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An Educational Module on Post-Operative Nausea & Vomiting Prevention Using Haldol

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DNP Project Proposal

An Educational Module on Post-Operative Nausea & Vomiting Prevention Using Haldol

College of Nursing, Florida International University

NGR 7941C: DNP Project 1

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Postoperative nausea and vomiting (PONV) is the most common side effect of patients receiving anesthesia. These outcomes are seen both shortly after and within 24 hours of a surgical procedure. PONV rates among surgical candidates can be as high as 30%.¹ There are many drug combinations anesthesia providers utilize to prevent PONV, including Reglan, Zofran, Decadron, Scopolamine, Emend, and Propofol to some degree. However, anesthesia providers do not commonly give Haldol to patients intra-operatively, even though it contains both anti-nausea and anti-vomiting properties. The purpose of this paper is to educate anesthesia providers on the benefits of incorporating Haldol in their patient treatment plans to help prevent PONV.

Background

PONV is a serious issue that many healthcare institutions have been trying to solve.² Enhanced Recovery After Surgery (ERAS) protocols have been created to accomplish this goal, given the widespread number of patients affected by PONV. ERAS protocols are evidence-based recommendations written to improve surgical outcomes. There are approximately 20 focus areas, with PONV being one of them. ERAS protocols promote a multi-modal approach to prevent PONV. Antiemetic administration, total intravenous anesthesia (TIVA), and less volatile agent usage are a few examples of ERAS recommendations designed to minimize PONV.³ In conjunction with ERAS, various assessment tools are available to determine patient risk factors that influence their susceptibility to PONV. A commonly used tool³ is the Apfel score, comprised of 4 high-risk categories: female gender, a history of PONV/motion sickness, non-smoking status, and the use of post-operative opioids. The more items on this list that a patient meets, the greater their PONV risk. Patients who meet 1-2 risk factors receive 2 antiemetics, and

patients with higher risk factors receive 2-3 antiemetics.³ The Apfel tool creates awareness for anesthesia providers to effectively formulate a treatment plan to combat PONV for at-risk patients. Authors Nagelhout and Elisha³ make mention of an expanded PONV at-risk list that includes: female gender, PONV history, non-smokers, age less than 50 years old, use of volatile anesthetic agents, use of nitrous oxide, opioid use post-operatively, and length of exposure to anesthesia during a given procedure.

Scope of the Problem

More than 21 million surgeries were performed in the United States in 2014.⁴ Globally, this number increases exponentially. PONV can be an unfortunate consequence for any patient who undergoes a surgical procedure. Research³ demonstrates that up to 30% of surgical patients experience PONV. However, other peer-reviewed journals and anesthesia textbooks claim this number may be as high as 80% depending on patient risk factors and co-morbidities.^{3,5} Moreover, specific procedures such as breast, gynecological, and open heart surgeries can carry a PONV risk as high as 70%.⁶

In an observational study,⁷ healthcare staff noticed patients experiencing PONV less than half of the time in the post-anesthesia care unit (PACU). Depending on the demands of the hospital and staffing issues, patients may be overlooked and not receive the necessary care to address their PONV needs. For example, the current COVID-19 pandemic has forced healthcare facilities to divert staff and other resources, which negatively impacts care and attention patients need for recovery and timely discharge.⁴

Consequences of the Problem

The consequences of PONV, or lack of prophylactic treatment, can lead to a myriad of issues. Research⁸ shows that patients attribute pain as a subsequent outcome when they

experience PONV symptoms. Moreover, patients consider PONV more concerning and stressful than pain post-operatively.⁸ Additional patient concerns associated with unwanted side effects from PONV exist as well. The act of emesis, for example, raises intracranial pressure and reduces cerebral perfusion necessary for brain function.⁸ PONV can lead to aspiration with emesis contents, and/or dehydration, as well as electrolyte and acid-base balances.^{2,8} The consequences of PONV can manifest in many undesirable ways and negatively affect patient health and recovery.

PONV can also lead to discharge delays from the PACU and the hospital.^{7,2} Among bariatric patients, PONV is the most common cause of unplanned hospital readmission.² One study concluded that the incidence of PONV among patients increased PACU stays by at least 1 hour.⁸ The cost to the healthcare system due to PONV within the United States amounts to approximately between \$253 270 and \$519 617 annually.⁸ These outcomes can be minimized or avoided with the use of anti-emetics such as Haldol.

Knowledge Gaps

ERAS recommendations, specifically related to PONV, have been put forth to guide anesthesia providers' plan of care. A review of the literature supports ERAS protocols and touts its many successes regarding improving patient care. Despite this, ERAS and other similar tools have not been readily accepted nor implemented across healthcare institutions.⁹ This knowledge gap directly contributes to the lack of its adoption and the use of Haldol as a PONV remedy.

Furthermore, anesthesia providers associate Haldol as a means to treat psychotic disorders, not necessarily PONV. Haldol has side effects that may include dystonia or tardive dyskinesia, which anesthesia providers want to avoid when possible.¹⁰ Additionally, the United States Food and Drug Administration (FDA) has issued a "Black Box" warning since Haldol is

associated with a prolonged QT interval, which is the depolarization and repolarization of the heart's ventricles.^{8,10,11} However, all these effects are seen only when Haldol is administered in doses equal to or greater than 2mg.¹¹ The lack of awareness associated with its PONV benefits and proper dosing to avoid its side effects impedes Haldol's use in the clinical setting.

