



RESEARCH ARTICLE

Study of Anesthesiologists' Knowledge in relation to Postoperative Nausea and Vomiting. Questionnaire-Based Study.

Haline Lacerda Magalhães, MD ¹ | Luiz Eduardo Imbelloni, MD, PhD ^{2*} | Eduardo Piccinini Viana, MD ³ | Jaime Weslei Sakamoto, MD ⁴ | André Augusto de Araujo, MD ⁵ | Shoit Henry Inoue, MD ⁶ | Geraldo Borges de Moraes Filho, MSc ⁷

¹Anesthesiology Resident Hospital Clínicas Municipal de São Bernardo do Campo, SP - Brazil

²Co-responsible for CET-SBA, Anesthesiologist Hospital Clínicas Municipal de São Bernardo do Campo, SP - Brazil

³Responsible for CET-SBA, Anesthesiologist Hospital Clínicas Municipal de São Bernardo do Campo, SP - Brazil

⁴Anesthesiologist Hospital Clínicas Municipal de São Bernardo do Campo, SP - Brazil

⁵Anesthesiologist Hospital Clínicas Municipal de São Bernardo do Campo, SP - Brazil

⁶Anesthesiologist Hospital Clínicas Municipal de São Bernardo do Campo, SP - Brazil

⁷Master in Labour Economics, UFPB, João Pessoa, PB, Brazil Government employee of the State of Paraíba, PB.

Abstract

BACKGROUND: Postoperative nausea and vomiting are very common complications in anesthetic practice, but they represent a significant challenge in the population of patients who are at high risk for postoperative nausea and vomiting (PONV). Early identification of PONV risk factors to predict which patients are most likely to experience these complications is necessary.

METHODS: This work consisted of a descriptive, prospective study involving the application of questionnaires and the use of scientific articles and books in order to elucidate the degree of knowledge of anesthesiologists at Hospital of Brazilian Health System in the prevention and treatment of nausea and vomiting postoperative.

RESULTS: The study population was 30 anesthesiologists, 83.34% were men and 16.66% were women. The age range was 54 - 28 years. Length of experience in Anesthesiology: 60% work between 0- 5 years; 10% work between 5-10 years; 10% work between 11-15 years and 20% work for more than 15 years. 100% of the participants got the risk factors for postoperative nausea and vomiting right, but only 43.3% got the name of the scale that assesses the chance of PONV in adults.

CONCLUSION: A strategy for handling and preventing PONV is important for anesthesiologists to know, since the prophylactic use of antiemetic therapy in patients at moderate to high risk of PONV provides a better cost-benefit ratio and also avoids the increase in hospital costs and human resources.

Keywords: Nausea, Postoperative Nausea and Vomiting, Antiemetics, Guidelines, Complications.

Copyright : © 2021 The Authors. Published by Publisher. This is an open access article under the CC BY-NC-ND license (<https://creativecommons.org/licenses/by-nc-nd/4.0/>).

1 | INTRODUCTION

Postoperative nausea and vomiting (PONV) are common adverse effects that cause significant discomfort to patients. It is important to distinguish nausea and vomiting, as they are not synonymous. Some drugs are more effective against nausea and others against vomiting (1). Nausea is the unpleasant sensation associated with the need to vomit, while vomiting is the forced expulsion of gastric contents. The act of vomiting is controlled by the center of vomiting, located in the lateral reticular formation in the spinal cord. Receives afferences from the chemoreceptor zone (floor of the 4th ventricle), vestibular apparatus, cerebellum, nucleus of the solitary tract and also from upper cortical centers. The receptors involved in the transmission of impulses to the center of vomiting are acetylcholinic, muscarinic, dopaminergic (D2), histamines (H1), opioids, serotonergic (5-HT3) and neurokininic (NK-1) (2). Other factors also contribute to PONV such as dehydration, certain odors, pain, apprehension and fear (2).

Several factors intervene in the genesis and worsening of PONV, several attempts have been made to obtain predictive factors and to identify patients at high risk for PONV. Several studies have been carried out, but the most used predictive model is that described in 1998, and evaluated in 1137 at random (3). This model presents as risk factors: female gender, history of nausea and vomiting with movement and / or history of PONV, absence of smoking and postoperative use of opioids (4).

