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Intraoperative Monitoring of Laryngeal Mask Airway Cuff Pressure and Minimizing Postoperative Complications: An Evidence-Based Education Module

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Intraoperative Monitoring of Laryngeal Mask Airway Cuff Pressure and Minimizing Postoperative Complications: An Evidence-Based Education Module

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ABSTRACT

Background: One of the most typical postoperative consequences is postoperative sore throat (POST).[1] POST can occur in anywhere from 12.1% to 70% of people. It has been demonstrated that POST hinders post-anesthesia recovery, lowers patient satisfaction, and increases the risk of aspiration pneumonia.[1-2] The vocal cords, the epithelium, and mucosal cells can sustain injury from airway secretion, congestive blood loss, and POST.[2] The project involved solving the following PICOT question: Are (P) anesthesia providers (I) intraoperatively monitoring laryngeal mask airways (LMA) cuff pressures (C) compared to standard practice (O) to decrease postoperative complications (T) within 24 hours of procedure?

Methods: A quality improvement project was conducted using a pre-test and post-test to assess attitude and knowledge at a Level 1 trauma hospital facility in South Florida. The search databases used included PubMed, Google Scholar, and MEDLINE to obtain journal articles related to the PICO question. The key participants were anesthesia providers who were recruited voluntarily through an email invitation. The anesthesia providers participated in a pre-test survey followed by an educational module and post-test survey. The data from the surveys were analyzed statistically to evaluate the impact of the educational module.

Results: The participants (n=6) demonstrated improved scores in the post-test survey compared to the pretest scores. When asked how likely they are to use a manometer in their daily practice for monitoring, 2 (33.33%) responded “most likely,” 3 (50%) responded “somewhat likely,” and 1 (16.67%) responded “most unlikely.” Furthermore, when asked if lack of monitoring laryngeal mask airway cuff pressure results in postoperative complications, 5 (83.33%) replied “agree” and 1 (16.67%) responded “somewhat agree.”

Discussion: The educational module demonstrated increased knowledge regarding monitoring intraoperative laryngeal mask airway cuff pressure to reduce postoperative complications. After implementing the educational module, 100% (n = 6) answered question 5 correctly, showing a 16.67% increase in knowledge for complications postoperatively.

Keywords: Laryngeal mask airway, cuff pressure, postoperative complication, monitoring

TABLE OF CONTENTS

INTRODUCTION

Reports of increased postoperative complications during and after anesthesia have reduced patient satisfaction during treatment procedures.[1-6] This negatively impacts patients' health outcomes. With the effective application of the laryngeal mask airway (LMA), the airway management technique has brought hope in limiting complications.[4] As such, the study aimed to assess whether monitoring LMA cuff pressure can reduce the occurrence and severity of postoperative complications.

PICO

The project involved solving the following PICOT question: Are (P) anesthesia providers (I) intraoperatively monitoring laryngeal mask airways (LMA) cuff pressures (C) compared to standard practice (O) to decrease postoperative complications (T) within 24 hours of procedure?

Significance of the Problem

During the administration of anesthesia before patients undergo surgical care, there is a need to keep the blood oxygen levels high.[11] This is because of the high dependency on oxygen for major body organs.[9] Notably, if the patient airway is not maintained to be open for free flow of oxygen, the patient is at a risk of hypoxemia.[4] To address this, healthcare researchers have developed different devices to help keep the airways as open as possible. Endotracheal tubes and laryngeal mask airway have been inserted in the patient's airway to provide a patent oxygen flow to the patient's body. While the two have been effectively used over the years, laryngeal mask airway has become very effective since its inception.[2-4] Many studies and observations have revealed that once the devices are used, there are certain risks of patients contracting postoperative complications.[11,13] Notably, when using laryngeal mask airway with poorly controlled cuff pressure, the rate of occurrence increases with postoperative sore throat,

hoarseness, numbness, and bucking. According to Paul et al.,[12] anesthesia has numerous complications that patients encounter after using LMA. Therefore, the main problem is considered to arise from anesthetic administration using laryngeal mask airway with little regulation of the cuff pressure.[6] Notably, in the PICOT study, the problems were high levels of postoperative complications when using devices like the endotracheal tube and LMA insertion.

Background

Over the years, healthcare professionals have demonstrated that low-flow anesthesia has numerous advantages when it comes to decreasing atmospheric pollution coupled with maintaining airway humidification and temperature. Gong et al.[1] suggested that the two methods widely used to help maintain an open airway system during anesthesia are endotracheal tubes (ETTs) and laryngeal mask airway (LMA). Notably, for general anesthesia, LMA has been regarded as a safe supraglottic compared to the ETTs. This is because the latter is responsible for difficult spontaneous ventilation and airway. Paul et al.[12] contended that LMA fails to provide a watertight seal and presents some challenges when used. However, studies have supported its use for positive pressure ventilation among children and adults.

The prevalence of postoperative complications after using LMA and ETT remains relatively high albeit with a level of variation from each device used.[1] For instance, studies have demonstrated that complications like sore throat following ETT usage remain much higher than when LMA is used. Many cases report complications from LMA usage like hoarseness, sore throat, nerve injury, and bleeding.[7-10] To help address this, LMA employs high cuff pressure using N_2O. Since ETT has high cases of preoperative complications compared to LMA and using LMA in low-flow controlled anesthesia, there is a need for tight sealing of airways. The LMA is a device that is straightforward to use, easy to teach, and simple to understand. It is less intrusive

than the tracheal tube.[3,6,8] Studies on patients, both adults and children, have described how simple it is to use. LMAs are frequently used in surgery and are considered safe with few documented problems.[5-7] Patients undergoing surgery LMAs are regarded as superior substitutes for endotracheal tubes due to LMAs decrease post-operative complications. Compared to endotracheal tubes, LMAs have been demonstrated to require less anesthesia, help patients recover more quickly.[3] Following the usage of LMA airways, adverse symptoms such as sore throat and aspiration have been documented. Despite being used more than 300 million times worldwide, the LMA airway has not been linked to any instances of fatalities.[6]

One of the most typical postoperative consequences is postoperative sore throat (POST). POST can occur in anywhere from 12.1% to 70% of people. It has been demonstrated that POST hinders post-anesthesia recovery, lowers patient satisfaction, and increases the risk of aspiration pneumonia. The vocal cords, the epithelium, and mucosal cells can sustain injury from airway secretion, congestive blood loss, and POST. Inhalation anesthetic use, cuff size, endotracheal intubation method, cuff pressure, and the form of intubation tubes have all been documented as contributing factors to POST in recent research. Additionally, studies have shown that topical dexamethasone, magnesium, and POST prophylaxis are effective treatments, whereas lidocaine spray is not.

Notably, to help forecast postoperative complications, many studies have measured the probability of those complications occurring through difficulties exhibited before surgery. However, no study has rated the preoperative POST risk variables compared to others side effects like hoarseness and postoperative pain. The dynamic character of pain as a sense, including tension and dread, has been described. It is noteworthy that pain as a sensation relates to variables including time, space, pressure, and temperature. Additionally, when faced with

discomfort, we must disregard it as an emotion to assess the organic origin of the pain. However, if there is minor organic damage but significant pain, we may need to concentrate on pain as an emotion. It is frequently helpful to separate pain into sensory and emotional suffering when assessing pain.

Studies indicate that selecting a device for pediatric airway management has numerous factors that healthcare professionals must consider.[4-7] These areas include respiratory problems such as laryngospasm or bronchospasm after recovery from anesthesia or postoperative cough and postoperative sore throat, which are major areas of concern.[2] Lack of airway humidity, poor endotracheal tube size, cuff design, high flow rates of anesthetic gas, trauma during insertion and suctioning, and manipulation of the airway and surrounding tissues are just a few of the multiple factors contributing to respiratory tract complications in the perioperative period.

Scope of the Problem

Given the identified nature of complications derived from supporting a clear airway using a laryngeal mask airway and endotracheal tubes, there is a need to research various mechanisms through which these complications can be minimized.[6] Studies have indicated that LMAs have reported higher levels of anesthesia success rates compared to endotracheal tubes, leading to lower levels of postoperative sore throat, hoarseness, and incidences of oropharyngeal bleeding.[3,4-7] Therefore, the study focused on using LMA and how postoperative complications arising from the intervention can be effectively minimized.[7] Many scholars have argued that monitoring and maintaining the cuff pressures within the recommended pressure levels can help alleviate many postoperative complications like postoperative sore throat.[7-10]

In addition, intraoperative manometry has also been cited as a strategy to minimize complications arising after anesthesia.[8] Many healthcare professionals have not included

intraoperative manometry as a routine practice. Therefore, not following the practice can lead to detrimental outcomes since the intervention has been linked to numerous positive outcomes, especially regarding postoperative complications.[10,12] Therefore, as a complementary strategy, the study also examined the impact of intraoperative manometry on limiting complications. However, the key scope of the research encompassed the areas where laryngeal mask airway (LMA) cuff pressures are monitored to allow for effective management and limitation of postoperative complications.

Consequences of the Problem

Anesthesia providers are responsible for ensuring patient safety and well-being throughout the entire period of general anesthetic or deep sedation. As such, they must ensure oxygen flows to the lungs when patients are anesthetized since muscles around the tongue and throat always relax, thus blocking the airway.[4,7,9] To prevent this problem, healthcare professionals use different airway management strategies like laryngeal mask airway and endotracheal tubes. Gong et al.[1] contended that using both LMA and ETT is associated with postoperative operations that can be detrimental to achieving positive health outcomes. The major postoperative complications have been reported a few hours after the completion of surgical operations.[1] However, some cases are mild, while others can be exasperated by the nature of the item used for airway management adopted by the anesthesia provider.

Sore throat is the most commonly reported postoperative complication that follows surgical operation procedures. Patients report these cases a few hours after their operations. This has, however, resulted in an increased risk of adverse symptoms if the condition is not properly managed.[5] For instance, a sore throat that lasts 3 days after the surgical operation can be

considered an adverse condition that must be addressed immediately.[8] However, it can cause postoperative morbidity and mortality, which ultimately cause negative patient outcomes.

Injuries to the lips or tongue or dental damage are part of the complications that can arise during and after operations.[8] Notably, lip and tongue damage cases have been reported during tube placement or removal. Minor bruises or splits may occur, thus leading to the patient's risk of wounds in the affected areas.[7-9] However, with proper management, the wounds can heal quickly, thus reducing the severity of the complications. However, when left untreated, the challenges arising from the conditions may be very detrimental to the patient's health.

According to Santambrogio et al.,[9] the postoperative complications, when left unattended, can result in increased healthcare expenses since their existence leads to longer hospital stays. The intubation manipulation can lead to laryngospasms, which make it difficult for patients to speak or breathe. While laryngospasm is reversible, most of these challenges can make a patient's recovery very difficult and contributes to their hardship. This then negatively impacts the patient recovery. Odeigah et al.[7] suggested that approximately 7% to 15% of the patients undergoing surgical operations experience some level of postoperative complication. Similarly, postoperative mortality is estimated to vary from 0.79% to 5.7%, thus making it necessary for the mechanisms for addressing the problem to be developed effectively.[9] Therefore, to help improve patient health outcomes after undergoing surgical operations, mechanisms need to minimize cases of postoperative complications.

Knowledge Gaps

Numerous studies have been conducted regarding strategies through which postoperative complications arising from LMA usage can be minimized.[4-9] However, despite the research, eliminating postoperative sore throat remains a serious challenge. Williams et al.[4] contended that

when ETTs or LMA are applied, the only difference is the severity of postoperative sore throat (POST); however, in both cases, POST occurs. Scholars, however, have tried to use LMA to ensure cases of postoperative complications are minimized. Schieren et al.[13] suggested that low-flow anesthesia registers minimal complications in LMA compared to ETT. This can be attributed to the techniques applied during the insertion of the LMA device into the patient and careful monitoring of the position of LMA.[6,7] As such, it is incumbent upon healthcare providers to develop strategies to limit or eliminate complications arising from anesthesia during surgical operations.

Proposal Solutions

Given the high cases of postoperative complications, anesthesia providers have researched the best mechanisms through which such can be eliminated. This has led to development of new airway management strategies, from endotracheal tubes to laryngeal mask airway.[10] Therefore, the project proposes adopting careful LMA insertion techniques and monitoring cuff pressures within acceptable limits during surgical operations.[8] Studies have indicated that when the cuff pressure is carefully monitored and maintained at an optimal level, the occurrence and severity of the postoperative complications can be minimized.[5-8] In essence, the proposed solution to postoperative sore throat, among other complications, is monitoring LMA cuff pressure.

SUMMARY OF LITERATURE REVIEW

Rationale/Objective

Given the increased number of medical interventions, such as minor or invasive surgical operations requiring anesthesia, cases of collapse of the upper airway have become a common occurrence. As such, maintaining an open airway is considered a fundamental anesthetic skill

that every anesthesia provider must have. Based on the patient's condition, an anesthetist may categorize an airway as challenging, particularly when it cannot maintain its patency without tracheal intubation. Difficulties also occur when the intubation process becomes challenging, arising from various anatomical factors that make the entire instrumentation process difficult. Van Esch et al.[14] explained that some patients face difficulties with airway obstruction due to neuromuscular characteristics and anatomical structures. Notably, during wakefulness, the airway patency is protected by the pharyngeal muscle tone, a feature that is abolished during anesthesia and sleep.[5,9] The loss of pharyngeal muscle tone results from a decrease in the chemoreceptor drive, cortical influences, and modulation of mechanoreceptor input.

With these airway obstruction challenges, healthcare practitioners, through research, developed mechanisms to eliminate such problems. These processes include intubation strategies such as laryngeal mask airway (LMA) and endotracheal intubation mechanisms. Despite the positive outcomes achieved by using the two interventions in maintaining open airways during anesthesia, many reports about the side effects of using such technologies have been made. During the administration of anesthesia before patients undergo surgical care, there is a need to keep the blood oxygen levels high.[11] Due to the high dependency on oxygen, a chemical required for proper function in major body organs.[9] Notably, if the patient airway is not maintained to be open for free flow of oxygen, the patients get at a high risk of hypoxemia.[4] To address this, healthcare researchers have developed different devices to help keep the airways as open as possible.