Proposal Solution

Haldol can be used to treat psychotic disorders, it causes sedation, and it contains anti-nausea and anti-vomiting properties, all of which are beneficial anesthesia outcomes. It is classified as a butyrophenone that antagonizes the dopamine 2 (D2) receptor. When triggered, the D2 receptor is known to induce nausea and vomiting in the chemoreceptor trigger zone (CTZ).¹² Therefore, stopping this process is beneficial, especially during and after surgical procedures. Haldol has an extended half-life and its anti-nausea and anti-vomiting mechanism can last 24 hours.¹¹ Haldol also seems to intensify the analgesic properties of opiates so that fewer narcotics are needed.¹³ This aligns well to reduce PONV and works synergistically with ERAS recommendations. The literature does recommend 0.5mg - 1mg for PONV to avoid dystonia or tardive dyskinesia.⁹

Literature Review

Objective

The literature review's purpose is to explore previous research on anesthesia provider knowledge, attitude, and skill in treating PONV. The literature review's secondary goal is to analyze available evidence-based guidelines that focus on preventing PONV. Finally, the focus of the literature review transitions to the review of Haldol as a specific treatment for PONV to improve patient outcomes.

Methodology

Eligibility Criteria

Research articles appraised for this literature review were selected based on various inclusion and exclusion criteria. Inclusion criteria were studies published from 2017 to 2021, English language, peer-reviewed, and full-text only. Exclusion criteria included studies with subjects younger than 18 years of age. Florida International University's (FIU) library database was utilized to access the articles for the literature review. The databases utilized for the search included CINAHL, MEDLINE, PubMed, Gale OneFile, DOAJ Directory of Open Access Journals, Wiley Online Library Database Model 2019, and ScienceDirect Journals. The literature review was further guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). Based on the clinical question, the following search keywords were identified: Haldol, Haloperidol, PONV, postoperative nausea and vomiting, ERAS, and enhanced recovery after surgery.

Search Strategy

Boolean search techniques were applied and included “(Haldol OR Haloperidol) AND (PONV OR “postoperative nausea and vomiting”)”. This initial search yielded 600 results. Of these, 399 were peer reviewed articles, 376 English language articles, 113 were published within the last 5 years, and 3 shared the exact title match. A second Boolean search was conducted and consisted of “(Haldol OR Haloperidol) AND (ERAS OR “enhanced recovery after surgery”)”. This search returned 2145 results with 1629 being peer review, 1608 written in the English language, 322 dated in the last 5 years, and 1 with an exact title match. The third Boolean search used was “(Haldol OR Haloperidol) AND (“general anesthesia” OR GA)” and returned 9779 results. The results were further parsed with 7994 being peer reviewed, 7795 written in the English language, 1328 written within the last 5 years, and 7 exact title matches. The final

Boolean search applied was “(Haldol OR Haloperidol) AND (“postoperative” OR “Post-op” OR Postop)” and 58 results were returned. Of the 58 articles, 35 were peer reviewed, 33 written in the English language, 7 articles created within the last 5 years, and 7 with an exact title match.

A total of 53 articles were reviewed and selected for a more in-depth abstract review. Of the 53 articles, 8 articles met the full criteria and were further reviewed. Articles that were removed in this process included those that focused on patients younger than 18 years old. Only the articles that fully met the criteria were designated appropriate for the literature review.

Table 1. Search Keywords

Boolean Search Criteria	Results	Peer Reviewed	English Language	Last 5 Years	Exact Title Match
(Haldol OR Haloperidol) AND (PONV OR “postoperative nausea and vomiting”	600	399	376	113	5
(Haldol OR Haloperidol) AND (ERAS OR “enhanced recovery after surgery”)	2145	1629	1608	322	1
(Haldol OR Haloperidol) AND (“general anesthesia” OR GA)	9779	7994	7795	1328	7
(Haldol OR Haloperidol) AND (“postoperative” OR “Post-op” OR Postop)	58	35	33	7	7

Results

Study Characteristics

The 8 articles designated for this literature review examined 2 specific concepts. The first concept outlines the benefits of using standardized tools that healthcare providers can use for PONV risk stratification and associated treatment recommendations. Bellizzi et al,⁵ Stephenson et al,⁸ and Jin et al² all cite advantages when anesthesia providers follow specific PONV facility protocols to combat PONV. Although the methods by which to accomplish this goal vary, incidences of PONV were reduced. The second concept focuses on the awareness and benefits of using Haldol for PONV. Brettner et al,⁹ Kamali et al,¹¹ Dağ et al,¹² Sunil et al,¹⁴ and Singh et al¹⁰ agree that Haldol is a beneficial drug to reduce the PONV risk. Research methods for the articles include a retrospective study by Bellizzi et al,⁵ a prospective cohort study by Stephenson et al,⁸ a systematic review by Jin et al,² a register-based cohort study by Brettner et al,⁹ randomized clinical trials by Kamali et al,¹¹ Dağ et al,¹² and Sunil et al,¹⁴ and meta-analysis and trial sequential analysis by Singh et al.¹⁰

Summary of the Literature

Bellizzi et al⁵ conducted a retrospective study to analyze PONV protocols within a specific hospital system and summarized the associated impacts. The authors collected data in 2012 and again in 2017 as a follow-up. Study participants were male and female, 18 years and older, undergoing elective surgery, and receiving general anesthesia. The authors examined which patients experienced PONV during their time in the post-anesthesia care unit (PACU) and who had an unplanned admission afterwards that was due to PONV. Contact was made 72 hours after surgery to follow up and determine PONV symptoms as well. The data was collected and

analyzed using various software such as Microsoft Excel and IBM SPSS. Patient eligibility reached 195 participants in 2012 and 173 in 2017. PONV protocols were not in place in 2012.⁵

However, in 2017 the Apfel scoring system was introduced and implemented.⁵ Bellizzi et al⁵ discovered that the administration of antiemetics in 2012 was only 27%, compared to 62% in 2017 after the Apfel scoring system was implemented. Results show that antiemetic administration in 2017 was still problematic as patients were under-prescribed PONV medications. For example, approximately one-third of patients with an Apfel score greater than 3, considered high-risk, were prescribed the correct dosage of antiemetic medications.