The mechanism involved in reducing the risk of PONV in smokers is still unknown. It is not known whether it is directly related to the constituents of cigarette smoke. However, there are some possible mechanisms. Chronic exposure to cigarette smoke would be one of them, resulting in protection against PONV. At the beginning of smoking, individuals often feel nauseous due to the stimulation of acetyl nicotinic from choline receptors, but with chronic cigarette smoking he would develop tolerance against these receptors (5). Smoking patients may still have cross-tolerance to other emetic stimuli, such as anesthesia and surgery. Chronic smoke exposure also produces changes in the microsome of liver enzymes that metabolize nicotine and other

compounds in cigarette smoke. This can affect the metabolism of drugs used in the preoperative period and the ability of these drugs to produce PONV (5).

PONV incidence was 10%, 21%, 61% and 79%, respectively, if 1, 2, 3 or 4 risk factors were present (3). There are risk factors related also to the anesthetic technique and the type of surgery. It cannot be said that the abbreviation for fasting, with the use of solutions enriched with carbohydrates and proteins, can reduce the risk of PONV (4).

The pediatric population is not spared, as children older than three years have an incidence of PONV of about 40% (6). Male gender appears to be a protective factor for PONV, with an incidence of PONV about one third lower than that of women (7), (8). The female gender, as mentioned, was shown to be a specific predictor, especially if she is a non-smoker and with a history of PONV in previous surgeries (9). The use of volatile anesthetic is dose dependent for PONV and significantly prominent in the first four to six hours after surgery, accompanied by the anesthesia time and the postoperative use of opioids and nitrous oxide (9), (10). The intraoperative use of opioids has little influence on the appearance of these adverse effects and there was no difference between their subtypes (11), (12). The type of surgery is still debated, since studies suggest that strabismus correction, ear, nose, and throat (ENT) surgery, gynecological surgery, shoulder surgery and laparoscopic surgery are associated with a higher incidence of PONV (8). The prediction of postoperative and post-discharge nausea and vomiting is particularly important in the population of outpatient surgery, as these symptoms can occur after hospital discharge and continue for up to a week when access to anti emetic therapy is limited (10), (13).

Supplementary information The online version of this article (<https://doi.org/10.15520/arjmcs.v7i06.325>) contains supplementary material, which is available to authorized users.

Corresponding Author: Luiz Eduardo Imbelloni, MD, PhD

Dr. Luiz Eduardo Imbelloni Rua dos Coroados, 162 - Apto 45 - Bloco B Vila Anastácio (Lapa) 05092-020 - São Paulo, SP - Brazil - + 55.11.99429-3637

Factors related to anesthesia influence the incidence of PONV (14). Arterial hypo tension, especially during induction, the use of opioids in the postoperative period and ineffective analgesia contribute to a higher incidence of PONV. The early recognition of high-risk patients and the establishment of preventive and therapeutic measures for these adverse reactions allow for better patient satisfaction, optimizes RPA time and, consequently, hospital stay and reduces the institution's financial costs (15). The ability to accurately predict an effective prophylactic or treatment strategy would result in the prevention of symptoms, faster recovery and increased patient satisfaction, limiting the occurrence of side effects and improving the use of resources (10), (16).

Thus, the assessment of risk factors for postoperative nausea and vomiting should be performed frequently in the preoperative period by these anesthesiologists in order to benefit from prophylactic therapy. The objective of this study was to evaluate the knowledge of Anesthesiologists of Hospital of the Brazilian Health System (SUS) accredited through the application of a questionnaire with eight objective questions about Postoperative Nausea and Vomiting.

2 | METHODS

Descriptive and prospective study involving the application of a questionnaire in order to assess the degree of knowledge of anesthesiologists of a hospital in the Brazilian Health System (SUS) accredited in relation to the prevention and treatment of postoperative nausea and vomiting. The study was carried out with the staff of the Anesthesiology Department of the São Bernardo do Campo Hospital Complex, composed of 60 anesthetists, for two months. Participants were informed that participation was not mandatory and that the collection was carried out after signing the Informed Consent Form. The exclusion criteria were the refusal to participate in the research and who were not residents of Anesthesiology. Project registered on the Brazil platform.

The collection method consisted of eight multiple-choice questions that addressed the risk factors for PONV, surgical time, surgeries in adult and pediatric patients with the greatest chance of developing

PONV (**APPENDIX A**). The questionnaire asked for answers about the knowledge of the receptors involved in the transmission of impulses to the center of vomiting, the Apfel scale, the use of single or combined antiemetic therapy for the prevention and the existence of protocols for PONV in that hospital.

