

## Antiemetic drugs used in surgical operations within Misurata Medical Center

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### Abstract

Antiemetic medications used in surgical procedures are drugs that aim to prevent and treat vomiting during and after surgery. **Study objectives:** The purpose of the present study is to: Determining the best antiemetic drugs to be used during surgical procedures. Study the effect of antiemetic drugs on the patient and find the most effective antiemetic drugs in Misurata Medical Centre. Identify the consequences of taking anti-emetic drugs on patients after surgery. **Methodology:** Questionnaires were distributed to anesthesiologists in 2021 and interview with patients' cases at Misurata Medical Center. **Results:** Samples were random; the patients were 80% female, while 20% were male. Most of the patients were between the ages of (31-50), where their percentage was 52%. The results also showed that the antiemetic drugs after surgery inside the Misurata Medical Center were dexamethasone and metoclopramide, but dexamethasone came in by 54%. The study indicated that no combination of anti-emetic drugs is used during surgical operations inside the Misurata Medical Center. In addition, the choice of antiemetic drug is not affected by the duration of anesthesia during the surgical operation, the type of drug used for anesthesia, or the medications that the patient takes before surgery. The most commonly used anesthetics was propofol, followed by ketamine and fentanyl. While the most commonly used analgesics was tramadol by 30%, followed by morphine by 22%. The study also confirmed that the chronic diseases of patients undergoing surgery significantly affect the choice of the type of antiemetic drug. We noticed that patients with diabetes are not given dexamethasone. **Conclusion:** In conclusion, postoperative nausea and vomiting (PONV) is defined as any nausea, retching, or vomiting occurring

during the first 24–48 hour after surgery in inpatients. It is one of the complications after surgery. There are many anti-emetic drugs after surgeries, the most important of which is Zovran, but it is not used inside the Misurata Medical Center due to its high price. And the drugs used as anti-emetic drugs after surgery are dexamethasone and metoclopramide. Dexamethasone is more effective, except in cases of diabetics, because it increases blood sugar levels. It is also better to use two anti-emetic drugs in the same surgery to get better results, and this was confirmed by the previous studies mentioned, but the results showed that this method was not used and the reasons were not mentioned. Gender and age did not show any relationship with postoperative vomiting and nausea. It is worth noting that the most used drug is dexamethasone, due to its availability and cheap price, in addition to its effectiveness and safety compared to other anti-emetic drugs.

**Keywords:** post, operative, nausea, vomiting, Antiemetic drugs, patient, general anesthesia, and side effects.

## دراسة حول الأدوية المضادة للقيء المستخدمة في العمليات الجراحية بمركز مصراتة الطبي

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### الملخص

الأدوية المضادة للقيء هي الأدوية التي تهدف إلى منع وعلاج القيء أثناء وبعد الجراحة. فالقيء هو ردة فعل طبيعية للجسم للتخلص من المواد الغريبة أو الضارة الموجودة في المعدة. ومع ذلك، فإن القيء أثناء الجراحة أو بعدها يمكن أن يكون ضارًا ويزيد من خطر الإصابة أو تأخير الشفاء. أهداف الدراسة: الغرض من الدراسة الحالية هو: تحديد أفضل الأدوية المضادة للقيء لاستخدامها أثناء العمليات الجراحية. دراسة تأثير الأدوية المضادة للقيء على المريض ومعرفة الأدوية المضادة للقيء الأكثر فعالية في مركز مصراتة الطبي. التعرف على الآثار الجانبية للأدوية المضادة للقيء على المرضى بعد الجراحة. المنهجية: تم توزيع الاستبيانات على أطباء التخدير في عام 2021 ومقابلة المرضى المستهدفين في مركز مصراتة الطبي. النتائج: المرضى المستهدفين كانوا 80% إناث، و20% ذكور. وتتراوح أعمار معظم المرضى بين (31-50) سنة حيث بلغت نسبتهم 52%. كما أظهرت النتائج أن مضادات القيء بعد الجراحة داخل مركز مصراتة الطبي هي ديكساميثازونوميتوكلوبراميد، لكن الديكساميثازون جاء بنسبة 54%. وأشارت الدراسة إلى عدم استخدام أي مزيج من الأدوية المضادة للقيء أثناء العمليات الجراحية داخل مركز مصراتة الطبي. كما أن اختيار الدواء المضاد للقيء لا يتأثر بمدة التخدير أثناء العملية الجراحية، أو نوع الدواء المستخدم للتخدير، أو الأدوية التي يتناولها المريض قبل الجراحة. وكانت أدوية التخدير الأكثر استخدامًا هي البروبوفول، يليه الكيتامينوالفنتانيل. بينما كانت المسكنات الأكثر استخدامًا هي الترامادول بنسبة 30%، يليه المورفين بنسبة 22%. كما أكدت الدراسة أن الأمراض المزمنة التي يعاني منها المرضى الذين يخضعون