Endotracheal tubes and laryngeal mask airway have been inserted in the patient's way system to provide a well-moderated and monitories oxygen flow to the patient's body. While the two have been effectively used over the years, laryngeal mask airway has become very

influential since its inception.[2-4] Many studies and observations have revealed that once the devices are used, there are certain risks of patients contracting postoperative complications.[11,13] According to Paul et al.,[12] anesthesia has numerous complications that patients encounter after using LMA. Therefore, the main problem is considered to arise from anesthetic administration using laryngeal mask airway with little regulation of the cuff pressure.[6] Notably, the project focuses on the strategies that can be deployed to eliminate or minimize postoperative complications associated with using a laryngeal mask airway during anesthesia.

In the field of anesthesia, supraglottic airway (SGA) devices and the models created for their use have long served as an alternative to endotracheal tubes. One form of SGA device that is relatively recent is the Supreme™ laryngeal mask airway (SLMA). Numerous studies have shown that SGA devices, such as the SLMA, are less likely than endotracheal tubes to generate postoperative side effects and reduced hemodynamic reactions during intubation.[14,16] Maintaining normal blood pressure allows for a safer induction of anesthesia in this patient population since increases in blood pressure, especially in hypertensive individuals, can follow harmful intubation.[3-7] The SLMA and other SGA devices raise blood pressure depending on the degree of pharyngeal stimulation.

High SLMA intracuff pressures may also impair mucosal perfusion, which could result in postoperative problems. Numerous studies show a reduction in the incidence of postoperative pharyngolaryngeal problems when the intracuff pressure of SGA devices is reduced and monitored[8]. There are no studies that research lowering the cuff pressure of SGA devices and hypertensive patients' hemodynamic response.[13-15] Additionally, there has not been any research on using SLMAs with lower intracuff pressure than is advised. The project's primary hypothesis was utilizing the SLMA with intracuff pressures lower than the manufacturer's guideline could

reduce patients' hemodynamic reactions to intubation and postoperative side effects without compromising airway safety.[14]

Given the high number of healthcare challenges requiring surgical procedures, anesthetists are required to have the skill of maintaining open airways throughout the entire procedure.[6-8] LMA and endotracheal tubing has been used for many procedures, leading to some cases of postoperative complications. Therefore, the project's main objective was to identify strategies for eliminating postoperative complications following LMA intubation. Major postoperative complications have been reported a few hours after the completion of surgical operations, including postoperative operative sore throat (POST) and bleeding that may affect the patients negatively. Reports of increased postoperative complications during and after anesthesia have reduced patient satisfaction during treatment procedures.[1-6] These complications can negatively impact patient health outcomes. With the effective application of the laryngeal mask airway (LMA), the airway management technique has brought hope in limiting the complications.[4] As such, the study aims to assess whether monitoring LMA cuff pressure can reduce the occurrence and severity of postoperative complications.

Methodology/Eligibility Criteria

The project involves the development of a PICOT question to understand the nature of the quality improvement initiative that should be implemented. The following PICOT question guided this project: Are (P) anesthesia providers (I) intraoperatively monitoring laryngeal mask airways (LMA) cuff pressures (C) compared to standard practice (O) to decrease postoperative complications (T) within 24 hours of procedure? As such, the scholar engaged in PICOT development, where the critical issues of concern were identified, providing a clear path through which the literature search can be conducted. According to Kraus et al.,[17] it is important to have a

clear path through which a literature search is to be conducted, as it helps limit the number of problems encountered. The search was conducted using a well-organized strategy, with the PICOT question guiding the selection of search terms. Volumes of research articles relating to laryngeal mask airway (LMA) to maintain open airways during and after anesthesia were considered.

Information Sources

The project largely used research articles as the main source of information, as these sources have the latest data on scientific growth and advancements. In this regard, only peer-reviewed journal articles were used to help in providing verified evidence that the scholar can effectively use for the project. Articles from professional journals were also used, albeit in a smaller proportion than the peer-reviewed journal; articles formed the bulk of the evidence and information used in the project. According to Kraus,[17] peer-reviewed journals form the foundation of any scholarly work, as they are subject to effective scrutiny by other experts in the field of concern. This explains why peer-reviewed journal articles formed the bulk of evidence sources in this project.

Search Strategy

The scholar searched various scholarly databases for peer-reviewed journal articles. The databases include PubMed, Google Scholar, MEDLINE, and Embase, where hundreds of journals were accessed and sorted out until a few articles were selected for the project.

Keywords

For the search, the key search terms that were used include postoperative sore throat, laryngeal mask airway, endotracheal intubation, anesthesia, and postoperative complications.

Study Characteristics

From the first search using the key terms, thousands of journal articles were obtained, thus making further elimination necessary to help select the most appropriate information source. The keyword search from the mentioned databases resulted in 96 journal articles. Notably, 20 of these studies involved using human beings in the study design, which included randomized controlled trials (RCTs), clinical trials, meta-analyses, reviews, and systematic reviews. Seven more studies were rejected after critically considering the eligibility criteria, and only 13 articles remained. These 13 journal articles included six randomized control trials, three experimental studies, one quasi-experimental study, one clinical guideline, one retrospective analysis, and one explanatory mixed-method study. Notably, clinical trials, meta-analyses, and systematic reviews were not used for the study since they are not primary sources of information. This explains why the number of journal articles in the study reduced significantly.

Gong et al.[1] conducted a single-blinded, parallel, controlled trial was conducted on 66 patients aged 20-80 years for elective radical thyroidectomy under general anesthesia. The Institutional Review Board of Peking Union Medical College Hospital approved and registered the study in the Chinese Clinical Trial Registry. Patients were excluded from the trial if they had preoperative symptoms or had recurrent laryngeal nerve injuries during surgery. Patients were randomly assigned to either an ETT (high-volume, low-pressure-cuff plain endotracheal tube) or LMA (flexible reinforced LMA) group before surgery. The study was conducted at Peking Union Medical College Hospital in Beijing, China. The anesthesiologist in charge of the anesthesia was not blinded to the group assignment, ensuring patient safety. The LMA group had a significantly lower incidence of sore throat and hoarseness postoperatively compared to the ETT group. Postoperative numbness was comparable in both groups. The severity of sore throat

was lower in the LMA group compared to the ETT group at 1- and 48 hours post-surgery. The study found that Group LMA had significantly lower HR, SBP, and DBP values after endotracheal intubation or FLMA insertion and a lower incidence of buckling during extubation.

Metange et al.[2] conducted a randomized prospective, single-blind study at a tertiary care hospital's Department of Anesthesiology from December 2017 to July 2019, with a 60-sample size chosen based on 80% power and 95% significance level in R studio software. Patients were divided into two groups, with cuff pressure checked every 10 minutes. After surgery, anesthesia was reversed, suctioning was done, and the LMA was removed when the patient started breathing spontaneously. The oropharynx was examined for visible injuries and bloodstains, and the patient was monitored for symptoms. The study compared the mean cuff pressure and total air volume removed after surgery in two groups: Group A and Group B. Group B had significantly higher cuff pressure and air removed. Post-operative complications were higher in Group B, with all 30 subjects in Group B experiencing complications. No significant association was found between complications and gender, surgery duration, or the American Society of Anesthesiologists (ASA) classification. The study found regular cuff pressure monitoring in LMA Supreme, maintained below 60 cmH2O, significantly reduces the risk of adverse pharyngolaryngeal effects.

Lin et al.[3] conducted a cross-sectional study that analyzed POST incidence and severity after LMA insertion, aiming to improve clinical practice, healthcare costs, patient outcomes, and satisfaction through future multicenter studies. The study was granted clearance for exemption from full ethics review due to its handling of anonymized data, minimal risk to patients, and meeting ethical standards. The study involved 88 patients requiring LMA insertion from a tertiary hospital between April and May 2019. Patients were inducted and emergence by trained

clinicians. Data was collected from the Post-Anaesthesia Care Unit (PACU), including information on LMA type, size, presence of POST, and sore throat severity. Due to local data protection regulations, patient biodata was omitted, and data points missing a pain score were considered the absence of sore throat. The study compared the use of Ambu-Auraflex LMA, i-gel LMA, F-LMA, and Classic LMA in 88 patients. The i-gel LMA had a higher incidence of POST and more pain. The size of LMAs affected POST in 0% and 33.3% of cases, while Ambu-Auraflex LMAs caused POST in 0%, 7.8%, and 0% of cases. The study found that i-gel LMAs have a higher incidence and severity of post-insertion pain (POST) than other LMAs, possibly due to more incredible difficulty in insertion. The study also found that POST was more common in the Size 4 population than the Size 5 population, possibly due to inappropriate sizing based on patient weight. The study revealed that i-gel LMA has a higher incidence and severity of POST, requiring future larger-scale multicenter studies to address confounders and improve clinical practice, cost, and patient outcomes.

Mitobe et al.[4] conducted a randomized control study with 100 patients for elective surgical procedures under general anesthesia, excluding those with ASA physical status, obesity, high risk of regurgitation or aspiration, or respiratory tract pathology. Patients were randomly assigned into two groups: 'Ambu AuraGain' and 'LMA Supreme.' The airway size was chosen according to manufacturers' recommendations. Patients were not premedicated and monitored before induction of anesthesia, with preoxygenation performed with high-flow oxygen. The study measured oropharyngeal leak pressure (OLP) after closing an adjustable pressure-limiting valve, detecting air leaks from the throat and stomach. The study also recorded the number of insertion attempts, time to establish adequate ventilation, ease of insertion, blood pressure, heart

rate, and maneuvers required to optimize airway devices. Anesthesia was maintained with sevoflurane, and patients were assessed for postoperative symptoms.

Experienced staff anesthesiologists performed all airway insertions with over ten years of experience in supraglottic airway management. An unblinded observer conducted contemporary data collection. The study used OLP as a comparison measure and recruited 50 patients per group to account for dropouts and protocol breaches. Using Student's t-test, Mann-Whitney U test, Fisher's exact test, and general linear model, the 95% confidence interval for insertion success rate was calculated. All statistical analyses were performed using SPSS 22.0™ software, with a P value of <0.05 deemed statistically significant. A study involving 147 patients found no significant differences in baseline demographics, airway anthropometric features, or surgery type or duration. The primary outcome measure of oxygen demand (OLP) was not significantly different between the AuraGain and LMA Supreme airway devices. The AuraGain had a lower initial insertion success rate and was deemed more complicated to insert. However, there were no significant differences in the need for repositioning or optimization maneuvers required for successful ventilation. The AuraGain required a smaller volume of air to attain a manometric intracuff pressure of 60 cmH2O and took six seconds longer to obtain the first capnograph trace. The AuraGain group had a significantly decreased incidence of sore throat, transient oxygen desaturation, difficulty in ventilation, minor lip and mucosal injury, dysphonia, dysphagia, and no significant differences in other adverse events.

The newer Ambu AuraGain, a supraglottic airway device, has yielded a similar oxygen supply (OLP) to the LMA Supreme in spontaneously breathing anesthetized patients. However, the insertion process is qualitatively more complex and takes longer despite similar first and overall insertion success rates. The higher insertion rates are surprising given AuraGain's newer

product and users' prior experience with the LMA Supreme. The study found that the bulky posterior curvature of the AuraGain and its slightly larger cuff were subjectively harder to maneuver into the oral cavity, resulting in a mean six-second longer insertion time. The six insertion failures experienced with the LMA Supreme were most likely due to repeated malposition of the tip into the airway. The passage of a large bore gastric tube into the esophagus was rated more manageable than the LMA Supreme in the clinical study. This observational finding is likely related to the narrower and less slippery surface of the i-gel channel.

Williams et al.[5] conducted a prospective, randomized, double-blind, controlled study involving 243 consecutive patients undergoing elective surgery requiring a laryngeal mask airway. Two hundred eighteen met inclusion criteria, with exclusions including refusal, age under 18, pregnancy, tracheal intubation, neuromuscular blockade, mental disorders, and poor language skills. Stratified randomization was performed using a computerized random number generator, with four strata constructed for different types of operations. The anesthesia department staff, including 28 anesthetists and 18 recovery room nurses, were trained in digital palpation under in vitro conditions. Two external investigators collected data, blinding staff and patients to treatment assignment and randomization list. The study involved patients who underwent a laryngeal mask operation. General anesthesia was induced using total intravenous anesthesia (TIVA) with propofol and remifentanil. Pressure-controlled ventilation was commenced after the insertion of the mask airway. Oxycodone and metamizole sodium were administered to reduce postoperative pain, and further analgesic medication was available upon request. The LMA SureSeal PreCurved SU was used in all patients. The study involved inserting a laryngeal mask, inflated using a syringe, and recording the entire volume of air inflated. If the mask was unsatisfactory, it was removed, and a new mask was used. The intracuff pressure was

estimated using digital palpation, and the air was released until a pressure less than 60 cmH2O was reached. An independent research assistant measured the accurate intracuff pressure without informing the anesthesia team. Continuous manometry set an intracuff pressure of 60 cmH2O or less throughout anesthesia. If incorrect placement was not achieved, the mask was removed, and a new attempt was made using a different device. The study found that the initial intracuff pressure was higher in the palpation group (86%) compared to the manometry group (92%). The volume of air inflated was higher in the palpation group (30-40 ml) compared to the manometry group (18-40 ml). All types of pharyngolaryngeal complications were higher in the digital palpation group. However, there were no significant differences between the groups in the duration of symptoms or severity of symptoms. In 159 patients, the laryngeal mask was placed successfully at the first attempt, but repeated attempts resulted in a higher rate of pharyngolaryngeal complications. The ‘very satisfied' rate was higher in the manometry group. All patients in both study groups stated that they would repeat the experience. The study found that digital palpation led to inaccurate cuff pressures, increasing postoperative pharyngolaryngeal complications. This was consistent with previous research showing that intracuff pressures can be as high as 200 cmH2O, even in children. The study only measured cuff pressure values up to 130 cmH2O, suggesting the actual values may be higher.

