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Development of Evidence-Based Clinical Practice Guidelines for Pediatric Preoperative Anxiety

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Final Scholarly Project: Development of Evidence-Based Clinical Practice Guidelines for Pediatric Preoperative Anxiety

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Abstract

Preoperative anxiety is a problem that occurs frequently in pediatric patients. Preoperative anxiety creates physical and psychological changes that impact a child's surgical experience. Pediatric patients who experience preoperative anxiety may also experience prolonged postoperative care, long-term psychological complications, and increased postoperative pain. Sedating medications are often administered to prevent and treat preoperative anxiety. Commonly, midazolam is administered intranasally to prevent preoperative anxiety. Midazolam increases the risk of cognitive impairment and respiratory depression. Dexmedetomidine is an effective alternative to midazolam. Dexmedetomidine is a highly selective alpha-2 agonist and provides arousable sedation without respiratory depression. Dexmedetomidine is safe and effective at decreasing modified Yale Preoperative Anxiety Scale (m-YPAS) scores, improving mask acceptance, and easing child-parent separation. Many hospitals lack evidence-based guidelines for preventing perioperative anxiety. This evidence-based practice project analyzes current literature to implement into practice for assessing and preventing preoperative anxiety. The Iowa Model guides the implementation of this evidence-based practice project. This project provides evidence-based guidelines for preoperative anxiety in pediatric patients in an outpatient surgery center in an urban midwestern community.

Keywords: preoperative anxiety, dexmedetomidine, midazolam, modified Yale Preoperative Anxiety Scale (m-YPAS), and evidence-based practice

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Introduction

Perioperative anxiety is a severe clinical concern for pediatric patients and their providers. Approximately 70% of pediatric patients undergoing surgery will experience preoperative anxiety (Vieco-Garcia et al., 2021). Preoperative anxiety leads to increased fear and agitation on induction of anesthesia. Pediatric patients who experience preoperative anxiety are more likely to develop perioperative complications, such as prolonged anesthetic induction, prolonged recovery time, increased postoperative analgesia requirements, and increased postoperative delirium. (Vieco-Garcia et al., 2021). Anxiety and fear during anesthetic induction can lead to hemodynamic instability (Saad et al., 2020). Long-term complications resulting from preoperative anxiety include maladaptive behavior such as separation anxiety, aggressiveness, insomnia, and nocturnal enuresis (Lee et al., 2012). To improve patient outcomes after surgery, preoperative anxiety must be addressed.

Anxiety increases when separation occurs between the pediatric patient and the parents when transporting to the operating room. In addition, some pediatric patients are fearful of the anesthesia mask over their faces. Anxiety in pediatric patients related to surgery can be measured by validated scales. Early identification of pediatric patients experiencing anxiety allows for on-time interventions that translate into improved perioperative outcomes. The modified Yale Preoperative Anxiety Scale (m-YPAS). can predict increasing anxiety level as a patient approaches the operating room (Vieco-Garcia et al., 2021). It is essential to identify and implement an appropriate anxiety assessment tool to improve outcomes for this population.

Anxiety can be decreased by giving sedating medications prior to the patient going to the operating room. Pharmacologic agents can be used prior to surgery to help with the fear of separation from their parents and mask acceptance. Premedication can provide easier induction of anesthesia for pediatric patients and the anesthesia provider. The most prescribed medication for perioperative anxiety is midazolam. Dexmedetomidine,

clonidine, fentanyl, and midazolam are pharmacological options for treating pediatric anxiety (Diwan et al., 2020). Therefore, several studies compare different pharmacological agents for premedication to choose the best treatment for preoperative anxiety.

Background

Preoperative anxiety is associated with adverse outcomes and impacts the overall surgical experience of the pediatric patient. As early as 1934, psychologists recognized that psychological changes may follow surgical procedures in pediatric patients. Pediatric patients may feel betrayed by their loved ones when surgery is performed without any prior explanation. Surgery can leave a child frightened by doctors and even leave them fearful about everyday life events (Forsyth, 1934). To prevent adverse outcomes and improve surgical experience, preoperative anxiety needs to be assessed and treated appropriately.

Currently, midazolam is the most widely used pre-anesthetic medication for preoperative. Midazolam for premedication in pediatric patients has been widely demonstrated as effective. Midazolam is a water-soluble benzodiazepine with benefits including sedation, anxiolysis, and anterograde amnesia (Diwan et al., 2020). Midazolam causes increased incidence of perioperative respiratory adverse events such as oxygen desaturation and airway obstruction (Shen et al., 2022). An alternative to midazolam is the novel drug dexmedetomidine. Dexmedetomidine provides sedation by stimulating alpha 2-adrenergic receptors to reduce sympathetic output. Dexmedetomidine has the potential to provide analgesic effects with minimal respiratory depression (Pasin et al., 2015). Studies show that dexmedetomidine provides superior benefits as compared to midazolam (Lang et al., 2020). Dexmedetomidine is the preferred medication in the treatment of preoperative anxiety. Therefore, evidence-based practice guideline must be implanted to reflect the current literature.

Anxiety is subjective and, therefore, challenging to assess consistently. Many hospitals do not require the use of a standardized anxiety assessment scale for the perioperative setting. Different scales exist, and studies have compared and validated several anxiety scales. Standard anxiety scales, such as Spielberger's State-Trait Anxiety Inventory, were used by psychologists and took five to ten minutes to complete. Therefore, the m-YPAS was created and can be completed in less than one minute (Kain et al., 1997). The validated scale can be implemented in the perioperative setting for pediatric patients.

Significance to the Profession

The anesthesia provider is responsible for providing comfort throughout the entire perioperative experience. Before surgery, pediatric patients are afraid of the unknown, physical injury, and separation from their parents. Preventing anxiety and fear about surgery can be done through medication and other distraction techniques (Bromfalk et al., 2021). Implementing guidelines and providing knowledge about the best anxiolytics to utilize to prevent anxiety and fear is the responsibility of the anesthesia provider.

The anesthesia provider must be prepared to treat pediatric anxiety. Anxiety in pediatrics creates challenges for the anesthesia provider and can worsen postoperative outcomes (Bromfalk et al., 2021). In the United States, an estimated 3.9 million surgeries are performed on pediatric patients ages 0 - 17 (Rabbitts & Groenewald, 2020). Many of these pediatric patients experience apprehension and stress in the perioperative setting. In addition, perioperative stress and fear can lead to postoperative recovery complications and cause long-term psychological changes such as nightmares, separation anxiety, and increased fear of medical staff (Rabbitts & Groenewald, 2020). Thus, the anesthesia provider must be educated on medications to care for patients with preoperative anxiety.

Preoperative anxiety contributes to hemodynamic instability and prolonged recovery times. Preoperative anxiety creates more risks for pediatric patients than adults. Pediatric patients experience an increased autonomic nervous system response compared to adults, causing hemodynamic instability on induction. Therefore, hemodynamic instability leads to prolonged induction and recovery times (Rabbitts & Groenewald, 2020). The anesthesia provider is responsible for keeping the patient safe and providing time-efficient care. Properly treating perioperative anxiety allows the anesthesia provider to provide efficient, quality care.