للجراحة تؤثر بشكل كبير على اختيار نوع الدواء المضاد للقيء . حيث لاحظنا أن مرضى السكر الذين تتراوح نسبتهم بين 28.6% لا يتم اعطائهم عقار ديكساميثازون. **الخلاصة:** في الختام، يتم تعريف الغثيان والقيء بعد العملية الجراحية (PONV) على أنه أي غثيان أو قيء يحدث خلال أول 24-48 ساعة بعد الجراحة في المرضى. وهو أحد المضاعفات بعد الجراحة. وتوجد العديد من الأدوية المضادة للقيء بعد العمليات الجراحية، وأهمها دواء زوفران، لكنه لا يستخدم داخل مركز مصراتة الطبي بسبب ارتفاع سعره. والأدوية المستخدمة كمضادات للقيء بعد الجراحة هي ديكساميثازونونوميثوكلوبراميد. يعتبر الديكساميثازون أكثر فعالية إلا في حالات مرضى السكر لأنه يزيد من مستويات السكر في الدم. ومن الأفضل أيضًا استخدام دواءين مضادين للقيء في نفس العملية الجراحية للحصول على نتائج أفضل، وهذا ما أكدته الدراسات السابقة المذكورة، لكن النتائج أظهرت عدم استخدام هذه الطريقة ولم تذكر الأسباب. كما أنه لم تظهر علاقة بين الجنس والعمر بالقيء والغثيان بعد العملية الجراحية. ومن الجدير بالذكر أن الدواء الأكثر استخداماً هو ديكساميثازون، وذلك لتوفره ورخص ثمنه، بالإضافة إلى فعاليته وأمانه مقارنة بأدوية القيء الأخرى.

**الكلمات المفتاحية:** الغثيان، القيء، بعد، العملية الجراحية، الأدوية المضادة للقيء، المريض، التخدير العام، والآثار الجانبية.

## Introduction

Antiemetic drugs that aim to prevent and treat vomiting during, and after surgery. Vomiting is a natural response of the body to get rid of foreign or harmful substances in the stomach. However, vomiting during or after surgery can be harmful and increase the risk of injury or delay in recovery (Pierre S *et al.*, 2004). These drugs are used in surgical procedures for several reasons, including:

- Preventing vomiting before surgery: These medications are given before surgery to reduce the likelihood of vomiting during the procedure. Vomiting during surgery can lead to respiratory problems, increased blood pressure, and the spread of infection.

-Treating anesthesia-induced vomiting: Anesthesia can cause vomiting after surgery. Antiemetic medications are used to control this vomiting and alleviate stress on the patient.

- Facilitating recovery: Vomiting after surgery can lead to delayed recovery and increased potential complications. The use of antiemetic medications can help avoid these problems and facilitate postoperative recovery (Pierre S *et al.*, 2004).

Examples of antiemetic medications used in surgical procedures include:

- Corticosteroids: such as dexamethasone and methylprednisolone. These drugs work by preventing vomiting through inhibiting the body's response to signals that cause vomiting.

- Antihistamines: such as dimenhydrinate and promethazine. These drugs work by alleviating irritation in the stomach and intestines, thereby reducing the likelihood of vomiting.

- Serotonin receptor antagonists: such as ondansetron and granisetron. These drugs work by preventing the body's response to serotonin, a chemical compound that causes vomiting.

- Anticholinergics: such as scopolamine. These drugs work by alleviating spasms in the stomach and intestines, thereby reducing the likelihood of vomiting. The aim of antiemetic medications in surgical procedures is to improve patients' experience and reduce potential complications. It is important to consult the treating physician to determine the appropriate medications and dosages for each case (Chin M *et al.*, 2011).

**Risk Factors:** There are several risk factors that can increase the likelihood of postoperative nausea and vomiting (PONV). These include:

- Female gender: Women have a higher risk of experiencing PONV compared to men.

- History of PONV or motion sickness: Individuals who have previously experienced PONV or have a history of motion sickness are more likely to develop PONV after surgery.

