command/ Organization	Institutional affiliation	Role in a research or work	E-Mail Address	Phone Number
Nunez, Jeffery M LT		/ DSS-00259-MAIN OPERATING ROOM-04SU0		Nurse		310-507-3426
Snyder, Meaghan R LCDR USN NAVMEDCEN SAN CA (USA)						

Does this work require expedited review? ◯ **YES** ◯ **NO**

*If yes, please explain (*note expedited review is not guaranteed):*	
Title of work:	Age-Appropriate Video Distraction for Pediatric Surgical Patients: Assessing the Process of Reducing Operating Room Delays NMCSD Abstract.pdf
Format: This automated work is a: Abstract, Poster, Presentation	(1) Abstract; (2) Poster; (3) Oral podium presentation, (4) Approval to upload final report to the "USU Archives"

Select your parent command:

Research and Development Enterprise (R&D) ◯ **NMETLC**

Military Treatment Facility ◯ **BUMED Headquarters** ◯ **Other**

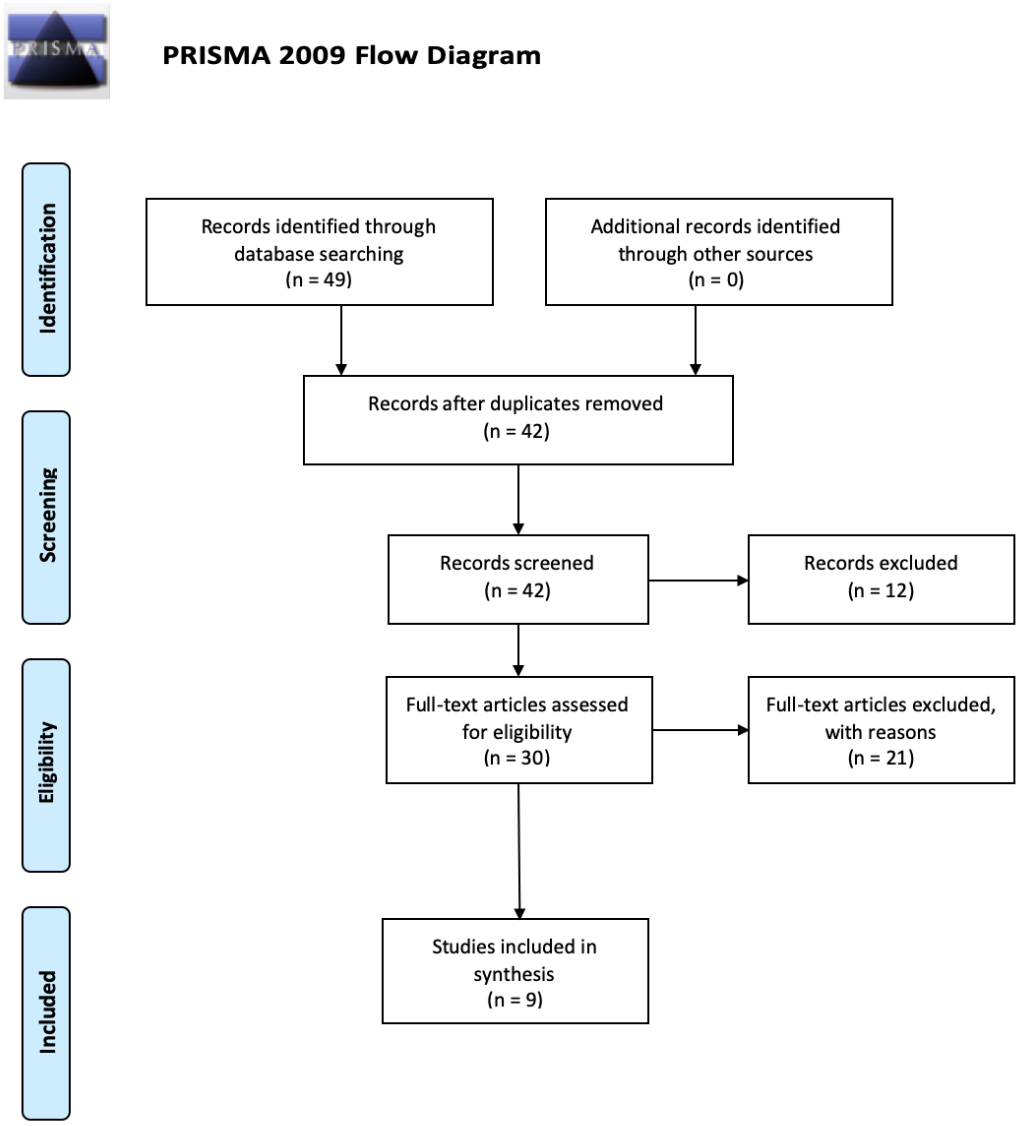
List publication(s) or forum(s) you plan to submit to (up to 3):
USUHS Archives http://cdm16005.contentdm.oclc.org/cdm/landingpage/collection/p15459coll1

Expected date of publication: 2022-02-17	**Name of conference or event:**
Conference or event date: 2022-02-17	**Intended audience:** Medical Professionals

Appendix E

Figure E1

PRISMA Flow Diagram



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and *M*eta-*A*nalyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit www.prisma-statement.org.

Figure E2:

