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RESEARCH

THE INCIDENCE OF POSTOPERATIVE NAUSEA AND VOMITING IN THE CENTRAL SURGERY UNIT AT PROF. DR. I.G.N.G. NGOERAH GENERAL HOSPITAL

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ABSTRAK

Latar belakang: PONV merupakan kejadian mual muntah pasca operasi yang umum terjadi, dan merupakan kejadian yang tidak nyaman dan tidak menyenangkan kepada pasien karena dapat memperlama waktu rawat inap dan meningkatkan pengeluaran.
Tujuan: Tujuan dari penelitian ini adalah untuk mencari tahu jumlah kejadian PONV di RSUP Prof dr. I.G.N.G Ngoerah dan distribusi atau karateristik kejadian PONV berdasarkan beberapa faktor seperti; jenis kelamin, usia, kebiasaan merokok, jenis operasi, jenis anestesi, durasi operasi, dan riwayat kemoterapi.
Metode: Penelitian jenis observasional dengan pendekatan deskriptif metode *cross sectional* dengan jumlah sampel 84, dengan menerapkan analisis bivariat untuk melihat peluang persentase faktor independen PONV terhadap kejadian PONV.
Hasil: Terdapat kejadian PONV sebanyak 26 pasien dari 84 pasien dengan persentase 31%, dengan distribusi kejadian PONV berdasarkan faktor independen dengan persentase yaitu; Perempuan (36%), usia 46 – 65 tahun (35,6%), bukan perokok (36,2%), jenis operasi potensi PONV (37%), anestesi umum (35,2%), durasi operasi >2 jam (50%), dan riwayat kemoterapi (40%).
Kesimpulan: Berdasarkan penelitian ini, *predictor independent* PONV yang paling banyak ditemui adalah durasi operasi >2 jam (p=0,002) dengan kejadian 17 pasien dari 34 pasien (50%). Tidak cukup bukti mengenai sejumlah faktor riwayat kemoterapi terhadap terjadinya PONV.

Kata kunci: Durasi operasi, Jenis kelamin, Kebiasaan merokok, PONV (*Postoperative Nausea and Vomiting*), Usia

ABSTRACT

Background: *PONV is a common occurrence of postoperative nausea and vomiting, and is an uncomfortable and unpleasant event for patients because it can prolong hospitalization time and increase expenditure.*
Objective: *This research aims to determine the number of PONV incidents at RSUP Prof dr. I.G.N.G. The direction and distribution or characteristics of PONV incidence are based on several factors such as gender, age, smoking habits, type of surgery, type of anesthesia, duration of surgery, and history of chemotherapy.*
Method: *Cross-sectional descriptive research with a sample size of 84, applying bivariate analysis to see the percentage chance of PONV independent factors on the incidence of PONV.*
Results: *There were PONV incidents in 26 patients out of 84 patients with a percentage of 31%, with the distribution of PONV incidents based on independent factors with percentages namely; Female (36%), aged 46 – 65 years (35.6%), non-smoker (36.2%), type of surgery with PONV potential (37%), general anesthesia (35.2%), duration of operation >2 hours (50%), and history of chemotherapy (40%).*
Conclusion: *Based on this study, the most common independent predictor of PONV was surgery duration >2 hours (p=0.002) with an incidence of 17 patients out of 34 patients (50%). There is insufficient evidence regarding several factors, such as a history of chemotherapy, in the occurrence of PONV.*

Keywords: *Age, Duration of surgery, Gender, PONV (Postoperative Nausea and Vomiting), Smoking habits.*

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INTRODUCTION

Anesthesia is an action carried out to facilitate surgery to reduce and eliminate the pain and discomfort experienced by the patient. Anesthesia has side effects such as dizziness, headaches, nausea and vomiting. Post-operative nausea and vomiting are effects of anesthesia and surgery with other external factors such as gender, age, smoking habits, type of surgery, type of anesthesia, duration of

surgery, history of chemotherapy, and other risk factors.