- Non-smoking status: Non-smokers are at a higher risk of PONV compared to smokers.

- Use of opioids for pain management: Opioids, commonly used for pain management after surgery, can increase the risk of PONV.
- Duration of surgery: Longer surgical procedures are associated with a higher risk of PONV.
- Type of surgery: Certain types of surgeries, such as abdominal or gynecological procedures, are associated with a higher risk of PONV.
- Age: Younger and older individuals are at a higher risk of developing PONV compared to middle-aged adults.
- Poor general health: Individuals with poor general health or underlying medical conditions may have an increased risk of PONV.
- Use of volatile anesthetics: Certain anesthetic agents, such as volatile anesthetics, can increase the risk of PONV.
- Postoperative pain: Severe postoperative pain can contribute to the development of PONV. It is important for healthcare providers to assess these risk factors and take appropriate measures to prevent and manage PONV in surgical patients. This may include the use of antiemetic medications, as well as other interventions such as regional anesthesia techniques or non-pharmacological approaches (Sébastien P and Rachel W, 2013).

### **Definition of terms**

The following terms are defined to provide the reader the correct understanding of the terms used in the study:

**PONV:** Postoperative nausea and vomiting (PONV) refers to the occurrence of nausea and vomiting after a surgical procedure. It is a common complication that can occur within the first 24-48 hours following surgery. PONV can be distressing for patients and can lead to complications such as dehydration, wound dehiscence, and delayed recovery. (Andreas H *et al.*, 2019).

**Drug:** A drug is a substance that is used to treat, cure, or prevent a disease or medical condition. It is typically administered orally, intravenously, or topically and works by interacting with specific receptors or enzymes in the body to produce a desired therapeutic effect. (Bertram G. *et al.*, 2008).

**Antiemetic drugs:** Antiemetic drugs are medications used to treat and prevent vomiting. These drugs work by calming the vomiting center in the brain or reducing the effects of chemicals that stimulate vomiting in the body. (Hain, T, 2020).

**Intravenous general anesthesia:** it refers to the administration of anesthetic drugs through a vein to induce a state of unconsciousness and prevent pain during surgical procedures. Intravenous general anesthesia is typically administered by an anesthesiologist. (Gan, T.J 2006).

**Patient:** A patient is an individual who seeks medical care or treatment from a healthcare professional or facility. They may be experiencing symptoms, seeking preventative care, or undergoing a surgical procedure. (Mrayyan, M, 2006).

**Side effects:** They are unintended and often undesirable reactions or consequences that occur as a result of taking a medication or undergoing a medical treatment. These effects may occur in addition to the desired therapeutic effects of the treatment. (David.F, 2000).

#### **Objectives of the study:**

The purpose of the present study is to:

- Finding the most commonly used antiemetic drugs in surgical operations.
- Choosing an antiemetic drug based on the length of the surgical procedure.
- To know the most common types of analgesics used in surgical operations.
- Knowing and determining the effect of anti-emetic drugs on patients with chronic diseases.

#### **Research Methodology**

This study utilized the descriptive research design to describe and analyze the characteristics, behaviors, or phenomena of a particular population or group. Descriptive research often involves collecting data through surveys, observations, or existing records, and then summarizing and interpreting the findings using statistical analysis or qualitative methods. According to Polit and Hungler(2004), qualitative description includes the prevalence, incidence, size and

measurable attributes of a phenomenon. Descriptive studies assist the researcher to discover new meaning describing what exists, determining the frequency with which something occurs and categorizing information (Burns and Grove, 1999).

### **Data gathering procedure**

The researchers secured all necessary permission from concerned authorities in the conduct of the study. The data for this research were collected by fill out a patient questionnaire by the doctor in Misurata Medical Center.

### **Data analysis**

It involves applying statistical measures, such as averages, percentages, correlations, or regression analysis, to the data in order to draw meaningful conclusions and make inferences about the patients being studied. Statistical treatment helps us identify patterns, relationships, and trends in the data. It is used to find out the incidence of most common used antiemetic drugs in surgical operation in Misurata Medical Center. Tables and charts were also used to describe the information gathered from the research study.

### **Search criteria**

The respondent should be the anesthesiologist and the patients who were given antiemetic drugs in the surgery, the respondent within the Misurata Medical Center, and the patient should be undergo surgery.