Aggarwal et al.[6] conducted a randomized controlled study involving 100 pediatric patients aged 2-5 years who underwent short surgeries like herniotomy, orchidopexy, and urethroplasty. The patients were enrolled in a tertiary care hospital with informed consent from their parents. Patients with an increased risk of aspiration, mouth openings below 2 cm, weight less than 10 kg or greater than 20 kg, or neck, upper respiratory, or upper gastrointestinal tract diseases were excluded from the study. The study followed a standard anesthetic technique for

children undergoing surgery. All children received an intravenous line the morning of surgery, premedicated with midazolam, and anesthesia was induced with fentanyl and propofol. Anesthesia was maintained with oxygen, nitrous oxide, and sevoflurane. Airway management was done with a size of 2 Supreme LMA (group SLMA) for the initial 50 patients and 2 I-gel (group I gel) for the following 50 patients. The device was inserted according to the manufacturer's instructions, and the cuff pressure was maintained throughout the surgery. Oropharyngeal seal pressure (OSP) was measured in both groups, and other factors such as insertion attempts, ease of insertion, insertion time, oxygen saturation, end-tidal carbon dioxide, and peak airway pressure were recorded.

Incidences of unsatisfactory ventilation, hypoxemia, gastric insufflation, cough, breath-holding, laryngospasm, or stridor were also recorded. Systolic blood pressure, heart rate, and SpO2 were recorded before, 1, and 5 minutes after insertion, with a 20% increase or decrease in SBP and HR considered clinically significant. The study assessed the ease of insertion of a supraglottic airway device (SAD) in 100 patients from July 2015 to January 2017. Of 885 patients, 679 did not meet inclusion criteria, and 106 were excluded due to the investigator's refusal or unavailability. Demographic parameters and clinical characteristics between the SLMA and I-gel groups were comparable. Both groups had 50 patients each, and 66% were males. No failed attempts were made in insertion, and the SLMA was more accessible in more cases than the I-gel group. The insertion time was also comparable, with an overall median duration of 15 seconds. No difficulty in passing the gastric tube was encountered in either group. Blood staining of the device's tip after removal was recorded in both groups, with 8 cases in the I-gel group and 4 in the SLMA group. No episodes of bucking, breath holding, stridor, coughing, laryngospasm, sore throat, or hoarse cry were observed in either group. Both devices were

simple and suitable for pediatric elective surgery, with SLMA being easier to insert, providing higher OSP during anesthesia, and well-tolerated during emergence without oropharynx injury.

Odeigah et al.[7] conducted a randomized trial involving a group of children aged 5-11 years with ASA physical status I-III, scheduled for surgery requiring airway management with a laryngeal mask. The children were randomized to receive an i-gel or Supreme airway device based on their ideal body weight. The standardized anesthetic protocol involved inhalational induction, intravenous access, and administration of fentanyl. The device was lubricated with a water-based agent before placement. If the depth of anesthesia was insufficient, a supplementary dose of fentanyl was allowed. Rocuronium was allowed if needed for surgical relaxation. The Ann & Robert H. Lurie Children's Hospital of Chicago Research Center's Institutional Review Board approved the study. The study aimed to determine leak pressure in a gastric tube device using a flexible fiberoptic scope. The device was placed through a drain tube, and the ease of placement was assessed. The study included 168 children, focusing on the i-gel and Supreme models. Airway leak pressures were higher with the I-gel than with the Supreme, with 20 cm H2O and 17 cm H2O, respectively. There were no significant differences between time-to-device placement, insertion success rates, fiberoptic grade of laryngeal view, airway quality, and complications. More patients in the i-gel group required airway manipulations to maintain device stability than those in the Supreme group. Advancement of the device with bimaxillary fixation with downward traction with tape was the most common maneuver reported. Improvement in patients with intermittent partial obstruction occurred after neck extension with a shoulder roll or reinsertion of the device. Patients with intermittent complete obstruction required removal and reinsertion of the device and tracheal intubation from bronchospasm.

Ali et al.[8] conducted a randomized controlled study to compare the effectiveness of laryngeal mask airway devices (LMA) in treating hypertension patients. One hundred twenty patients were divided into two groups: low pressure (Group L) and standard pressure (Group N), with equal cases. The SLMA was inflated to maintain the appropriate pressure during surgery, with two attempts allowed for insertion. The study found no significant difference between the groups regarding demographic data and Mallampati scores. The mean durations of surgeries were 58.0±12.2 min for Group L and 56.1±10.2 min for Group N. Patients in both groups used ACE inhibitors, diuretics, beta-blockers, alpha-blockers, and calcium channel blockers preoperatively. The study concluded that SLMA insertion was effective in reducing hypertension in patients with hypertension. The Supreme™ laryngeal mask airway with a cuff pressure of 45 cm H2O significantly reduces hemodynamics response and post-operative side effects, with no adverse impact on placement success or airway security, except for specific surgeries requiring higher seal pressures.

Santambrogio et al.[9] conducted a prospective parallel trial on 78 pediatric patients at the Hospital of Legnano e, Italy, to compare size 2 Supreme LMA (SLMA) and size 2 Proseal LMA (PLMA) for elective surgeries. The study included children aged 12 months to 6 years, with ASA physical status II and weight 10-20 Kg. Patients were assigned to receive PLMA or SLMA by simple randomization, with informed consent obtained from parents during pre-anesthesia visits. The study compared the effectiveness of two laryngeal masks, PLMA and SLMA, in providing mechanical ventilation to pediatric patients. The transversal section area and length of the masks were measured, with PLMA having a larger area and longer length. The work of breathing increased faster for PLMA as driving pressure raised, while SLMA had a slower increase. The study found no significant difference between the two groups, and the mean

oxygen saturation (OLP) was significantly lower in the SLMA group. The pressure/volume curve for both masks showed a constant increase in tidal volume, with PLMA showing a continuous increase and SLMA showing an increase and reduction. All symptoms were resolved at discharge, and the success rate of placement and ease of positioning were significantly higher with the Supreme mask. No device failures occurred during anesthesia maintenance or conversion to an endotracheal tube. The study found that the SLMA has lower resistance and work of breathing, while the OLP is significantly greater for PLMA. There was no significant difference in maximum tidal volume, ease of insertion, gastric tube positioning, or intra-post-operative complications. The SLMA's transversal area is 1.66 times larger than PLMA's, and other factors like shape factor and surface roughness contribute to airflow resistance. Both PLMA and SLMA are effective and safe for managing upper airways and ventilation in children undergoing pediatric surgery without neuromuscular blockade. SLMA offers structural advantages for mechanical ventilation resistance and insertion ease. Perioperative complications are minor, and no significant issues like gastric regurgitation or upper airway loss were detected.

Elkhadem et al.[10] conducted a prospective, double-blind, randomized controlled trial with parallel arms, with informed consent from legal guardians. The sample size was 25 children per group, calculated using the PSS software, with a minimal clinical difference of 1.5. A pedodontist evaluates children recovering from general anesthesia using the Aldrete system, which assesses five categories of physical status. Recovery time starts when a child score ≥ nine on the system. The study involved 50 children aged 4.6±1.2 years, with a 1:1 male-to-female ratio. Baseline characteristics were similar. Outcomes were divided into patient-oriented and dentist-oriented endpoints. Patient-oriented parameters assessed postoperative complications, parental satisfaction, and intraoral accessibility. Dentist endpoints included total dental operating

time and recovery time. The study found no significant difference in dental pain and postoperative nausea and vomiting (PONV) between LMA and nasotracheal intubation (NTI) groups but reduced laryngeal pain and dysphonia. Parental satisfaction was also not significantly different between the two groups. The study found that LMA reduced postoperative laryngeal pain and dysphonia in children, while NTI improved intraoral accessibility and treatment time, making NTI preferred for full-mouth rehabilitation.

Varshney et al.[11] conducted a randomized prospective study comparing Proseal LMA (PLMA) with i-gel™ and laryngeal tube suction D (LTS- D™) conducted on 150 patients from June 2015 to June 2016, following Good Clinical Practice standards and the Helsinki Declaration. The patients aged 20-60 with American Society of Anesthesiologists physical status I and II undergoing elective surgical procedures. Patients excluded from the study were those with complex airway, pulmonary, cardiovascular, or aspiration risk factors. The study aimed to measure airway sealing pressure in patients with PLMA, with a mean of 25.73 cmH2O and a standard deviation 2.21. The sample size was increased to 50 patients each, considering a 25% difference between means. The study compared three second-generation supraglottic airway devices (SADs) in elective surgical cases under general anesthesia with controlled ventilation. The PLMA and i-gel™ airways were most suitable, with i-gel™ having better insertion characteristics and higher sealing pressure. The studies differed in defining insertion time and ease, allowing varying attempts before determining failure. Factors like neuromuscular blocking drugs and device user experience may affect insertion time, potentially contributing to device assortment.

Paul et al.[12] conducted a comparative study involving low-risk adult patients who underwent surgeries in less than 2 hours over a year from February 2017 to February 2018.

Patients were randomized into either the Baska mask (BM) or the LMA group, with the size of the SAD selected based on body weight according to the manufacturer's recommendations. The study was single-blinded, with all device insertions done by consultant anesthesiologists with over three years of experience. Exclusion criteria included neck pathology, upper airway or upper gastrointestinal tract problems, laparoscopic surgeries, pregnancy, and increased risk of aspiration. The study found BM patients were successfully inserted in 28 (77.8%) attempts without manipulation, while LMAS patients were successfully inserted in 33 (97.1%) attempts without manipulation. In the BM group, seven patients required manipulation during the first attempt, while only one patient needed two attempts. The mean oropharyngeal seal pressure was significantly higher in the BM group, with a maximum of 40 cm of water achieved in 10 patients (27.7%). The study found that the BM provides a better airway seal than the LMAS but is more difficult to insert. Postoperative laryngopharyngeal morbidity is similar in both groups, and the gastric port is correctly positioned over the esophagus.

Schieren et al.[13] conducted a retrospective data analysis on patients with Supraglottic airway devices (SADs) between 2010 and 2015. SADs were used in 10 patients with extensive tracheal stenosis and severe comorbidities. SAD insertion and positive pressure ventilation were successful, with one patient experiencing persistent hypercarbia. High-frequency jet ventilation was used during resection and reconstruction. No intraoperative complications occurred, but postoperative complications occurred in 4 patients (40%). Most patients had an uneventful postoperative course. The study demonstrated the feasibility of using supraglottic airways alongside high-frequency jet ventilation for airway management in at least some cervical tracheal resection and reconstruction cases. Most patients (n = 6; 60%) had an uneventful postoperative course. In this high-risk cohort, postoperative complications (that is, vocal cord edema,

postoperative hemorrhage, pneumonia) occurred in 4 patients (40%).

Literature Review

Author	Design/Method	Sample/Setting	Major Variables Studied & Their Definitions	Measurement & Data Analysis	Findings	Results	Conclusion	Appraisal: Worth to Practice/Level
Gong et al.,[1] 2020	Design: Randomized Controlled Trials (RCT) Description: The participants were randomly divided into ETT group and FLMA group. The participants were randomly divided into ETT group and FLMA group	Sample: 90 patients, scheduled for elective radical thyroidectomy under general anesthesia aged between 20 years-old and 80-year-old Setting: Study was conducted in operating rooms in Peking Union Medical College Hospital in Beijing, China.	IV1: flexible reinforced LMA IV2: DV: Cuff pressure DV2: Incidence of sore throat, buckling, and numbness	Incident of sore throat after thyroid surgery. Incidences of sore throat, numbness, hoarseness, and buckling analyzed using Fisher's exact test. Hemodynamic data at exact time point compared using one-way ANOVA.	The incidence of sore throat was significantly lower in group LMA than in the group ETT at 1 h (48.9% vs 68.9%, $p < 0.001$), 24 h (37.8% vs 51.1%, $p = 0.012$) and 48 h (6.7% vs 24.4%, $p = 0.023$) postoperatively. The incidence of hoarseness was also significantly less in the group LMA than in the group ETT at 1, 24 and 48 h postoperatively (8.9% vs. 57.8%, $p < 0.001$; 6.7% vs. 28.9%, $p < 0.001$; 0% vs. 13.3%, $p = 0.002$). The severity of sore throat in the group LMA was significantly lower than in the group ETT at 1 h (0[0–4] vs. 2 [0–7], $p = 0.006$) and 48 h (0 [0–1] vs. 0 [0–2] at 48 h, $p = 0.017$) after surgery. VAS score of sore throat was higher in the group ETT than in the group LMA at 24 h after surgery, but the difference was not significant.	The results of this study showed that compared with the endotracheal tube, the use of a flexible LMA during thyroidectomy decreased the incidence and severity of postoperative laryngopharyngeal symptoms, including sore throat and hoarseness. Furthermore, flexible LMA achieved better hemodynamic profile during intubation and less buckling during extubation	Patients undergoing thyroid surgery with FLMA had less postoperative laryngopharyngeal symptoms, when compared with ETT. The use of FLMA also achieved less buckling during extubation and better hemodynamic profiles during intubation	Strength: The relatively large sample size allows for generalizability of the study findings. Weakness: The operations required serious patient care regarding as the procedure is prone to injury. Feasibility: The FLMA caused less postoperative laryngopharyngeal symptoms hence necessary for the scholar's research. Evidence Level: Level I, High Q
Metange et al.,[2] 2021	Design: RCT Description: The participants were divided into two groups with each group undergoing LMA surgical operation with focus on cuff pressure.	Sample: 60 patients of ages between 18 years-old and 60 years-old belonging to ASA I or II were included. Setting: Study conducted at Department of Anesthesiology of Seven Hill Hospital, Mumbai,	IV: Intervention DV1: LMA cuff DV2: Incidence of sore throat and hoarseness	Independent sample t-test and Mann Whitney are used to find the significance between variables. Chi square test is used to find the association between the variables. A $p < 0.05$ is significant. Descriptive data are presented on MS-Excel 365	The mean cuff pressure of Group B was found to be significantly higher than in Group A (108.43 ± 9.183 vs 61.07 ± 1.143 cmH2O; $p < 0.001$). The total volume of air removed at the end of the surgery was significantly higher in Group B (43.07 ± 5.91 vs 33.47 ± 5.75 mL; $p < 0.001$) as compared to Group A.	The result of the study was that continual cuff pressure monitoring in LMA Supreme to maintain it at sealing pressure (below60 cmH2O)helps in the reduction of incidences of pharyngolaryngeal adverse effects.	The study concludes that conclude that the continual cuff pressure monitoring in LMA is necessary to guarantee reduced cases of adverse effects like	Strength: The study effectively answers the PICO question as it specifically analyses how LMA cuff pressure monitoring reduces complications. Weakness: Lack of generalizability due to small sample size. Feasibility: The study is feasible as it covers a defined sample size. Evidence Level: Level I, Good Quality