The objective of the study evaluated the knowledge of Anesthesiologists of the CET Complexo Hospitalar de São Bernardo do Campo through the application of a questionnaire with eight objective questions about Post-Operative Nausea and Vomiting, including which patients are at high risk for PONV, establish which factors reduce this risk, determine the best prophylaxis and therapy (monotherapy or combination therapy), and whether there is a protocol at that hospital.

Because the Hospital belongs to SUS, the value in reais (Brazilian currency) of each drug was realized with direct action in the prevention and treatment of PONV. The values in reais obtained were calculated the values of the different treatment possibilities, using one drug or several drugs. These substances were not asked to participants according to Appendix A. The Fourth Consensus Guidelines for the Management of Postoperative Nausea and Vomiting published in 2020 (17). Was also used to assess the degree of evidence for each substance.

The Brasindice system was used to check the prices of products to be used in the Brazilian Health System (SUS).

2.1 | Statistical Analysis

The analyzed data are summarized through descriptive statistics graphs and tables. Charts are used to represent a range of phenomena, and their large-scale use in social, technical and scientific media is due both to their ability to reflect general and particular patterns of the data set under observation, and to the ease of interpretation and the efficiency with which it summarizes information from them. A graphical representation highlights the trends, the occasional occurrences, the minimum and maximum values and also the orders of magnitudes of the phenomena being observed. To perform the statistical analysis we used Microsoft Excel and the R Commander plugin for the R software.

STUDY OF ANESTHESIOLOGISTS' KNOWLEDGE IN RELATION TO POSTOPERATIVE NAUSEA AND VOMITING. QUESTIONNAIRE-BASED STUDY.

3 | RESULTS

Thirty staves answered the questionnaire, making up 50% of the Anesthesiology Department, 25 men and 5 women. The professionals' age ranged from 28 to 57 years, with an average of 38.6 ± 7.55 years (Figure 1). The length of experience in the specialty showed that 18 (60%) anesthesiologists work between 1 and 5 years, 9 (30%) anesthesiologists work between 6 and 20 years, and only 3 (10%) of anesthesiologists have worked for more than 20 years in the profession (Figure 1).

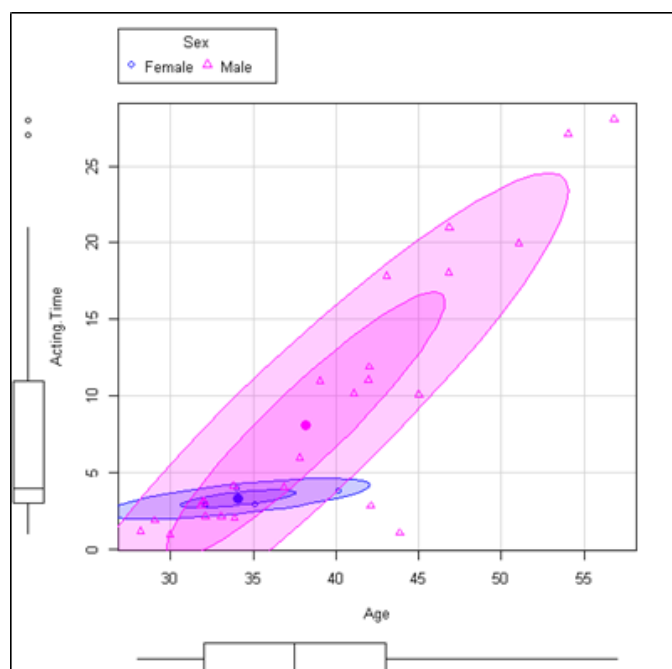


FIGURE 1: Age, Sex and Actingtime

The values of the standardized substances in the study hospital are in reais (Brazilian currency) and this way the values can be easily calculated when using one, two, three or more substances (Table I).

* Ref (20)

Regarding the factors that contribute to PONV, all answered the previous story with a predominant factor with 100% correctness. In question 2, when a patient is at high risk for PONV 25 (83.3%) they correctly treat the patient using two antiemetics associated with the multimodal approach (Figure 2).