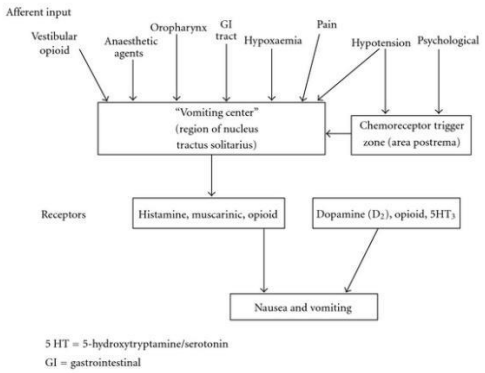
Postoperative Nausea and Vomiting (PONV) disrupt the healing process. The effects of PONV are discomfort which causes difficulty sleeping, disruption of intake which causes dehydration, vomiting, increased pain sensitivity which lenghents hospital stays.

From the past until now, post-operative nausea and vomiting are still a problem frequently experienced by patients who have undergone anesthesia. Every year, surgical procedures increase significantly, so number of PONV occurrences increases. It was recorded that in 2017 the number of patients undergoing surgery was 1.2 million patients in Indonesia, and more than 140 million patients in all hospitals in the world, and increased to 148 million in 2018.[1]

In 2020, more than 40 million patients were undergoing surgery in the United States, and more than 100 million surgical patients worldwide, approximately 30% of whom experienced post-operative nausea and vomiting. The remaining 70% - 80% of patients undergoing anesthesia or surgery are at high risk of experiencing PONV.[2] Based on the above, the researcher wants to conduct research on the incidence of postoperative nausea and vomiting at the Prof. General Teaching Hospital. Dr. I.G.N.G. Ngoerah.

LITERATURE REVIEW

The cause of PONV is considered to be multifactorial. Of course, this is proven because there are many neurotransmitters play a role in influencing the occurrence of PONV. Apart from neurotransmitters, there are also opioids, histamine, muscarinic, acetylcholine, neurokinin-1, dopamine, and serotonin which are responded to by nausea and vomiting center, namely the Chemoreceptor Trigger Zone (CTZ).[3] There are also several stimuli that occur in several specific nerves such as the vagus, glossopharyngeal, and vestibulocochlear nerves, especially the nausea and vomiting center, namely the medulla oblongata, which plays a role in PONV. Apart from that, external factors from the environment around the patient such as smell, humidity, and taste sensations, are received at the Vomiting Center (VC). Therefore, PONV still needs to use a combination of drugs so that it can interact with more than one receptor.[4]



Picture 1. Chemoreceptor Trigger Zone (CTZ) [3]

Risks factors of PONV

1. Gender Factor

Women have a higher chance of experiencing PONV than men.[5] This is due to fluctuations in hormone levels that occur during menstruation, especially in the third and fourth weeks. The presence of follicle-stimulating hormone (FSH), estrogen, and progesterone in the CTZ which is exposed during menstruation is the main cause of increased PONV in women. The increase in PONV in women will decrease and remain constant during menopause or early old age (45 - 55 years) because exposure to hormone levels due to menstruation is no longer there.[6]

2. Age Factor

According to [7] quoted from the Indonesian Ministry of Health (2009), age is a unit of calculation for measuring the time of existence of animate and inanimate objects. Age is calculated from when an object was first created which is measured using time when viewed from a chronological perspective. In humans, changes in growth and development can be seen from an anatomical and physiological perspective. In psychology, the unit of calculation measures age in terms of a person's mental development. In contrast, in medical science, age is estimated based on the stage of physical development, both in terms of the size and physiology of a person's body. Elderly starts from 46–55 years. This is the beginning of a decline in body function due to physical, and mental conditions, and changes in a person's pharmacokinetics and pharmacodynamics in response to drugs or anesthesia. Age is one of the factors that causes nausea and vomiting in post-operative patients.