		Maharashtra, India.		package and analysis performed on R studio v1.2.5001.			throat pain, hoarseness, cough, and bleeding.	
Lin et al.,[3] 2020	Design: Clinical Practice Guidelines Surveys. Description: The study focused on obtaining opinions of Certified Registered Nurse Anesthetists on best practice policy recommendations on using LMA to reduce post-operative complications.	Sample: 30 CRNAs were consulted in the study. Setting: The study was conducted at USM clinical affiliate sites in Mississippi.	IV: Intervention. DV1: inter-operative complications	Prospective best practice policy. Proposal was used to obtain both qualitative and quantitative data.	76.2% selected pilot balloon palpation, 47.6% selected minimal occlusive volume test, for access intra-cuff pressure intra-operatively. Audible cuff-leak resulted in introspective assessment of LMA inter-cuff pressure.	The survey results showed subjective measurement approaches for assessing LMA intra-cuff pressure, non-uniformity in evaluation techniques among providers, and a knowledge deficiency about manometry monitoring usage and the repercussions of not employing an objective measurement technique.	The survey's findings revealed a lack of understanding regarding the use of manometry monitoring and the repercussions for stakeholders of not using an objective measurement technique, as well as the prevalence of subjective measurement techniques for determining LMA intra-cuff pressure among providers and a lack of uniformity in assessment techniques among them.	Strength: The study provides CRNAs' view on the best practice to adopt when conducting LMA manometry. Weakness: Sample size used is small hence complicating generalizability. Feasibility: Since the study involves obtaining opinions of experts, it is impactful in the DNP project. Evidence Level: Level IV, Good Quality

Mitobe et al.,[4] 2022	Design: Experimental study Description: Ambu® Auraflex LMA, i-gel LMA, F-LMA and Classic LMA were used in 69, 17, 1 and 1 patients, respectively	Sample: 88 patients coming for surgery who required LMA insertion were recruited Setting:	IV: LMA insertion intervention IV2: Cuff pressure IV3: Incident of POST DV1: Severity of Post-Operative Sore Throat	Presence of post-operative Sore throat analyzed with Fisher's Exact Test and Mann-Whitney U test. P value <0.05 was taken as statistically significant. Severity of post-operative sore throat analyzed with Student's t-test	Comparing the Ambu® Auraflex LMA and the i-gel LMA, there was a significantly higher incidence of POST associated with the use of the i-gel LMA (P = 0.013). When comparing the severity of POST between the two LMAs, there was significantly more pain with the i-gel LMA (P = 0.003). Comparing the prevalence of sore throat across the various sizes of LMA, usage of the size 3 and size 4 LMAs for i-gel produced POST in 0% and 33.3% of cases, respectively, while usage of the size 3, size 4 and size 5 LMAs for Ambu®Auraflex caused POST in 0%, 7.8%, and 0% of cases, respectively.	The study found that the incidence and severity of POST for i-gel LMA were increased as compared to other forms of LMAs used. A contributing factor to this finding could potentially be the greater difficulty of insertion which could predispose to greater laryngopharyngeal trauma and thus sore throat, agreeing with current literature,[15] although some studies report the opposite: greater ease of insertion of the i-gel LMA	While many studies have reported that the i-gel LMA has lower incidence of POST. The study findings report the converse, with greater incidence and greater severity of POST with i-gel use.	Strength: The study effectively analyzes how monitoring of LMA cuff pressure results in POST. Weakness: The study population differs from that of other studies hence can be a contribution to different results. Feasibility: The study is fairly feasible given the target population. Evidence Level: Level I, Good Quality.
Williams et al.,[5] 2016	Design: clinical practice guideline. Description: The clinical practice guideline was developed through conducting search and evaluation of different literatures on LMA adoption for managing POST.	Sample: 17 respondents ranging from CRNAs, anesthesiologists, and the authors. Setting: The study was conducted at USM clinical affiliate sites in Mississippi. Literature search was conducted in CINAHL, EBSCOhost, MEDLINE, and Google Scholar	IV: LMA insertion intervention. IV2: Cuff pressure.DV1: Severity of Post-Operative Sore Throat	The measurable outcomes from the survey were severity of POST.	In order to compare comments and recommendations about the use of LMAs and results, the evaluation instrument from the expert panel was examined.	The results showed an overwhelming willingness to adopt the use of manometry monitoring in the operating room if they were provided with the opportunity.	According to the most recent research, using manometers can significantly lower the number of patients who develop this problem. The adoption of a rule requiring this convenient and easy procedure could significantly increase patient satisfaction	Strength: The study clearly outlines the literature evidence and expert opinion on impact of monitoring LMA cuff pressure on POST. Weakness: Small clinicians sample size. Feasibility: Given the availability of clinicians the project is perfectly feasible. Evidence level: Level IV, Good Quality.

							while also guaranteeing that the institution is operating in accordance with the highest standards and evidence-based best practices.	
Aggarwal et al.,[6] 2021	Design: Experimental study Description: Participants were prospectively allocated to two groups depending upon the device inserted as SLMA (n = 50) and I-gel (n = 50)	Sample: 100 pediatric patients aged between 2-5 years undergoing short surgery were involved. Setting: R&R Hospital Institution.	IV: Anesthetic procedure DV1:Supreme LMA insertion DV2: I-gel insertion	Difficulty in insertion of Supreme LMA. Difficulty in insertion of I-gel.	Securing an adequate airway took <30 seconds in both the groups with an overall median duration of 15 seconds. There was no difficulty in passing the gastric tube in either group (P < .30).	SLMA was successful on the first attempt in 90% patients and was equal to the I-gel group with no failures in either group.	Both the devices appeared to be simple and suitable for ventilating the patients' lungs during elective surgery in the pediatric patient. However, the SLMA was easily inserted with less insertion time in the majority of patients.	Strength: Ease for generalizability due to large sample size. Weakness: Younger patients involved making the project very delicate. Feasibility: Can be feasible as long as participants are assured of safety. Evidence Level: Level I Good Quality

Odeigah et al.,[7] 2019	Design: RCT Description: LMA airway cuff pressures were adjusted to 30 to 32cm of H20 for Intervention group & only had LMA cuff pressures monitored throughout the surgery for control group.	Sample: 80 adult patients scheduled to receive general anesthesia with use of LMA were involved. Setting: The study was conducted at Aga Khan University Hospital, Nairobi	IV: Intervention. IV2: LMA cuff pressure DV1: Post Occurrence DV2: Severity of POST	Occurrence of POST in both study arms was presented as a proportion and reported together with the 95% confidence interval. The difference in severity of POST in both arms was analyzed using the Mann-Whitney U test.	The use of manometry to limit LMA AMBU® AuraOnce™ intracuff pressure to 30-32cm of H20 reduces POST in surgical patients by 62% at 2 hours and 6 hours and by 54% at 12 hours. Secondly, the median POST pain score was 0 at 2, 6 and 12 hours post-operatively in the intervention group.	The study seem beneficial forLMA AMBU® AuraOnce™ cuff pressure to be measured routinely using manometry, and deflating the cuff to less than manufacturer's recommendations of 60cm of water to 30 cm H20.	Among this population, reduction of LMA AMBU® AuraOnce™ intracuff pressure to 30-32cm H2O reduces the occurrence and severity of POST. The LMA cuff pressures should be measured routinely using manometry and reducing the intracuff pressures to 30-32 cm of H20 recommended as best practice.	Strength: The study specifically investigates the usefulness of manometry to aid modern day practice of general anesthesia using the LMA AMBU® AuraOnce. Weakness: Insertion technique was not standardized because of varied individual preferences. Feasibility: The program is feasible owning to its relevance to the PICOT question. Evidence Level: Level I, High Quality.
Ali et al.,[8] 2018	Design: RCT Description: Participants were randomly divided into a low pressure group (Group L) and normal pressure group (Group N) with an equal number of cases	Sample: 99 patients diagnosed with hypertension and administered antihypertensive drugs. Setting: Istanbul Medical Faculty	IV: Intervention IV2: DV: SLMA Insertion DV2: Ventilation DV3: hemodynamic values	Tidal volume leakage percentage values. MAP and HR values.	The mean durations of surgeries were 58.0±12.2 min and 56.1±10.2 min for Group L and Group N, respectively (p=0.932). Fifteen patients used ACE inhibitors, six patients used diuretics, twelve patients used beta blockers, seven patients used alpha blockers and nine patients used calcium channel blockers preoperatively in Group L. Twelve patients used ACE inhibitors, seven patients used diuretics, fourteen patients used beta blockers, seven patients used alpha blockers and ten patients used calcium channel blockers preoperatively in Group N.	The results were that SLMA use with a low cuff pressure leads to lower hemodynamic response and fewer post-operative side effects compared with a normal cuff pressure.	Except for some specific surgeries that require higher seal pressures, such as laparoscopic interventions, we recommend the use of the SLMA with cuff pressures <60 cm H2O.	Strength: Ease of generalizability due to large sample size. Weakness: Further studies may be required using SLMA with different cuff pressures. Feasibility: The project is generally feasible. Evidence level: Level I, Good Quality

Santambrogio et al.,[9] 2020	Design: Explanatory Mixed Method Description: Instrumental evaluation undertaken coupled with randomized PLMA and SLMA administration	Sample: 78 pediatric patients were involved Setting: The patients were hospitalized at the ASST-ovestmilanese Hospital of Legnano,Italy.	IV: Intervention DV1: PLMA Insertion DV2: SLMA insertion	Oropharyngeal leak pressure and pressure/volume ratio.	Transversal section area was 35.71 mm in PLMA and 59.61 in SLMA, while length was 133.67 and 123.07 mm; the loading test on free air confirmed lower resistance of SLMA. Oropharyngeal leak pressure resulted significant lower in SLMA.	No significant difference in other clinical parameters and complications.	Instrumental measurements highlight that SLMA offers the advantage of less resistance to the airflow, allowing to keep lower oropharyngeal leak pressure during mechanical ventilation.	Strengths: The intervention is easily generalizable. Weakness: The study did not produce significant differences from both interventions. Feasibility: The project is fairly feasible. Evidence Level: Level I, Good Quality
Elkhadem et al.,[10] 2020	Design: RCT Description: The participants were randomized as either Nasotracheal intubation (NTI) or laryngeal mask airway (LMA).	Sample: 50 pediatric patients aged between 3-7 years-old were involved. Setting: Mira Dental pediatric unit (Cairo, Egypt)	IV1: Standard anesthetic protocol DV1: POST occurrence DV2: POST severity	Recovery time. Postoperative discomfort.	The risk of laryngeal pain was less in LMA compared to NTI with a relative risk reduction of 0.73 (95%CI 0.31, 0.89) (p=0.03). Further, the risk of dysphonia was less in LMA compared to NTI with a relative risk reduction of 0.77 (95%CI 0.49, 0.89) (p=0.01)	Meanwhile, there was no difference in postoperative dental pain between the two groups. Thus, the type of airway management during dental treatment doesn't affect the postoperative dental pain, which would be affected by the dental procedure rather than airway management.	LMA resulted in less postoperative laryngeal pain and dysphonia, while NTI resulted laryngeal pain and dysphonia; NTI resulted in better intraoral accessibility and decreased total treatment time significantly.	Strength: The intervention effectively addresses the PICO issue with regards to using LMA to minimize postoperative complications. Weakness: Generalizability to adult population is a challenge. Feasibility: The study addresses the key issues under PICOT consideration hence feasible. Evidence Level: Level I, High Quality

Varshney et al.,[11] 2017	Design: RCT Description: The design involved prospective, randomized, double-blind study.	Sample: 150 ASA I-II undergoing elective surgical procedure were involved Setting:	IV: Standard anesthesia protocol IV2: PLMA, i-gel™ or LTS-D™ DV1: Insertion time DV2: Level of postoperative complications	POST severity. POST occurrence.	Overall success rate was comparable between the three devices (i-gel™ 100%, LTS-D™ 94%, PLMA 96%). Airway sealing pressure was lower with i-gel™ (23.38 ± 2.06 cm H2O) compared to LTS-D™ (26.06 ± 2.11 cm H2O) and PLMA (28.5 ± 2.8 cm H2O; P < 0.0005).	The most suitable devices for use in this scenario are the PLMA and i-gel™ airway, where i-gel™ had better insertion characteristics and PLMA had higher sealing pressure.	The airway sealing pressure of PLMA was higher compared to i-gel™ and LTS-D™, but the insertion time of LTS-D™ was least among the three devices.	Strength: The sample size is adequate hence easy generalizability. Weakness: The study is not specific to LMA. Feasibility: The project is feasible when two items are involved. Evidence level: Level I, Good Quality.
Paul et al.,[12] 2020	Design: Quasi-experimental study Description: Patients were randomized into either the BM group or the LMAS group by computer-generated randomization chart and sealed envelope technique	Sample: 70 adult patients were involved Setting:	IV: Standard Anesthesia protocol DV1: Baska mask (BM) efficiency DV2: LMA efficiency	Mean oropharyngeal seal pressure. Postoperative laryngopharyngeal morbidity.	The mean oropharyngeal seal pressure in the BM group was 33.28 ± 6.80 cmH2O and that of the LMAS group is 27.47 ± 2.34 cmH2O. BM created a significantly higher oropharyngeal seal pressure than the LMAS group (P < 0.001). Sore throat was noticed in 6 (16.7%) patients in BM group and 3 (8.8%) patients in LMAS group in the postoperative recovery room and 9 (25%) patients in BM group and 7 (20.6%) patients in LMAS group 24 h postoperatively.	The oropharyngeal seal pressure is higher with BM than with LMAS. The BM, however, requires more effort to insert. The POST cases were minimal in both scenarios	From the present study, it is concluded that the BM creates a higher oropharyngeal seal pressure than the LMAS. However, the BM is more difficult to insert. The incidence of postoperative laryngopharyngeal morbidity is similar in both groups	Strength: Ease for generalizability Weakness: Presence of inherent possibility of observer bias Feasibility: The program is feasible Evidence Level: Level II, High Quality

Schieren et al.,[13] 2018	Design: Retrospective Analysis Description: Analysis of the data on patients with Supraglottic airway devices (SADs) between 2010 and 2015	Sample: 10 patients who had extensive tracheal stenosis and a high prevalence of severe comorbidities were involved. Setting: Ingenta University Hospital	IV1: SADs and LMA interventions DVI: Postoperative complications	POST severity. POST occurrence. Respiratory failure. Hypercarbia occurrence	Most patients (n = 6; 60%) had an uneventful postoperative course. In this high-risk cohort, postoperative complications (that is vocal cord edema, postoperative hemorrhage, pneumonia) occurred in 4 patients (40%).	High-frequency jet ventilation was utilized during the resection and rebuilding phase to guarantee appropriate oxygenation. Other than transitory hypercarbia during and after jet breathing, there were no anesthetic management-related intraoperative problems.	The study demonstrates the feasibility of using supraglottic airways alongside high-frequency jet ventilation for airway management in at least some cases of cervical tracheal resection and reconstructio n.	Strength: The study effectively captures the core area of research with positive outcomes. Weakness: Small sample size hence difficulty in generalizability. Feasibility: The program is perfectly feasible. Evidence Level: Level III, Good Quality.