In Figure 3, it is shown that gynecological surgery is important in increasing the incidence of PONV in adult patients. And in Figure 4, it shows the incidence

TABLE 1: Values in reais(Brazilian currency) of the various standardized substances in the hospital

ANTIEMETIC	REAIS (R\$)	EVIDENCE *
Dexamethasone	1.31	A1
Dimenhydrinate	1.21	A1
Haloperidol	1.40	A1
Methylprednisolone	10.54	A2
Metoclopramide	0.48	A1
Ondansetron	1.08	A1
Promethazine	1.74	A2
Scopolamine	1.04	A1

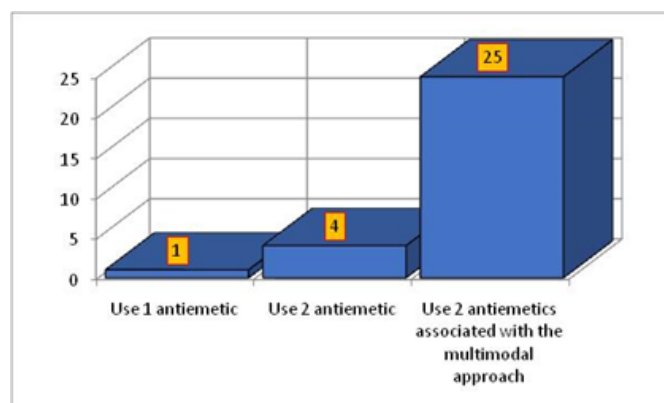


FIGURE 2: When the patient has high risk for PONV, what is his/her conduct?

of PONV in pediatric patients, with more occurring in postectomy surgeries.

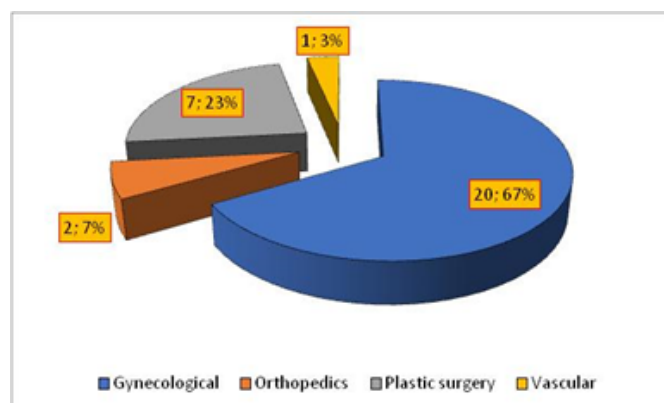


FIGURE 3: Incidence of PONV in different types of surgery in adult patients.

The Figure 5 shows that 70% of anesthesiologists correctly correlate the central nervous system receptors that cause PONV.

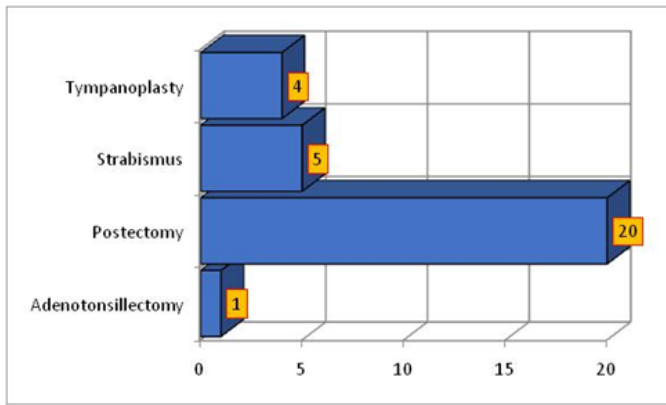


FIGURE 4: Incidence of PONV indifferent types of surgery in pediatric patients.

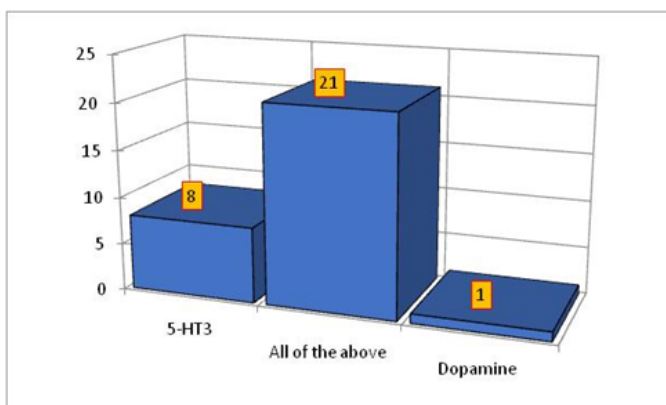


FIGURE 5: Incidence of different types of receptors correlated with PONV.