**Search location:** Misurata Medical Center.

### **Results**

This part deals with the presentation of the data gathered from the respondents through the study on the use of antiemetic drugs in surgical operations in Misurata Medical Center. The information gathered from the participants is presented in the form of tables and charts. The questionnaire contains several questions about the patient, such as age, gender, is he a smoker, as well as if the patient has chronic diseases and the medications he takes. The questionnaire also contains questions about the type of drug used, the dosage, and the time of administration of the drug and the reason for choosing the drug.



## Profile of the respondents:

### Gender of patient:

**Table (1) frequency and percentage of distribution of respondents according to gender:**

Gender	The number	Percentage
Male	10	20%
Female	40	80%
Total	50	100%

It is clear from the table (1) we note from the results that most of the targets were females, where the percentage reaches 80 percent, while the percentage of males is about 20 percent.

### Age of patient:

**Table (2) frequency and percentage of distribution of respondents according to age:**

The age	The number	Percentage
(13-1 )	0	0%
( 14- 30)	7	14%
( 31- 50)	26	52%
More than 50	17	34%
Total	50	100%

It is clear from the table (2) related to the distribution of the study sample according to age that the percentage of people aged between (14-30) reached (14%), which is the lowest percentage, while the percentage of people whose ages range between (31-50) is the largest, reaching (52) %, and the percentage of people over the age of 50 was about (34%).

### Antiemetic drugs which is used in surgical operation:

**Table (3): frequency and percentage of antiemetic drugs which is used in surgical operations:**

Antiemetic drug	The number	Percentage
Dexamethasone	27	54%

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<b>Metoclopramide</b>	23	46%
<b>Combination</b>	0	0%
<b>Total</b>	50	100%

Looking at Table(3), we note that the antiemetic drugs used in surgical operations are dexamethasone and Metoclopramide, and the use of dexamethasone was more than Metoclopramide, where dexamethasone was used by (54%), while the use of Metoclopramide came by (46%). Relative to these results, we note that the most common antiemetic-drug used in surgical operations is dexamethasone, followed by Metoclopramide. However, these results reveal that not all anesthesiologists in this study use combination of antiemetic drugs in same surgery. All anesthesiologists use one drug.

#### The duration of anesthesia and antiemetic drugs:

**Table (4): frequency and percentage of the duration of anesthesia**

duration	dexamethasone	percentage	metoclopramide	Percentage
(1-2 hours)	4	14.8%	2	8.7%
(2-4 hours)	10	37%	8	34.8%
(4-6 hours)	7	26%	8	34.8%
(>6 hours)	6	22.2%	5	21.7%
<b>Total</b>	27	100%	23	100%

We note from the table that dexamethasone and metoclopramide are used in surgical operations, regardless of the length of the operation. That is, the length of the surgical procedure does not affect the choice of antiemetic medication. Also, the percentage of variation in choosing the drug is very small.

#### Knowledge of anesthesia drugs used in surgical operations:

**Table (5) anesthesia drugs used in surgical operations:**

Anesthesia drug	Frequency	Percent
Propofol, Fentanyl, Etomidate	39	78%
Propofol	5	10%
Propofol, Fentanyl, dormicum (midazolam)	2	4%
Ketamine	2	4%

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Propofol, ketamine	1	2%
Ketamine,propofol, Fentanil,Etomidate	1	2%
Total	50	% 100

It is clear from Table (5) the most common anesthesia drugs used in surgical operation. That the percentage of propofol, fentanil, etomidate reached (78%), which is the highest percentage, while it reached (10 %) for propofol, followed by the percentage of propofol, Fentanil, dormicum(4%), and it is equal to ketamine. (Ketamine, propofol, fentanil, etomidate)and (propofol, ketamine ) reached (2 % ) which is the lowest percentage. Also, all surgeries for which data were collected in this study were under general anesthesia (100%).

### Identify the most common types of analgesics used in surgical operations:

**Table (6) most common types of analgesics used in surgical operations.**

Types of analgesics	Frequency	Percent
Morphine 5mg s.c,	11	% 22
Tramadol 50mg iv, Voltaren injection im	3	% 6
Voltaren injection im, mog10 s/c	2	% 4
Morphine 5mg s.c, Tramadol 50 iv, Voltaremim	6	% 12
Tramadol 100mg iv	15	% 30
NSAID	5	% 10
Paracetamol 500mg iv	3	% 6
Morphine, Paracetamol 500 mg iv	1	% 2
Morphine	1	% 2
Paracetamol 500mg iv , Voltaren injection im	1	% 2
Tramadol 100mg iv , NSAID	1	% 2
Tramadol	1	% 2
Total	50	100