Summary of Evidence

The project focused on the 13 peer-reviewed journal articles obtained from search databases to help explain the evidence-based practice intervention. From most studies, laryngeal mask airways equipment is instrumental in maintaining open airways among patients undergoing mild operation. In addition, many journals demonstrate that monitoring LMA cuff pressure can lead to positive outcomes by reducing the severity of postoperative sore throat (POST), among other complications such as hoarseness and pain within the airway systems. The evidence obtained in favor of the anesthetists using a manometer to reduce POST occurrence is summarized in this assessment of the available data. Studies supporting the use of an intraoperative manometer to monitor and avoid cuff overinflation when an LMA is used for general anesthesia are included in the review, which will help to reduce the occurrence of POST.

Gong et al.[1] conducted a randomized control trial about how the laryngeal mask airway helps reduce incidences of postoperative sore throat among patients who have undergone thyroid surgery compared to when an endotracheal tube is used. From their study, the scholars established that using a flexible laryngeal mask airway (FLMA) management strategy effectively minimizes the occurrence of postoperative sore throat, a major complaint among patients undergoing surgical operations. In essence, among the intervention group, FLMA reported only 48.9% of cases of postoperative sore throat after 1 hour compared to 68.9% for patients who used endotracheal tubes. After 24 hours, FLMA only recorded POST among 37.8% of the patients, while ETT was 51.1%; this percentage was significantly reduced when a check was done 48 hours after the operation. In this regard, only 6.7% of the FLMA intervention patients reported suffering from postoperative complications, while 24.4% of the ETT intervention suffered from POST. Ta[16] explained that when FLMA is used as a strategy to maintain patient

airway during operations, regular monitoring of cuff pressure helps to make immediate decisions regarding required adjustments. This ensures that patients receive immediate attention leading to reduced postoperative complications when dealing with such patients.

Similarly, Metange and Kadam,[2] in their research on the impact of LMA cuff pressure on incidences of pharyngolaryngeal adverse effects, emphasized the need for regular monitoring of the cuff pressure. Notably, they explained that continuous monitoring of Supreme LMA to maintain it at sealing pressure minimizes incidences of postoperative complications. However, if little attention is directed towards managing the cuff pressure, most patients will, at a higher incidence, report cases of POST. The results from the study indicate that patients in Group A, where cuff pressure was monitored every 10 minutes, had a significantly lower cuff pressure compared to Group B, where the cuff was inflated to 60 cmH_2O, and cuff pressure was recorded at the end of surgery. According to Schieren,[13] when the cuff pressure is high, the LMA is not perfectly sealed, indicating leakages. This increases the chances of patients experiencing adverse impacts of pharyngolaryngeal discomfort. For this reason, the researchers recommended using LMA when conducting minor anesthetic duties. Notably, from their study, healthcare professionals reported a higher affinity towards using LMA than ETT, which is prone to many postoperative complications. However, they established that one of the hindrances to using LMA is that most certified registered nurse anesthetists (CRNAs) lack understanding regarding manometry monitoring. As such, there is a need to develop mechanisms through which anesthesia providers are trained on cuff pressure monitoring and how to use different technologies to facilitate quality care provision.

When i-gel LMA was used instead of other types of LMAs, POST incidence and severity increased.[4,6] Although some studies suggest the reverse, the greater difficulty of insertion may

have contributed to this outcome. This could have increased the risk of laryngopharyngeal damage and, consequently, sore throat. Notably, when the cuff pressure is not monitored for i-gel LMA, which is difficult to insert, the severity of postoperative complications remains high. Aggarwal et al.[6] discussed that both i-gel LMA and SLMA equipment seemed straightforward and appropriate for ventilating patients' lungs during elective surgery on a child patient. However, the SLMA appeared simple and easy to insert for most patients. Williams[5] developed a postoperative sore throat clinical practice guideline that anesthesia providers can use to help manage adverse reactions from LMA-applied elective surgery. Odeigah et al.[7] established that there is a need for anesthetists to have the skill for insertion of LMA and use of manometry to facilitate monitoring of LMA cuff pressure. Notably, from their study, using manometry to limit the LMA AMBU® AuraOnce™ intracuff pressure to 30-32cm of H_20 helps to reduce POST among surgical patients. The POST prevalence is reduced by 62% between 2 and 6 hours and by 54% at 12 hours, thus indicating the significance of cuff pressure monitoring.[7]

Cuff pressure monitoring stands out as the most effective strategy that anesthetists can use to help reduce complaints of postoperative complications.[1,5] Ali et al.[8] conducted research comparing different cuff pressures with supreme LMA and established that low cuff pressures led to lower hemodynamic responses and fewer postoperative side effects than when normal pressure is applied. In this regard, a clear strategy to manage and monitor LMA cuff pressure reduces cases of reported postoperative sore throat and other complications. The scholars discuss that for special surgical operations requiring high seal pressures like laparoscopic interventions, SLMA should be accompanied by cuff pressures maintained below 60cmH_2O.[16] Instrumental measurements highlight that SLMA is less resistant to airflow, allowing for oropharyngeal leak pressure to be maintained at a lower level. In their comparison between Proseal and Supreme

LMA, they established that there is a need for both types to be applied within surgical operations that can effectively lead to positive outcomes on the part of the patients. As such, where low pressure is not an issue, SLMA can be used to help eliminate cases of postoperative complications. Ta[16] contended that as research continues on strategies for improving LMA operations, cuff pressure must be continually monitored to help understand different patient feelings and circumstances.

Apart from LMA, other scholars have applied nasotracheal intubation (NTI), specifically among pediatric patients who may require specialized care. Elkhadem[10] explained that postoperative complications are minimal when LMA is used. In addition, the risk of dysphonia was lower when LMA was used, which was a reduction of about 0.77 from when NTI was used. Mitobe et al.[14] explained that LMA is associated with minimal preoperative laryngeal pain, whereas nasotracheal intubation leads to better intraoral accessibility, which significantly reduces the treatment time. Paul et al.[12] also compared using the Baska mask and Supreme laryngeal mask airway. Their study shows that LMA remains the most effective strategy because of its ability to control cuff pressures. However, the Baska mask creates a higher pressure than LMASs, yet it is still difficult to insert on patients. However, for both interventions, it is evident that cases of postoperative complications remained minimal.

Mitobe et al.[14] asserted that anesthesia providers should develop proper guidelines to define how various intubation strategies are to be deployed, coupled with strategies through which cuff pressures can be monitored and changed to an optimal level. Schieren et al.[13] researched the feasibility of using supraglottic airways alongside high-frequency jet ventilation airway management. With high-frequency jet ventilation, the sectioning and rebuilding process of surgical operations can be conducted effectively. Varshney et al.[11] also worked on research

comparing Proseal laryngeal mask airway with other LMA brands. They established that both LMA brands limit cases of preoperative complications when lower cuff pressures are maintained.[4,6] Notably, from their comparison, the airway sealing pressure of PLMA was higher compared to i-gel™ and LTS-D™, but the insertion time of LTS-D™ was the least among the three devices.[15] When cuff pressure is effectively monitored during intraoperative sessions, any challenges patients may encounter are identified as early as possible to eliminate adverse reactions from postoperative complications.[1,7,8-11]

Conclusion

LMA is a supraglottic airway device that an anesthesiologist uses to help keep the patient's airways open during general anesthesia. Notably, inflating the LMA's cuff produces a seal that prevents air from leaking and ensures the LMA stays in place while allowing proper ventilation. However, an overinflated cuff might impair pharyngeal mucosal perfusion, resulting in a postoperative sore throat (POST). Hoarseness, dysphagia, dysphonia, and even recurrent laryngeal nerve palsy are all potential side effects of an overinflated LMA cuff. Manometers are recommended to ensure that LMA cuff pressures do not exceed 60 cmH2O.

Notably, this has not been preserved as standard practice despite the manufacturer's instructions and the significant body of evidence favoring manometry to prevent LMA cuff overinflation. According to some research, around 70% of LMA cuffs are over-inflated. This is proven by the fact that 40% to 50% of patients who undergo general anesthesia with an LMA also experience POST.[15] LMA manufacturing companies have not yet developed the quantitative measurement of LMA cuff pressures, indicating the need to continuously monitor cuff pressures. The anesthetists currently fail to monitor intraoperative LMA cuff pressures, leading to numerous complaints of postoperative complications. Notably, POST is a prevalent complaint

among approximately 40% of patients under general anesthesia who have used LMA or endotracheal intubation.[7,9,15]

The literature review section has been instrumental in providing the latest information regarding the processes of monitoring cuff pressure. In this regard, it has been established that using manometers remains critical for improving patient outcomes during and after the administration of anesthesia. As such, to help maintain and positively balance health circumstances among many of the patients, scholars have proposed using manometers to help regulate LMA cuff pressures. From the available evidence, monitoring cuff pressure helps minimize postoperative complications that may be challenging to patients and providers. This organization's use of manometers to regulate LMA cuff pressures has reduced the POST frequency. As a result, maintaining the usage of manometers to stop negative patient outcomes like POST would be advantageous to patients and the organization. As demonstrated, using manometers to control LMA cuff pressure results in increased patient happiness and higher hospital patient satisfaction scores, a favorable relationship with the patient. Additionally, if POST can be avoided, patients are less likely to need more painkillers, thus making most patients avoid over-dependence on drugs that can subject them to medication side effects. In many studies that focused on comparing different forms of LMA, the outcomes were positive, as each of the LMAs had different cuff pressures indicating the importance of having LMAs with different levels of cuff pressures.

Notably, this provided an avenue for the scholar to effectively understand when high, medium, or low cuff pressures can be deployed for effective outcomes in surgical operations. The studies established that healthcare practitioners must train to use manometers to control LMA cuff pressure, as this was one of the major hindrances to using LMA in controlling patient

airways during surgical procedures. Further, when it comes to sustainability, input from providers indicated that getting enough manometers to stock in the operating rooms would enable more frequent use of manometers. On the frequency of use, the studies indicated that where practitioners are effectively trained on how to use the manometers for cuff pressure control, they would use them to keep LMA cuff pressures within the advised range. This is also true when the manometers are readily available to the practitioners during anesthesia. In addition, mandatory cuff pressure charting would promote the sustainability of manometer use and increase access to manometers. The anesthesia team would merely work with IT to incorporate a prompt to remind providers to chart measured cuff pressures because there is already a section in the electronic health record (EHR) for documentation of LMA cuff pressures. This would also make it possible for a team working on quality improvement to monitor the impact of using manometers on lowering POST over time.

ORGANIZATION ASSESSMENT

Purpose/Objective

Laryngeal mask airways (LMAs) are frequently used in anesthesia to help maintain open airways among patients undergoing anesthesia for surgical procedures. A common side effect of using LMA is postoperative sore throat (POST), which can be upsetting for patients.[2] Therefore, as a strategy for minimizing postoperative complications during and after anesthesia, anesthetists have proposed controlling the laryngeal mask airways (LMA) cuff pressure throughout anesthesia and patient surgical procedures.[2] In this regard, the project aimed to identify and utilize best practices of monitoring laryngeal mask airways (LMA) cuff pressure to decrease the occurrence of postoperative complications.

The scholar evaluated the current practice at the immersion site and established that the primary care clinic utilizes an endotracheal tube as a tubing mechanism for keeping patient airways open during surgical procedures. Gong et al. explained that when anesthetists use endotracheal tubing for airway management, postoperative complications are increased.[2] That is, the number of patients reporting postoperative sore throat and hoarseness is higher than with laryngeal mask airways. In this regard, the immersion site must adopt a new intervention where LMA is used coupled with regular monitoring of variation in cuff pressure.[2] Monitoring cuff pressures will help eliminate the many postoperative complications reported when ETT is used. As such, the main aim of the immersion project was to implement laryngeal mask airways for airway management during surgical procedures coupled with regular monitoring of cuff pressure to eliminate incidences of postoperative complications. This was undertaken using identified best practices from the literature review to monitor LMA cuff pressure during and after anesthesia.

Goals and Outcomes

For any project to succeed, there needs to develop SMART goals that can be used to guide the project to completion.[6] These goals also help assess whether the project implementation has achieved its intended purpose. In this regard, the key objectives ensured that surgical procedures implement LMA cuff pressure monitoring. These goals included the following:

- *Replacing the endotracheal tube with a laryngeal mask airways system at the beginning of the project*

This goal ensures that the immersion site changes from using a postoperative complication-laden endotracheal tube system to laryngeal mask airways as the airway

management intervention. This will be done immediately since the new evidence-based practice requires using LMA for airway management.

- *Ensure fewer cases of postoperative complications are reported by the end of the project*

This goal is also the critical outcome of the immersion project, as it focuses on minimizing cases of postoperative complications. Reynolds et al. explained that to achieve the required results in a project, all implementation strategies must be effectively applied to the project, as this allows for sufficient variable management and evaluation.[6] Therefore, this outcome will help in always guiding the project team towards continually implementing strategies required to achieve the project's overall objective.