Evidence Table

1st Author Name (Publication Yr)	Study Purpose/Aims	Research Questions/Hypotheses (IF different from/specifically described separately from study purpose & aims)	Study Design	Total Sample Size (How many initially, how many at final analysis?)	Sampling Plan	Independent Variables AND LEVEL OF MEASUREMENT	Dependent Variables AND LEVEL OF MEASUREMENT	Statistical Analyses - what tests were used for which research questions?	Results	Strengths (how promoted internal/external validity)	Weaknesses (biases; poorly controlled threats to internal/external validity)	LEVEL OF EVIDENCE - using JHNEBP tool (Strength and Quality)
Sola, et al., 2017	1.) This study was designed to assess three different strategies for childhood preoperative anxiolysis: 1. midazolam premedication 2. midazolam in combination with portable Digital Video-Disk player or 3. video distraction strategy alone	None specified	Prospective randomized study	135 children aged 2-12 years enrolled (45 children in each of 3 groups)	Setting: Montpellier University Hospital, between April 2012 and June 2013. Convenience Sample Inclusion: All patients, aged 2-12 years hospitalized in the Ambulatory Surgery Unit. Exclusion: Children requiring emergency surgery and those with developmental delay/impairment were not eligible.	Treatment. Group 1) Pharmacological sedative premedication with midazolam (MDZ group); Group 2) Combination of midazolam and distraction strategy using a hand-held Digital Video-Disk player (MDZ+DVD group); Group 3) Video distraction strategy alone (DVD group) NOMINAL	1) Children's anxiety level evaluated on day of surgery using the Modified Yale Preoperative Anxiety Scale (mYPAS), 2) Parental and children's anxiety assessed using the Visual Analog Scale (VAS-anxiety), 3) Severity of children's agitation in recovery measured using the Pediatric Anesthesia Emergence Delirium (PAED) scale, 4) Children's postoperative pain during hospital stay measured using the Face, Legs, Activity, Cry, Consolability (FLACC) scale, 5) Children's postoperative pain at home measured using the Parents' Postoperative Pain Measurement (PPPM) scale, 6) Overall parental satisfaction assessed on an ordinal scale from 1 (unsatisfied) to 3 (very satisfied) INTERVAL/RATIO	Chi Square analysis was utilized for categorical variables. The authors stated ANOVA was conducted on normally distributed/adequate sample size continuous variables. They mentioned the use of Kruskal-Wallis for all non-parametric/inadequate sample size continuous variables. For paired measurements they utilized a Wilcoxon Signed Rank test for interval/ratio data while McNemars for nominal data.	Results reported that video, midazolam, or their combination seems to have similar effects to prevent and/or allay preoperative anxiety in 2-12-year-old children scheduled for outpatient surgery. Video distraction appears to b e an alternative easy to use, cost effective and devoid of side effects tool to mitigate presurgical anxiety in children.	Randomized to treatment, prospective study	1. Health professionals could not be blind to intervention group, therefore they couldn't eliminate risk of bias due to lack of blinding and proper allocation concealment. 2. Observer bias is a limitation of trials that use observational tools for anxiety assessment. 3. For ethical reasons the study did not include a control group without any anxiety prevention strategy.	IB
Aytekin et al., 2016	1.) The purpose was to investigate the effect of distraction on childhood anxiety levels in preoperatively.	None specified	Prospective two group experimental study design	n = 83 initially and throughout study. n = 40 for interventio n group while n = 43 in control group	Setting: Nov 20th 2013 - Jan 23 2014 at a university hospital in Turkey. Sampled entire pediatric patient population who was currently hospitalized for surgery during the time of the experiment. Written consent from parents and verbal consent from child. Power analysis was determined before and concluded a 40 person requirement for the study. Convenience Sampling Inclusion: ages 9-18, literate, willing to participate, and ASA score of I or II. Exclusion: children or families with chronic illness, developmental delays, being illiterate or unwilling to participate, and ASA > II.	Treatment Group: Distraction interventions. Distraction options were choice of video games, book, audio tracks, or cartoons. Control Group: Usual care, no distractions intervention. NOMINAL	1.) Separation scoring scale - was conducted at time of parental separation. INTERVAL/RATIO 2.) Straight Trait Anxiety Inventory For Children State (STATIC) Form - 20 to 60 point self report scale. Cronbach's number determined 0.88 for this study. INTERVAL	Independent t test was performed for both the separation scale and STATIC	The control group had mean 2.02 SD (0.72) compared to intervention group mean 1.45 SD (0.64) for separation scale. p value was statistically significant for intervention group at p .00 STATIC control mean 56.37 SD (5.49) and intervention group mean 53.95 SD (3.59). p value statistically significant for intervention group at .02	1.) Power analysis stated set a priori. 2.) Cronbachs score mentioned for STATIC tool. 3.) alpha set a priori at .05 4.) Mentions the gap in the literature as to why this study's purpose is important. 4.) Displayed similarity with patient characteristics.	1.) Convenience sampling conducted, could have controlled for more bias with a purposive approach. 2.) Could have described specifics of the anxiety separation tool more clearly. Unsure of what type of characteristics it's measuring. 3.) Did not mention confidence interval with results.	IIA
Stewart et al., 2018	1.) The purpose was to compare the effects of tablet based interactive distraction (1 minute prep time) to oral midazolam administration (45 minute prep time) on preoperative anxiety, emergence delirium, and post anesthesia length of stay in children.	Research question stated the same measures as the purpose statement.	Single blind Random Controlled Study	n = 102 total, n = 51 control group, n = 51 interventio n group	Setting: Conducted between Feb 2016 - Sept 2016 in both the ambulatory and main surgical suites of a large southwestern hospital. Power analysis a priori revealed a 102 requirement. Randomization was performed by selection of either a robot card for the ipad intervention or or dinosaur card for the oral midazolam intervention. Inclusion: ages 4-12, surgical procedure < 1.5 hours, ASA I II, no prior surgeries and english speaking. Exclusion: Allergies to midazolam, previous behavioral, neurosensory/developmental delays.	Treatment Group: ipad mini 1 minute before parental separation. Control Group: received 0.3m/kg oral midazolam 15-45 minutes prior to parental separation. NOMINAL	1.) Children's anxiety level evaluated on day of surgery using the Modified Yale Preoperative Anxiety Scale, mYPAS (INTERVAL/RATIO) 2.) Pediatric Emergence Delirium Scale, PAED (ORDINAL) 3.) Caregivers Perception of Child's Anxiety (ORDINAL) 4.) Electronic Health Record PACU Length of Stay (RATIO)	1.,2.) mYPAS and PAED used repeated ANOVA with Bonfferoni to determine which groups were statistically significant. 3.) Caregivers perception of child's anxiety utilized ANOVA for main effect and paired t test to determine within group differences between two periods.	1.) mYPAS scores at parental separation mean 29.3 SD (12.2) for oral midazolam and mean 25.7 SD (8.7) for TBID p value .006 statistically significance; at mask induction mean 35.7 SD (16.4) for oral midazolam and mean 28.6 SD (11.6) for TBID p value <.001 statistically significant. 2.) On initial emergence delirium scores 10.6 SD (2.9) for oral midazolam and 9.6 SD (4.7) for TBID which were NOT statistically significant. However, after 15 minutes oral midazolam 6.7 SD (4.3) vs 3.9 SD (3.7) for TBID group p value .001 statistically significant. 3.) No statistically significance among caregiver perception of child anxiety. 4.) There was a statistically significance among shorter postoperative times at all the measurements for TBID compared to oral midazolam p values were .007 at 5 minutes, .003 at 7 minutes, and <.001 25 minutes until discharge.	1.) Randomized to treatment, prospective study. 2.) Randomization explained and appropriate. 3.) Single blinded postoperative staff. 4.) Power analysis set a priori. 5.) Appropriate parametric statistical tests utilized. 6.) Demographics displayed similarities.	Unable to blind mYPAS scorer. 2.) Child life specialist accompanying patient to OR may have distraction influence. 3.) Only conducted on healthy kids. 4.)	IA

