

## RELATIONSHIP BETWEEN FULFILLMENT OF PRE-OPERATIVE FLUID NEEDS AND THE INCIDENCE OF NAUSEA AND VOMITING IN PATIENTS POST GENERAL ANESTHESIA AT DR SAIFUL ANWAR HOSPITAL, EAST JAVA PROVINCE

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### ABSTRACT

**Introduction:** Postoperative nausea and vomiting, known as Postoperative Nausea Vomiting (PONV), is one of the problems often experienced by post-operative patients. Most anesthetic drugs have a vasodilation effect which causes hypotension and hypoperfusion, thereby stimulating the CTZ to produce nausea and vomiting reactions. Hypotension will be more dangerous if the body's fluid needs are not met at the time of surgery. Hypotension is one of the triggers that can cause nausea and vomiting. Giving fluids to preoperative patients is generally done to prevent intraoperative hypotension.

**Methods:** This study collected data from 80 participants using a proportionate sampling method; it is cross-sectional in nature and based on analytical observation. The fluid calculations based on the fresh holiday formula and the RINVR observation sheet are used by this research apparatus. Application of SPSS IBM Version 23's Fisher Test to Data.

**Results:** As a whole, 72 respondents (or 90%) channelled less fluid than was necessary before surgery; 44 respondents (or 55%) reported mild nausea and vomiting; and 61.1% reported mild nausea and vomiting while still meeting their preoperative fluid needs. Patients having general anaesthesia at RSUD Dr. Saiful Anwar in East Java Province are more likely to experience nausea and vomiting after surgery if they consume more fluids before the procedure (a p-value of 0.001 from the Fisher Test).

**Conclusions:** In preoperative patients, a lot of fluid is lost. Fluid lost during fasting is replaced by calculating fluid requirements per day (per hour), calculating the fasting deficit (length of fasting) or dehydration (degree of dehydration). Providing sufficient fluids can reduce the risk of postoperative nausea and vomiting under general anesthesia.

## Introduction

An example of this is Postoperative Nausea and Vomiting (PONV), which occurs after surgery. issues that patients often report after surgery. Thirty percent of patients who have anaesthesia may experience postoperative nausea and vomiting (PONV), and as much as seventy percent will be very vulnerable to a medical emergency in the twenty-four hours after the episode (Firdaus & Setiani, 2022). Additional postoperative problems may arise as a result of patient worry in cases with PONV. Management of PONV is all-encompassing, beginning with risk factor evaluation and continuing through prophylactic and emergency therapy.



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. In addition, the effects of nausea and vomiting in postoperative patients can cause dehydration, pain, electrolyte imbalance, can cause bleeding, hypertension, increased esophageal tears (Karnina & Salmah, 2021).

In the recovery room after surgery, 30% of patients experience nausea and vomiting. Nausea and vomiting are possible in over 70% of those at high risk. Even in individuals without preexisting conditions, around 10% may have nausea and vomiting after surgery. Thirty percent of American patients, or more than 100,000 individuals, get PONV (Arif, 2022). Twenty to thirty percent of patients having general surgery and seventy to eighty percent of those at high risk had nausea and vomiting after the procedure. Some 36.2% of patients have nausea and vomiting after surgery, according to research done in Ethiopia. A history of motion sickness, the duration of anaesthesia, the intricacy of the surgery, and the presence of any gynaecological operations are all variables that increase the likelihood of postoperative nausea and vomiting (PONV) (Karnina & Salmah, 2021). Regrettably, definitive data about the incidence of postoperative nausea and vomiting is lacking in Indonesia. Nausea and vomiting were more common after gynaecological surgeries, such as mastectomy (31.4%) and laparotomies (31.25% of patients). The significant risk of readmission after surgery makes postoperative nausea and vomiting not only a bothersome side effect, but it may also raise outpatient care expenses by around 0.1 to 0.2%. (Cing et al., 2022).

One of the things that might set off the vomiting and nausea is low blood pressure. Although the precise process by which hypotension produces postoperative nausea and vomiting (PONV), it is known that impacts on the central vestibular system (CTZ) and decreased blood supply to the brainstem may lead to vertigo and nausea. The hypothesis explained in the study is that avoiding intraoperative hypotension can reduce PONV in general anaesthesia. Adding fluids before surgery can prevent hypotension (Cing, 2022). Fluid administration in preoperative patients is generally done to prevent intraoperative hypotension. There have been a number of studies looking at different ways to lessen the likelihood of nausea and vomiting in patients recovering from anaesthesia. One such study looked at the effects of anti-emetic medication on reducing postoperative nausea and vomiting following surgery. (Riska, 2022).