The incidence of PONV increases from childhood to adolescence, where during this period there is so much growth and physical development that reactions often occur due to hormonal instability and body function to the symptoms of anesthesia. The incidence of PONV will be stable in early adulthood and late adulthood, and the incidence of PONV will decrease when people enter their 60s or late adulthood.[5]

3. Smoking Habit Factors

A smoker has a lower risk of PONV compared to people who do not smoke or who only smoke passively.[8] The psychoactive chemicals in cigarette smoke can increase the metabolism of drugs that have similarities to the chemicals in anesthetics and can affect the nervous system and brain. Based on research data from the Sleman District Hospital, it is said that there are 4 active smokers out of 22 active smokers who experience PONV, and there are 12 passive smokers out of 22 passive smokers who experience PONV,[9] his can be explained by the psychoactive substances contained in cigarette smoke such as nicotine, which is a small alkaloid that can mimic the effects of the endogenous neurotransmitter acetylcholine. Acetylcholine is a neurotransmitter created by neurons which can be called cholinergic. Nicotine, which binds to acetylcholine receptors in the nervous system, can reduce the sensitivity of neuronal tissue function, which plays a role in reducing the incidence of PONV in active smokers. It is repeated states of tolerance that make smokers dependent on chemicals in the form of nicotine.[10] In addition, chronic exposure to smoke (especially polycyclic aromatic hydrocarbons) produces changes in liver microsomal enzymes that can affect the metabolism of drugs used in the perioperative period and the ability of this drug to produce PONV.

The protective aspect of smoking on postoperative nausea and vomiting is unlikely to be due to the acute action of smoke constituents.[11] So smokers will experience tolerance to chemicals related to anesthetic drugs and be resistant to the side effects of anesthesia such as symptoms of nausea, vomiting or dizziness.

4. Operation Type Factor

The type and duration of surgery greatly influences the success of the treatment process and influences the chances of PONV occurring. The cause of PONV due to the type of surgery is still controversial, although it has been identified as one of the factors causing PONV in many reports. Because in some studies there are sometimes variations in the specific procedures involved and there is a very high risk of being emetogenic or injuring the patient. Types of procedures that may be seen as risk factors for PONV include intra-abdominal, laparoscopic, orthopedic, gynecological, ear nose and throat (ENT), thyroid, breast, and head and neck surgery such as plastic surgery as well as neurosurgery.[12],[13] One of the causes of a high increase in PONV during laparoscopic procedures could be due to the gas used to expand the stomach to create an optimal working space for carrying out surgery with various existing instruments or tools. This action can put pressure on the vagus nerve or the nerve that functions for digestion, because this nerve has connections to the nausea and vomiting center in the brain. Apart from the gas pressing on the nerves, patients undergoing laparoscopic gynecological procedures have other factors that cause PONV, such as female gender, perioperative opioid use, and ambulatory care which allows for a lowering of the emesis threshold induced by movement.[14] When compared between laparoscopic versus open cholecystectomy, and the effect of laparoscopy remained, there was no significant difference between the risk of PONV after risk adjustment in a general linear regression model.[15]

5. Anesthesia Type Factor

General anesthesia is an important risk factor for PONV compared to regional anesthesia and other types of anesthesia. The incidence of PONV often occurs when using inhalation anesthetics compared to propofol.[16] Inhaled anesthetic drugs are very influential and responsible for the induction of PONV. If inhalation anesthesia is not used in the procedure, the incidence of PONV can decrease by up to 19%. Another important risk factor for PONV is postoperative opioid administration. Therefore, the type of surgery is considered the main risk factor for PONV, but this opinion is still controversial. Some experts argue that the type of surgery is not directly responsible for the occurrence of PONV, but patient population factors and anesthesia factors play a role in causing PONV. One study reported the incidence of PONV after anesthesia with isoflurane at 34%, enflurane at 33%, sevoflurane at 33% and propofol at 18%.[17]