It is clear from table (6) related to the most common types of analgesics used in surgical operations that the percentage of tramadol 100mg iv reached (30%), which is the highest percentage, while it reached (22%) for morphine 5mg s.c, followed by the percentage of morphine 5mg s.c, tramadol 50 iv, voltaremim (12%), followed by the percentage of NSAID (10%), followed by the ratio of tramadol 50mg iv, voltaren injection im and paracetamol 500mg iv (6%), followed by the ratio of voltaren injection im, mog10 s/c (4%), and both of them are equal to (morphine, paracetamol 500 mg iv, morphine , paracetamol 500mg iv , voltaren injection im , tramadol 100mg iv , NSAID , tramadol ) where the ratio reached (2%).Figure 2 illustrates this.

#### Effect of chronic disease on the choice of antiemetic drug:

Table (7) frequency and percentage of distribution of drugs according to chronic disease:

Disease	Frequency	percentage	Antiemetic drug
(Diabetes mellitus)	8	16%	metoclopramide
HTN (Hypertension)	10	20%	Dexamethasone metoclopramide
Asthma	6	12%	Dexamethasone metoclopramide
Hepatitis	1	2%	Dexamethasone
TR	1	2%	Dexamethasone
Cardiac stent	1	2%	Dexamethasone
urticaria	1	2%	metoclopramide
No chronic disease	22	44%	Dexamethasone metoclopramide
Total	50	100%	

We note from the results that 8 patients with diabetes did not use dexamethasone with them, but metoclopramide was use; because it causes hyperglycemia. While in high blood pressure and asthma, metoclopramide or dexamethasone was used. As for cases of Hepatitis, TR, and Cardiac stent, each disease was only one case for which dexamethasone was used; because they are individual cases, they cannot be compared. While there was only one case of urticaria,

with which metoclopramide was used, it is also considered an individual case.

### Summary of findings:

Most of the patients targeted were 80% female, while 20% were male. Most of the patients were between the ages of (31-50), where their percentage was 52%. The results also showed that the antiemetic drugs after surgery inside the Misurata Medical Center were dexamethasone and metoclopramide, but dexamethasone came in by 54%. The study indicated that no combination of antiemetic drugs is used during surgical operations inside the Misurata Medical Center. The current study also showed that there is no relationship between vomiting and nausea after surgery and smoking, as there is no clear relationship through statistics. Also, the choice of antiemetic drug is not affected by the duration of anesthesia during the surgical operation, the type of drug used for anesthesia, or the medications that the patient takes before surgery. The most commonly used anesthetics were propofol, followed by ketamine and fentanyl. While the most commonly used analgesics was Tramadol by 30%, followed by morphine by 22%. The study also confirmed that the chronic diseases of patients undergoing surgery significantly affect the choice of the type of antiemetic drug. Where we noticed that, patients with diabetes, which ranges from 28.6%, are not given dexamethasone.

### Discussion:

Through our current study, we note that postoperative vomiting is related to smoking, in contrast to previous studies, Where Van T and others (2019) emphasized that smoking is related to postoperative vomiting. The results also showed that the duration of anesthesia does not affect vomiting after surgery and therefore the alternative hypothesis is rejected and the null hypothesis accepted, which states that That “there is no statistically significant relationship the effect of the duration of anesthesia on the doses of antiemetic drugs.” The results also showed that the most used antiemetic drugs in surgical operations are dexamethasone and metoclopramide, and this was shown by previous studies, where Wang and others (2002) indicated

that dexamethasone was one of the most effective drugs. Metoclopramide is also one of the most effective drugs besides dexamethasone; this was confirmed by De Oliveira and others (2012). These two medicines are considered among the available and cheap medicines. And by talking and discussing with anesthesiologists at Misurata Central Hospital, everyone confirmed that ondansetron is one of the most effective and safest drugs, but it is not used inside Misurata Medical Center because of its unavailability due to its very high price. This was confirmed by previous studies, as van T and others (2019) confirmed that ondansetron is the safest and most effective drug. These results reveal that the anesthesiologists in this study did not use a combination of antiemetic drugs. This negates some previous studies that confirm that the combination of two antiemetic drugs is more effective and safer. No antiemetic medication has been shown to be a comprehensive solution to nausea and vomiting after surgery. It is not feasible to give very high doses of such drugs because of saturation effects and safety, so combinations of antiemetic drugs are possibility. By looking at the results, we note that chronic diseases affect the choice of medication, as we note that when patients have diabetes, we exclude the use of dexamethasone because it increases the level of sugar in the blood. This was confirmed by previous studies, where Chin M, and others confirmed 2011. Indicates that dexamethasone is not used in patients with diabetes because it causes hyperglycemia.