Study limitations were noted by Bellizzi et al.⁵ Pain is a known contributor to the perception of nausea and vomiting. Pain assessments were not collected nor analyzed in conjunction with PONV reporting. Moreover, patient satisfaction scores were not accounted for to determine treatment success rates. Future recommendations were noted as well. The importance of creating greater educational awareness was stressed, and creating automated PONV prophylaxis computer reminders, especially for high-risk surgical procedures, were all suggested.⁵

Similar conclusions were made by Stephenson et al⁸ in a prospective cohort study. The study spanned 12 months and analyzed PONV data from 500 same-day surgical patients receiving general anesthesia. The Apfel scoring system was used for each study participant. The data analysis consisted of the Mann-Whitney U test, the Chi-square, and Fisher's exact test. Exclusion criteria included chemotherapy patients, palliative care patients with chronic opioid use, and antiemetic use 24 hours before surgery. Study limitations⁸ were outlined, and patient follow-up did not occur post-discharge from the PACU, so the patient population affected by PONV may be more extensive. This study⁸ did not include female patients undergoing

gynecological procedures. These operations were performed in an adjacent building, and therefore, PONV prevalence rates are likely skewed. Stephenson et al⁸ identified that PONV is significantly reduced when a risk stratification system, like Apfel, is used and the correct administration of antiemetic prophylaxis is dispensed based on these systems approaches. The authors states this sentiment is supported in research conducted by Kranke et al⁷ as well. Without PONV protocols and education on accompanying treatment, it is difficult to prevent or mitigate PONV.

Jin et al² reinforce the concept of PONV prevention and provide a systematic literature review. The study does not include research methods or search criteria; however, the authors reference various clinical research articles throughout the paper. PONV prevention is a multipronged approach. It encompasses risk factor assessment, intervention, prophylaxis, and rescue treatment. The conclusions provided by Jin et al² support the use of the Apfel scoring system, noting the largest barrier to PONV management is low healthcare provider compliance. According to these authors, historically, healthcare providers would administer only 1 antiemetic for PONV, and in some cases none. Currently, however, there is a movement towards a multimodal approach for PONV prophylaxis. Recommendations outlined for reducing PONV were based on various research methods and include: clinical trials, Cochrane reviews and meta-analyses; total intravenous anesthesia (TIVA) approach with propofol; use of Sugammadex versus neostigmine for neuromuscular blockade reversal; administering 30 mL/kg IV crystalloids intraoperatively; the use of Dexmedetomidine bolus or infusion; and chemoprophylaxis drugs such as Aprepitant. Combining medications to combat PONV is recommended, although Jin et al² state a lack of consensus on the degree of benefit for each added antiemetic.

The articles mentioned previously^{2,5,8,9,11,12}, establish the importance of creating, implementing, training, and reinforcing a formal PONV risk scoring system within a facility. While Jin et al² provide several common medication combinations to prevent PONV, Brettner et al⁹, through the use of a register-based cohort study, specifically explored the use of Haldol for PONV prevention, an uncommon approach in clinical practice. Brettner et al⁹ share that Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for reporting observational studies were used. Interestingly, the Ethics Committee agreed that informed consent from the participants was unnecessary. Patient information was collected from 7 January 2008 through 19 June 2012, and those who received general anesthesia were 18 years or older. Study participants were split into 2 groups, those who received 0.5mg Haldol after induction and those who did not receive any antiemetic for PONV. Exclusion criteria were patients who received a dose other than 0.5mg of Haldol. The Apfel scoring system established a base risk score. Chi-square, Mann-Whitney-U, logistic additive model, and statistical software R were employed as well. A total of 2617 cases were deemed appropriate and analyzed for the study.⁹

The research⁹ concluded that outcomes from 0.5mg of Haldol were affected by gender. Males were more prone to benefit from the medication and avoid PONV, while females did not see any appreciable benefit. Moreover, the authors point out that many other studies did not determine any gender difference outcomes and that Haldol was just as effective in females as males. Limitations of the study exist; patient documentation was lacking on smoking and PONV history. Both of these limitations alter the Apfel scoring system and a patient's PONV risk.⁹

A randomized control study conducted by Kamali et al¹¹ focused on the use of Haldol for PONV treatment compared to ondansetron and dexmedetomidine. The study participants were

composed of 114 patients undergoing an abdominal hysterectomy. These patients were split into 3 groups, with each section receiving either ondansetron 4mg IV, Haldol 2mg IV, or dexmedetomidine 1µg/kg IV. It was not disclosed to the patients which antiemetic they were receiving. The data gathered was analyzed with the statistical software SPSS 23. Inclusion and exclusion criteria are provided by the authors. For example, exclusion criteria encompassed patients classified by the American Society of Anesthesiologists (ASA) equal to or greater than risk levels III and IV. Exclusion also included patients under 35 years old or older than 60, with Parkinson's disease, with psychiatric disorders, or with a history of chemotherapy.¹¹

Scoring of the results¹¹ measured that vomiting occurred at hours 2, 4, 12, and 24. Patients did not experience PONV post hour 12 in any section. However, there was a significant reduction in PONV before hour 12 for the ondansetron group. The authors¹¹ recognize that their study disagrees with other research and cite Predeep et al,¹⁵ who concluded that ondansetron 4mg IV and Haloperidol 2mg IV are equally efficacious in preventing PONV. Further, the authors¹¹ indicate that for gynecological laparoscopic surgery, all 3 medications are equally effective.

Brettner et al⁹ and Kamali et al¹¹ recognize that elements of their research are not wholly in agreement with their peers, including ideas such as Haldol being less effective for PONV experienced by females and Ondansetron being a superior medication for PONV in the first 12 hours of administration for abdominal hysterectomies. Dağ et al¹² combine these variables and conducted a randomized control trial with 250 female patients ages 19-70 years, who were receiving laparoscopic abdominal hysterectomy.