Perioperative anxiety can significantly increase the cost of a patient's healthcare stay by delaying surgeries and prolonging recovery times. Decreasing anxiety is empirical to a child's surgical experience. If the child is traumatized by the experience, the parents are likely to choose a different hospital or facility site to receive care. Parents are more likely to choose that facility to take their children to again if the experience is comfortable.

Creating practice guidelines can reduce variability in patient care. Evidence-based practice guidelines are created by reviewing current evidence and recommending best practices. Practice guidelines create consistency in practice and improve outcomes and processes in medicine (Cassidy et al., 2021). Developing best practice guidelines for pediatric anxiety could improve anxiety scores and anesthesia outcomes in the perioperative setting.

PICO(T) and Problem Statement

The process of a medical procedure or surgery can be scary for a child. To provide a safe environment for the child and the anesthesia provider, it is ideal that the child remain calm and cooperative. An anxious and fearful child can cause more challenges for the anesthesia provider in the operating room. Therefore, this raises the question: In pediatric patients ages 2-12 undergoing general anesthesia, (P) how does the development and implementation of evidence-based practice guidelines (I) for preoperative anxiety compare to the traditional approach affect (C) modified Yale Preoperative Anxiety Scale scores?

Literature Synthesis and Analysis

PubMed and Cumulative Index to Nursing and Allied Health Literature (CINAHL) are open-access databases to gather current information about medical concerns. To gather the best evidence available, it is suggested to search at least two databases (Melnyk & Overholt, 2019).

While searching for information, searchers must consider various ways to search for the topic. Keyword searching, subject heading searching, and title searching are techniques used to gather information about a specific medical concern (Melnyk & Overholt, 2019). Utilizing different methods within each database allows the searcher to collect significant amounts of relevant data quickly.

To retrieve the results needed, medical subject headings (MeSH) were chosen for PubMed and CIAHNL. In CINAHL, "explode" was selected to include all keywords that appear under the chosen subject heading. The Boolean connector "AND," terms perioperative, anxiety, and children were 44 searched; the search yielded 455 results. After further research, the author wanted to narrow my results to specific medications. The Boolean connector "AND," terms perioperative care, dexmedetomidine, and midazolam were searched; the search yielded 30 results. Placing the Boolean connector "OR" to include both the generic and

brand name of the drug increased the results to 51. By placing "OR" between the drug names, the search consists of articles containing either name.

Researchers can also rely on PubMed's PICOT tool. The PICOT tool categorizes each part of the PICOT question and creates a search. When searching by PubMed's PICOT tool and inserting each part of the PICOT question, 59 resulted. According to Melnyk and Overholt (2019), searchers should maintain uniformity in search techniques when searching different databases. Ultimately, the articles matching closest to the PICOT question and providing the best level of evidence were selected.

Preoperative Anxiety Assessment

Kain et al. (1997) conducted a study to modify The Yale Preoperative Anxiety Scale and compare it to the State-Trait Anxiety Inventory for Children. At the time, the "gold standard" was considered the State-Trait Anxiety Inventory for Children. Pediatric patients were video recorded and assessed to compare the validity of each scale. The study included 51 pediatric patients ages 5-12 years old. The results concluded that the m-YPAS provides statically significant reliability and is a valid tool to assess preoperative anxiety in pediatric patients.

Vieco-Garcia et al. (2021) performed a study to compare three preoperative anxiety scales for pediatric patients to the results of the child's compliance with induction using the induction Compliance Checklist. The observational prospective trial included 76 pediatric patients ages 2-16 years old. The three scales compared were the Spence Anxiety Scale-Pediatric, the State-Trait Anxiety Inventory Children, and the modified Yale Preoperative Anxiety Scale (m-YPAS). A statistically significant correlation was found between the Induction Compliance Checklist and the modified Yale Preoperative Anxiety Scale (m-YPAS) during transfer to the surgical unit ($p=0.738$) and induction ($p=0.794$). The study concluded that when the m-YPAS is assessed during entry into the surgical unit, it can predict the quality of anesthetic induction. The scale can anticipate the need to treat anxiety, leading to a safe anesthetic induction (Vieco-Garcia et al., 2021).

The two studies conducted by Vieco-Garcia et al. (2021) and Kain et al. (1997) confirmed the validity and reliability of the m-YPAS. To properly evaluate and treat perioperative anxiety, a standardized scale is

needed to assess a child's current level of fear, stress, and apprehension. Adding a standardized scale to every child's preoperative experience will allow providers to administer treatment appropriately.

Pharmaceutical Interventions

Saad et al. (2020) conducted a study comparing intranasal dexmedetomidine with intranasal midazolam for preoperative medication for pediatric patients. 48 pediatric patients ages 3-7 were included in the study. The pediatric patients in the study were randomly divided into two groups. Group D received intranasal dexmedetomidine at 1mcg/kg, and group M received intranasal midazolam at 0.2 mg/kg. Mask acceptance was better in group D than in group M and was statistically significant ($p = 0.028$). Parent separation was easier in group D but was not statistically significant ($p = 0.801$). Sedation scores were higher in group D ($p<0.001$) (Saad et al., 2020).

Lang et al. (2020) conducted a meta-analysis searching three data bases to find randomized clinical trials comparing midazolam and dexmedetomidine in pediatric patients. The researchers found thirty-four randomized trials involving 2,281 pediatric patients. The results concluded that dexmedetomidine was associated with less emergence agitation (RR = 0.78, with 95% CI [0.65, 0.92]) than midazolam. The results also showed that dexmedetomidine had better sedation at parental separation than midazolam. There was no significant difference between the two medications regarding sedation before parental separation (RR = 0.86, with 95% CI [0.74, 1.00]). (Lang et al., 2020).

Bromfalk et al. (2020) performed a study comparing the use of clonidine, dexmedetomidine, and midazolam to relieve anxiety during the preoperative stage of surgery. The study included school-age children receiving ear, nose, and throat surgery. 90 children were randomly assigned to receive one of the medications. The study found no difference between medications' effectiveness when used to prevent intravenous insertion distress. The pediatric patients's anxiety score increased during anesthesia preparation with clonidine ($p = 0.016$) and dexmedetomidine ($p = .0\ 07$), while the score did not change with midazolam. Clonidine and dexmedetomidine caused higher sedation scores than midazolam (MID, 2.26 ± 0.45; CLO, 3.56 ± 1.12; DEX, 4.03 ± 0.72; $p < .001$) (Bromfalk et al., 2020).

Diwan et al. (2020) conducted a study comparing the sedative effects, anxiety level, successful child–parent separation, and hemodynamic parameters of intranasal dexmedetomidine and midazolam in pediatric patients undergoing surgery. The study included 60 children ages 2 – 12 years old. Sixty children were randomly placed into two groups. Thirty children received intranasal dexmedetomidine (1 mcg/kg). The other thirty children received intranasal midazolam (0.2 mg/kg). The sedation score, anxiety score, and successful child–parent separation were recorded at the time the child was taken to the operating room. The pediatric patients who received intranasal dexmedetomidine achieved lower sedation scores ($P < 0.001$), lower anxiety levels ($P = 0.001$), and easier child–parent separation ($P = 0.003$) than pediatric patients who received intranasal midazolam when transferring patients to the operating room (Diwan et al., 2020).