Kim et al., 2015	1.) The purpose was to see if video distraction alone or in combination with parental presence was as efficacious as parental presence alone in reducing preoperative anxiety in children. 2.) Secondary aim was to investigate the impact on above interventions against emergence delirium.	None specified	Random Controlled Trial	Initial n = 125 eligible, 6 didn't meet inclusion criteria and 2 didn't consent thus n = 117 randomized. n = 39 X three groups. However, consent was pulled and some participants didn't complete the study thus a total of n = 104 was the final data analysis	Setting: Dec 2013 in Yeungnam University Hospital in South Korea. Randomization was conducted by a computer generated software and power analysis was set a priori at 0.80 which determined appropriate sample size. Inclusion: Ages 2-7, ASA I II, scheduled for elective minor surgery under general anesthesia, Exclusion: Chronic illness, cancer, recent stressful event, developmental delay, previous anesthetic event, or emergency surgery.	Treatment Group: 1.) Video distraction of cartoon via smartphone only 2.) Video distraction of cartoon via smartphone plus parental presence Control Group 3.) Parental presence only NOMINAL	1.) Children's anxiety level evaluated on day of surgery using the Modified Yale Preoperative Anxiety Scale, mYPAS at three times, T0 = baseline, T1 = parental separation, T2 = mask induction (INTERVAL/RATIO) 2.) Pediatric Emergence Delirium Scale, PAED Conducted every 10 minutes upon arrival in recovery room. (ORDINAL)	1.) Non Normally distributed mYPAS scores at each time point utilized the Kruskal-Wallis test. 2.) mYPAS scores measured at the three different times used the repeated measures ANOVA. Bonefforni adjustment was conducted for any statistical significance for both above mentioned measurements. INTERVAL/RATIO 3.) Spearman Rank correlation was used to assess PAED scores. ORDINAL	1.) mYPAS scores at T0 were not statistically significant p value p=0.558 2.) Median scores T1 were 23.4 (23.4-31.6) for Video group, 33.4 (23.4-50.0) for parental presence group, and 28.4 (23.4-43.6) for combo group statistically significant with p scores 0.002. At T2 28.8 (23.4-46.6) for Video group, 43.4 (23.4-65.0) for parental presence group, and 43.4 (23.4-70.0) for combo group statistically significant with p score 0.012 respectively. 2.) No statistical significance among PAED scores between 3 groups. Scores were 7.9 +- 6.3, 8.0 +- 5.5, and 9.3 +- 6.0 for Video, parental presence, and combo groups respectively.	1.) Randomization of subjects. 2.) Set power analysis a priori and provided similarity characteristics. 3.) Based sampling off prior pilot study 4.) Provided flow diagram of participants 5.) Clearly described the statistical tests used for each intervention including the basis for parametric and non-parametric measures.	1.) Unable to fully blind subjects. Video distraction and parental presence are obvious interventions that are not possible to blind the researcher/participants. 2.) The authors make note to the lack of statistical significance for postoperative delirium. Specifically, they assert that they may need a larger sample size to detect differences in emergence delirium as this was a secondary aim and power wasn't conducted towards that goal.	IB
Eijlers et al., 2017	1.) Develop a VRE tool that will reduce preoperative child anxiety. 2.) The primary outcome is to determine the efficacy of reducing preoperative child anxiety utilizing a Virtual Reality Exposure VRE tool compared to care as usual CAU. 3.) Secondary outcomes stated the effect of the VRE tool on postoperative delirium and analgesia requirement, parental anxiety, and postoperative anxiety.	None specified	Prospective Random Controlled Trial	n = 200 total n = 100 CAU and n = 100 VRE	Setting: Erasmus MC-Sophia Children's Hospital Netherlands Recruitment for prospective study began Mar 2017 - Aug 2018 and is currently in progress still. Power conducted a priori and set at 0.85, required 100 participants per group. Randomization conducted via stratification depending on ages and type of surgery. Inclusion: ages 4-12, elective same day surgery. Exclusion: ASA >IV, parents unable to read or write, mental retardation.	Treatment Group: Will receive 15 minutes VRE instruction tool on what to expect for perioperative experience. Control Group: Will watch online informative movie about surgical experience during preoperative screen. NOMINAL	1.) Measure child anxiety at T1-T3 (baseline to induction) using the mYPAS scale. INTERVAL/RATIO 2.) Child self report anxiety measured at T1-T5 using Visual Analog Scale INTERVAL 3.) Parental anxiety via State Trait Anxiety Inventory STAI scale. ORDINAL 4.) Postoperative pain measured with Faces pain scale. ORDINAL 5.) Pediatric Emergence Delirium Scale PAED to measure postoperative delirium. ORDINAL	Repeated measures ANOVA will be used to analyze child anxiety scores from the mYPAS scale, for the results of parental anxiety scores, and also on postoperative pain scores. An ANCOVA will be utilized for emergence delirium results.	The VRE tool was developed and tested as a pilot study on a sample size of 10. The initial study began in Mar 2017 and ended in Sept 2018. The officials results of this study has yet to be published.	The study will use randomization for application of their participants. The sample size will be adequate according to power analysis set a priori. The VRE tool developed provides better personal engagement with patient/parent of the hospital experience. VRE tool is completely non-verbal thus will be more applicable for younger children, non-verbal children, and of parents who can't comprehend their second language.	The biggest limitation of this article is the fact that the actual study and results have yet to be published. This article's main focus was to develop a functioning VRE tool and describe how they will conduct their study design. Therefore, we are unable to generalize the efficacy of the VRE as of yet.	IB
Dwairej et al., 2019	1.) The purpose of this study was to analyze the effectiveness of a combination of video game distraction with anesthesia mask exposure in reducing preoperative anxiety in children. 2.) Secondary aims include effectiveness of combo interventions on induction compliance and emergence delirium.	None specified	Random Controlled Trial	n = 168 acessed for eligibility, n = 136 initial radomization, n = 128 was the final data collected, n = 64 per control group and n = 64 per interventio n group	Setting: Recruited as a convenience sample from Mar 2018 to Jul 2018 at a university hospital in Amman Jordan. A power analysis was established a priori 0.80, alpha at 0.05 and medium effect size of 0.50 It was determined a minimum of 128 participants is required. **Inclusion:** Ages 5 -11, no previous surgeries, ASA I or II, and day of elective surgeries. Exclusion: None stated outside of inclusion criteria	Treatment Group: Received mask exposure/shaping for 20 minutes and video game distraction while in preoperative holding area. NOMINAL Control Group: Received usual care of surgical verbal explanation. NOMINAL	1.) Treatment Group: Measure child anxiety at baseline, after combination intervention, and during mask induction using the mYPAS scale. INTERVAL/RATIO 2.) Control Group: Measure child anxiety at baseline, after usual care, and mask induction using mYPAS scale INTERVAL/RATIO 3.) Induction Compliance Checklist (ICC) ORDINAL 4.) Pediatric Emergence Delirium Scale PAED to measure postoperative delirium. ORDINAL	1.) Independent t test for mean differences in anxiety scores between the intervention and control groups. 2.) Repeated ANOVA was used to test anxiety levels from baseline to induction per child. 3.) X2 was used for ICC scores. 4.) Independent t test used for comparison of emergence delirium means.	1.) Independent t test for means of mYPAS anxiety scores at different times was statistically significant for a reduction in anxiety. Intervention group mean 42.67 SD (13.91) vs control group mean 63.00 SD (15.66) p value < 0.001 2.) Scores from the repeated ANOVA revealed a statistical significance in no increase of anxiety scores among the intervention group compared to the control group from baseline to induction. F value 9.62 and p value <0.001 3.) X2 fewer children demonstrated uncooperation of induction on the ICC in the intervention group compared to the control group, specifically X2 (1) = 3.91 and p value 0.04 5.) The mean PAED scores did not differ significantly between groups. p value .30	1.) Excellent job on describing sampling process including how randomization was conducted. 2.) Demographic characteristics displayed similarities among groups. 3.) CONSORT flow chart provided for sample. 4.) Appropriate statistical test completed for comparison of scores.	1.) No blinding to subjects. 2.) Potential for observer bias 3.) No confidence interval provided 4.) Unable to generalize as study did not include non elective surgical cases.	IA
Inan et al., 2018	Aimed to study the effectiveness of 3 distraction methods on the pain and anxiety of children during venipuncture.	4 Hypothesis Stated: 1.) Video game distraction (a form of active distraction) will reduce child anxiety and pain during venipuncture. 2.) Cartoon movies (passive distraction) will reduce child anxiety and pain during venipuncture. 3.) Parental verbal communication (passive distraction) will reduce child anxiety and pain during venipuncture 4.) Video game distraction will reduce child anxiety and pain during venipuncture more than the other techniques.	Random Controlled Trial	n = 196 was the initial number of children and their parents selected, n = 180 was final number of participants, n = 45 per all 3 interventio n groups and n = 45 for control group	Setting: Took place in Aug - Nov 2016 in Training and Research Hospital in Istanbul. Power was set a priori at 0.80, alpha level set at .05 and determined 42 applicants would be adequate for the study. **Inclusion:** Ages 6-10 who visited the hospital for various procedures during the study's run time and were referred to the phlebotomy clinic for blood draw. Able to consent or parent consent, no opioids within past 6 hours, no visual or aural deficiency, and enough cognitive level to respond to the scales. Exclusion: None mentioned outside of above criteria.	Treatment Groups: 1.) iPad cartoon distraction began 3 minutes before the venipuncture 2.) iPad video game distraction began 3 minutes before the venipucnture 3.) Parental communication distraction began 3 minutes before the venipuncture Control Group: Received usual venipuncture protocol which consisted of nurse only communication strictly about the procedure process, no distraction involved. NOMINAL	1.) Children's Fear Scale measures anxiety levels before, during and after the venipuncture. Scale ranges from 0 - 4 and is ORDINAL 2.) Wong Baker Faces Pain Scale measure pain during and after the venipuncture. Scores range from 0 - 10 and is ORDINAL	1.) Kruskal Wallis for CFS and Wong Baker scores. 2.) Friedman Test was used for intra group parameters of anxiety reports from self, parent, and observer. 3.) X2 was used for the demographic characteristics comparison	1.) The results of the Kruskal Wallis test among the groups showed that the video game group was statistically significant in all three types of reports (child report score = 0.27 +-0.26, observer report score 0.58 +-0.87 and parent report score 0.51 +- 0.76) for reducing anxiety compared to the other two interventions groups and control group. Moreover, other two intervention groups (cartoon movie and parental communication) both were statistically significant for a reduction of anxiety compared to the control group P value 0.001 and 0.007 respectively. 2.) The Wong Baker results showed similar to the above with the biggest reduction in pain response was from the video game distraction patients, scores were 1.42 +-1.74 for child report, 1.69 +-1.86 for parent report, and 1.96 +-1.88 for observer report. P value 0.001 The other two intervention groups also showed a reduction in pain compared to the control group. 3.) The interclass reporting by the child, observer, and parents of anxiety and pain were positively well correlated as well, 0.67 - 0.924 P value <0.01	1.) Randomization utilizing a computer generated process with opaque envelopes. 2.) Thorough description of the two scales used to measure the outcome variables. Both have been proven to be valid and reliable. 3.) Ran a power a significance level a priori 4.) Demographics non statistically significant on X2 results, thus good similarity in groups.	1.) No blinding was conducted. 2.) Convenience sampling conducted 3.) No confidence interval reported	IA