Study participants were split into 5 groups: placebo, haloperidol 2mg, haloperidol 1mg, haloperidol 0.5mg, and haloperidol 0.25mg.¹² The Ramsay sedation scale, Apfel scoring,

Aldrete's recovery scale, and Lyles Quality of Recovery survey were used. Postoperatively, heart rate, systolic and diastolic arterial pressure, sedation level, visual analog scale values, need for antiemetics, patient satisfaction, and side effects were measured at 30 minutes, and hours 1, 2, 3, 4, 6, 12, and 24. A nurse with no involvement in the study prepared the medications without the healthcare provider's knowledge of each patient's dose of Haldol. Postoperative evaluations were conducted by healthcare providers who were also not privy to the specifics of each study group. The data was analyzed and synthesized by means of SPSS 17.0 statistical software, Kolmogorov-Smirnov test with Lilliefors correction, Kruskal-Wallis test, Mann-Whitney U test, Monte Carlo test, and the Chi-square test.¹²

The study¹² results revealed that 0.5-2mg could be used safely for the prevention of PONV and that Haldol doses of 1-2mg led to higher patient satisfaction scores. Furthermore, Haldol is a cost-effective antiemetic, and patients did not experience extrapyramidal side effects regardless of the dosage of Haldol administered. Moreover, the authors¹² reference a randomized double-blinded trial¹⁶ that assessed whether 1mg of Haldol is non-inferior to 4mg of ondansetron for PONV in 112 adults undergoing general anesthesia. The outcome of the study revealed that Haldol is non-inferior to ondansetron.¹⁶ Therefore, Haldol's usage should be considered by healthcare professionals when dealing with PONV prevention.

Sunil et al¹⁴ also favor Haldol as an effective PONV treatment. These authors¹⁴ examined the relationship between Haldol and Granisetron, a 5-HT₃ receptor antagonist. Inclusion criteria consisted of adults ages 18-65 years, ASA classification I-II, and patients who were undergoing laparoscopic surgery under general anesthesia. Exclusion criteria included patients who were obese, pregnant, diagnosed with a psychiatric disorder, had taken an antiemetic within 24 hours of the study, had a chronic cough, or had significant organ disease. The patients were split into 2

groups of 30. While 1 group received 2mg IV Haldol, the other received 1mg IV Granisetron. Patients were monitored post-operatively and for the following 24 hours.

Study¹⁴ results were analyzed using the unpaired t-test, Chi-square test, and ANOVA analysis. Based on the analysis, the authors¹⁴ concluded that there was no statistically significant difference between 2mg IV Haldol and 1mg IV Granisetron post-operatively through 24 hours. Both were effective treatments for PONV; however, Granisetron did produce headaches in 20% of the patients, a statistically significant finding according to Sunil et al.¹⁴

Finally, Singh et al¹⁰ continue to provide evidence for the use of Haldol as a prophylactic PONV medication as previous authors^{9,11,12,14} have supported. The study¹⁰ is a noninferiority meta-analysis and trial sequential analysis of randomized controlled trials that are compliant with PRISMA. Two independent reviewers analyzed the research. Databases used include PubMed, Medline, Science Citation Index, Embase, Scopus, Cochrane Central Register of Controlled Trials, clinical trials registry, Google scholar, and meta-register of controlled trials for published articles. Title search words used encompassed, haloperidol postoperative nausea vomiting, PONV efficacy haloperidol, 5-HT₃ receptor antagonists (ondansetron, granisetron, ramosetron, palonosetron) vs haloperidol, perioperative haloperidol, antiemetic haloperidol QTc. Exclusion terms were also used and only prospective, randomized control trials were incorporated. Data was analyzed using Comprehensive Meta-Analysis-Version 3, fixed-effects modeling, random-effects modeling-based analysis, trial sequential analysis software. Of the 316 articles initially identified, only 7 were deemed a complete match for full analysis.¹⁰

The research¹⁰ focus was on comparing Haldol to 5-HT₃ antagonists for early and late PONV results, the need for rescue anti-emetics, and drug effects on QTC prolongation. The results are comparable and yielded no statistically significant variables. The only exception was

found with 5-HT3 drug prices being more expensive by approximately 50% on average. Singh et al¹⁰ conclude that Haldol is not inferior to 5-HT3 medications and it should be used on a regular basis. A summary of the findings is outlined in Table 2, below.

Table 2. Haldol Versus 5-HT3¹¹

Drugs	Vomiting Within 6 Hours	Need for Rescue Anti-emetic Within 24 Hours	QTc Prolongation	Price (\$)
Haldol	7.65%	70 out of 342 patients	18.82%	4.50
5-HT3	5.56%	75 out of 343 patients	15.82%	10

Discussion

Summary of the Evidence

Based on the literature, it has been established that PONV is a significant issue for patients, healthcare workers, and healthcare facilities attempting to reduce readmission rates and increase patient satisfaction scores. According to research, with PONV rates as high as 80%, every viable medication must be considered.^{3,4} The first step to combat PONV is to ensure that a proper systematic PONV risk scoring system is in place.^{5,8,12} The Apfel scoring system is a frequently used tool within the healthcare space and assigns a PONV risk level based on a patient's medical history, gender, and age. Once implemented, adherence to the new scoring system is vital to ensure at-risk patients are identified so that treatment options can be considered.

The next step is to educate healthcare providers on medications based on evidential research that can mitigate PONV. Haldol is a prime example of a medication that should be used more to treat PONV in the clinical setting. While Kamali et al¹¹ concluded that Haldol is not as effective at preventing PONV when compared to other medications for every surgery type, their research recognized that others¹⁵ disagree. Overall, review of the literature^{2,9,10,12-16} determined that Haldol is a highly effective anti-nausea and anti-vomiting medication.