- *Training all healthcare professionals handling patients before, during, and after surgical operations on the workings of laryngeal mask airways*

For the project to be effectively implemented, all participants must be trained to work with patients during the entire journey of recovery during and after surgical operations. Reynolds et al. [6] explained that for patients to have a faster recovery period, healthcare professionals must be trained on how to handle patients during their recovery period.

- *Improving LMA insertion skills to reduce postoperative complications after surgical operations*

Many postoperative complications arise from a lack of knowledge about inserting the LMA tubes. Therefore, when anesthetists are trained in LMA insertion skills, they can eliminate complications arising from human error during surgical operation procedures.

Description of Program Structure

The project implementation required cooperation between the scholar and the health professionals at the immersion site. Notably, after the facility administration granted permission,

the scholar liaised with the department of focus, primarily the surgical department where the project was implemented. With the emphasis on the surgical department, the key stakeholders during the project implementation were anesthesiologists, intra-op nurses, and medical assistants.[2] The anesthesiologists were trained to administer anesthesia using the LMA airway management strategy. This also involved the LMA tube insertion techniques to help prevent numerous postoperative complications. The medical assistants and intra-op nurses were also trained to respond to patients during the operation procedures when using LMA. According to Murphy et al., training members of a project team on how to undertake project implementation helps to ensure that the intervention is implemented successfully.[5]

Further, to help effectively monitor LMA cuff pressure during the project implementation process, nurses were trained on how to operate the LMA framework and monitor cuff pressure.[1] In addition, they undertook the regulation of cuff pressure throughout the surgical procedure. This ensured that the cuff pressure was within the company's recommended 60mg H_2O. Medical assistants participated in the equipment assembly and identification of the missing components of the equipment during the implementation process to allow for effective in-tubing of the Laryngeal mask airways[2].

SWOT Analysis

A critical analysis of the immersion site reveals that factors work together to contribute to the successful implementation of the project. A SWOT analysis is conducted since it can help to capture strength, weaknesses, opportunities, and threats.

Strength

The immersion site has several strengths, making the project implementation a possibility. The strengths include:

- Skilled healthcare professionals

- Available resources for project implementation
- Good administrative management
- Availability of alternative intervention to complement the new quality improvement intervention

Weaknesses

- Lack of experience with using LMA airway management
- Over-emphasis on endotracheal tubes limiting preference for new interventions
- High number of postoperative complication cases

Opportunities

- LMA can be integrated with technology to monitor patients
- New interventions can help eliminate postoperative complications

Threats

- Healthcare professionals can resist the new intervention.
- Lack of knowledge in LMA intubation may present patients with risks if not monitored.

Discussion

The SWOT analysis effectively captures the critical issues hindering LMA intubation and cuff pressure monitoring. From the analysis, it was evident that the immersion site has numerous issues that make LMA implementation possible. Notably, having skilled healthcare personnel is a crucial strength for the facility, as the team can easily understand the new ideas in the evidence-based practice service quality improvement.[1] On the weaknesses, one outstanding issue was the lack of experience in LMA usage. Therefore, this indicates that the team must be diligent and have effective trainings to minimize knowledge gaps. In addition, the team had to undergo training on LMA intubation and cuff pressure management.[2] With the strategy's ability to be

integrated with technology, LMA implementation was an opportunity that allowed for improved patient care. Finally, for the intervention to be implemented effectively, the existing threat was that some healthcare professionals may resist the new interventions. In addition, since the immersion site had not implemented LMA, the team members might have faced difficulties during their project implementation period, exposing patients to risks.[1] As such, the scholar must develop strategies to ensure that the weaknesses and threats to laryngeal mask airway implementation were addressed effectively before implementing the project.

Theoretical Framework

For the implementation of the project, the conceptual framework that was used was Donabedian's quality framework. The framework helps define the concepts to implement the quality improvement process, including structure, process, and outcome.[4] The systems, in this case, include the healthcare professionals involved in implementing quality improvement strategies. The anesthesia providers were trained on LMA use to be prepared to handle the entire process of QI implementation.[4] The second concept in the framework is the process, which includes the best practice laryngeal mask airways cuff pressure monitoring. The process is the actual process of implementing the intervention and requires it to be effectively implemented. The structure facilitates this concept. The final component of the intervention is the outcomes of care.[4] Notably, the framework helps to define the steps through which the immersion project was implemented. With this, it was possible to develop adequate resources to sustain project implementation.

METHODOLOGY OF PROJECT

Setting and Participants

The project took place at Level 1 trauma hospital facility in South Florida. The project was implemented in a clinical setting in the surgical department among patients undergoing surgical operations. The key participants were anesthesia providers who were recruited voluntarily through the email invitation. To help the participants understand the project's objectives, the literature review and the organizational assessment were attached to the anesthesia providers' invitation emails. Once the anesthesia providers' acceptance emails were received, they were vetted for their understanding of how to use laryngeal mask airways to manage patient airways during anesthesia. The outcome of the vetting was utilized to determine which anesthesia providers would participate in the project. This was the strategy for identifying the participants to be included and those who were to be excluded.

Protection of Human Subjects

The participants were recruited through email invitations, and all anesthesia providers on the project site received an invitation. The selected anesthesia providers were provided with consent forms where they would consent to the study. During this time, the scholar explained why the project was necessary and its benefits. Since the project did not involve serious safety issues, the participants were provided with the necessary personal protective equipment for anesthesia administration and the LMA intubation process.

Data Collection

The information was used as the baseline comparison group for the project. The data collection method was EHR database monitoring and the retrieval of patient records on postoperative complications recorded among 50 patients who underwent surgical operations after

anesthesia administration. These complications include the prevalence of postoperative sore throat, hoarseness, and other postoperative complications reported by the patients. Methods used by the anesthesia providers during anesthesia administration were measured based on the cuff pressure measurements, reassessment techniques for intra-cuff pressures, and usage level for the manometer.

Data Management and Analysis Plan

Since the data utilized in the project involved patient information from electronic health records, there was a high threat to confidentiality and privacy of such information. As such, the EHR technology was assessed for compliance to HIPAA laws. In this regard, the scholar, with the help of the primary care administration, sought consent from patients whose data would be used in the project.[24] Those patients who refuse to consent for their data to be used were not included in the study. In addition, consenting patients' names were hidden, and special unique codes were used to identify each patients' data. Further, the access granted was only used for the purpose of this research, thus preventing any unauthorized use of patient data. Goldstein et al. explained that when crucial patient data are involved in research, obtaining consent is necessary. In addition, the researcher must commit to maintaining confidentiality for such information not to be used recklessly.[24] The IRB permission was also sought to help in enforcement of patient data confidentiality.

Summary

The project methodology ensured that the project's main objectives were effectively met. Notably, the team members were briefed on the key interventions to be applied, and, where necessary, training and policy adjustments were made. The primary healthcare facility was the practicum site with key participants being the facility's anesthesia providers. After the posttest

survey, the scholar compared it with the pretest survey, thus providing an opportunity for assessing the impact of intervention in enhancing patient safety and positive outcomes by eliminating postoperative complications.

TIMELINE

Description of Approach and Project Procedure

Once the anesthesia providers were selected for the project, they were retrained on how to use LMA and cuff pressure manometer during anesthesia for patients undergoing surgical operations. The scholar retrieved the records on the incidence rate of different postoperative complications before implementation of the LMA cuff monitoring intervention. The scholar obtained records of the postoperative complication complaints recorded by 50 patients who went through surgical operations based on different times from the EHR—complications were noted at 6 hours after anesthesia, 12 hours after anesthesia, 18 hours after anesthesia, and 24 hours after anesthesia. Once the incidence rates were recorded, the data were used as the baseline or comparison group. After obtaining the baseline data, the anesthesia providers implemented the intervention by administering LMA airways management while monitoring the cuff pressure to be as low as 20 cm H_2O and 30 mm Hg, which is lower than the maximum cuff pressure of 60 cm H_2O recommended by the LMA manufacturers.[14] Anesthesia providers recorded the incidences of postoperative complications ranging from postoperative sore throat, which is common, and hoarseness, among other complications noted in the electronic health records. After the intervention, the anesthesia providers monitored the patients at 6 hours, 12 hours, 18 hours, and 24 hours after anesthesia to record the new postoperative complications' incidence rate after LMA cuff pressure monitoring. This information served as the data for the intervention group. Notably, the intervention followed the following steps:

i. Application for project approval was sent to the IRB through the university.

ii. Once IRB approval was obtained, it was sent to the primary care facility for review.

iii. Invitation emails were sent to anesthesia providers who would participate in the project.

iv. Patient postoperative complications incidence rates were obtained from the EHR, noting complications based on hours after anesthesia.

v. The report on findings of the postoperative complaints was developed and used as the baseline or comparison group information.

vi. Areas of adjustment and policy recommendations were assessed based on the evidence and advice from the participants.

vii. Any further improvements in practice policy were submitted to the university and the primary healthcare facility for evaluation and approval.

viii. After approval, anesthesia providers were allowed to administer anesthesia to patients and apply LMA as the airway management tool, accompanied by monitoring the cuff pressure using the manometer.

ix. Anesthesia providers recorded the data on postoperative complication incidences on the electronic health records and use the data as the intervention group.

x. In the end, a comparison of the baseline and intervention group was evaluated for any variations.

RESULTS

Participant Demographics

After the launch of Qualtrics, 6 participants completed the survey. Female participants accounted for 66.67% (n = 4), and 33.33% (n = 2) were males. The survey participants encompassed individuals from various racial/ethical backgrounds, such as 16.67% Asian,

16.67% African Americans, 66.67% Caucasians, and 0% Hispanics. All the participants were CRNAs; however, 83.33% (n = 5) were doctoral degree level, and 16.67% (n = 1) were certificate degree level. The participants had varying levels of experience: 1 to 2 years (n = 4, 66.67%), 2 to 5 years (n = 1, 16.67%), 5 to 10 years (n = 0, 0%), and over 10 years (n = 1, 16.67%). The participants' demographics are illustrated in Table 1.

Table 1. Demographics

	N	%
Total Participants	6	100%
Gender		
Male	2	33.33%
Female	4	66.67%
Ethnicity		
Hispanic	0	0.00%
Caucasian	4	66.67%
African American	1	16.67%
Asian	1	16.67%
Level of Education		
Master's	0	0.00%
Doctorate	5	83.33%
Certificate	1	16.67%
Experience		
1-2 years	4	66.67%
2-5 years	1	16.67%
5-10 years	0	0.00%
Over 10 years	1	16.67%

Pretest: Assessment of Baseline Knowledge

The pretest and posttest consisted of identical questions (see Appendix B). The pretest questions were administered to assess the baseline knowledge of the participants. The test was administered prior to the implementation of the educational module. The pretest results displayed

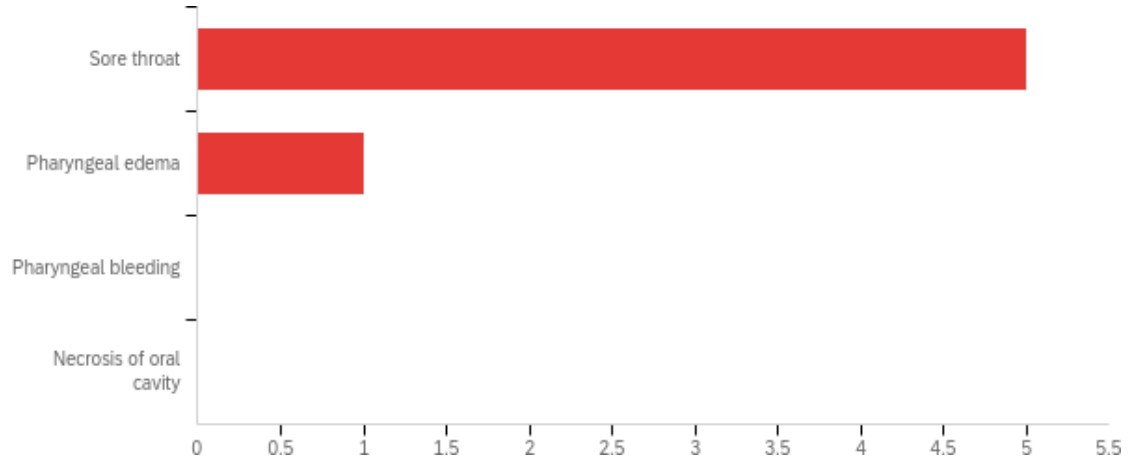
on Table 2. The pretest results for question 5 depicted on Figure 1 indicates 83.33% correctly answered the question (n = 5).