Chaurasia et al., 2019	The purpose of this study was to analyze the effectiveness of using a combination of an incentive based game and parental presence to reduce preoperative anxiety in children. Secondary aims was to study if the intervention also had an impact on the induction compliance checklist (ICC) and/or parental anxiety.	They hypothesized that the use of the incentive game based intervention along with parental involvement would be a cost effective non-pharmacological way in reducing childhood anxiety preoperatively	Prospective Random Controlled Trial	n = 92 eligible, 10 did not meet inclusion criteria while 2 denied consent, Two groups n = 40 and n = 40 for a total of n = 80 data collection	**Setting:** Selected from the clinical trial registry in India May 5th 2016. Randomization was conducted via a computer generated number table Power was set a priori at 0.90 and alpha level 0.05 based on a prior pilot study Inclusion: Patients were scheduled for elective surgery under general anesthesia, ASA I/II school aged 4-8, parent able to provide consent Exclusion: deaf, cerebral palsy, mentally challenged, premedicated, or uncooperative from the trial	Treatment Group: Child and parents were shown the anesthesia circuit and mask while in the preoperative holding area. Control Group: Usual care received in preoperative holding area. NOMINAL *Both groups had parental presence during preoperative to induction of anesthesia phase	1.) mYPAS scores measure between two groups at three different times, the day before preop, while in the preoperative holding area before the intervention, and during induction of anesthesia. INTERVAL/RATIO 2.) ICC scores were taken during mask induction ORDINAL 3.) State-Trait Anxiety Inventory STAI assessed before and after anesthesia induction. ORDINAL	1.) For parametric normally distributed data the authors state they used a t test for score 2.) If the data was non-normally distributed, they used a Mann Whitney U test 3.) For categorical data they used chi square 4.) They used a repeated ANOVA for time related variables	1.) There was no significant difference among the means of the two groups anxiety at baseline and preoperatively. However, the mean anxiety score of the intervention group at mask induction was 32 (30.4-34.6) compared to control group mean 52 (48.9-56.3) which was statistically significant p value <0.001 CI 95% 2.) The ICC scores demonstrated a more cooperative induction score with the intervention group vs the control group p value <0.001 3.) There was no statistically significance among scores of parental anxiety p value 0.189	1.) Randomization utilized to control for confounding variables 2.) Power and alpha set a priori 3.) Sample size determined on power analysis and also previous tested pilot study 4.) Confidence interval referenced 5.) CONSORT diagram for flow of participants	1.) No blinding 2.) Potential observer bias 3.) Potential for study bias from exclusion criteria of uncooperative children 4.) Unsure of what setting exactly study was conducted. It's stated the children were selected from a registry however it doesn't reference where the study took place 5.)	IA
Eijlers et al., 2019	This systematic review and meta analysis was performed to determine the effectiveness of virtual reality VR on reduction of pain and anxiety within the pediatric population.	None specified	Systematic Review including Meta Analysis	Screened articles n = 2889, records excluded n = 2845, remaining was n = 44 full text (these were screened as well for eligibility and records included for final review n = 17	Setting: The authors used the assistance of a biomedical information specialist on April 25th 2018 to search the following databases: EMBASE, PSYCINFO, MEDLINE, CENTRAL, PubMed, Web of Science. Inclusion: To be eligible for screening the article had to have VR as the intervention applied to reduce child anxiety and pain. This was defined as a 3D interactive head mounted display HMD Exclusion: Reviews, meta-analysis, single case studies, dissertations, abstracts, and conference papers were excluded	Treatment Groups: The IV measured in all of these studies were the use of a virtual reality head mounted display Control Group: Received the usual care at the facility of their surgical operation NOMINAL	1.) Observational pain and anxiety scores made by caregivers and health care providers ORDINAL 2.) Pain and anxiety reported scales measurement using the visual analog scale, graphic rating, and faces scales *Variable-ORDINAL/INTERVAL/RATIO	Using the Comprehensive Meta-Analysis Software Version 2 to determine 1.) standardized mean difference SMD effect size for pain and anxiety 2.) Heterogeneity was assessed using the I2 statistic 3.) Sensitivity analysis were run for the type of medical procedure 4.) Meta regression analysis used to determine if the mean age of the studies had an influence on results	1.) Delphi list had scores only 0 - 6 for 16 articles as the blinding question was removed due to it being impossible to accomplish in the studies. The 1 study that did blinding, the intervention was conducted before the procedure and thus the observing staff wasn't aware. The mean data of quality for the articles via the Delphi score was 3.5 SD (1.7) 2.) After adjusting for the largest effect size result, to aid in a more accurate representation of VR effect on pain reduction, the SMD 0.73; CI 95% 0.35-1.11; p value <0.001 which was statistically significant for VR pain reduction compared to usual care; heterogeneity after correction was I2 78.3% 3.) The meta regression analysis to determine age differences in reported pain revealed p value <0.001 after correction of the largest effect size result 4.) As for anxiety reduction after correction for the largest effect size and lowest methodological studies, the results were SMD 0.50; 95% CI 0.20-0.79; P = 0.001 and a heterogeneity score of I2 22.4% both of which were statistically significant 5.) Meta regression on age differences among anxiety reduction via VR was p = 0.37 after correction for largest effect size skew	1.) Systematic review including meta-analysis of RCT's. 2.) Rigorous inclusion and exclusion criteria led to a total of only 17 articles after over 4,000+ were initially populated 3.) Under the results section, correct for possible erroneous results by conducting a meta regression analysis on the omitted largest effect size study and lowest methodological study 4.) Performed I2 heterogeneity sensitivity analysis to ensure age differences in results	1.) Effect sizes for patients anxiety reporting was only conducted on 7 of the articles 2.) The authors stated that there was limited reporting of observer data, this could lead to observer bias in some of the analyzed studies 3.) For 3 of the studies used there was median and IQR scores used, this may lead to non generalizable information for overall effect 4.) Unable to distinguish what the usual care was in many studies, this makes it challenging to determine if the reduction in pain and anxiety is due to the VR only or a combination of the usual care and VR. For instance, the studies typically did not mention if the usual care already contained some type of distraction method as in watching a video	IA
Cameron et al., 1996	The primary aim was to determine if parental presence reduced child anxiety during induction of anesthesia. The secondary aims seeks to clarify the effect of premedication, the timing of parental separation, and the seriousness of the case and how they relate with child anxiety during surgical procedures.	None specified	Quasi Experimental Design	n = 74 total; n = 38 are treatment group that had parental presence during induction; n = 36 are the control group where no parental presence during induction	Setting: Private hospital Adelaide South Australia over a 3 month period, convenience sampling with a 80.4% response rate on provided questionnaire Inclusion: Ages 1-8, minor and major surgeries, consent provided by parents Exclusion: None stated outside of above mentioned	Treatment Group: Parental presence accompanied child throughout preoperative to induction phase NOMINAL Control Group: Parental presence only occurred during the preoperative holding area NOMINAL	1.) Effect of background characteristic on anxiety; level of measurement varied with both ORDINAL and INTERVAL data. See statistical test column for details 2.) Effect of parental presence on anxiety INTERVAL/RATIO 3.) Effect of anxiety based on timing of parental separation INTERVAL	1.) Effect of background characteristics on anxiety; measured using independent t test and chi square for premedication vs non premedication comparison 2.) Effect of parental presence on anxiety; used an independent t test for comparison between parental presence and non parental presence groups 3.) To measure the effect of timing of separation with anxiety, the authors used an independent t test	1.) Children who received premedication had a higher anxiety mean score of 5.8 SD (2.6) compared to child who did not receive premedication 4.5 SD (2.3) p value <0.05 which was statistically significant; Chi square results reflected the same information of X2 = 13.4 and p < 0.001 2.) There was a significant difference between parental presence and lack there of at time of induction for child anxiety t score = 3.61 P <0.001, parental anxiety t score 6.71 p <0.001, and parental attitude t score 4.36 p <0.001 3.) Children that were separated during during the ward were more likely to be anxious at induction than those separated within the holding are t score 3.67 p <0.001	1.) The study utilized both parametric and nonparametric proportion statistical analysis to confirm results of studies 2.) Explanation of scales used was detailed	1.) The sampling method used was a convenience sampling. It was difficult to understand their process how how the participants were acquired. 2.) No randomization 3.) No power analysis to determine the adequate sample size 4.) No CONSORT flow chart provided 5.) There was a large amount of parents unable to accompany their child to the operating room, the majority of those were not of their own will. Thus potential for bias among the participants who were able to be present for induction 6.)	IIB/C