Linares Segovia et al. (2014) conducted a randomized, double-blinded study that included 108 children ages 2 – 12 years old undergoing surgery. 52 children were administered intranasal dexmedetomidine and 56 were administered oral midazolam. Anxiety was assessed using the m-YPAS. Anxiety was decreased in the dexmedetomidine group at 60 minutes *(P*=.001), induction (p=.04), and recovery *(P*=.0001). Changes in heart rate, mean arterial pressure, and oxygen saturation, were statistically significant in the pediatric patients who received dexmedetomidine, although none of the changes caused clinical consequences. The study concluded that intranasal dexmedetomidine provided more effective anxiolysis than oral midazolam.

Ghali et al. (2011) conducted a double-blinded, randomized study including 120 children undergoing an adenotonsillectomy. The pediatric patients were equally divided into two groups. One group received dexmedetomidine 1 mcg/kg, while the other group received oral midazolam 0.5 mg/kg before induction of anesthesia. Preoperative sedative effects, the m-YPAS, and the ease of child-parent separation were assessed. The study also compared postoperative analgesia and time of recovery. Pediatric patients who received intranasal dexmedetomidine achieved significantly lower sedation levels (*P*=0.042), lower anxiety levels (*P*=0.036), and easier child-parent separation (*P*=0.029) than pediatric patients who received oral midazolam.

Pasin et al. (2015) conducted a meta-analysis which included 1033 children in 13 randomized trails. The trials included compared dexmedetomidine and midazolam for preoperative sedation, anxiety, and successful parent-child separation. The study also evaluated postoperative pain and agitation. The dexmedetomidine

group had a higher incidence of satisfactory sedation at separation from parents (P = 0.02). The dexmedetomidine group also had reduced postoperative agitation (P = 0.008), and a reduction in the need for analgesic drugs (P<0.001).

Ultimately the studies conducted on the best pharmacological treatments found dexmedetomidine and midazolam to be safe and appropriate pharmacological interventions to treat perioperative anxiety in pediatric patients ages 2-12. The dosages and routes were relatively consistent throughout the literature. However, dexmedetomidine provided lower sedation levels and lower anxiety levels. Dexmedetomidine had easier child-parent separation and better mask acceptance. There were no clinical consequences due to changes in heart rate, mean arterial pressure, or oxygen saturation.

Project Objectives

The project aims to recommend evidence-based practice (EBP) guidelines to manage perioperative anxiety in pediatric patients undergoing general anesthesia. Developing objectives and organizing activities to ensure the project's goals are met (Moran et al., 2020). The anesthesia providers, nurses, and pharmacy personnel are essential members of the project and are necessary for the success of the objectives. The following are the objectives created for the project:

• Develop EBP guidelines for managing perioperative anxiety for pediatric patients ages 2 – 12 years old

• Develop a comprehensive plan to implement EBP guidelines

• Develop a comprehensive plan to monitor/measure EBP guidelines outcomes by utilizing the modified Yale Anxiety Scale (m-YPAS).

• Develop a comprehensive plan to adjust EBP guidelines if the outcomes are less than desirable.

Evidence-Based Guideline Framework

New research fosters constant changes to practices within healthcare. To instill new research into everyday practice, nurses from the University of Iowa Hospitals and Clinics and the College of Nursing created The Iowa Model of Research-Based Practice to Promote Quality Care. The model derived from Roger's Theory, Diffusion of Innovations. (Iowa Model Collaborative et al., 2017) *Roger's Theory* is a conceptual framework that identifies effective ways of adopting new research and diffusing new methods into a specific community

(Mohammadi et al., 2018). The Iowa model provides a step-by-step guide to implementing evidence-based practice guidelines. Although implementing new guidelines can be challenging, using the Iowa model allows practitioners to implement valuable research into clinical practice. Therefore, the Iowa model will be effective when implementing evidence-based practice guidelines to treat and assess preoperative anxiety in pediatric patients undergoing general anesthesia.

Design and Method

The Iowa Model begins with identifying a clinical issue or opportunity for improvement. The staff or patients identify the current issue by reporting it to project manager. New research or data could prompt the need for changes within protocols and guidelines to improve care (Iowa Model Collaborative et al., 2017). Using the Iowa Model as guidance, the project manager first identified the problem of preoperative anxiety by reviewing current research and recognized a gap between the research and current practice. The project manager recognized the lack of consistency in caring for pediatric patients with anxiety. Therefore, the project manager desired to create perioperative guidelines for treating and assessing preoperative anxiety.

The next crucial step of the Iowa Model is to clearly state the question or problem (Iowa Model Collaborative et al., 2017). This scholarly project aims to improve the outcomes of pediatric surgery patients by providing evidence-based practice guidelines to treat and assess preoperative anxiety. Then, the project manager must convince the institute and stakeholders that the project is a priority. If the problem does not align with the intuition's values, the project will not receive the support and resources necessary to come to fruition. (Iowa Model Collaborative et al., 2017). The project manager must relay the importance of recognizing and treating perioperative anxiety. Healthcare providers' main priority is to provide safe and quality health care. The project will reduce adverse events due to preoperative anxiety, reducing hospital expenses.

Next, a team is developed to plan, implement, and evaluate the project. The team is chosen based on the desire for involvement and the skills required to plan and implement the project (Iowa Model Collaborative et al., 2017). A team will be created to plan, implement, and evaluate the guidelines to treat and assess preoperative anxiety. The team will include medical practitioners who are knowledgeable about

pharmaceuticals and the anesthesia induction process. The team comprises of anesthesia providers, preoperative care nurses, pharmacists, and administrative staff.

The following step is to gather research and literature regarding the selected issue. If sufficient research is not available, research must be conducted. The evidence is used to create new guidelines and implement them into practice. High-level research, such as clinical studies, meta-analyses, and systemic research reviews, are valued more when gathering data. Using clinical databases and the help of professional librarians can assist in finding publications regarding the topic. Together, the group should appraise the literature found. Advanced practice nurses are integral to the team. They provide the knowledge to appraise research and apply it to clinical practice (Titler et al., 2001).

The team appoints members to review high-level data that supports the best assessment tools and medications to treat pediatric perioperative anxiety. The team members with the most knowledge and interest in research appraisal will assemble the research. A systematic search was conducted by the author of this scholarly project using the PICO(T) question. The John-Hopkins Evidence Level and Quality Guide were used to appraise the current research during the systematic search (Dearholt et al., 20212). After appraising the literature, the evidence was placed in a literature synthesis table (Appendix A). The findings are discussed, and themes from the evidence are recognized.

The project team is then faced with determining if there is sufficient evidence. The model suggests appraising multiple types of evidence and evaluating the quality, quantity, and consistency of the evidence. The team should determine the most substantial evidence and weigh the risks before changing medical practices (Iowa Model Collaborative et al., 2017). The same themes and conclusions were found in several high-quality research articles. The ample amount of research and similar conclusions found by the author are displayed and suggest sufficient evidence.

Furthermore, The Iowa Model suggests creating a localized pilot practice change before a systemic-wide guidelines change. The team must consider restraints and the need for approval by the administration. The change must be promoted to the chosen staff, and education will be required (Iowa Model Collaborative et al., 2017). The institution's technology department will need to assist in creating changes to implement the

assessment tool within the computerized charting. After initiated, data must be collected and analyzed to conclude if the pilot practice change had successful outcomes. The data collected will determine if the change is appropriate to adopt permanently.