Table 2. Pretest Results

Pre_Q1 - Do you currently monitor laryngeal mask airway cuff pressure intraoperatively?	**N**	**%**
Always	0	0.00%
1-2 times a week	1	16.67%
3-4 times a week	0	0.00%
Never	5	83.33%
Pre_Q2 - How likely does your employer offer manometers to monitor laryngeal mask airway cuff pressure?		
Most likely	0	0.00%
Somewhat likely	2	33.33%
Somewhat unlikely	0	0.00%
Most unlikely	4	66.67%
Pre_Q3 - How likely are you to use a manometer in your daily practice to monitor laryngeal mask airway cuff pressure?		
Most likely	0	0.00%
Somewhat likely	1	16.67%
Somewhat unlikely	1	16.67%
Most unlikely	4	66.67%
Pre_Q4 - Do you believe lack of monitoring laryngeal mask airway cuff pressure could result in postoperative complications?		
Agree	3	50.00%
Somewhat agree	1	16.67%
Somewhat disagree	2	33.33%
Disagree	0	0.00%
Pre_Q6 - What is your limitation of using manometer intraoperatively?		
No access to manometer	4	66.67%
Unsure when to use it	1	16.67%
Only monitor laryngeal mask airway cuff pressure at beginning of case	1	16.67%

Pre_Q7 - How likely are you to monitor laryngeal mask airway cuff pressure intraoperatively?		
Most likely	0	0.00%
Somewhat likely	2	33.33%
Somewhat unlikely	1	16.67%
Most unlikely	3	50.00%
Pre_Q8 - Is the monitoring of laryngeal mask airway cuff pressure time consuming?		
Yes	1	16.67%
No	5	83.33%
Pre_Q9 - Does the task of monitoring laryngeal mask airway cuff pressure intraoperatively limit your usage in daily practice?		
Yes	0	0.00%
No	6	100.00%
Pre_Q10 - Do you believe monitoring laryngeal mask airway cuff pressure is expensive?		
Agree	0	0.00%
Somewhat agree	0	0.00%
Somewhat disagree	4	66.67%
Disagree	2	33.33%

Figure 1. Pretest Question 5



Posttest: Assessment of Learning

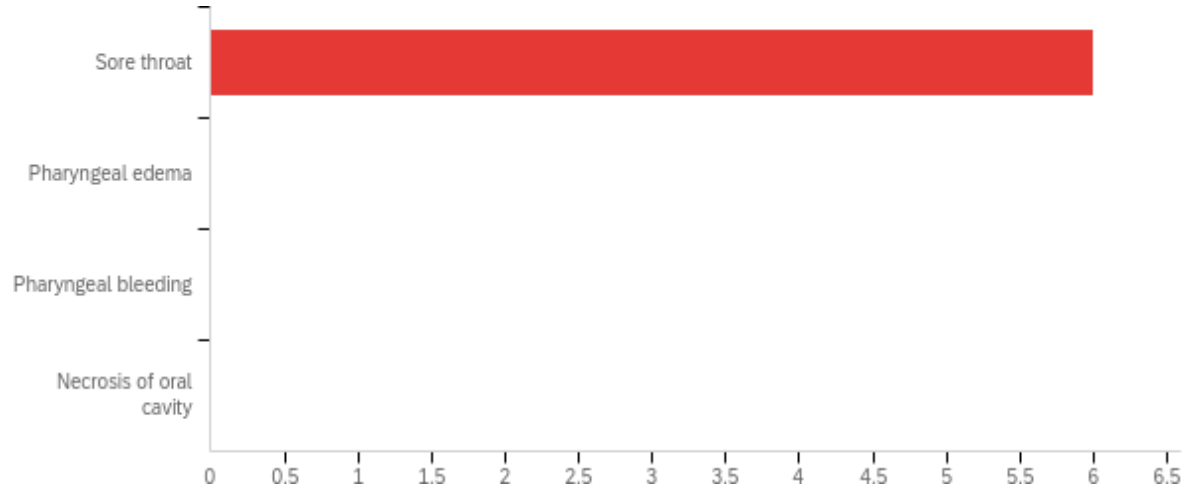
In contrast, the posttest was administered after implementing the educational module. It was administered to assess knowledge gained after the module's presentation and the probability of the participants monitoring laryngeal mask cuff pressures intraoperatively. Participants demonstrated improved scores in the posttest survey compared to the pretest scores. When asked how likely they are to use a manometer in your daily practice for monitoring, 2 (33.33%) responded “most likely,” 3 (50%) responded “somewhat likely,” and 1 (16.67%) responded “most unlikely.” Furthermore, when asked if lack of monitoring laryngeal mask airway cuff pressure results in postoperative complications, 5 (83.33%) replied “agree,” and 1 (16.67%) responded “somewhat agree.” Results for posttest questions are shown in Table 3. Figure 2 depicts 100% selected the correct answer for question 5, correlating to a +16.67% change.

Table 3. Posttest Results

Post_Q1 - Do you currently monitor laryngeal mask airway cuff pressure intraoperatively?	**N**	**%**
Always	0	0.00%
1-2 times a week	1	16.67%
3-4 times a week	0	0.00%
Never	5	83.33%
Post_Q2 - How likely does your employer offer manometers to monitor laryngeal mask airway cuff pressure?		
Most likely	1	16.67%
Somewhat likely	0	0.00%
Somewhat unlikely	1	16.67%
Most unlikely	4	66.67%
Post_Q3 - How likely are you to use a manometer in your daily practice to monitor laryngeal mask airway cuff pressure?		
Most likely	2	33.33%
Somewhat likely	3	50.00%

Somewhat unlikely	0	0.00%
Most unlikely	1	16.67%
Post_Q4 - Do you believe lack of monitoring laryngeal mask airway cuff pressure could result in postoperative complications?		
Agree	5	83.33%
Somewhat agree	1	16.67%
Somewhat disagree	0	0.00%
Disagree	0	0.00%
Post_Q6 - What is your limitation of using manometer intraoperatively?		
No access to manometer	5	83.33%
Unsure when to use it	0	0.00%
Only monitor laryngeal mask airway cuff pressure at beginning of case	1	16.67%
Post_Q7 - How likely are you to monitor laryngeal mask airway cuff pressure intraoperatively?		
Most likely	1	16.67%
Somewhat likely	4	66.67%
Somewhat unlikely	0	0.00%
Most unlikely	1	16.67%
Post_Q8 - Is the monitoring of laryngeal mask airway cuff pressure time consuming?		
Yes	1	16.67%
No	5	83.33%
Post_Q9 - Does the task of monitoring laryngeal mask airway cuff pressure intraoperatively limit your usage in daily practice?		
Yes	0	0.00%
No	6	100.00%
Post_Q10 - Do you believe monitoring laryngeal mask airway cuff pressure is expensive?		
Agree	0	0.00%
Somewhat agree	1	16.67%
Somewhat disagree	4	66.67%
Disagree	1	16.67%

Figure 2. Posttest Question 5



DISCUSSION

The educational module demonstrated increased knowledge regarding monitoring intraoperative laryngeal mask airway cuff pressure to reduce postoperative complications. After implementing the educational module, 100% (n = 6) answered question 5 correctly, showing a 16.67% increase in knowledge for complications postoperatively. Results showed 16.67% (n = 1) of participants were "most likely" to monitor laryngeal mask airway cuff pressure intraoperatively and 66.67% (n = 4) were "somewhat likely." When participants were asked limitations with regards to monitoring cuff pressure intraoperatively, 5 (83.33%) responded "no access to manometer," and 4 (66.67%) "most unlikely" their employer to offer a manometer. Additionally, 5 (83.33%) participants acknowledged monitoring of laryngeal mask airway cuff pressure was not time consuming. All participants agreed the task of monitoring cuff pressure would not limit its usage in their daily practice. Furthermore, 4 (66.67%) participants disagreed monitoring of laryngeal mask airway cuff pressure to be expensive.

Limitations

The significant limitation of the quality improvement project was the sample size. The educational module was disseminated to 45 anesthesia providers via their work email using

Qualtrics; 1 email bounced back and thus could not be delivered. However, after a reminder email was sent prior to the closure of Qualtrics link, only 6 CRNAs completed the survey. Another limitation for consideration is the virtual format of the quality improvement project. Virtual format creates a unique type of limitation as supposed to in-person demonstration. One must consider the technological literacy of the invited participants. Additionally, email notifications tend to be easily overlooked and allows for limited control over ensuring a participant completes the survey.

Implications for Anesthesia Practice

The usage of laryngeal mask airway contributes to a patient's postoperative oropharyngeal complaint within the first 24 hours of recovery. Increased intraoperative monitoring of laryngeal mask airway cuff pressure demonstrates fewer postoperative complaints and increased patient satisfaction. Most of the literature review analyzed focused on intraoperative monitoring of laryngeal mask airway cuff pressure to minimize postoperative complications for a patient during their recovery period. Hence, implementation of manometer usage during the intraoperative period for cuff pressure monitoring significantly assists an anesthesia provider to effectively minimize a patient's oropharyngeal postoperative complaint. As a result of newly gained knowledge, participants are willing to engage in evidence-based prevention practices. With the proper tool and education, anesthesia providers ensure a patient's safety while providing quality care. Making a manometer accessible to an anesthesia provider increases the manometer usage during the intraoperative phase.

CONCLUSION

After implementing the educational module with six participants, results showed increased knowledge regarding monitoring intraoperative laryngeal mask airway cuff pressure to

reduce postoperative complications. There was a 16.67% increase in knowledge for the most common postoperative complications within the first 24 hours of a patient's recovery. Also, 16.67% (n = 1) were "most likely" to monitor laryngeal mask airway cuff pressure intraoperatively and 66.67% (n = 4) were "somewhat likely." When participants were asked limitations with regards to monitoring cuff pressure intraoperatively, 5 (83.33%) responded "no access to manometer," and 4 (66.67%) stated it was "most unlikely" their employer to offer a manometer. Additionally, 5 (83.33%) participants acknowledged that monitoring of laryngeal mask airway cuff pressure was not time consuming. All participants agreed the task of monitoring cuff pressure would not limit its usage in their daily practice. Furthermore, 4 (66.67%) participants disagreed that monitoring of laryngeal mask airway cuff pressure was expensive. Considering the significant limitations of the quality improvement project sample size, further research is needed to provide accurate data.

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APPENDIX

Appendix A: IRB Consent Form

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CONSENT TO PARTICIPATE IN A QUALITY IMPROVEMENT PROJECT

The intraoperative monitoring of laryngeal mask airway cuff pressure and minimizing postoperative complications: An evidence-based education module.

SUMMARY INFORMATION
Things you should know about this study:

- **Purpose:** Educational module to increase providers awareness of monitoring laryngeal mask airway cuff pressure intraoperatively to minimize postoperative complications.
- **Procedures**: If the participant chooses to participate, they will be asked to complete a pretest, watch a voice PowerPoint, and then a post test
- **Duration:** This will take about a total of 25 minutes (5 minutes pretest, 5 minutes posttest, 15 minutes PowerPoint) total.
- **Risks**: There will be minimal risks involved with this project, as would be expected in any type of educational intervention, which may include mild emotional stress or mild physical discomfort from sitting on a chair for an extended period.
- **Benefits:** The main benefit to you from this research is increase the participants knowledge on minimizing postoperative complications to patients after the usage of laryngeal mask airways.
- **Alternatives:** There are no known alternatives available to the participant other than not taking part in this quality improvement project.
- **Participation:** Taking part in this quality improvement project is voluntary.

Please carefully read the entire document before agreeing to participate.

NUMBER OF STUDY PARTICIPANTS:
If the participant decides to be in this study, they will be one of approximately 15 people in this research study.

PURPOSE OF THE PROJECT
The participant is being asked to be in a quality improvement project. The goal of this project is to increase providers' knowledge on intraoperative monitoring of laryngeal mask airway cuff pressure to minimize postoperative complications. If you decide to participate, you will be 1 of approximately 15 participants.

DURATION OF THE PROJECT
The participation will require about 25 minutes.

PROCEDURES
If the participant agrees to be in the project, PI will ask you to do the following things:
1. Complete an online 10 question pretest survey via Qualtrics, an Online survey product for which the URL link is provided

2. Review the educational PowerPoint Module lasting 15 minutes via Qualtrics, an Online survey product for which the URL link is provided.
3. Complete the online 10 question posttest survey via Qualtrics, an Online survey product for which the URL link is provided.

RISKS AND/OR DISCOMFORTS
The main risk or discomfort from this research is minimal. There will be minimal risks involved with this project, as would be expected in any type of educational intervention, which may include mild emotional stress or mild physical discomfort from sitting on a chair for an extended period.

BENEFITS
The following benefits may be associated with participation in this project: An increased participants knowledge on effective intraoperative monitoring of laryngeal mask airway cuff pressure, and as a result, preventing postoperative complications to patients. The overall objective of the program is to increase the providers' knowledge based on the current literature.

ALTERNATIVES
There are no known alternatives available to the participant other than not taking part in this project. However, if the participant would like to receive the educational material, it will be provided to them at no cost.

CONFIDENTIALITY
The records of this project will be kept private and will be protected to the fullest extent provided by law. If, in any sort of report, PI might publish, it will not include any information that will make it possible to identify the participant. Records will be stored securely, and only the project team will have access to the records.

PARTICIPATION
Taking part in this quality improvement project is voluntary.

COMPENSATION & COSTS
There is no cost or payment to the participant for receiving the health education and/or for participating in this project.

RIGHT TO DECLINE OR WITHDRAW
The participation in this project is voluntary. The participant is free to participate in the project or withdraw the consent at any time during the project. The participant's withdrawal or lack of participation will not affect any benefits to which you are otherwise entitled. The investigator reserves the right to remove the participant without their consent at such time that they feel it is in their best interest.

RESEARCHER CONTACT INFORMATION
If you have any questions about the purpose, procedures, or any other issues relating to this research project, you may contact Veronica Fernandez at (954) 815-7786 / VFern102@FIU.edu and Dr. Fernando Alfonso at (305) 348-3510 / FAlfonso@FIU.edu.

IRB CONTACT INFORMATION
If the participant would like to talk with someone about their rights pertaining to being a subject in this project or about ethical issues with this project, the participant may contact the FIU Office of Research Integrity by phone at 305-348-2494 or by email at ori@fiu.edu.

PARTICIPANT AGREEMENT

I have read the information in this consent form and agree to participate in this study. I have had a chance to ask any questions I have about this study, and they have been answered for me. By clicking on the "consent to participate" button below I am providing my informed consent.

Appendix B: Pre and Posttest Questionnaire

Pre and Posttest Questionnaire:
The intraoperative monitoring of laryngeal mask airway cuff pressure and minimizing postoperative complications: An evidence-based education module

INTRODUCTION

The primary aim of this QI project is to increase providers awareness regarding monitoring laryngeal mask airway cuff pressure intraoperatively to minimize postoperative complications.

Please answer the question below to the best of your ability. The questions are either in multiple choice or true/false format and are meant to measure knowledge on intraoperative monitoring of laryngeal mask airways.