The results of research analysis prove that increasing the duration of inhalation anesthesia is associated with an increase in the incidence of PONV, however this did not occur in anesthesia studies using propofol. The dose-response relationship of inhaled anesthetic drugs to the incidence of PONV proves that there is a "pro-emetic" effect that comes from inhaled anesthetic drugs. Many patients experience PONV after general anesthesia with volatile anesthetics.[18] Currently, volatile anesthetics have been proven to be strongly emetogenic and there is no significant difference between halothane, enflurane, isoflurane, sevoflurane and desflurane in this regard. However, when propofol was replaced with a volatile anesthetic, the risk of PONV was only reduced by approximately 20%, indicating that there are other causes of PONV besides general anesthesia. It can be concluded that antiemetic prophylaxis to treat PONV induced by volatile anesthetics has the same effect. The most logical prevention is to eliminate volatile

anesthetics and nitrous oxide and replace them with total intravenous anesthesia with propofol. However, because volatile anesthetics are not a risk factor for the most common PONV, it would be preferable to perform general anesthesia and regional anesthesia free from opioids.

6. Operation Duration Factor

The duration of surgery influences the occurrence of PONV in patients. The longer the duration of the operation, the more PONV will occur. Operations that are carried out for longer periods usually result in a risk of decreasing the function of anti-nausea and vomiting drugs, which can lead to an increase in the incidence of PONV. The duration of the operation can cause neuromuscular blockade which determines the patient's condition.[19] The longer the duration of the operation makes the patient's body less mobile, which causes the patient's blood to thicken and causes a sensation of dizziness which stimulates vestibular disequilibrium. Vestibular equilibrium can increase CTZ activation above normal with the balance or vestibular nerve, thereby triggering PONV. An increase in the duration of surgery by 30 minutes can increase the risk of PONV events by around 60% compared to the normal duration of surgery.[5]

7. Chemotherapy History Factors

Cancer has various types of therapy. Several actions taken to treat cancer consist of chemotherapy, radiotherapy, hormone therapy, surgery and immunotherapy.[20] Chemotherapy is a type of action commonly used in systemic therapy and metastatic cancer therapy, both clinical and subclinical. In advanced-stage cancer, especially locally, chemotherapy is often the only and most effective therapeutic option.[21] To date, there are more than 100 types of chemotherapy anti-cancer drugs that can be used clinically.[22] Nausea, and vomiting is one of the symptoms that arises as a result of administering anti-cancer drugs such as chemotherapy. This situation can cause severe stress in the patient and can cause the patient to stop the therapy cycle due to boredom, resulting in low life expectancy in the future. If these side effects are not resolved or are prolonged, the symptoms of nausea and vomiting can cause dehydration, electrolyte imbalance, and the risk of aspiration pneumonia.[23]

Based on research in 2014 according to[24], it was stated that as many as 75 patients out of 90 patients (83.3%) experienced nausea and 71 patients out of 90 patients (78.9%) experienced vomiting from the number of patients undergoing chemotherapy treatment. Several drugs such as Cisplatin, Carmustine, and Cyclophosphamide are types of drugs that have a high effect of around 90% on nausea and vomiting.[25] Indirectly, a history of chemotherapy use can cause PONV, this is because the mechanism of PONV is similar to the mechanism of chemotherapy-induced nausea and vomiting (CINV) where neurotransmitters such as serotonin that arise as a result of chemotherapy treatment and anesthesia during surgery can cause nausea and vomiting in the emesis center in the brain.[26]

The Effect of Nausea and Vomiting on Post-operative Healing

Postoperative Nausea and Vomiting (PONV) is one of the most frequent side effects of general anesthesia. Although PONV can go away independently, this situation can cause discomfort for patients and medical personnel. Until now, PONV remains a serious clinical problem that can reduce the patient's quality of life while in the hospital and after leaving the hospital/outpatient setting. PONV can also increase perioperative costs, increase perioperative morbidity, increase the duration of post-anesthesia hospitalization, prolong the hospital stay, delay the patient's discharge time, delay the patient's activity time, and even cause the patient to require further hospitalization for PONV treatment. Even though there are many ways to prevent and treat PONV, doctors cannot be sure of systematically treating PONV with pharmacological and non-pharmacological strategies in order to minimize the incidence of PONV.[27]