This literature review also uncovered anesthesia provider concern with Haldol's ability to potentially cause QTc prolongation and dystonia or tardive dyskinesia.^{8,10,11} While legitimacy of this viewpoint is not unfounded, it is important to note that these outcomes are either not statistically significant or the patient was not properly dosed. Moreover, QTc prolongation is present at approximately the same rate as 5-HT3 medications such as Zofran.^{8,10} The anesthesia professional's choice to avoid Haldol as a medication to prevent PONV is based on a lack of knowledge. Furthermore, Haldol's affordable price point is more attractive to healthcare organizations, and patients, seeking to be more cost conscious.¹⁰

Conclusion

Postoperative nausea and vomiting (PONV) continues to remain a serious issue that many healthcare institutions need to address. For this reason, ERAS protocols have been created to accomplish this goal, including the use of Apfel scores which can reveal a patient's PONV risk. As demonstrated by the evidence, when dosed at 0.5-2mg, Haldol can effectively help prevent PONV in the clinical setting. Its usage can generate faster discharge times, reduce healthcare costs, lower opioid use, and increase patient safety and satisfaction. Greater awareness and education of ERAS protocols, specifically the benefits of Haldol to prevent PONV, are necessary for greater adoption amongst anesthesia providers.

PICO Question

The purpose of this quality improvement project is to increase awareness of the benefits of Haldol in reducing PONV. In translating evidence from the literature into a clinical problem, the PICO formula has been used to guide this research. As such, the PICO clinical question for this project is:

- For anesthesia providers working in an acute care facility (**P**), does the use of an educational model regarding the use of Haldol for patients over the age of 18 undergoing general anesthesia (**I**), when compared to current treatments (**C**), increase anesthesia provider Haldol usage as an ERAS option (**O**).

When breaking down this question into its respective P, I, C, O elements, the following can be noted:

- P: Anesthesia providers working in an acute care facility.
- I: Education regarding the use of Haldol for patients undergoing general anesthesia.
- C: Care as usual.
- O: Increased anesthesia provider adoption of Haldol as an ERAS option.

Goals and Outcomes

To help guide the project to its outcomes, specific, measurable, achievable, relevant, and time-bound (SMART) goals were used.¹⁷

Specific

Anesthesia providers will have ERAS protocols in place for treating PONV, which will include anesthesia provider education on the use of Haldol for adults undergoing general anesthesia.

Measurable

Pre and post-test assessments will be conducted among anesthesia providers to determine if ERAS protocols were followed, assess anesthesia provider Haldol knowledge, and if Haldol was used for patients at risk for PONV. The data will be collected, analyzed, and synthesized.

Achievable

Inter-professional collaboration between stakeholders is paramount for the success of this project. Project champions or leaders will be assigned to help ensure the project's roll-out is successful. These individuals will act as knowledge guides should questions arise and they will help remind stakeholders of the project's objectives.

Realistic

Anesthesia professionals will be educated on the project's goals and introductions to the project leaders will be made prior to implementation. The pre and post-test will be collected and uploaded into a software system. If electronic charting is used, partnering with nursing informatics may be necessary to help create system reminders to follow ERAS protocols and recommend Haldol to treat PONV if a patient meets the project's criteria.

Timely

Stakeholders will be educated on the project for 2 weeks prior to implementation. Data will be collected over the course of 6 months from anesthesia professionals. Goal outcomes will be assessed every 2 weeks to determine if adjustments are required.

Definition of Terms

- Anesthesia Provider/Anesthesia Professional: Any licensed healthcare personnel who are able to provide anesthesia medication to patients, such as anesthesiologist, certified registered nurse anesthetist, physician's assistant, PACU nurser, or pre-operative nurse.

- Postoperative Nausea and Vomiting (PONV): PONV is an undesirable outcome of general anesthesia that can occur soon after surgery or as late as 24 hours after surgery.¹
- Enhance Recovery After Surgery (ERAS): Protocols put in place by a healthcare facility to enhance surgical outcomes, promote patient well-being, and reduce costs.¹⁶
- Haldol: A medication classified as a butyrophenone that antagonizes the dopamine 2 receptor. It is used as a treatment for psychotic conditions and it can be used to treat PONV.¹²

Theoretical Framework Overview

The Theory of Unpleasant Symptoms (TOUS) is a middle range theory that was first presented in 1995.¹⁸ It focuses on 1 or more symptoms occurring together whereby, treating 1 symptom will lead to downstream modifications and possible prevention of other symptoms. Symptoms have measurable concepts such as severity timing, distress, and quality. The TOUS recognizes antecedent factors affecting a patient that an anesthesia provider must consider: physiological, psychological, situational, and performance factors.¹⁸ The anesthesia professional attempts to discover the cause, treatment methods tried, emotional state, the patient's life circumstances, other symptoms present, medical history, and antecedents. Physiologically, inquiries about past procedures or medications being used could be contributing to unpleasant symptoms. Psychological exploration could uncover a patient's history of anxiety that may be causing unwanted symptoms.¹⁸ A complete assessment should yield a holistic picture of the patient's situation so that, based on findings, a treatment plan is created.

Theory/Clinical Fit

The TOUS requires an anesthesia provider to evaluate the patient's background on a deeper level. If nausea and vomiting are related to recent opioid use for pain by the patient, the

anesthesia provider should consider the following interventions: advise on non-pharmacological methods, antiemetic medications, and alcohol avoidance. The anesthesia professional would expect the outcome of these interventions to reduce or eliminate PONV symptoms and achieve relief for the patient.

Theory Evaluation

Assessment of symptoms is paramount. Symptoms are subjective; therefore, attention to psychological, physiological, and situational factors offer a more complete health profile of a patient. Each patient is unique, and these influences provide data points that guide anesthesia providers towards a treatment plan. Symptom considerations should be validated in conjunction with physical examination and diagnostic testing in an attempt to determine the true cause of the symptoms. The focus on symptoms, versus them simply being used as an indicator of an underlying cause, is a novel concept within nursing literature.¹⁸ Further, implementing a middle range theory as a blueprint for symptom management is also a nascent approach to patient care. The issue is that not many healthcare institutions utilize TOUS for patient systems evaluation.¹⁸

Theory Operationalization

TOUS can be applied and measured in a variety of different ways. A single symptom or a multitude of symptoms can be addressed. Additionally, the evaluation of symptoms can be solely physically centered, or it can be physically and emotionally based. The Fatigue Symptom Inventory accounts for symptom severity and how much it impedes performance of daily living.¹⁸ If the healthcare provider is interested in measuring performance, observation of activities is used. The visual analog scale and numeric rating scale are additional tools used to measure symptom intensity. The Memorial Symptom Assessment Scale accounts for physical

and psychological symptoms.¹⁸ These are some of the many tools available to healthcare providers when employing the TOUS.