Figure E3

Business Case Analysis

NURS5220: Translation of Evidence

Business Case Assignment and Operating Budget

BUSINESS CASE ASSIGNMENT AND OPERATING BUDGET
Proposed Title for Project/Initiative/Opportunity to Improve
Selection of the best preoperative child (ages 2-12 years old) anxiolysis intervention to reduce operating room delays and allow for on-time surgical cases.
Opportunity Statement *(Description of Proposed Project/Initiative/Opportunity to Improve)*
Investing in age appropriate, non-pharmacological evidence-based measures will reduce operating room delays due to child surgical cases, lower hospital costs from a reduction in delays, improve patient and parent/guardian satisfaction, and increase the DHA's quadruple aims for Naval Medical Center San Diego.
Business Opportunity/Objectives *(Prioritize listing)*
1. Reduce delays in the operating room schedule 2. Improve patient throughput from preoperative to postoperative setting 3. Cost savings 4. Increase patient and parent satisfaction
Potential Impact of Business Results *(Identify metrics to measure outcomes associated with the objectives identified)*
1. Chart comparison of time to induction of anesthesia among children ages 2-12 years old. After completion of the pilot implementation of our EBP, we will then compare the time differences to induction by measuring time 0 as the initial encounter in the preoperative holding area and time 1 the time once induction is completed. 2. Rate of on-time surgical schedule. Were surgery commencing times met? This will be compared using the scheduled hard start times to surgical start time. The Innovian anesthesia chart will aid in the determination of surgical start times. We will then compare those to the scheduled operating room time slots. 3. Dollars spent on preoperative time delays due to improper or ineffective anxiolysis. To determine this metric, we will use $8.24 as Naval Medical Center San Diego's cost per OR minute delay. This data was gathered after consulting with the anesthesia department's fiscal staff. Once the hours of delay are determined from the statistical analysis, we will then multiply that per the above cost per minute to yield an overall cost of delays. 4. Discharge surveys and satisfaction surveys gathered during follow up phone interview. The postoperative anesthesia telephone interview will allow for completion of this outcome. During the interview, questions such as "how was your anesthesia care?" and "were you satisfied with the anesthesia you received?" will be probed.
Alternatives (courses of action) chosen for Analysis
1. Administration of preoperative age appropriate (2-12) video distraction media within the surgical holding area and continued until induction of anesthesia. 2. Parental/Guardian presence accompanying the child within the holding area and into the surgical suite until induction of anesthesia. 3. *"Status Quo"*: Administration of a pharmacologic oral benzodiazepine for preoperative anxiolysis.
Assumptions
-Estimated idle labor costs calculated at $8.24 per minute and estimated OR staff overtime calculated at $2.08 per minute (Hicks et al., 2020). -Pediatric patients account for 4.1% of first case OR delays, accounting for a total of 1,549 minutes per year, amounting to $15,986 in idle labor costs and OR staff overtime (Hicks et al., 2020). -Cost of oral midazolam 2mg/ml (per ml) is $0.69-$2.16 (Lexicomp, 2020). -One-time cost for iPad purchase is $599 per iPad x 3 = $1,797 ("iPad Air," n.d.). -Reducing the cost of OR delays aligns with the DHA's Quadruple Aim for better care, better health, increased readiness, and lower costs (Military Health System, 2017).
Analysis of Alternatives