Lastly, evaluation of the guidelines is necessary and may prompt revision. The Iowa Model suggests engaging key personnel and monitoring indicators through quality improvement initiatives to sustain new guidelines. Also, it suggests re-introducing the changes several times as needed to create a sustained change in practice (Iowa Model Collaborative et al., 2017). The quality improvement committee at the institution will assist in this step. Key personnel, such as preoperative nurses and anesthesia providers, will provide feedback on the guideline changes. The project team will review charts from all patients ages 2 – 12 who have undergone general anesthesia and the charted m-YPAS will be assessed. The team will compile results and present them to the quality improvement committee. This step also allows the team to review the literature, ensuring the most current evidence is provided in the evidence-based practice guidelines. Revisions will be made, and the project will be re-introduced.

To impact a large population of patients, the guidelines must be shared. The Iowa Model's final step is disseminating the project results. (Iowa Model Collaborative et al., 2017). The project team members will disseminate the results of the practice guidelines through the system. The project team will create an informational poster to share the project results with other medical organizations.

Implementation

The Iowa Model guides the implementation stage of the project. The author of this scholarly project will choose the project team. The project team will comprise of two nurse anesthetists, one pharmacist, an anesthesiologist, and two preoperative nurses interested in preventing preoperative anxiety. The project team will discuss the literature review and the importance of recognizing preoperative anxiety with key stakeholders and administration. The project team will demonstrate the need for an anxiety assessment tool for pediatric patients. The project team leader will gain approval from the internal review board prior to proceeding.

Once the guidelines are approved, the project can be implemented in a pilot group. The Iowa Model suggests implementing a localized pilot guideline change first. The project team will educate a selected group of

preoperative nursing staff and anesthesia providers to test the guidelines. Meetings will be arranged with the selected postoperative care unit nurses and anesthesia providers to explain the new preoperative guidelines. Initially, ten preoperative nurses and six anesthesia providers will be educated about the guidelines. A representative from each department will be utilized as a resource person for the new guidelines. The resource personnel will be trained a second-time one-on-one with the project team. The staff will be notified of the resource personnel in case of questions throughout the pilot.

The education meetings will address the new guidelines' importance and the steps to assess and treat perioperative anxiety. The project team will discuss the literature review and the importance of recognizing preoperative anxiety with the staff. Educating the staff on the consequences of preoperative anxiety will encourage staff to accept and integrate the new guidelines. The staff will be educated on assessing and charting the m-YPAS. The m-YPAS will be assessed when the patient arrives to the preoperative area and upon transfer to the operating room. The nursing staff will take the assessment upon arrival to the preoperative area and again as the patient enters the surgical room.

Nurse anesthetist and anesthesiologists should be educated on using intranasal midazolam and dexmedetomidine. The doses, route, and timing to give the preoperative medications will be within the guidelines. The anesthesia department will be given the literature on the safety and efficacy of administering dexmedetomidine as an alternative to midazolam. During morning huddles, nursing staff will be reminded at which intervals to document the m-YPAS. The anesthesia department will be sent an email from the project team each week reminding them of the guidelines and when to refer to them. The project will include weekly follow-ups with the anesthesia team and the nursing staff resource personnel to assess for questions or concerns about using the new guidelines.

The project team members will provide the informational technology (IT) department with the m-YPAS. The IT department will be asked to integrate the scale into the nursing flowsheets. The scale should be readily available for all practitioners to use and review at any point in the perioperative care of a pediatric patient. The quality improvement (QI) committee will review and monitor how often the scale is used with patients between

the ages of 2-12. The QI department will gather data on which patients received midazolam or dexmedetomidine.

After the pilot has been live for four weeks, the project team will meet with the QI committee to discuss the data collected about using the m-YPAS and the anxiety medications administered to the patients in the pilot. To assess outcomes, the medications and m-YPAS scores will be compared. Suppose the results are desirable and m-YPAS scores are improved since the new preoperative anxiety guidelines were placed. In that case, the guidelines will be distributed to all surgical departments caring for pediatric patients ages 2-12.

The guidelines will be dispersed through all surgical departments through educational meetings. The project team will hold several meetings with the preoperative nursing staff and the anesthesia department over three weeks. The staff will be given the same education as the localized pilot to disperse the new preoperative anxiety guidelines. Several opportunities will be available for staff to attend one of the meetings. During morning huddles, the entire preoperative nursing staff will be reminded at which intervals to use the m-YPAS for the first four weeks.

The anesthesia department will be emailed to remind them of the new guidelines for the first four weeks. Again, the project team will check in with resource personnel to answer questions and discuss barriers weekly. Long-term communication between the project manager, the nursing department, and the anesthesia department will be continued to ensure project sustainment.

Clinical Immersion Site

The doctoral scholarly project clinical immersion site will be an outpatient surgery center in an urban midwestern community that does not have evidence-based practice guidelines for preoperative anxiety. The surgery center will provide general anesthesia to pediatric patients, including patients ages 2-12 years old. The facility will require anesthesiologists and nurse anesthetists on staff. There will be a technology department that can add the m-YPAS within the computerized charting system.

Timeline

The first phase, the pilot phase, will occur over seven weeks. The project team will educate the selected staff for the pilot phase over two weeks. The pilot phase will include fewer staff members, requiring less education time. The pilot phase will then consist of four weeks of implementing the new guidelines in the perioperative area with the selected staff. The QI committee and the project team will meet and review post-pilot data. Necessary adjustments will be made before the guidelines are dispersed to all staff and departments.

The project's second phase will include the team disseminating the guidelines to all staff and surgical departments over ten weeks. The project team will educate the rest of the preoperative nurses and the anesthesia department over four weeks. Once all staff attend an education meeting, the guidelines will be implemented for every patient 2-12 years old undergoing general anesthesia. After four weeks, the quality improvement committee and the project team will meet again to review the indicators monitored. Necessary changes can be made, and the guidelines are re-introduced over the following two weeks. The Iowa model is a continuous cycle and repeats to ensure the indicators are being met and new data can be implemented into the guidelines. The timeline is represented in a graph on Appendix C.

Budget

The budget for the project includes the expected expenses for the education, implementation, and monitoring of the guidelines. The budget is outlined in Appendix B. The project team will be reimbursed for their time spent reviewing the literature and creating the guidelines. The budget includes the hourly wages of the staff who will be educated on the new guidelines. The education requires staff to attend an educational meeting for one hour. The resource personnel will need to be educated for two hours to ensure they can answer staff questions throughout the changes.

The budget also includes the IT department's time incorporating the m-YPAS into the electronic chart. The quality improvement committee, typically comprised of at least the nursing director and chief medical director, will be reimbursed for their time monitoring outcomes. The guidelines review committee, typically

comprised of the chief anesthesiologist and chief medical director, will require reimbursement for their time spent on the reviewing the new perioperative guidelines.