Regarding the Scale that assesses the chance of PONV created in 1998, only 13 (43.3%) of anesthesiologists responded correctly (Figure 6).

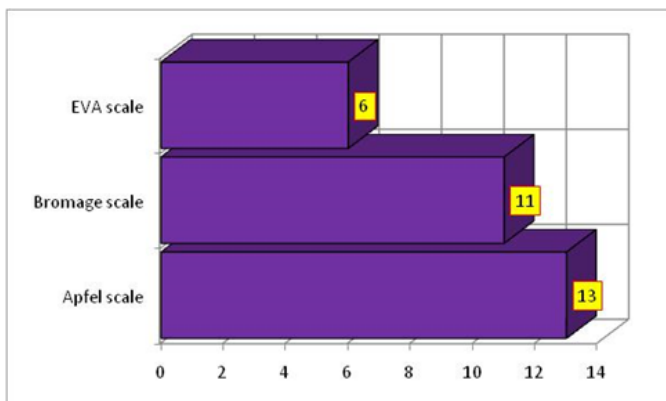


FIGURE 6: Scale that assesses the chance of PONV created in 1998.

Regarding the presence of Protocols for PONV control in hospitals where they exceed their functions,

only 20% of these hospitals present the protocol.

4 | DISCUSSION

This research showed that all anesthesiologists consulted know the risk factors for PONV. When patients have several risk factors, 83.3% of anesthesiologists adequately treat these patients.

Adverse events such as PONV are a negative experience in almost 30% of the general surgical population (17). This process also leads to a longer stay in the anesthetic recovery room, generating an increase in hospital health costs. Thus, the identification of risk factors for PONV in adults and children; prophylactic intervention for patients recognized as high risk for PONV; single antiemetic treatment or combination of therapies are strategies that anesthesiologists must know in order to offer a better treatment for their patients. These facts were recognized by anesthesiologists in the present questionnaire.

The surgeries most associated with an increased risk of PONV, such as: laparoscopic, bariatric, gynecological surgery in the adult population and strabismus surgery, adenotonsillectomy and tympanoplasty in pediatric patients should already be known by this professional (18), were recognized by anesthesiologists through of the questionnaire. The prolonged surgical time, the use of volatile anesthetics and opioids in the postoperative period are also responsible for the increased incidence of PONV (1).

According to the fourth consensus of guidelines for management of postoperative nausea and vomiting, they reveal that the use of nitrous oxide, commonly used in the analgesia of normal birth, seems to be dose dependent on the risk of PONV (17). Pharmacological combination therapy, doses and duration of action of antiemetic medications for PONV prophylaxis must be the domain of the anesthesiologist. The availability of medications will also be essential for the correct rescue therapy, which must be of a different medication class from that used in prophylaxis. At that SUS hospital, eight drugs for the treatment of PONV are standardized and, therefore, one must try to choose according to the price.

STUDY OF ANESTHESIOLOGISTS' KNOWLEDGE IN RELATION TO POSTOPERATIVE NAUSEA AND VOMITING. QUESTIONNAIRE-BASED STUDY.

All this dynamic of postoperative nausea and vomiting was addressed through the application of questionnaires in order to find out what were the main doubts and what were the deficit points in this matter. Thus, it was possible to observe that the risk factors for PONV were well known by anesthesiologists, but the classification of antiemetic drugs that interrupt the transmission of impulses to the center of vomiting was not the wisdom of the majority. Thus, it is worth emphasizing the need for continuous learning and encouraging the updating of these professionals by the health service through the promotion of courses or discussion of clinical cases. The adoption of a post-operative nausea and vomiting protocol would also be a method to assist these professionals in the effective prevention of PONV (19). The protocol would direct interventions for the prevention of PONV according to the peculiarities of the surgical procedure and the patient's initial characteristics. The establishment of conducts allows a standard of care and a better cost-effectiveness of treatments.

Postoperative nausea and vomiting are more frequent complications in recovery from anesthesia. These adverse effects, as well as pain and the absence of sedation are the concerns for the health service, as they delay hospital discharge, increase financial costs, require unexpected hospitalizations and decrease the degree of patient satisfaction. Some patients consider PONV to be the most undesirable of ten possible postoperative results, including postoperative pain (16).