Alternative 1:	Administration of preoperative age appropriate (2-12 years old) video distraction media within the surgical holding area and continued until induction of anesthesia.
Pros	**Cons**
-Fast onset of anxiolysis via non-pharmacological means. -Relatively cost-effective considering less delays from a one-time iPad purchase. -Ease of administration. -Child directed care: Lets the patient be in control. -Already purchased iPads from a prior grant at NMCSD: There are three iPads within the OB department that can be utilized to implement this process improvement project. -Media on iPads requires no internet access as the applications will be downloaded preemptively.	-Extra equipment within operating room. -Potential for parent/guardian dissatisfaction thinking their child is not receiving appropriate medicine for preoperative anxiolysis. -Resistance from parents/guardians to their children using electronic devices. -Cost to purchase or rent iPads. -Will require policy change to the standard operative procedure (SOP). -Resistance to change from pediatric anesthesia providers. -Safeguarding of iPad during implementation.
Alternative 2:	Parental/Guardian presence accompanying the child within the holding area and into the surgical suite until induction of anesthesia.
Pros	**Cons**
-Most cost-effective alternative: Requires no purchasing of electronic equipment. -Ease of administration: Have parent/guardian who brings the child to the preoperative holding area accompany them to the OR. -Parental satisfaction with being involved in care: Fosters a patient and family centered model. -Help from family member if needed to assist child during induction: May be beneficial for emotional and physical support.	-Unclear evidence on efficacy especially for children who may not want their parents present; the literature doesn't support this option as the most beneficial to reduce anxiety in preoperative children and thus time delays to surgical start -Abusive parent/guardian that increases child's anxiety level, this may lead to further anxiety and delays to induction times -Unable to have family member in OR during induction due to policy; this requires the parents to don hair cover and mask prior to entrance into the surgical suite -Extra person unsterile in OR; may lead to introduction of microorganisms -Requires staff to accompany family member out of OR after induction; this takes potentially a member of the surgical team to exit the room, or requires extra staffing for such purposes -Will require policy change to the standard operative procedure (SOP); to adopt the new policy would require written change and command/chair approval
Alternative 3:	*"Status Quo"*: Administration of a pharmacologic oral benzodiazepine for preoperative anxiolysis.
Pros	**Cons**
-Current standard of care: Requires no new change of policy or command approval. -No change to SOP: This process can be tedious and requires stakeholder acceptance. -Staff are familiar with procedure and times to onset/peak: No new learning is required. -Familiarity and requires no acceptance of change from pediatric anesthesia providers.	-Time delay in anxiolysis due to onset and peak of medication: Typical peak time for oral midazolam is 30-60 minutes (Lexicomp, 2020). -Cost of medication: See above "assumptions" section for cost per medication. -Risk of hypoventilation; benzodiazepines lead to activation of the $GABA_A$ receptor. This activation leads to chloride influx and thus neuronal hyperpolarization and a decrease in excitability. The respiratory effects are dose dependent and lead to a decrease in the tidal volume delivered, increase in respiratory rate, and reduction in minute ventilation causing hypoventilation. Furthermore, midazolam causes a reduction in the response to CO_2. Patients will require a larger level of CO_2 for the chemoreceptors to stimulate the respiratory center to take a breath potentiating the hypoventilatory response (Barash et. al., 2017). -Child resisting taking medication: Oral midazolam is the usual administration route for this medication. Most children will not have

	an intravenous catheter in place before induction in the preoperative holding area and thus are not likely to receive IV midazolam.

Recommendation and Rationale

Recommendation

Proposal to recommend alternative #1: Administration of preoperative age appropriate (2-12 years old) video distraction media within the surgical holding area and continued until induction of anesthesia.

Rationale

Results after heavily scrutinizing 49 evidence-based articles revealed that implementing age appropriate video distraction for child preoperative anxiolysis greatly reduces their anxiety level as much, and often times more so, than oral midazolam or parental presence (Stewart et al., 2019).

Operating Budget Supporting Project/Initiative *(forecasted)*

I. Volume projection based on:

According to Hicks et al. (2020), pediatric patients accounted for 4.1% of first case OR delays, for a total of 1,549 minutes, from January through December of 2018.

Total delay in minutes per year for pediatric patient OR delays.	1,549
Total	**1,549**

II. Reimbursement calculated for:

Average cost per minute delay is $10.32 (idle labor costs = $8.24 per minute and OR staff overtime = $2.08 per minute) (Hicks et al., 2020).

Conservative 75% reduction in pediatric patient OR delays. Projected 1,549 minutes. 75% of 1,549 is 1,162 minutes. 1,162 minutes x $10.32 = the "reimbursement" or savings	$ 11,992

III. Costs:

Variable Costs:

Median training/hour is $203 per MDA, $97 per CRNA, $41 per Periop RN ("Get Pay Right," 2020)	$ 341
Total	**$ 341**

For purposes of this budget plan, 1 MDA, 1 CRNA, and 1 Periop RN compensated for one hour of pay for the hour-long training (salary figures from Salary.com for civilian hourly pay)

Fixed Costs:

One-time iPad purchase (3 iPads at $599 each)	$ 1,797
Total	**$ 1,797**

IV. Forecasted P&L statement:

Revenues:

Reduction in pediatric patient OR delays by 75%	$ 11,992
Total revenues	**$ 11,992**

For purposes of this budget plan, 1,549 minutes per year in pediatric patient first case OR delays. Based on assumption data, each minute in OR delays amounts to $10.32 (see assumption data).

Costs:

Variable costs	$ 341
Fixed costs	$ 1,797

Total costs	**$ 2,138**

PROJECTED PROFIT ***$ 9,854***

Risks and Mitigation Plan	
Risks	**Plan**
1. Parent/guardian refusal to omit preoperative oral anxiolysis.	1. Provide education to family members while within holding area explaining video distraction is as efficacious with less adverse risks of oral midazolam.
2. Provider fails to participate resulting in operating room delays.	2. Promote pilot EPB project during surgical department morning muster and pass around sign-up sheet for voluntary participation.
3. Unable to view age appropriate distraction media due to technical difficulties.	3. Ensure device is connected to hospital Wi-Fi services and have each participant understand potential use of their personal smart phones on their cellular network can be used as a backup.
4. Child is not interested in video distraction media.	4. Allow child to control their choice of entertainment via iPad, to include the internet, social media platforms, YouTube, etc.
5. Ineffective treatment plan/course of action, resulting poor anxiolysis and/or operating room delays.	5. Gather relevant data throughout project implementation and if results are not statistically an improvement revert back to oral midazolam *"status quo"* and seek out new research.

Implementation Plan	
Phase 1:	Gather best practice evidence and stakeholder buy-in.
Milestone Description:	Research available evidence to determine best non-pharmacological practice. In addition, provide surgical and anesthesia department stakeholders the results of best practices available to help gain their buy-in.

Deliverables	Due Date	Accountable Person
Measurable Goals: Search, synthesize, analyze and critique at least 20 full text peer reviewed grade 1 and 2 evidence consisting of systematic reviews, random controlled trails, meta-analysis and professional opinions.	Three months	Two student research investigators Surgical/Anesthesia department stakeholders

Resources Needed
Time permitting to perform tasks. Access to medical databases via USUHS Learning Resource Center. Collaborate with surgical and anesthesia department during morning muster for stakeholder buy-in. *Mitigate risks* by ensuring schedule permits such morning muster briefings. Sign-up sheets for participants of EBP project will allow enough staff to complete tasks.

Expected Level of Benefit
This milestone is necessary to demonstrate an alternative to preoperative child anxiolysis. Without strong evidence supporting its efficacy, the status quo would most likely be maintained and thus delays in operating room times will continue. Furthermore, it's imperative that stakeholder buy-in takes place in order to carry out the EBP project with enough staff.