METHODS

This research is a quantitative observational research that uses cross-sectional methods to collect risk factors that patients have or do not experience postoperative nausea and vomiting. Analytical descriptive techniques used to analyze accessible populations, which includes all patients who have undergone surgery in the Central Surgical Installation building, Recovery Room, Prof. Hospital Dr. I.G.N.G Ngoerah Denpasar, Bali, period April to May 2024. Samples will be taken from the accessible population, based on

Inclusion Criteria	Exclusion Criteria
Age 12 years and over.	Patient is unconscious.
Patients who have undergone surgery	have a history of severe nausea and vomiting,

and are conscious and have used and have no antiemetics	
cognitive limitations	
Willing to participate	Not willing to participate

The Sample used in this research was 84 people. Data was taken from direct questions and answers to patients and medical records in the recovery room. After that the data is processed using Statistical Products and Service Solutions (SPSS) version 26 for obtaining characteristics based on gender, age, smoking habits, type of surgery, type of anesthesia, duration of surgery, and history of chemotherapy. This research was approved by the ethics committee of Udayana University Faculty of Medicine.

RESULT

Based on data collected from a total sample of 84 people, it was found that 26 patients experienced PONV with a percentage of 31%. which have been collected during the period April to May 2024 at RSUP Prof. Dr. I.G.N.G Ngoerah.

Table 1. Gender Distribution of Risk Factors for PONV Incidence

Gender	Frequency PONV (n)	Non-PONV(n)	Total
Male	10 (25%)	30 (75%)	40
Female	16 (36%)	28 (63,6%)	44

Based on Table 1, it shows that 10 out of 40 male respondents experienced PONV with a percentage of 25%, and 16 out of 44 female respondents experienced PONV with a percentage of 36.4%, which shows that women have a higher risk of PONV than men.

Table 2. Distribution of Age Risk Factors for PONV Incidence

Age	Frequency PONV(n)	Non-PONV(n)	Total
12-25	2 (20%)	8 (80%)	10
26–45	6 (30%)	14 (70%)	20
46–65	16 (35,6%)	29 (64,4%)	45
>65	2 (22,2%)	7 (77,8%)	9

Table 2. shows that the highest exposure to PONV based on age from this study mostly occurred in the early elderly and late elderly or aged 46 - 65 years, namely 16 respondents out of 45 respondents in the early elderly and late elderly with a percentage of 35.6 %.

Table 3. Distribution of Risk Factors for Smoking Habits on the Occurrence of PONV

Behavior	Frequency PONV(n)	Non-PONV(n)	Total
Smoker	5 (19,2%)	21 (80,8%)	26
Non-smoker	21 (36,2%)	37 (63,8%)	58

Table 3 shows that the incidence of PONV is more common in the group of respondents who do not have a history of smoking, namely 21 out of 58 respondents with a percentage of 36.2%.

Table 4. Distribution of Risk Factors for Types of Surgery on the Occurrence of PONV

Type operation	Frequency PONV (n)	Non-PONV (n)	Total
Non-potential PONV	16 (28,1%)	41	

Potential PONV	10 (37%)	17 (63%)	27
Non-potential PONV	16 (28,1%)	41 (71,9%)	57

Table 4. shows that the incidence of PONV is more common in types of surgery that have the potential to cause PONV such as intra-abdominal, laparoscopic, orthopedic, gynecological, ear nose and throat (ENT), thyroid, breast, and head and neck, and plastic surgery and neurosurgery, namely as many as 10 out of 27 respondents with a percentage of 37%.