In conclusion, early recognition of risk factors for postoperative nausea and vomiting and anesthetic handling in PONV prophylaxis with single or combined antiemetic treatment are strategies that anesthesiologists must know and master in order to offer a better treatment for their patients. The study showed that it is important to provide anesthesiologists with updated knowledge based on guidelines of a post-operative nausea and vomiting protocol to offer multimodal treatment with drugs of different classes, chosen according to the patient's characteristics, as well as the availability of medicines and health institution policy (20).

APPENDIX A : DATA COLLECTION INSTRUMENT

1. Check which factors contribute to postoperative nausea and vomiting.
 - A. Men
 - B. Smoker
 - C. Age > 50anos
 - D. Previous history of postoperative nausea and vomiting
2. When a patient is at high risk (3 to 4 risk factors) for postoperative nausea and vomiting, how do you treat it?
 - A. Use 1 antiemetic
 - B. Use 2 antiemetic
 - C. Use 2 antiemetics associated with the multimodal approach
 - D. Wait and evaluate how the patient will evolve
3. What types of surgeries increase the incidence of postoperative nausea and vomiting?
 - A. Gynecological
 - B. Orthopedics
 - C. Vascular
 - D. Plastic surgery
4. What types of surgeries increase postoperative nausea and vomiting in pediatric patients, except?
 - A. Postectomy
 - B. Adenotonsillectomy
 - C. Tympanoplasty
 - D. Strabismus
5. Indicate which Central Nervous System receptors cause postoperative nausea and vomiting?
 - A. Dopamine
 - B. 5-HT3
 - C. Neurokinin 1 (NK1)
 - D. All of the above
6. Which scale assesses the chance of postoperative nausea and vomiting?
 - A. Apfel scale
 - B. Bromage scale
 - C. EVA scale
 - D. Ramsay Scale

7. What drugs do you use to treat postoperative nausea and vomiting, except?

- A. Corticoids
- B. Vasoconstrictors
- C. NK1 receptor antagonists
- D. Serotonin 5 HT-3 antagonist

8. Does the Hospital you work in have a Postoperative Nausea and Vomiting Protocol?

- A. To all
- B. Some
- C. None

Residency Completion Work carried out at CET-SBA of Hospital Clinicas Municipal of São Bernardo do Campo, São Paulo, SP.

Conflict of interest

The authors declare that this research was conducted without commercial or financial sponsorship that could lead to a potential conflict of interest.

This article was never published.

REFERENCES

1. Tramer MR. A rational approach to the control of postoperative nausea and vomiting: evidence from systematic reviews. Part I. Efficacy and harm of antiemetic interventions. and methodological issues *Acta Anaesthesiol Scand*. 2001;45:4–13.
2. Watcha MF, White PF. Postoperative nausea and vomiting. Its etiology, treatment, and prevention. *Anesthesiology*. 1992;77:164–184.
3. Apfel CC, Greim CA, Haubitz I, Goepfert C, Usadel J, Sefrin P, et al. A risk score to predict the probability of postoperative vomiting in adults. *Acta Anaesthesiologica Scandinavica*. 1998;42(5):495–501. Available from: <https://dx.doi.org/10.1111/j.1399-6576.1998.tb05157.x>. doi:10.1111/j.1399-6576.1998.tb05157.x.
4. Marquini GV, Pinheiro F, Vieira A. Preoperative fasting abbreviation and its effects on postoperative nausea and vomiting incidence in gynecological surgery patients. *Rev Bras Ginecol Obstet*. 2020;42(8):468–475.
5. Whalen F, Sprung J, Burkle CM, Schroeder DR, Warner DO. Recent Smoking Behavior and Postoperative Nausea and Vomiting. *Anesthesia & Analgesia*. 2006;103(1):70–75. Available from: <https://dx.doi.org/10.1213/01.ane.0000221435.14002.4c>. doi:10.1213/01.ane.0000221435.14002.4c.
6. Leman J. Surgical and patient factors involved in postoperative nausea and vomiting. *Br J Anaesth*. 1992;69(7Suppl1):24–32.
7. Apfel CC, Laara E, Koivuranta M, Greim CA, Roewer N. A simplified risk score for predicting postoperative nausea and vomiting: Conclusions from cross-validations between two centers. *Anesthesiology*. 1999;91:693–700.
8. Sinclair DR, Chung F, Mezei G. Can Postoperative Nausea and Vomiting Be Predicted? *Anesthesiology*. 1999;91(1):109–118. Available from: <https://dx.doi.org/10.1097/00000542-199907000-00018>. doi:10.1097/00000542-199907000-00018.
9. Gan TJ, Diemunsch P, Habib AS. Consensus Guidelines for the Management of Postoperative Nausea and Vomiting. *Anesth Analg*. 2014;118:85–113.
10. McCaul C, Buckley M, Hegarty A. Ambulatory anesthesia and postoperative nausea and vomiting: predicting the probability. *Ambulatory Anesthesia*. 2016;Volume 3:27–35. Available from: <https://dx.doi.org/10.2147/aa.s54321>. doi:10.2147/aa.s54321.
11. Gan TJ, Meyer TA, Apfel CC. Society for Ambulatory Anesthesia. Society for Ambulatory Anesthesia guidelines for the management of postoperative nausea and vomiting. *Anesth Analg*. 2007;105:1615–1628.
12. Kim JH, Hong M, Kim YJ, Lee HS, Kwon YS, Lee JJ. Effect of body mass index on postoperative nausea and vomiting: Propensity analysis. *J Clin Med*. 2020;9(6):1612–1612.