Theory Application

The TOUS was originally used to address childbearing fatigue.¹⁸ Since then it has evolved and is now applied to managing patients with chronic illnesses, cancer, breast-feeding promotion for inner city mothers, chronic obstructive pulmonary disease, heart failure, gastric and transplant surgery, multiple sclerosis, Parkinson's disease, and supporting patients to manage their symptoms on their own.¹⁸ The TOUS has many application usages that can benefit the healthcare provider and patient.

Theory Performance

Practical use of the TOUS has been successful. Research¹⁸ examining fatigue in patients with stable coronary heart disease using the TOUS discovered that a depressive mood was a strong determinant of fatigue intensity and hindrance on quality of life. Another application of the TOUS in a clinical setting involved exploring relaxation training and sleep hygiene education to treat insomnia in depressed patients. The conclusion supported these techniques as a compliment or alternative to pharmacological treatments.¹⁸

Theory Relationship

The TOUS has a direct relationship with this project's goal. Patients who experience PONV, which are unpleasant symptoms, can benefit from this theory's holistic approach to performing a comprehensive pre-screen and pre-treat patients who are at risk based on findings. For example, anesthesia providers should inquire if a patient has a history of PONV and attempt to uncover what precipitated the episode. Factors such as emotional or surgical stress, anesthesia side effects, and surgery type, are just a few contributing elements that can lead to PONV.¹⁸

Anesthesia providers can mitigate PONV by using risk assessment tools, such as the Apfel scoring system, and treat patients with the appropriate types of pharmacological agents.

Additionally, anesthesia professionals should inquire about what tactics historically worked for the patient when they experienced PONV.

Methodology

Setting and Participants

This study will take place within the Broward Health system in Florida and will include educating anesthesia providers of patients 18 years and older who are undergoing surgery with general anesthesia. A wide variety of surgeries are performed at this facility including cardiac, thoracic, gastrointestinal, genitourinary, and others. The American Society of Anesthesiologists (ASA) created a risk classification system based on a patient's comorbidities. Patient ASA classification of I through IV will be included in this study. Patient exclusion criteria are those experiencing nausea and vomiting symptoms 24 hours prior to surgery, antiemetic use 24 hours before surgery, chemotherapy patients, and palliative care patients with chronic opioid use.

Description of Approach and Project Procedures

The initial step to this project is to ensure ERAS protocols are in existence at the facility and that healthcare professionals adhere to these recommendations. Once this is confirmed, anesthesia providers will be educated by the author of this paper on the purpose, project design, and implementation phase and invited to participate in the study. Inter-professional collaboration between stakeholders is paramount for the success of this project. Project champions or leaders will be assigned to help ensure the project's roll-out is successful. These individuals will act as knowledge guides should questions arise and they will help remind stakeholders of the project's objectives. Further, pre and post-test assessments will be conducted among anesthesia providers

to determine if ERAS protocols were followed, their experience with the use of Haldol, and if Haldol was used for patients at risk for PONV. The end result should be an increase in provider knowledge in the use of Haldol as a treatment for PONV.

Protection of Human Subjects

To ensure the protection of human subjects, approval from the Institutional Review Board (IRB) is necessary prior to project commencement. Anesthesia providers will be informed of the project's details. Patient qualifications will be confirmed by the anesthesia provider based on the project's criteria via the education provided prior to project commencement. No patient identifiers will be used for Health Insurance Portability and Accountability (HIPPA) purposes.

Data Collection

For the pre and post-test, a paper form will be created and disseminated to anesthesia providers to track each patient case. The intent of the form is to streamline data collection in a uniform manner. It will require the anesthesia provider to complete information about their understanding of ERAS protocols, education of Haldol to treat PONV, and Haldol's usage in practice.

Data Management and Analysis Plan

The paper forms will be collected and reviewed before and after the project. The primary investigator, clinical mentor, and assignment project faculty member will have access to the data. Based on the data, it can be determined if there was an increase in provider knowledge of Haldol as a means to treat PONV and its adoption rate.

Discussion of the Results

Short Message Service (SMS) will be used to stay in touch with anesthesia providers and address questions as they arise. Barriers to the use of Haldol for PONV prevention will be

discussed and addressed throughout the project's implementation phase. Upon project completion, the final results will be made available to participating anesthesia providers in a follow up meeting. The participants will have an opportunity to discuss the results and ask follow-up questions. Project feedback will be encouraged to determine what improvements could be made for future implementations.

Implications to Advanced Nursing Practice

Evidence-based practices (EBPs) are a systematic method to ensure optimal healthcare outcomes. It is a sophisticated analytical process that relies on evidence garnered from research conducted in, or extrapolated from, a clinical setting.¹⁹ Further, the Institute of Medicine (IOM) recognized the importance of EBP within healthcare and instituted that by 2020, 90% of clinical decisions are to be based on EBP.²⁰ Similarly, the American Association of Colleges of Nursing (AACN) identified EBP as one of its 9 essential elements.²¹

ERAS are EBPs that can enhance patient outcomes and reduce healthcare costs for organizations and patients. Educating anesthesia providers on the use of Haldol meets each of the aforementioned components. The opportunity to bring attention to a PONV remedy, such as Haldol as this project has outlined, helps solve a major industry issue.