Phase 2:	Acquiring multimedia devices and briefing staff
Milestone Description:	Obtain 3 electronic tablets from one of four ways: 1) Inquiry with the morale welfare and recreation department to see about loaning them, 2) Rent them from a private entity, 3) Preferably purchase for the operating room department, 4) Allow for individual providers to use personal smart phone application for multimedia device. Once collected, give a brief explanation to provider participants of EBP project on how to access age appropriate child applications.

Deliverables	Due Dates	Accountable Person
Measurable Goals: Acquire 3 multimedia iPads, pre and post demonstration on accessing age appropriate child media on tablet.	One month after completion stakeholder buy-in	Principle Point of Contact Participant anesthesia staff of EBP project

Resources Needed		
Funds to purchase or rent tablets. Time to brief anesthesia participant staff on application use which requires appropriate scheduling of providers' availability. *Mitigate risks* with the above budget plan benefit of short-term single purchase of iPads compared to long term cost of surgical delays. Collaborate with scheduling officer to build in time for a brief meeting with providers who will be administering the non-pharmacological intervention of anxiolysis.		
Expected Level of Benefit		
Ensuring available multimedia resources to conduct EBP project will aid in the determination of the efficacy of non-pharmacological intervention as a means of preoperative anxiolysis. Positive demonstration of electronic access from tablets will confirm participant provider understands which application to use for their patient.		
Phase 3:	Conduct pilot program	
Milestone Description:	Anesthesia providers who agreed to participate in EBP project will execute non-pharmacological video distraction to their pediatric patients. For a successful pilot, we will need at least 25 pediatric surgical cases who received alternative #1 intervention within time allotted for this milestone. Simultaneously, *status quo* intervention of oral anxiolysis medication will be conducted as well on 25 different pediatric patients.	
Deliverables	Due Dates	Accountable Person
Measurable goals: Patients will be coded and receive "0" for the oral medication or "1" if they received video distraction.	Six months	Principle Point of Contact/Investigator Anesthesia participant providers
Resources Needed		
Time and healthcare record access for principle POC/investigator to ensure patients are receiving either one of the interventions for preoperative anxiolysis. Secure computer database to organize coded patients within categories. Scheduling of anesthesia providers with appropriate pediatric patients to perform interventions. *Mitigate risks* by discussing intentions with scheduling officer ahead of time to ensure pediatric patients are paired with participating anesthesia providers. Use CAC only computers to prevent breach of HIPAA measures.		
Expected Level of Benefit		
The pilot program results will demonstrate potential for efficacy of an alternative means for child preoperative anxiolysis. If favorable, it will be easier for the command executive to buy-in and make a permanent change in the standard operating procedures.		
Phase 4:	Analyze/Compare data from pilot intervention and *status quo*	
Milestone Description:	Compile 25 cases minimum of both interventions. Once data is collected and organized, run statistical Paired T test or Wilcoxon Signed Rank Test if data is not distributed equally. Determine if statistical significance is present or not.	
Deliverables	Due Dates	Accountable Person
Measurable goal: Time 0 = Time to intervention initiation Time 1 = Time to induction of anesthesia P value results Statistical significance between two means	Three months	Principle Point of Contact/Investigator SPSS superuser
Resources Needed		
Time for POC/Investigators to conduct data collection, organize, and statistically analyze results. Use of institution's statistical analysis expert to assist in running specific metric tests. *Mitigate risks* by engaging with statistician early and before collecting data.		
Expected Level of Benefit		
Determine if a reduction in mean time to induction of anesthesia by use of non-pharmacological intervention occurred.		
Phase 5:	Dissemination of results and change of Standard Operating Procedures (SOP)	
Milestone Description:	Flyers posted throughout institution informing staff of the latest results. If positive, work with departmental leadership to change SOP permanently, reflecting a change of practice.	
Deliverables	Due Dates	Accountable Person

Measurable Goals: Flyers creation Email results of EBP project Brief results during morning muster SOP change	Within three months from completion of analysis. This will also be an ongoing process	Principle Point of Contact/investigator Department Leadership
Resources Needed		
Access to Learning Resource Center to create flyers of results. Scheduling availability with leadership to collaboratively update SOP. Time permitted to brief staff during AM muster about results. *Mitigate risks* by electronic and verbal dissemination of data results. Have recommended draft of policy change written up for department leadership to ease SOP update.		
Expected Level of Benefit		
Acknowledges best practice for child preoperative anxiety treatment. Allows for concrete policy change among anesthesia department. Ensures the message is received by all who are and may be affected.		

NOTE: Modified from Harvard Business Review Press. (2011). *Pocket mentor: Developing a business case.* Boston: Author (pp 82-85).