Table 5. Distribution of risk factors for types of anesthesia on the incidence of PONV

Type	Frequency PONV (n)	Non-PONV(n)	Total
Regional/ Local	7 (23,3%)	23 (76,7%)	30
General	19 (35,2%)	35 (64,8%)	54

Table 5 shows that the incidence of PONV occurred more frequently in respondents who underwent surgery with general anesthesia, namely 19 out of 54 respondents who underwent general anesthesia with a percentage of 35.2%.

Table 6. Distribution of risk factors for duration of surgery on PONV incidence

Duration	Frequency PONV (n)	Non-PONV(n)	Total
<2 hour	9 (18%)	41 (82%)	50
>2 hour	17 (50%)	17 (50%)	34

Table 6 shows that the incidence of PONV occurred more frequently in respondents who underwent surgery with a duration of >2 hours, namely 17 out of 34 respondents with a percentage of 50%.

Table 7. Distribution of Risk Factors for History of Chemotherapy on the Occurrence of PONV

Chemotherapy	Frequency PONV (n)	Non-PONV (n)	Total
Non-Chemotherapy	24 (30,4%)	55 (69,6%)	79
Chemotherapy	2 (40%)	3 (60%)	5

Table 7 showed that the incidence of PONV occurred more frequently in the group of respondents with a history of chemotherapy, namely 2 out of 5 respondents with a percentage of 40%.

DISCUSSION

According to articles from[28],[29], it is stated that women have a higher risk of PONV which is caused by a surge in several hormones such as estrogen and progesterone, especially in women during the active menstrual phase, or the use of hormonal contraception. Increased estrogen can stimulate the chemoreceptor trigger zone (CTZ) in the medulla oblongata which acts as an emetic or nausea stimulus. Apart from sex hormones, genetic influences and neurotransmitters in women, such as dopamine and serotonin receptors, which are higher than in men, make women more sensitive to nausea and vomiting, which in this case is a determinant of the incidence of PONV in women.

The incidence of PONV varies greatly, according to articles from[13],[30],[31] showing that the incidence of PONV most often occurs in early adolescence and young adulthood, where at this age, the central nervous system is fully developed and more sensitive to stimuli such as anesthesia, especially in the CTZ. Early adolescents and young adults also have higher levels of dopamine and serotonin receptors, where these receptors also play a role in the emetic or nausea process in the central nervous system. Meanwhile, in adulthood, there is a

decrease in vestibular nerve activity and a reduction in the sensitivity of the emetic center also because drug metabolism in the liver and kidneys is slower, the effect of anesthesia on the incidence of PONV was found to be low in this research. Likewise, infants and toddlers have a low risk of POVN because the emetic center or CTZ in the nervous system is not yet fully developed, which makes them insensitive to anesthetics which can cause PONV. This theory is not in line with the results of this study where in this study it was found that the highest incidence of PONV was in the age group 46 – 65 years. Based on the results of research from[30],[31],[32] it shows that in early adulthood and old age, physiological changes occur in the body, where esophageal reflux often occurs in this age group, slowed gastric emptying, and decreased stomach acid production can trigger nausea and vomiting. It was also stated that the adult and early elderly age groups, this is the age group that has more complications, so they have types of treatment other than anesthesia that they undergo, so that due to the many types of treatment they undergo, such as anti-inflammatory treatment, antibiotics, and chemotherapy drugs, it can cause side effects that trigger nausea and vomiting.