The project team must consider the price difference between intranasal dexmedetomidine and midazolam. Dexmedetomidine 100mcg/ml undiluted for intranasal dosing is $20.73 per vial of 4 milliliters. Midazolam 1mg/ml for intranasal dosing is $0.77 per vial of 2 ml (Drugs.com, n.d.). Approximately, 70% of pediatric patients experience anxiety; therefore, most pediatric patients 2-12 years old undergoing anesthesia at the facility will receive intranasal dexmedetomidine (Vieco-Garcia et al., 2021). With the new guidelines in place, anesthesia will be prescribing more dexmedetomidine. The pharmaceutical supply of the drug will need to be increased at the facility.

Outcomes and Analysis

The m-YPAS score will assess the level of anxiety on arrival to the preoperative area and upon transfer to the operating room. Four weeks after the pilot phase, the QI committee will collect the m-YPAS scores and review them with the project manager. The QI committee will gather data about the results of each m-YPAS score and medication administered in the preoperative area. The project manager will place the data in a flowsheet and review it with the project team. The scores will be compared to the medication administered. Four weeks after the preoperative guidelines are dispersed throughout the facility, the QI committee will again gather data from the m-YPAS scores and review it with the project manager.

Due to the development of evidence-based practice guidelines for pediatric preoperative anxiety, m-YPAS scores should decrease upon entering the operating room. A statistically significant decrease in m-YPAS scores three months after implementing the guidelines will determine the project's success. Follow-up with charge nurses and resource personnel will inform the project team about barriers and limitations to the project's success. If the project outcomes are less than desirable, the staff will be re-educated, and the project will be re-implemented.

Barriers and Limitations

The evidence-based practice project aims to improve preoperative anxiety detection and treatment. Treating preoperative anxiety with dexmedetomidine is a newer approach to the treatment of preoperative

anxiety in pediatric patients. One barrier to consider is the cost of dexmedetomidine. The higher cost may deter pharmacies from ordering enough medication. The exact number of pediatric patients who will experience preoperative anxiety is difficult to predict. The facility will face a medication shortage if the predicted amount of medication required is inaccurate.

Another barrier will be ensuring the nursing staff completes the m-YPAS at appropriate intervals. The charge nurses in the perioperative department will oversee the compliance of the m-YPAS. The preoperative nurses will chart the m-YPAS score when the patient is transferred to the operating room. The charge nurses will assess any barriers to charting the m-YPAS scores in the electronic record. The IT department will develop an automated audit report that the charge nurses can run at the end of each shift. The report will pool all patients 2-12 years old admitted to the preoperative area over the past 24 hours and will show whether the m-YPAS assessment tool was completed. Then, the charge nurse can discuss with the nurses to discover why the m-YPAS was not documented. The reasons will be shared with the project team leader. The project team will address common incidents which may lead to process modifications to improve compliance.

The anesthesia provider may be hesitant to administer a novel drug to pediatric patients for the treatment of anxiety. The anesthesia provider must be adequately educated on the superior effects of the medication, and they should be ensured of the safety of intranasal dexmedetomidine as an alternative to midazolam. Establishing stakeholders can be challenging and create a barrier to new guidelines. The team must present the facts on the importance of recognizing and treating preoperative anxiety with key stakeholders.

Conclusion

Preoperative anxiety will continue to be a concern in anesthesia. A comprehensive literature review supports that pediatric patients who experience perioperative anxiety are at risk of poor outcomes during the induction of anesthesia. Currently, facilities lack standard evidence-based practice guidelines to assess and treat preoperative anxiety. This evidence-based practice project proposes a plan for implementing, evaluating, and revising guidelines utilizing The Iowa Model.

Providing evidence-based practice guidelines for preoperative anxiety will improve patient experience and patient outcomes. Providing an assessment tool to assess anxiety is essential to recognize preoperative

anxiety. Current literature supports that dexmedetomidine can decrease the incidence of preoperative anxiety and improve perioperative outcomes. A comprehensive literature review confirms that the m-YPAS is the preferred scale to assess anxiety of surgical patients ages 2-12 years old. Perioperative nurses and anesthesia providers must collaborate to assess and treat preoperative anxiety.

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Appendix A: Evidence Review								
APA Citation: Kain, Z., Mayes, L., Cicchetti, D., Bagnall, A., Finley, J., Hofstadter, M. The yale preoperative anxiety scale: how does it compare with a "gold standard"? *Anesth Analg*, 85(4):783-8. doi: 10.1097/00000539-199710000-00012. PMID: 9322455.								
Conceptual Framework or Model	***Design or Method***	***Sample & Setting***	***Major Variables Studied & their Definitions if any***	***Outcome Measurement(s)***	***Data Analysis***	***Findings***	***Level of Evidence***	***Quality of Evidence: Critical Worth to Practice***
A study to compare State-Trait Anxiety Inventory for Children to The Modified-Yale Preoperative Anxiety Scale (m-YPAS).	RCT	N=51 Children ages 5-12 years old	IV1: State-Trait Anxiety Inventory for Children IV2: m-YPAS	Observed the scales compared to observation of video by phycologist and anesthesiologist Compare the scales during different phases of the perioperative setting	Weighted kappa statistics Paired t-tests with Bonferroni's correction	The study showed m-YPAS has excellent observer reliability, construct validity and concurrent validity	**II**	**Strengths:** • Included ages younger than prior studies of this scale **Limitations:** • Compared the scales only during preoperative holding area and not during induction of anesthesia **Feasibility:** • reasonable and safe to implement
APA Citation: Shen F, Zhang Q, Xu Y, et al. Effect of Intranasal Dexmedetomidine or Midazolam for Premedication on the Occurrence of Respiratory Adverse Events in Children Undergoing Tonsillectomy and Adenoidectomy: A Randomized Clinical Trial. *JAMA Netw Open.* 2022;5(8):e2225473. doi:10.1001/jamanetworkopen.2022.25473								
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Study comparing the number of respiratory adverse events when administering intranasal midazolam versus intranasal dexmedetomidine	RCT	n=384 Children 0 – 12 years old undergoing elective tonsillectomy and adenoidectomy	IV1: intranasal D IV2: Intranasal M IV3: Intranasal 0.9% saline	Incidence of perioperative respiratory adverse events in perioperative setting	Chi-squared Fisher exact test Bonferroni's correction	Children given midazolam had a higher risk of perioperative respiratory adverse events (aOR, 4.44; 95% CI, 2.54-7.76).	**II**	**Strengths:** • large sample size **Limitations:** • population limited tonsillectomy and adenoidectomy surgeries