Figure E4

Iowa Model

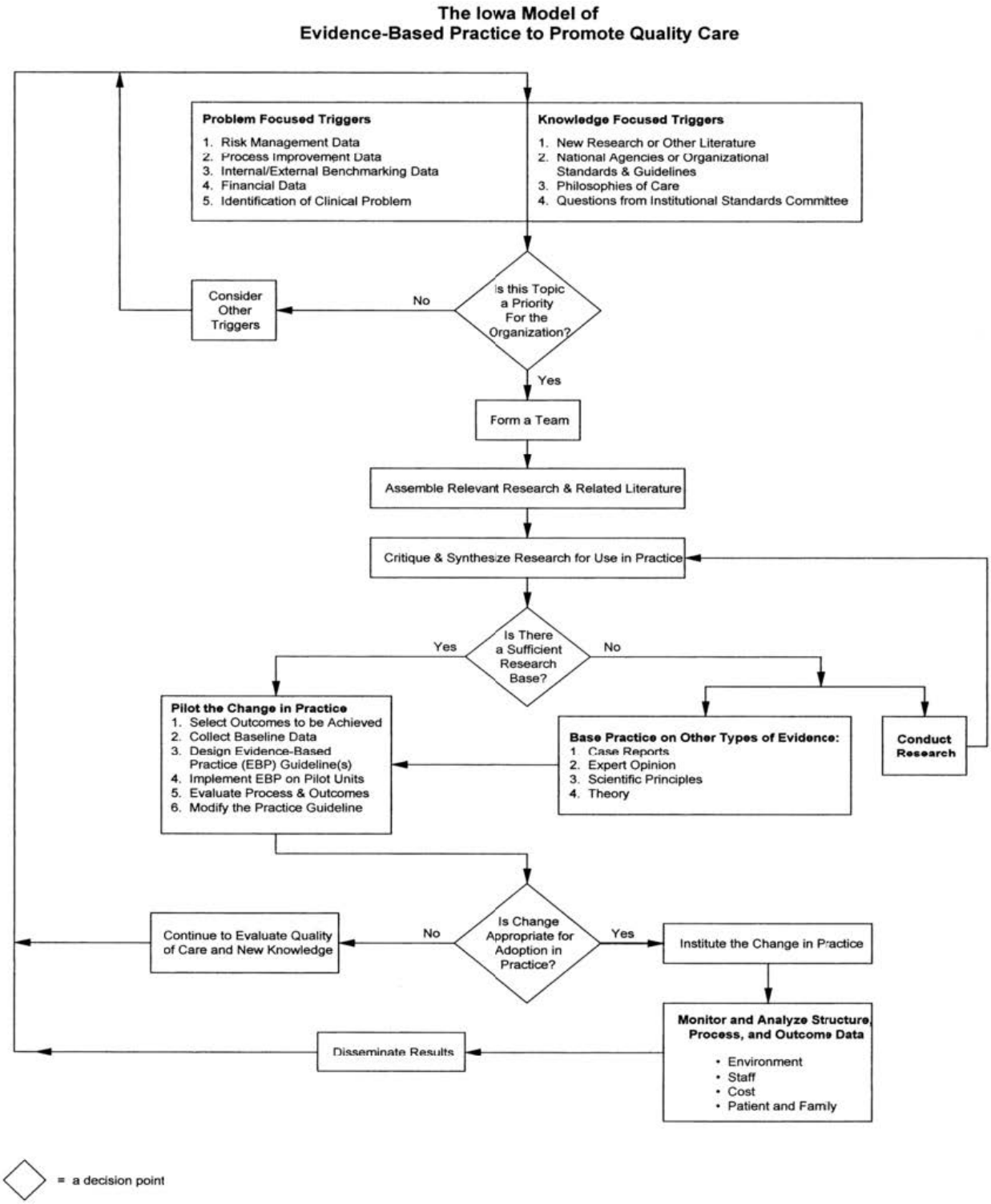


Figure E5

Project Timeline

Project Year 1 (2020)												
Activity/Month	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
USUHS VPR Submission and Approval												X
Site IRB Submission and Approval												X
Project Planning -Task 1: Stakeholder engagement meetings -Task 2: Surgical morning briefings -Task 3: Signup sheet for anesthesia providers									X	X	X	X

Project Year 2 (2021)												
Activity/Month	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Data Collection: -Task 1: Retrospective/concurrent chart review of oral medication given for preoperative anxiolysis	X	X	X									
-Task 2: Data collection for non-pharmacological intervention performed for preoperative anxiolysis	X	X	X	X	X	X						
Data Analysis: -Task 1: Organization of statistical data -Task 2: Perform appropriate statistical test							X	X	X			
Dissemination: -Task 1: Formulating results into understandable material -Task 2: Creating poster presentation and flyers of results for surgical department -Task 3: Department wide briefings/emails notifying of completed results										X	X	X

Project Year 2 (2022)												
Activity/Month	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Revisions if necessary via Iowa Model framework	X	X	X									
Sustainment	X	X	X									

Figure E6

Likert Scale

Preoperative Pediatric Video Distraction Questionnaire

Provider Type (please circle): Anesthesiologist CRNA Resident SRNA

Please use the following scales to record your personal level of agreement or disagreement with the following statements.

1. Before initiation of video distraction initiative, I utilized video distraction for pediatric surgical patients___

1 Never	2 Rarely	3 Sometimes	4 Very Often	5 Always

2. Utilizing video distraction for pediatric surgical patients was easy to incorporate into my practice.

1 Strongly Disagree	2 Disagree	3 Neither Agree or Disagree	4 Agree	5 Strongly Agree

3. I was satisfied with the level of anxiolysis when utilizing video distraction.

1 Strongly Disagree	2 Disagree	3 Neither Agree or Disagree	4 Agree	5 Strongly Agree

4. I plan to utilize video distraction for pediatric surgical patients in the future___

1 Never	2 Rarely	3 Sometimes	4 Very Often	5 Always

5. Do you have any comments, suggestions, or recommendations you would like to share?

Figure E7

Data Analysis Table

		Variable Name	Variable Description and type of measure	Data Source	Possible Range of Values	Level of Measurement	Time Frame for Collection	Statistical Test	Decision Rule
EVENT	IV	Intervention Group: Video distraction media Comparison Group: Oral midazolam 0.4-0.8mg/kg	Description: Pediatric patients aged 2-12 will receive an age-appropriate video distraction media device once encountered in the preoperative holding area. This content will accompany the child throughout the perioperative period until induction of anesthesia Type: Process Measure Description: The comparison group will receive a dose of oral midazolam 0.4-0.8mg/kg once in the preoperative holding area	Electronic Health Record via "Preoperative Anesthesia Evaluation Form" on Essentris. Providers will document a narrative that video distraction was or was not used	0 = Received oral midazolam 0.4-0.8mg/kg 1 = Received video distraction media 2 = No treatment received 3 = Received alternative interventions 4 = Received a combination of oral midazolam and video distraction	Nominal	Time 0 = Arrival to the preoperative holding area Time 1 = Mask induction of anesthesia	Descriptive: What percentage received video distraction vs. oral midazolam	None
		Second Objective: Staff opinion on video distraction method	Type: Process Measure Description: Post pilot-study Likert scale surveying staff opinion on the use of video distraction as an alternative method of for preoperative anxiolysis Type: Process Measure	Likert Scale Measurement	0-4: 0 = Strongly disagree 1= Disagree 2 = Neutral 3 = Agree 4 = Strongly agree	Nominal	Post assessment after pilot study complete	None	N/A
	DV	Time to enter the operating room	Description: The mean time it takes for case turnover between pediatric patients Type: Outcome Measure	Electronic Health Record/Innovian anesthesia record	0 to infinite amount of time in minutes	Ratio	Time 0 = End of one pediatric case Time 1 = Start time of subsequent pediatric case in the same operating room	Paired T test. Wilcoxon signed rank test if data is not normally distributed	Based on literature review, preoperative anxiolysis is achieved by oral midazolam at a peak time of 30 minutes. While optimal, it is not mandatory for providers to wait until anxiolysis is achieved
		Second Objective: Results of Likert scale staff opinions	Description: The mean Likert scale score of staff opinion on use of non-pharmacological alternative for preoperative anxiolysis in pediatric population Type: Outcome Measure	Likert scale results	0-4: 0 = Strongly disagree 1= Disagree 2 = Neutral 3 = Agree 4 = Strongly agree	Ratio	One-time staff survey issuance at the completion of pilot study	Independent T test for normal distribution of mean scores. If not normally distributed, Chi Square	None

Appendix F

DNP Project Completion Verification Form

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: Age-Appropriate Video Distraction for Pediatric Surgical Patients: Assessing the Process of Reducing Operating Room Delays

was completed at Naval Medical Center San Diego by the following student(s):

(Student Name)	*(Digital Signature)*
LT Jeffery M. Nunez	NUNEZ.JEFFERY.MARK.1288529414 Digitally signed by NUNEZ.JEFFERY.MARK.1288529414 Date: 2022.02.19 11:39:43 -08'00'
LCDR Meaghan R. Snyder	SNYDER.MEAGHAN.ROSE.1401937737 Digitally signed by SNYDER.MEAGHAN.ROSE.1401937737 Date: 2022.02.25 04:56:32 -08'00'
_____	
_____	
_____	

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)*	
CDR Danielle Cuevas	CUEVAS.DANIELLE.KAY.1275198877 Digitally signed by CUEVAS.DANIELLE.KAY.1275198877 Date: 2022.02.22 16:15:12 -08'00'	Senior Mentor
_____		Team Mentor
_____		Team Mentor
CDR Danielle Cuevas	CUEVAS.DANIELLE.KAY.1275198877 Digitally signed by CUEVAS.DANIELLE.KAY.1275198877 Date: 2022.02.22 16:15:39 -08'00'	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: 2022.02.28 14:29:13 -05'00'
RNA Project Director *(type name)*	(*Digital Signature)*

Form Version: 4 December 2020