Smokers have an adaptation to excessive nicotine causing changes in the central nervous system which causes reduced sensitivity to nausea and vomiting stimulation from anesthetics.[33] Nicotine is a psychoactive substance which is a small alkaloid that can mimic the effects of neurotransmitters such as the endogenous neurotransmitter acetylcholine which is cholinergic in nature. So the presence of nicotine in the nervous system can block the binding of the acetylcholine receptor to the neurotransmitter acetylcholine, thereby causing an anti-cholinergic effect or reducing tissue sensitivity and function to the stimulation of nausea and vomiting in the CTZ.[10],[33]

Types of surgical procedures that are at risk of PONV include intra-abdominal, laparoscopic, orthopedic, gynecological, ear nose and throat (ENT), thyroid, breast, and head and neck surgery such as plastic surgery and neurosurgery.[12],[13] Laparoscopy is a procedure that carries a very high risk of PONV. This is because the laparoscopic procedure uses a balloon filled with gas to expand in the stomach to create an optimal working space during the operation. This action puts pressure on the surrounding nerves, such as the vagus nerve, which functions in the digestive organs and is related to the response. And stimulation of nausea and vomiting in the brain.[14] There were 4 incidents of PONV from 5 patients who underwent laparoscopic surgery in this study with a percentage of 80%.

In general, general anesthesia often triggers PONV because it can affect the nervous system, such as inhalation anesthesia such as isoflurane, and sevoflurane, and the use of opioids which are associated with receptors that trigger nausea and vomiting in the center, especially in the CTZ and medulla oblongata.[30] Regional anesthesia has a lower PONV impact than general anesthesia because regional anesthesia works by blocking nerves in certain areas only, without causing systemic effects, and minimal effect on the CTZ. However, regional anesthesia has an optimal PONV effect if regional anesthesia is used via the epidural and intrathecal routes close to the center of nausea and vomiting, such as in head-neck surgery.[30] Meanwhile, local anesthesia has the smallest risk of PONV because it only works to block nerve induction locally and in a smaller area than regional anesthesia.[30]

The short duration of surgery can reduce exposure to anesthetic agents such as inhaled anesthetic agents such as sevoflurane and isoflurane and opioid anesthetics which are high risk factors for PONV. So that a shorter duration can reduce exposure to anesthetic agents and have a smaller dose, so direct exposure to CTZ is less likely to cause anesthetic side effects such as nausea and vomiting.[30] On the other hand, a long duration of operation can cause exposure to more anesthetic agents and more drug doses, so that the accumulation of anesthetic substances lasts longer and many of them cause stimulation of the CTZ which is more incentive and anesthetic side effects such as higher levels of nausea and vomiting.[30]

The relationship between PONV and side effects of chemotherapy such as nausea and vomiting is almost indistinguishable, because patients who have undergone surgery and have a history of chemotherapy are likely to experience PONV due to the effects of chemotherapy treatment itself, or PONV events due to the anesthetic drug itself, even the effect of nausea and vomiting can be caused by a combination of chemotherapy drugs and anesthetic drugs which cause a high effect of nausea and vomiting in the CTZ. Based on research from[33] hereditary factors can play an important role in PONV and the incidence of chemotherapy-induced nausea and vomiting (CINV), including a person's resistance to PONV which is related to genetics carried from his family.

CONCLUSIONS AND RECOMMENDATION

Based on the results of research on the incidence of postoperative nausea and vomiting in the Central Surgery Room at Prof. Hospital. Dr. I.G.N.G Ngoerah with 84 research samples

that have met the inclusion criteria, it can be concluded that: Research on the incidence of post-operative nausea and vomiting or PONV in the Central Surgery Room at Prof. Hospital. Dr. I.G.N.G Ngoerah showed that;

1. There were 26 out of 84 patients who experienced PONV with a percentage of 31%. Based on the results of data processing from several risk factors such as gender, age, smoking habits, type of surgery, type of anesthesia, duration of surgery, and history of chemotherapy for PONV,
2. It was found that the incidence of PONV with exposure to surgery duration >2 hours had the highest percentage of PONV, namely 50% in this research.
3. The study authors recommend carrying out further research on a larger scale population and more variables to determine additional characteristics that can differentiate them between patients with PONV and non-PONV. Further research regarding actions to handle the incidence of PONV, treatment of PONV, or research on the prevention of PONV which researchers recommend for broader coverage, especially regarding the incidence of PONV which is still increasing every year.

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