A preliminary study conducted in March 2024 at Dr. Saiful Anwar Hospital, East Java Province found that 25 patients underwent general anaesthesia and 20 patients were found to experience nausea with adequate fluid intake and 5 patients experienced vomiting during recovery with insufficient fluid intake. Patients requiring a lengthier recovery period of about one to two hours were identified during interviews as experiencing nausea and vomiting. In light of the above, the author is considering doing research to establish a correlation between the amount of fluids patients need before surgery and the frequency with which they experience nausea and vomiting while under general anaesthesia. The aim of this study was to determine the relationship between the fulfillment of preoperative fluid requirements and the incidence of nausea and vomiting in post-general anaesthesia patients at the Anaesthesia Installation of Dr. Saiful Anwar Regional Hospital, East Java Province.

## Methods

This study used a cross-sectional design and an analytical method based on observations. This study included one hundred patients undergoing general anaesthesia at the RSSA. A purposive sampling strategy was utilised to choose this study sample. Inclusion criteria: patients willing to be respondents, patients undergoing surgery with general anaesthesia, age 18-55 years, and patients with mild to moderate systemic disorders. Exclusion Criteria: patients with decreased consciousness, patients with kidney disorders, patients with heart disorders, not receiving anti-nausea and vomiting premedication. A total of eighty people will be polled for this study, with the results derived using the Slovin formula. Questionnaires about the frequency of nausea and vomiting used *Rhodes Index of Nausea Vomiting and retching (RINVR)* and the



amount of fluids needed prior to surgery constitute the main data set used in this study. Following the administration of PSP (explanation before consent) and the attainment of written informed consent, data collection was initiated. The next step in processing quantitative data is cleaning, editing, coding, and entering the data after collection. To examine the distribution of frequencies for each variable, descriptive statistics were used to the data. After the data is obtained, it is statistically tested, namely by analysing the frequency of nausea and vomiting and the amount of fluids needed before surgery using a chi-square test. The results of this analysis are then used to conclude a hypothesis which has been approved by the health research ethics commission of the RSSA with letter number 400/165/K.3/102.7/2024

## Results

In this study, We used bivariate analysis to look for a connection between patients experiencing nausea and vomiting after general anaesthesia and whether or not their hydration demands were met before the operation. Things that will be examined based on the characteristics of the respondents occurrences of nausea and vomiting, the requirement for fluids prior to surgery.

Table 1. Cross Tabulation of Preoperative Fluid Requirement Fulfillment with Nausea and Vomiting Incidence in Post-General Anesthesia Patients

Fulfillment of preoperative fluid needs	Nausea and Vomiting Occurrence			Total
	No nausea vomiting n(%)	Mild nausea and vomiting n(%)	Moderate nausea and vomiting n(%)	
More	6 (100%)	0(0,00)	0(0,00)	6(100%)
Enough	2(100%)	0(0,00)	0(0,00)	2(100%)
Less	19(26,4%)	44(61,1%)	9(12,5%)	72(100%)
<b>Total</b>	<b>27(33,7%)</b>	<b>44(55%)</b>	<b>9(11,3%)</b>	<b>80(100%)</b>

Based on table 1, it shows that most respondents with preoperative fluid requirement fulfillment did not experience nausea and vomiting, which was 6 respondents (100%). Meanwhile, most respondents with sufficient preoperative fluid requirement fulfillment experienced mild nausea and vomiting, which was 2 respondents (100%). Meanwhile, most respondents with less preoperative fluid requirement fulfillment experienced mild nausea and vomiting, which was 44 respondents (61.1%).

Table 2 Chi Square Test

Fulfillment of preoperative fluid needs		Nausea and Vomiting Occurrence		
		No nausea vomiting	Mild nausea and vomiting	Moderate nausea and vomiting
More	<i>Count</i>	19	44	9
	<i>Expected Count</i>	24,3	39,6	8,1



T	Enough	Count	2	0	0
		Expected Count	0,7	1,1	0,2
B	Less	Count	6	0	0
		Expected Count	2,0	3,3	0,7
Total	Total	Count	27	44	9
		Expected Count	27	44	9

shows the count values of 19, 44, 9; 2, 0, 0; 6, 0, 0 while the expected counts are 24.3; 39.6, 8.1; 0.7, 1.1, 0.2; 2.0, 3.3, 0.7. The results above this table are not suitable for testing with Chi Square because there are expected count values that are less than 5. The data were tested with the Fisher Test.