								Feasibility: • reasonable and safe to implement
APA Citation: Saad, B., Tharwat, A.I., Ghobrial, H.N., & Elfawal, S.M. (2020). Intranasal dexmedetomidine versus intranasal midazolam as pre-anesthetic medication in pediatric age group undergoing adenotonsillectomy. *Ain-Shams Journal of Anesthesiology*, *12*, 40. https://doi.org/10.1186/s42077-020-00090-x								
Conceptual Framework or Model	***Design or Method***	***Sample & Setting***	***Major Variables Studied & their Definitions if any***	***Outcome Measurement(s)***	***Data Analysis***	***Findings***	***Level of Evidence***	***Quality of Evidence: Critical Worth to Practice***
Trial to compare midazolam versus dexmedetomidine to reduce perioperative anxiety	RCT	n=48 children ages 3-7 years old	IV1= midazolam 0.2 mg/kg IV2 = dexmedetomidine 1mg/kg	Modified observers' assessment of alertness/sedation scale and Child-Parent Separation and Anxiety Scale and Mask Acceptance Scale And vital sign measurements	Mann-Whitney test, independent t-test, Fischer exact test	Mask accept was better in group D compared with group M and it was statistically significant (p = 0.028). Parent separation was easier in group D, but it was not statically significant	II	**Strengths:** • compared several important outcomes **Limitations:** • timing of drug administration **Feasibility:** • Reasonable and safe to implement
APA Citation: Lang, B., Zhang, L., Zhang, W., Lin, Y., Fu, Y., & Chen, S. (2020). A comparative evaluation of dexmedetomidine and midazolam in pediatric sedation: A meta-analysis of randomized controlled trials with trial sequential analysis. *CNS neuroscience & therapeutics*, *26*(8), 862–875. https://doi.org/10.1111/cns.13377								
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Review of literature to assess midazolam versus dexmedetomidine for perioperative sedation and anxiety	SR	n=34 studies including a total of 2,281	IV1= midazolam dose and route IV2= dexmedetomidine dose and route	sedation scale, vital sign measurements, parent, postop pain, emergence agitation, mask acceptance, parent separation satisfactory	Risk Ratio	The results revealed that D had better sedation at parental separation than M. There was not a significant difference found regarding sedation before parental separation (RR = 0.86, with 95% CI [0.74, 1.00])	**I**	**Strengths:** • compared several important outcomes **Limitations:** • medications have different routes and dosages **Feasibility:** • Reasonable and safe to implement
APA Citation: Vieco-Garcia, A., Lopez-Picado, A., Fuentes, M. et al. (2021) Comparison of different scales for the evaluation of anxiety and compliance with anesthetic induction in children undergoing scheduled major outpatient surgery. *Perioper Med* 10, 58. https://doi.org/10.1186/s13741-021-00228-x								
Conceptual Framework or Model	***Design or Method***	***Sample & Setting***	***Major Variables Studied & their Definitions if any***	***Outcome Measurement(s)***	***Data Analysis***	***Findings***	***Level of Evidence***	***Quality of Evidence: Critical Worth to Practice***
Study comparing three preoperative anxiety scales for children undergoing elective outpatient surgery	Observational perspective study	n=76 patients ages 2 – 16 years old	IV1= m-YPAS IV2= State-Trait Anxiety Inventory Children IV3= Spence Anxiety Scale-Pediatric IV4= Induction Compliance Checklist	Comparing each tool with the degree of patient compliance on induction, measured by the Induction Compliance Checklist.	Student's *T* test linear correlation analysis	M-YPAS detects increasing anxiety as children approach procedures, and it strongly correlates with worse anesthesia induction	**II**	**Strengths:** • compared induction compliance and different scales **Limitations:** • 72.4% male population, included only ASA I & II **Feasibility:** • Reasonable and safe to implement
APA Citation: Bromfalk, A., Myrberg, T., Wallden, J., Engstrom, A., & Hultin, M. (2021). Preoperative anxiety in preschool children: A randomized controlled trial comparing midazolam, clonidine and dexmedetomidine. *Pediatric anesthesia, 31(11), 1225-1233.* https://doi.org/10.1111/pan.14279								
Conceptual Framework or Model	***Design or Method***	***Sample & Setting***	***Major Variables Studied & their Definitions, if any***	***Outcome Measurement(s)***	***Data Analysis***	***Findings***	***Level of Evidence***	***Quality of Evidence: Critical Worth to Practice***

Trial to compare clonidine, dexmedetomidine and midazolam in reducing preoperative anxiety	RCT	90 children 2-6 years old	IV1= clonidine IV2= dexmedetomidine IV3= midazolam	Modified Yale Preoperative Anxiety Scale (m-YPAS), Behavioral distress scale, induction compliance checklist, Ramsay sedation scale	Kruskal-Wallis Test and one-way ANOVA	The children's anxiety score increased during anesthesia preparation with C ($p = 0.016$) and D ($p = .0\ 07$), while with M the score did not change. C and D caused higher sedation scores than M ($p < .001$)	**II**	**Strengths:** • block randomization; groups included similar characteristic • Used validated outcome scales **Limitations:** • only one clinical site was chosen • sample size • early termination of study **Feasibility:** • reasonable and safe to implement
APA Citation: Diwan, G., Bharti, A. K., Rastogi, K., & Gupta, P. K. (2020). Comparison of Intranasal Dexmedetomidine and Midazolam as Premedication in Pediatric Surgical Patients: A Prospective, Randomized Double-Blind Study. *Anesthesia, essays and researches*, *14*(3), 384–389. https://doi.org/10.4103/aer.AER_102_20								
Conceptual Framework or Model	***Design or Method***	***Sample & Setting***	***Major Variables Studied & their Definitions if any***	***Outcome Measurement(s)***	***Data Analysis***	***Findings***	***Level of Evidence***	***Quality of Evidence: Critical Worth to Practice***

Trial to compare intranasal dexmedetomidine and midazolam as a premedication	RCT	60 children 2-12 years old	IV1= dexmedetomidine IV2= midazolam	Ramsay Sedation Scale, Behavioral score (anxiety score), successful child–parent separation and hemodynamics	Student's *t*-test and chi-square test	Lower heart rate in D group was statistically significant (<0.013), BP comparable and statistically insignificant (>0.076), Anxiety score and sedation scale was lower in D group and statically significant	**II**	**Strengths:** • double blind study characteristic • Used validated outcome scales **Limitations:** • only one clinical site was chosen • sample size **Feasibility:** • reasonable and safe to implement
APA Citation: Ghali, A. M., Mahfouz, A. K., & Al-Bahrani, M. (2011). Preanesthetic medication in children: A comparison of intranasal dexmedetomidine versus oral midazolam. *Saudi journal of anaesthesia*, *5*(4), 387–391. https://doi.org/10.4103/1658-354X.87268								
Conceptual Framework or Model	***Design or Method***	***Sample & Setting***	***Major Variables Studied & their Definitions, if any***	***Outcome Measurement(s)***	***Data Analysis***	***Findings***	***Level of Evidence***	***Quality of Evidence: Critical Worth to Practice***

Trial to compare intranasal dexmedetomidine and oral midazolam in reducing preoperative anxiety	RCT	120 children 2-6 years old	IV1= Intranasal dexmedetomidine 1mcg/kg IV2= Oral midazolam 0.5mg/kg	Modified Yale Preoperative Anxiety Scale (m-YPAS), 6- point sedation scale, and hemodynamics	Fisher's exact test was used to compare nominal data or percentages. Bonferroni correction was used for repeated comparisons. <0.05 was considered significant.	The children treated with dexmedetomidine had lower sedation levels (*P*=0.042), lower anxiety levels (*P*=0.036), and easier child-parent separation (*P*=0.029)	**II**	**Strengths:** • large sample size • Used validated outcome scales **Limitations:** • Only adenotonsillectomy cases were included **Feasibility:** • reasonable and safe to implement
APA Citation: Linares Segovia, B., García Cuevas, M. A., Ramirez Casillas, I. L., Guerrero Romero, J. F., Botello Buenrostro, I., Monroy Torres, R., & Ramírez Gomez, X. S. (2014). Pre-anesthetic medication with intranasal dexmedetomidine and oral midazolam as an anxiolytic. *Anales de pediatria (Barcelona, Spain: 2003), 81*(4), 226–231. https://doi.org/10.1016/j.anpedi.2013.12.006								
Conceptual Framework or Model	***Design or Method***	***Sample & Setting***	***Major Variables Studied & their Definitions if any***	***Outcome Measurement(s)***	***Data Analysis***	***Findings***	***Level of Evidence***	***Quality of Evidence: Critical Worth to Practice***