PERSONAL INFORMATION

1. **Gender:** Male Female
2. **Age:** _____
3. **Ethnicity:** Hispanic Caucasian African American
   Asian Other_____
4. **Position/Title:** CRNA Anesthesiologist
5. **Level of Education:** Certificate Bachelors Masters DNP PhD
6. How many years have you been a perioperative provider?
   Over 10 5-10 years 2-5 years 1-2 years

QUESTIONNAIRE

1. **Do you currently monitor laryngeal mask airway cuff pressure intraoperatively?**
    a. Always
    b. 1-2 times a week
    c. 3-4 times a week
    d. Never

2. **How likely does your employer offer manometers to monitor laryngeal mask airway cuff pressure?**
    a. Most likely
    b. Somewhat likely
    c. Somewhat unlikely
    d. Most unlikely

3. **How likely are you to use a manometer in your daily practice to monitor laryngeal mask airway cuff pressure?**
    a. Most likely
    b. Somewhat likely
    c. Somewhat unlikely
    d. Most unlikely

4. **Do believe lack of monitoring laryngeal mask airway cuff pressure could result in post- operative complications?**
    a. Agree
    b. Somewhat agree
    c. Somewhat disagree

5. **Common complications of using laryngeal mask airway include:**
    a. Sore throat
    b. Pharyngeal trauma
    c. Pharyngeal bleeding
    d. Necrosis of oral cavity

6. **What is your limitation of using manometer intraoperatively?**
    a. No Access to manometer
    b. Unsure when to use it
    c. Only monitor laryngeal mask airway cuff pressure at beginning of case

7. **How likely are you to monitor laryngeal mask airway cuff pressure intraoperatively?**
    a. Most likely
    b. Somewhat likely
    c. Somewhat unlikely
    d. Most unlikely

8. **Is the monitoring of laryngeal mask airway cuff pressure time consuming?**
    a. Yes

b. No

9. Does the task of monitoring laryngeal mask airway cuff pressure intraoperatively limit your usage in daily practice?

a. Yes
b. No

10. Do you believe monitoring laryngeal mask airway cuff pressure is expensive?

a. Agree
b. Somewhat agree
c. Somewhat disagree
d. Disagree

Appendix C: Letter of Support

ANESCO™
Driving Results in Anesthesia

February 7, 2023
Fernando Alfonso, DNP, CRNA, APRN
Clinical Assistant Professor
Department of Nurse Anesthesiology
Florida International University

Dr. Alfonso,

Thank you for inviting ANESCO to participate in the Doctor of Nursing Practice (DNP) project conducted by **Veronica Fernandez** entitled **"The intraoperative monitoring of laryngeal mask airway cuff pressure and minimizing post-operative complications: An evidence-based education module"** in the Nicole Wertheim College of Nursing and Health Sciences, Department of Nurse Anesthesiology at Florida International University. I have granted the student permission to conduct the project using our providers.

Evidence-based practice's primary aim is to yield the best outcomes for patients by selecting interventions supported by the evidence. This proposed quality improvement project seeks to utilize the latest literature to increase providers awareness regarding monitoring laryngeal mask airway cuff pressure intraoperatively to minimize post-operative complications.

We understand that participation in the study is voluntary and carries no overt risk. All Anesthesiology providers are free to participate or withdraw from the study at any time. The educational intervention will be conveyed by a 15-minute virtual PowerPoint presentation, with a pretest and posttest questionnaire delivered by a URL link electronically via Qualtrics, an online survey product. Responses to pretest and posttest surveys are not linked to any participant. The collected information is reported as an aggregate, and there is no monetary compensation for participation. All collected material will be kept confidential, stored in a password encrypted digital cloud, and only be accessible to the investigators of this study: Veronica Fernandez and Dr. Fernando Alfonso.

Once the Institutional Review Board's approval is achieved, this scholarly project's execution will occur over two weeks. Veronica Fernandez will behave professionally, follow standards of care, and not impede hospital performance. We support the participation of our Anesthesiology providers in this project and look forward to working with you.

2/9/23

Edward Punzalan, DNP, CRNA, APRN
Administrative Director of Nurse Anesthesia
Healthcare Performance Anesco

Date

Appendix D: IRB Approval Letter

FIU Research & Economic Development
FLORIDA INTERNATIONAL UNIVERSITY

MEMORANDUM

To: Dr. Fernando Alfonso

CC: Veronica Fernandez

From: Carrie Bassols, BA, IRB Coordinator

Date: March 2, 2023

Proposal Title: "The intraoperative monitoring of laryngeal m minimizing post-operative complications: A module"

The Florida International University Office of Research for the use of human subjects and deemed it Exempt

IRB Protocol Exemption #: IRB-23-0078
TOPAZ Reference #: 112806

As a requirement of IRB Exemption you

1) Submit an IRB Exempt Amen procedures involving human approved prior to implemen
2) Promptly submit an IR unanticipated adverse e deviations from the a
1) Submit an IRB E discontinued.

Special Condit

For further

Appendix E: Recruitment Letter

Nicole Wertheim College of Nursing & Health Sciences

The intraoperative monitoring of laryngeal mask airway cuff pressure and minimizing post-operative complications: An evidence-based education module

Dear ANESCO Perioperative Providers:

My name is Veronica Fernandez, and I am a student from the Anesthesiology Nursing Program Department of Nurse Anesthesiology at Florida International University. I am writing to invite you to participate in my quality improvement project. The goal of this project is to increase health care providers' awareness of monitoring laryngeal mask airway cuff pressure intraoperatively to minimize post-operative complications. You are eligible to take part in this project because you are a part of the ANESCO perioperative provider.

If you decide to participate in this project, you will be asked to complete and sign a consent form for participation. Next, you will complete a pre-test questionnaire, which is expected to take approximately 5 minutes. You will then be asked to view an approximately 15 minutes long educational presentation online. After going through the educational module, you will be asked to complete the post-test questionnaire, which is expected to take approximately 5 minutes. No compensation will be provided.

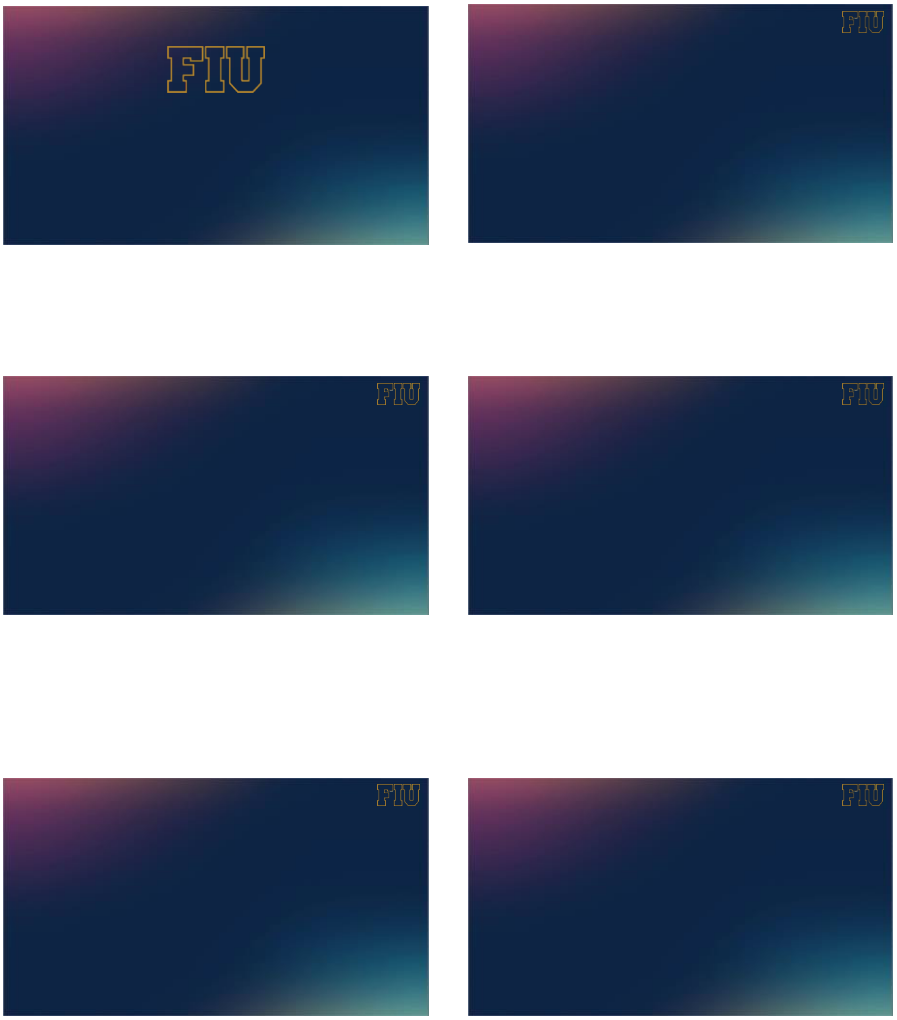
Remember, this is completely voluntary. You can choose to be in the study or not. If you'd like to participate or have any questions about the study, please email or contact me at (954) 815-7786 or VFern102@FIU.edu.

Thank you very much.

Sincerely,

Veronica Fernandez
(954) 815-7786
VFern102@FIU.edu

Appendix F: Educational Module



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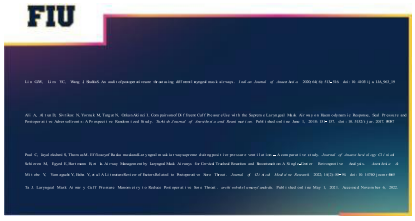
Take Home Summary
Weaknesses
Opportunities
• LMA can be integrated
• New interventions can
cases
complications

10



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Appendix G: DNP Symposium Presentation

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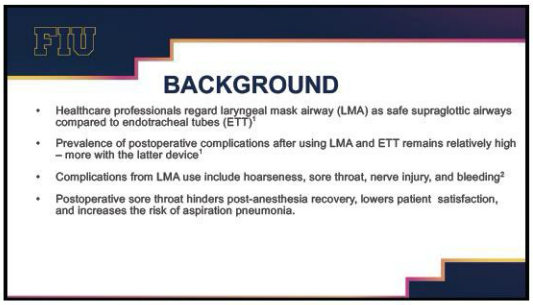

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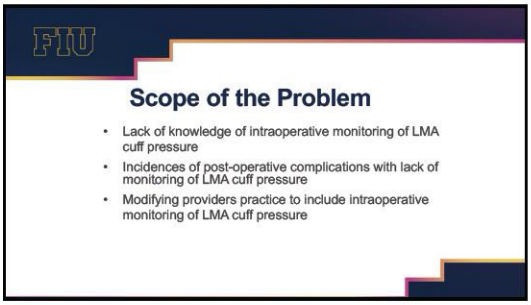

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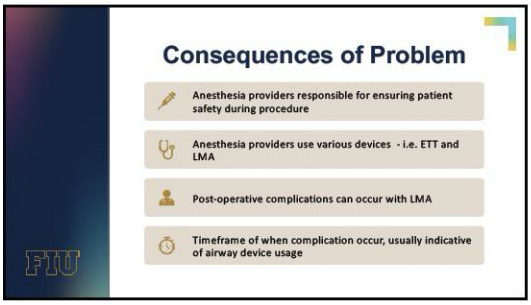

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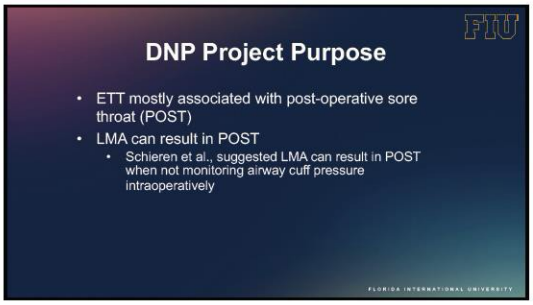

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PICO Question

Are (P) anesthesia providers (I) intraoperatively monitoring laryngeal mask airways (LMA) cuff pressures (C) compared to standard practice (O) to decrease postoperative complications within 24 hours of procedure?

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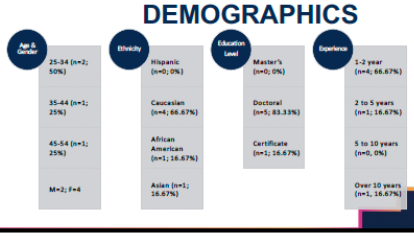
7

QI Project Method

- IRB Approval
- Anonymous participation via Qualtics email distribution
- Participants obtained from a large hospital system in South Florida
- Pre-test questionnaire
- Educational video on laryngeal airway mask cuff assessment process
- Post-test questionnaire

8

QI RESULTS: PARTICIPANT DEMOGRAPHICS



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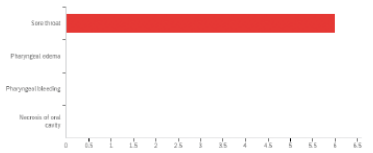
QI RESULTS



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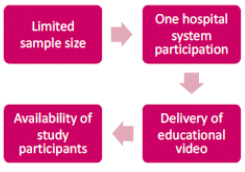
Limitations



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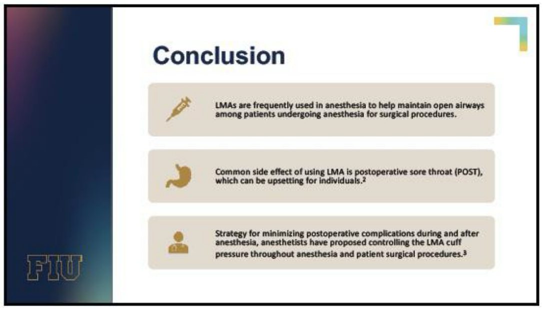
QI Discussion

- Educational module
- Email
- Limitation for virtual format

12


Conclusion
LMAs are frequently used in anesthesia to help maintain open airways among patients undergoing anesthesia for surgical procedures.
Common side effect of using LMA is postoperative sore throat (POST), which can be upsetting for individuals.2
Strategy for minimizing postoperative complications during and after anesthesia, anesthetists have proposed controlling the LMA cuff pressure throughout anesthesia and patient surgical procedures.3
FIU
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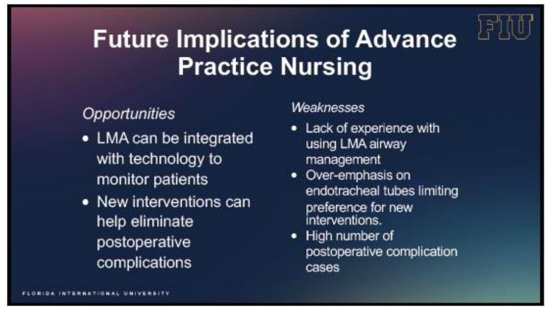
Future Implications of Advance Practice Nursing
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Opportunities
LMA can be integrated with technology to monitor patients
New interventions can help eliminate postoperative complications
Weaknesses
Lack of experience with using LMA airway management
Over-emphasis on endotracheal tubes limiting preference for new interventions.
High number of postoperative complication cases
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14


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References
15


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Thank you!
16