Advance nursing practitioners play a vital role in improving clinical outcomes and are expected to be change agents within the healthcare industry. EBP projects such as this align well with the expected standards of practice for an advanced practicing nurse. Awareness creation via anesthesia provider education, is the first step to practice transformation.

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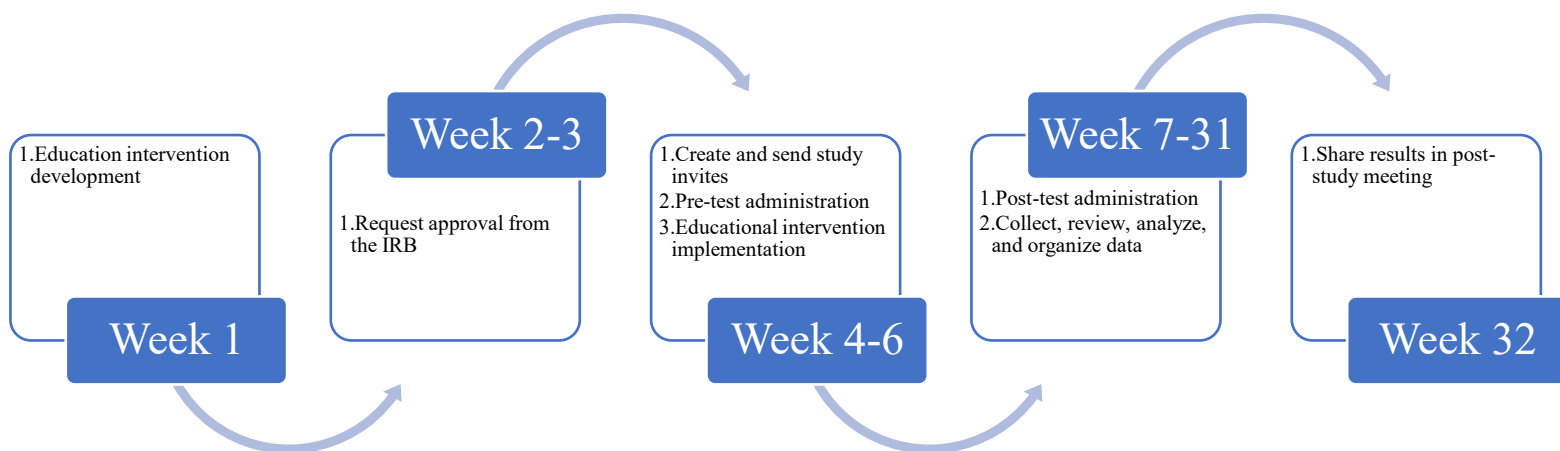
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Appendix 1: Timeline

Project Tasks

1. Education intervention development
2. Request approval from the IRB
3. Create and send study invites to anesthesia providers
4. Pre-test administration
5. Educational intervention implementation
6. Post-test administration
7. Collect, review, analyze, and organize data
8. Share results in post-study meeting

Diagram 1. Project Timeline



**Appendix 2:
Literature
Matrix**

Author(s)	Purpose	Methodology/ Research Design	Intervention(s)/ Measures	Sampling/Setting	Primary Results	Relevant Conclusions
Bellizzi et al, 2020	Analyze PONV protocols within a specific hospital system and summarize the associated impacts	Retrospective study Level III	<p>The authors examined which patients experienced PONV during their time in the post-anesthesia care unit (PACU) and who had an unplanned admission after that due to PONV.</p> <p>Contact was made 72 hours after surgery to follow up to determine PONV symptoms as well.</p> <p>The data was collected and analyzed using various software such as Microsoft Excel and IBM SPSS.</p> <p>PONV protocols were not in place in 2012.</p>	Data collection occurred in 2012 and again in 2017 as a follow-up. Patient eligibility reached 195 participants in 2012 and 173 in 2017.	Administration of antiemetics in 2012 was only 27% compared to 62% in 2017 after the Apfel scoring system was implemented.	<p>The importance of identifying at risk PONV patients and creating greater prevention awareness was stressed.</p> <p>Creating automated PONV prophylaxis computer reminders, especially for high-risk surgical procedures, was suggested.</p>

			In 2017 the Apfel scoring system was introduced and implemented.			
Stephenson et al, 2021	Importance of implementing a PONV risk tool and standardization of treatment protocols	Prospective cohort study Level IV	<p>Apfel scoring system was used to gauge patient PONV risk.</p> <p>Patients monitored every 30 minutes in PACU.</p> <p>Number of PONV episodes and time were recorded.</p> <p>Severity of PONV was recorded via the Numerical Rating Scale at least one minute apart.</p> <p>Rescue anti-emetics use, dose, and time were recorded.</p> <p>PACU duration was noted</p> <p>Data collection occurred using a primary investigator and co-investigators.</p>	<p>Study spanned 12 months.</p> <p>Analyzed PONV data from 500 same-day surgical patients receiving general anesthesia from a tertiary care teaching institute.</p> <p>Patient follow-up did not occur post-discharge from the PACU, so the patient population affected by PONV may be more extensive.</p>	<p>In general, PONV occurred in up to 80% of patients deemed “high risk”.</p> <p>In this study, PONV was 2.05%- 2.45%.</p>	<p>PONV is significantly reduced when a risk stratification system, like Apfel, is used and the correct administration of antiemetic prophylaxis is administered based on these systems approaches.</p>