Trial to compare intranasal dexmedetomidine and oral midazolam in reducing preoperative anxiety	RCT	108 chilren 2 – 12 years old	IV1= Intranasal dexmedetomidine 1mcg/kg IV2= Oral midazolam 0.5mg/kg	modified Yale Preoperative Anxiety Scale (m-YPAS)	(ANOVA) with Tukey's post hoc test, Student's *t*-tests	lower anxiety scale scores with dexmedetomidine (P = .001), lower heart rate dexmedetomidine P = .001, lower blood pressure with dexmedetomidine (P = .005)	**II**	**Strengths:** • randomized, double-blind, • Used validated outcome scales **Limitations:** • only one clinical site was chosen • sample size • early termination of study **Feasibility:** • reasonable and safe to implement
APA Citation: Pasin, L., Febres, D., Testa, V., Frati, E., Borghi, G., Landoni, G., & Zangrillo, A. (2015). Dexmedetomidine vs midazolam as preanesthetic medication in children: a meta-analysis of randomized controlled trials. *Paediatric anaesthesia*, *25*(5), 468–476. https://doi.org/10.1111/pan.12587								
Conceptual Framework or Model	***Design or Method***	***Sample & Setting***	***Major Variables Studied & their Definitions if any***	***Outcome Measurement(s)***	***Data Analysis***	***Findings***	***Level of Evidence***	***Quality of Evidence: Critical Worth to Practice***

Trial to compare intranasal dexmedetomidine and oral midazolam in reducing preoperative anxiety	Meta-analysis	1033 children in 13 randomized trials	IV1= Intranasal dexmedetomidine IV2= Oral midazolam	modified Yale Preoperative Anxiety Scale (m-YPAS)	Cochran Q test	dexmedetomidine group there was a higher incidence of satisfactory sedation at separation from parents (P=0.02), reduced incidence of postoperative agitation (P=0.008)	**II**	**Strengths:** • large sample size • Used validated outcome scales **Limitations:** • high clinical heterogeneity (due to study drugs dosages and routes of administration). **Feasibility:** • reasonable and safe to implement

**Legend: OR = odds ratio, CI = confidence interval, P = probability value, RR = risk ratio, RCT = Randomized Control Trial, SR = Systemic review, ANOVA= Analysis of Variance, D = dexmedetomidine, M = midazolam, C = clonidine*

Annotated Bibliography

Kain, Z., Mayes, L., Cicchetti, D., Bagnall, A., Finley, J., Hofstadter, M. The yale preoperative anxiety scale: how does it compare with a "gold standard"? *Anesth Analg*, 85(4):783-8. doi: 10.1097/00000539-199710000-00012. PMID: 9322455.

Kain et al. (1997) conducted a study to modify the Yale Preoperative Anxiety Scale and compare it to the State-Trait Anxiety Inventory for Children. At the time the "gold standard" was considered the State-Trait Anxiety Inventory for Children. Pediatric patients were video recorded and assessed to compare the results of the scales. To assess whether the scale accurately measured anxiety the m-YPAS was used to compare scores during increasing levels of stress through the perioperative period. The study included 51 children ages 5-12 years old. The results concluded that the m-YPAS provides significant reliability and is a valid tool to assess preoperative anxiety in pediatric patients.

Shen F, Zhang Q, Xu Y, et al. Effect of Intranasal Dexmedetomidine or Midazolam for Premedication on the Occurrence of Respiratory Adverse Events in Children Undergoing Tonsillectomy and Adenoidectomy: A Randomized Clinical Trial. *JAMA Netw Open.* 2022;5(8):e2225473. doi:10.1001/jamanetworkopen.2022.25473

The study aimed to compare the number of incidences of perioperative respiratory adverse events when administering intranasal dexmedetomidine (2 mcg/kg) versus intranasal midazolam (0.1 mg/kg). Perioperative adverse events include oxygen desaturation, airway obstruction, coughing, wheezing, laryngospasm and bronchospasm. The study included 384 children receiving tonsillectomy and adenoidectomy surgery. The children were between the ages of 0 and 12 years. The pediatric patients were randomly placed into three groups. The midazolam group received intranasal midazolam (0.1 mg/kg) and the dexmedetomidine group received intranasal dexmedetomidine (2.0 μg/kg) prior to surgery. The control group received intranasal 0.9% saline. The midazolam group had an increased risk of perioperative respiratory adverse events than compared to the dexmedetomidine group (aOR, 4.44; 95% CI, 2.54-7.76).

Saad, B., Tharwat, A.I., Ghobrial, H.N., & Elfawal, S.M. (2020). Intranasal dexmedetomidine versus intranasal midazolam as pre-anesthetic medication in pediatric age group undergoing adenotonsillectomy. *Ain-Shams journal of anesthesiology*, *12*, 40. https://doi.org/10.1186/s42077-020-00090-x

The study compared intranasal dexmedetomidine with intranasal midazolam for preoperative medication for pediatric patients. The pediatric patients in the study were randomly divided into two groups. Group D (n=24) received intranasal dexmedetomidine and group M (n=24) received intranasal midazolam. Mask acceptance was better in group D than in group M (p = 0.028). Parent separation was more manageable in group D, but it was not statically significant (p = 0.801). The interventions and conclusion of this study were clear and precise. The study results are helpful for providers caring for pediatric patients in the preoperative setting.

Lang, B., Zhang, L., Zhang, W., Lin, Y., Fu, Y., & Chen, S. (2020). A comparative evaluation of dexmedetomidine and midazolam in pediatric sedation: A meta-analysis of randomized controlled trials with trial sequential analysis. *CNS neuroscience & therapeutics*, *26*(8), 862–875. https://doi.org/10.1111/cns.13377

The meta-analysis searched three databases for randomized clinical trials comparing midazolam and dexmedetomidine in pediatric patients. The researchers found thirty-four randomized trials involving 2,281 pediatric patients. The results concluded that dexmedetomidine was associated with less emergence agitation than midazolam. The results also showed that dexmedetomidine had better sedation at parental separation than midazolam. There was no significant difference between the two medications regarding sedation before parental separation. In general, the studies found similar results regarding the two medications. The meta-analysis applies to the pediatric patients being cared for in the perioperative setting. The information in the meta-analysis could be safely applied to caring for pediatric patients in the perioperative setting.