STUDY OF ANESTHESIOLOGISTS' KNOWLEDGE IN RELATION TO POSTOPERATIVE NAUSEA AND VOMITING. QUESTIONNAIRE-BASED STUDY.

13. Öbrink E, Jildensl   P, Oddby E, Jakobsson JG. Post-operative nausea and vomiting: Update on predicting the probability and ways to minimize its occurrence, with focus on ambulatory surgery. *International Journal of Surgery*. 2015;15:100–106. Available from: <https://dx.doi.org/10.1016/j.ijssu.2015.01.024>. doi:10.1016/j.ijssu.2015.01.024.
14. Scuderi PE, James RL, Harris L, Mims GR. Multimodal Antiemetic Management Prevents Early Postoperative Vomiting After Outpatient Laparoscopy. *Anesthesia & Analgesia*. 2000;91(6):1408–1414. Available from: <https://dx.doi.org/10.1097/00000539-200012000-00020>. doi:10.1097/00000539-200012000-00020.
15. Chen Y, Chang J. Anti-emetic drugs for prophylaxis of postoperative nausea and vomiting after craniotomy: An updated systematic review and network meta-analysis. *Front Med (Lausanne)*. 2020;7:40–40.
16. Wu YH, Sun HS, Wang ST, Tseng CCA. Applicability of Risk Scores for Postoperative Nausea and Vomiting in a Taiwanese Population Undergoing General Anaesthesia. *Anaesthesia and Intensive Care*. 2015;43(4):473–478. Available from: <https://dx.doi.org/10.1177/0310057x1504300409>. doi:10.1177/0310057x1504300409.
17. Gan TJ, Belani KG, Bergese S. Fourth Consensus Guidelines for the Management of Postoperative Nausea and Vomiting. *Anesth Analg*. 2020;131:411–448.
18. Chau D, Reddy A, Breheny P, Young A, Ashford E, Song M, et al. Revisiting the applicability of adult early post-operative nausea and vomiting risk factors for the paediatric patient: A prospective study using cotinine levels in children undergoing adenotonsillectomies. *Indian Journal of Anaesthesia*. 2017;61(12):964–964. Available from: https://dx.doi.org/10.4103/ija.ija_303_17. doi:10.4103/ija.ija_303_17.
19. Dewinter G, Staelens W, Veef E, Teunkens A, de Velde MV, Rex S. Simplified algorithm for the prevention of postoperative nausea and vomiting: a before-and-after study. *British Journal of Anaesthesia*. 2018;120(1):156–163. Available from: <https://dx.doi.org/10.1016/j.bja.2017.08.003>. doi:10.1016/j.bja.2017.08.003.
20. DiLustro J. Postoperative Nausea and Vomiting: 168 Years in Review. *Journal of Anesthesia & Intensive Care Medicine*. 2017;1(4). Available from: <https://dx.doi.org/10.19080/jaicom.2017.01.555570>. doi:10.19080/jaicom.2017.01.555570.

How to cite this article: H.L.M.M.D., L.E.I.M.D.P.D., E.P.V.M.D., J.W.S.M.D., A.A.A.M.D., S.H.I.M.D., G.B.M.F.M.S. **Study of Anesthesiologists' Knowledge in relation to Postoperative Nausea and Vomiting. Questionnaire-Based Study.** Advance Research Journal of medical and clinical science. 2021;590–596. <https://doi.org/10.15520/arjmc.v7i06.325>