### **Conclusion:**

In conclusion, postoperative nausea and vomiting (PONV) is defined as any nausea, retching, or vomiting occurring during the first 24–48 hour after surgery in inpatients. It is one of the complications after surgery. There are many anti-emetic drugs after surgeries, the most important of which is Zovran, but it is not used inside the Misurata Medical Center due to its high price. And the drugs used as anti-emetic drugs after surgery are dexamethasone and metoclopramide. Dexamethasone is more effective, except in cases of diabetics, because it increases blood sugar levels. It is also better to use two anti-emetic drugs in the same surgery to get better results,

and this was confirmed by the previous studies mentioned, but the results showed that this method was not used and the reasons were not mentioned. Smoking, gender, or age did not show any relationship with postoperative vomiting and nausea. It is worth noting that the most used drug is dexamethasone, due to its availability and cheap price, in addition to its effectiveness and safety compared to other anti-emetic drugs.

## References

- Andreas H. Taenzer, Jeana E. Havidich, 2019. The Postanesthesia Care Unit and Beyond. A Practice of Anesthesia for Infants and Children. 6<sup>ed</sup>. 1095-1108.
- Bertram G., Susan B., and Anthony J., 2008: Pharmacology examination and board review, 8th. University of California, San Francisco: McGraw...
- Burns, N. and Grove, S (1999). Understanding Nursing Research. 2nd edition. United states of America: W.B. Saunders Company.
- Chin Mingo, HsinLun, Shung Tai, JhiJoung, 2011. Dexamethasone prevents postoperative nausea and vomiting: benefit versus risk. Acta Anaesthesiologica Taiwanica. 49(2011) 100-104.
- David, F (2000). Adverse drug reactions: definitions, diagnosis, and management. The Lancet, Volume 356, Issue 9237, 7 October 2000, Pages 1212.
- De Oliveira, S. Castro-Alves, L. Chang, E. Yaghmour, and McCarthy.R (2012). Systemic metoclopramide to prevent postoperative nausea and vomiting: a meta-analysis without Fujii's studies. BJA: British Journal of Anaesthesia, Volume 109, Issue 5, November 2012, Pages 688–697, <https://doi.org/10.1093/bja/aes325>.
- Gan, T.J (2006). Risk factors for postoperative nausea and vomiting. Anesthesia Analgesia. 102(6):1884-98.
- Hain, T. C. (2020). Drug Treatment of Vertigo. In Dizziness-and-balance.com. Retrieved October 15, 2020, from <https://www.dizziness-and-balance.com/treatment/drug/drugrx.html>

- Mrayyan, M (2006). Jordanian nurse's job satisfaction, patient's satisfaction and quality nursing care. *International Nursing Review*, 53,224-230.
- Pierre S, Corno G, Benais H, Apfel CC. A risk score-dependent antiemetic approach effectively reduces postoperative nausea and vomiting-a continuous quality improvement initiative, *Can J Anaesth*, 2004, vol. 51 (pg. 320-5).
- Polit, D. and Hungler, B (2004). *Nursing Research Principles and Methods*. 7th edition. Philadelphia: Lippincott William and Wilkins.
- Sébastien Pierre and Rachel Whelan, 2013 continuing Education in Anaesthesia Critical Care & Pain, Volume 13, Issue 1, February 2013, Pages 28–32, <https://doi.org/10.1093/bjaceaccp/mks046>.
- Van N Tran, Brennan J Fitzpatrick, Stefanie N Edwards, Emily J Ferraro, Federica Marafioti, Thi Nguyen, Alia Rafhi, On Na Lam and Vincent Chan (2019). Antiemetic prescribing patterns for post-operative surgical patients. *Journal of Surgery and Surgical Research*.ISSN: 2455-2968.
- Wang JJ, Ho ST, Uen YH, Lin MT, Chen KT, Huang JC, 2002. Small-dose dexamethasone reduces nausea and vomiting after laparoscopic cholecystectomy: a comparison of tropisetron with saline. *Anesthesia and analgesia*.2002 Jul;95(1):229-32.