Vieco-Garcia, A., Lopez-Picado, A., Fuentes, M. et al. (2021) Comparison of different scales for the evaluation of anxiety and compliance with anesthetic induction in children undergoing scheduled major outpatient surgery. *Perioper Med* 10, 58. https://doi.org/10.1186/s13741-021-00228-x

The observational prospective study compares three anxiety assessment scales correlating them with the patient's compliance on induction. Compliance of induction was assessed by the Induction Compliance Checklist (ICC). The three preoperative anxiety scales included the modified-Yale Preoperative Anxiety Scale (m-YPAS), The State-Trait Anxiety Inventory Children, and The Spence Anxiety Scale-Pediatric. The study included 76 children ages 2 to 16 years old

with an ASA of I or II undergoing an elective surgery. The study observed the patients at three different stages. The first stage was the moment the patient arrived at the preoperative area (M0). The second stage was the patient being transferred to the surgical area (M1). The third stage was the moment anesthesia was induced (M2). The patient's anxiety increased through each stage, and it was the greatest during the transfer to the surgical area. (M0 = 26.1 ± 9.5; M1 = 31.8 ± 18.1; M2 = 33.5 ± 21.1). There was a strong correlation between ICC scale and m-YPAS at stages M1 (0.738) and M2 (0.794). The study suggest m-YPAS detects increasing anxiety as pediatric patients approach procedures, and it strongly correlates with worse anesthesia induction.

Bromfalk, A., Myrberg, T., Wallden, J., Engstrom, A., & Hultin, M. (2021). Preoperative anxiety in preschool children: A randomized controlled trial comparing midazolam, clonidine and dexmedetomidine. *Pediatric anesthesia, 31(11), 1225-1233.* https://doi.org/10.1111/pan.14279

The study aimed to compare the effectiveness of clonidine, dexmedetomidine, and midazolam in relieving anxiety during the preoperative stage of surgery. The population was school-age children receiving ear, nose, and throat surgery. The trial was double-blinded; the children (n=90) were randomly assigned to receive one of the medications. Six children who refused the medication were excluded. There was no difference between medications' effectiveness when used to prevent intravenous insertion distress. The pediatric patients's anxiety score increased during anesthesia preparation with clonidine ($p = 0.016$) and dexmedetomidine ($p = .0\ 07$), while the score did not change with midazolam. Clonidine and dexmedetomidine caused higher sedation scores than midazolam ($p < .001$). All clinical outcomes were measured, and the results were clearly displayed. Although the trial had to be terminated early due to a lack of resources, there is important information that could impact clinical decision-making about anxiolytics.

Diwan, G., Bharti, A. K., Rastogi, K., & Gupta, P. K. (2020). Comparison of intranasal dexmedetomidine and midazolam as premedication in pediatric surgical patients: A prospective, randomized double-blind study. *Anesthesia, essays and researches*, *14*(3), 384–389. https://doi.org/10.4103/aer.AER_102_20

Diwan et al. (2020) conducted a study comparing the sedative effects, anxiety level, successful child–parent separation, and hemodynamic parameters of intranasal dexmedetomidine and midazolam in pediatric patients undergoing surgery. The study included 60 children ages 2 – 12 years old. Sixty children were randomly placed into two groups. Thirty children received intranasal dexmedetomidine (1 mcg/kg). The other thirty children received intranasal midazolam (0.2 mg/kg). The sedation score, anxiety score, and successful child–parent separation were recorded at the time the child was taken to the

operating room. The pediatric patients who received intranasal dexmedetomidine achieved lower sedation scores ($P < 0.001$), lower anxiety levels ($P = 0.001$), and easier child–parent separation ($P = 0.003$) than pediatric patients who received intranasal midazolam when transferring patients to the operating room (Diwan et al., 2020).

Ghali et al. (2011) conducted a double-blinded, randomized study including 120 children undergoing an adenotonsillectomy. The children were equally divided into two groups. One group received dexmedetomidine 1 mcg/kg, while the other group received oral midazolam 0.5 mg/kg before induction of anesthesia. Preoperative sedative effects, the m-YPAS score, and the ease of child-parent separation were assessed. The study also compared postoperative analgesia and time of recovery. Pediatric patients who received intranasal dexmedetomidine achieved significantly lower sedation levels (P=0.042), lower anxiety levels (P=0.036), and easier child-parent separation (P=0.029) than pediatric patients who received oral midazolam.

Linares Segovia, B., García Cuevas, M. A., Ramirez Casillas, I. L., Guerrero Romero, J. F., Botello Buenrostro, I., Monroy Torres, R., & Ramírez Gomez, X. S. (2014). Pre-anesthetic medication with intranasal dexmedetomidine and oral midazolam as an anxiolytic. *Anales de pediatria*, *81*(4), 226–231. https://doi.org/10.1016/j.anpedi.2013.12.006

Linares Segovia et al (2014) conducted a randomized, double-blinded study that included 108 children ages 2 – 12 years old undergoing surgery. 52 children were administered intranasal dexmedetomidine and 56 were administered oral midazolam. Anxiety was assessed using the m-YPAS score. Anxiety was decreased in the dexmedetomidine group at 60 minutes (P=.001), induction (p=.04), and recovery (P=.0001). Changes in heart rate, mean arterial pressure, and oxygen saturation, were statistically significant in the pediatric patients who received dexmedetomidine, although none of the changes caused clinical consequences. The study concluded that intranasal dexmedetomidine provided more effective anxiolysis than oral midazolam.

Pasin, L., Febres, D., Testa, V., Frati, E., Borghi, G., Landoni, G., & Zangrillo, A. (2015). Dexmedetomidine vs midazolam as preanesthetic medication in children: a meta-analysis of randomized controlled trials. *Paediatric anaesthesia*, *25*(5), 468–476. https://doi.org/10.1111/pan.12587

Pasin et al. (2015) conducted a meta-analysis which included 1033 children in 13 randomized trails. The trials included compared dexmedetomidine and midazolam for preoperative sedation, anxiety, and successful parent-child separation. The study also evaluated postoperative pain and agitation. The dexmedetomidine group had a higher incidence of satisfactory sedation at separation from parents ($P = 0.02$). The dexmedetomidine group also have reduced postoperative agitation ($P = 0.008$), and a reduction in the need of analgesic drugs ($P<0.001$).

Appendix B

Budget			
Items	**Cost**	**Multiplier**	**Total**
Nurse Anesthetist	$90/hour	1 hours x 20 CRNAs + 2 hours x 5 CRNAs + 30 hours x 2 CRNAs	$8,100
Anesthesiologist (MDA)	$204/hour	30 hours x 1 MDA + 1 hour x 6 MDA	$7,344
Staff Nurse	$34/hour	0.5 hour x 45 RNs + 1 hour x 6 RNs + 30 hours x 2 RNs	$3,009
Pharmacist	$70/hour	30 hours x 1	$2,100
IT Department	$42/hour	6 hours x 4 employees	$1,008
Guidelines Review Committee	$369/hour	4 hours	$1476
Quality Improvement Committee	$225/hour	32 hours	$7,200
Ink Cartridge	$65/cartridge	2 cartridges	$130
Paper	$15/pack	4 packages	$60
Total			**$29,356**

(Incredible Health, 2023). (Salary, 2023).

Appendix C

First "Pilot" Phase Timeline

Weeks	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Educate Staff							
Implement Guidelines							
Review Data/Adjustments							

Figure 2

Second Phase Timeline

Weeks	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Educate Staff										
Implement Guidelines										
Review Data/Adjustments										
Re-implementation										