			Data was analyzed using Epidata (Version 2.0.7.53) and Stata (Version 13.1).			
Jin et al, 2021	To educate on PONV prevention which, encompasses risk factor assessment, intervention, prophylaxis, and rescue treatment.	Systematic literature review Level I	The study does not include research methods or search criteria; however, there are references to various clinical research articles throughout the paper	Recommendations outlined for reducing PONV were based on various research methods that include clinical trials, Cochrane reviews, and meta-analyses.	Recommendations outlined for reducing PONV: Total intravenous anesthesia (TIVA) approach with propofol, use of Sugammadex versus neostigmine for neuromuscular blockade reversal, administering 10–30 mL/kg IV crystalloids intraoperatively, use of Dexmedetomidine bolus or infusion, and chemoprophylaxis drugs such as, Aprepitant.	Combining medications to combat PONV is recommended. Lack of consensus on the degree of benefit for each added antiemetic.
Brettner et al, 2016	Low-dose Haldol and its effects on PONV	Register-based cohort study Level IV	STROBE guidelines for reporting observational studies were used. Interestingly, the Ethics Committee agreed that informed consent was unnecessary from the participants.	2,617 surgical procedures at an university hospital. Patient information was collected from January 7 th , 2008 through June 19 th 2012,	Female patients 3x risk versus males for PONV. 12.9% of patients experienced PACU PONV. Average PACU stay= 150±83 minutes No PONV significant difference between Haldol: non-Haldol groups (12.6%:13.2%)	0.5mg of Haldol outcomes were affected by gender. Males were more prone to benefit from Haldol and avoid PONV, while females did not see any appreciable benefit. Many other studies did not determine any

			Study participants were split into 2 groups, those who received 0.5mg Haldol after induction and those who did not receive any antiemetic for PONV		PONV female: male= 18.5%:7.9%	gender difference outcomes and that Haldol was just as effective in females as males.
Kamali et al, 2018	Evaluate the effectiveness of ondansetron, Haldol, and dexmedetomidine on PONV post laparoscopic cholecystectomy.	Randomized clinical trials Level II	<p>Patients were split into 3 groups, with each section receiving either ondansetron 4mg IV, Haldol 2mg IV, or dexmedetomidine 1 µg/kg IV.</p> <p>It was not disclosed to the patients which antiemetic they were receiving.</p>	<p>Taleghani hospital in Arak.</p> <p>114 patients undergoing an abdominal hysterectomy.</p>	<p>PONV frequency: Ondansetron= 10% Haldol= 40% Dexmedetomidine= 48%</p>	<p>Patients did not experience PONV post hour 12 for any section.</p> <p>Significant reduction in PONV before hour 12 for the ondansetron group. The authors recognize that their study disagrees with other research studying the same topic.</p> <p>For gynecological laparoscopic surgery, all 3 medications are equally effective.</p>
Dağ et al, 2019	Conclude the most effective does for Haldol to prevent PONV	Randomized clinical trials Level II	Study participants were split into 5 groups: placebo, haloperidol 2 mg, haloperidol 1 mg, haloperidol 0.5 mg, and haloperidol 0.25 mg.	250 female patients ages 19-70 years, who were receiving laparoscopic abdominal hysterectomy.	<p>Post-operatively (first 2 hours): 26% of patients in Group I, 4% of patients in Group II, 14% of patients in Group III, 14% of patients in Group IV, and 28% of</p>	0.5-2 mg could be used safely for the prevention of PONV and that Haldol doses of 1-2mg led to higher patient satisfaction scores. Furthermore, Haldol is a cost-

					<p>patients in Group V experienced PONV.</p> <p>2-24 hours: 18% of patients in Group I, 4% of patients in Group II, 2% of patients in Group III, 6% of patients in Group IV, and 28% patients in Group V experienced PONV.</p>	<p>effective antiemetic, and patients did not experience extrapyramidal side effects regardless of the dosage of Haldol administered.</p> <p>Haldol is non-inferior to ondansetron.</p>
Sunil et al, 2016	To assess the difference between Haloperidol and Granisetron as a prophylactic PONV treatment in patient undergoing laparoscopic surgery	Randomized clinical trials Level II	PONV post-operatively through 24 hours, recovery time, sedation level, pain scores, nausea scores, episodes of vomiting, drug side effects, need for rescue antiemetic, and ECG monitoring at 10 minute intervals once drug was administered.	Single site facility, adults ages 18-65 years, ASA classification I-II, and patients who were undergoing laparoscopic surgery under general anesthesia.	Recovery time and pain score not statistically significant. Gender, weight, and age shown to not be statistically significant factors.	No statistically significant difference between 2mg IV Haldol and 1mg IV Granisetron post-operatively through 24 hours. Both were effective treatments for PONV however, Granisetron did produce headaches in 20% of the patients, a statistically significant finding.
Singh et al, 2018	To evaluate Haldol versus 5-HT3 antagonists for PONV and QTc prolongation	Noninferiority Meta-Analysis and Trial Sequential Analysis Level I	Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines used.	Title search words used encompassed, haloperidol postoperative nausea vomiting, PONV efficacy haloperidol, 5-HT3	<p>Vomiting within first 6 hours: Haldol group= 7.65% 5-HT3 group= 5.56%</p> <p>Need for rescue anti-emetic within 24 hours:</p>	<p>Haldol is not inferior to 5-HT3 medications and it should be used on a regular basis.</p> <p>Haldol is more cost effective on average</p>

			<p>PICO question format followed</p> <p>Two independent reviewers analyzed the research.</p> <p>Comparing Haldol to 5-HT3 antagonists for early and late PONV results, the need for rescue anti-emetics, and drug effects on QTC prolongation.</p>	<p>receptor antagonists (ondansetron, granisetron, ramosetron, palonosetron) vs haloperidol, perioperative haloperidol, antiemetic haloperidol QTc.</p> <p>Exclusion terms were also used and only prospective, randomized, and control trials were incorporated.</p> <p>Databases used include Pubmed, Medline, Science Citation Index, Embase, Scopus, Cochrane Central Register of Controlled Trials, clinical trials registry, Google scholar, and meta-register of controlled trials for published articles.</p>	<p>Haldol group= 70 out of 342 patients 5-HT3 group= 75 out of 343 patients</p> <p>QTc prolongation: Haldol group= 18.82% 5-HT3 group= 15.82%</p> <p>Price (USD\$): Haldol group= 4.50 5-HT3 group= 10</p>	<p>compared to 5-HT3 medications.</p>
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				Full text used.		
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