Tabel 3 Uji Hipotesis Fisher Exact Test

	Value	.df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	17,449 <sup>a</sup>	4	0,002	,006		
Likelihood Ratio	19,198	4	0,001	,000		
Fisher's Exact Test	14,581218			,001	,000	
Linear-by-Linear Association	12,360	1	0,000	,000	,000	,000
N of Valid Cases	80					

a. 6 cells (66,7%) have expected count less than 5. The minimum expected count is ,23.  
b. The standardized statistic is 3,516.

Based on table 3, the hypothesis test conducted using the Fisher Exact test, obtained a sig value = 0.001 (sig <0.05), At the Anaesthesia Installation of Dr. Saiful Anwar Regional Hospital in East Java Province, it was determined that patients experiencing nausea and vomiting after general anaesthesia had a strong correlation with their preoperative fluid needs.

## Discussion

The results of the hypothesis test conducted using the Fisher Exact test, obtained a sig value = 0.001 (sig <0.05), Based on the data collected at the Anaesthesia Installation of Dr. Saiful Anwar Hospital in East Java Province, it was determined that patients experiencing nausea and vomiting after general anaesthesia had a strong correlation with the amount of fluids they needed before the procedure. Patients undergoing general anaesthesia at Dr. Saiful Anwar Hospital in East Java Province are less likely to have nausea and vomiting if their hydration needs are met prior to the procedure. A decrease in blood pressure may lead to hypoxia and reduced blood flow to the area responsible for producing vomiting, known as the chemoreceptor trigger zone (CTZ). The vomiting centre, nucleus tractus solitarius, and chemoreceptor trigger zone (CTZ) are three areas of the central nervous system that work together to coordinate the vomiting reflex (Messina et al., 2021). These three structures are



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located in the brainstem area. There are two anatomical areas in the medulla that act as a vomiting reflex, namely the CTZ and the central vomiting center (CVC). Outside of the blood-brain barrier, at the postrema region near the base of the IV ventricle's caudal end, is where you'll find the CTZ. Proemetic chemicals in the blood circulation or cerebrospinal fluid activate receptors in this region. (Nowak, 2022).

Gastrointestinal symptoms include hyperperistalsis, salivation, tachypnea, and tachycardia. Gastrointestinal reflexes originating from the gastrointestinal tract can occur due to irritants entering the digestive tract, due to abdominal radiation, or due to dilation of the digestive tract (Riska, 2022). This reflex occurs due to the release of local inflammatory mediators from damaged mucosa, which triggers vagal afferent signals. In addition, serotonin is released from enterochromaffin cells of the mucosa. The vomiting center does not appear to be a single anatomical structure, but is the final common pathway of a centrally programmed reflex via medullary interneurons via the tractus solitarius and various sites around the reticular formation. These interneurons receive cortical, vagal, vestibular, and other inputs, especially from the area postrema (Shilpa Sunil Khanna et al., 2022). The area postrema has been identified as a crucial source of input that causes the gag reflex, especially in response to drugs or toxins and pupillary dilation. Parasympathetic responses, on the other hand, are characterised by hypersalivation, esophageal, gastric, and duodenal motility enhancement, and esophageal sphincter relaxation. Antiperistaltic motions might push duodenal contents towards the stomach. The process of gastric emptying involves taking a deep breath in, closing the pylorus and glottis to halt breathing, and quickly emptying the stomach by compressing it between the diaphragm and abdominal muscles. (Shilpa Sunil Khanna et al., 2022).

According to researchers, anesthetic drugs mostly have a vasodilatory effect that causes hypotension and hypoperfusion, thus stimulating CTZ to cause nausea and vomiting. Hypotension will be more dangerous if the body's fluid needs are not met when surgery is to be performed (Beck et al., 2020). Preoperative fluid loss is not only seen from fasting, but also from urine output, fluid loss, third space (internal redistribution of fluid or fluid moving from intravascular to interstitial), and gastrointestinal secretions. Therefore, replacement fluids are needed while the patient is fasting. Finding out how much fluid you need each day (in millilitres), how long you fast (in hours), or how dehydrated you are (in degrees of dehydration) is how you replenish the fluids you lose when fasting. Fluid requirements can be calculated using the 4-2-1 method for fluid maintenance and deficit. Fluid calculations are based on body weight, the first 10 kg are calculated as 4 ml/KgBB/hour, the second 10 kg are calculated as 2 ml/KgBB/hour, the remaining body weight is calculated as 1 ml/KgBB/hour. By fulfilling fasting replacement fluids, it is hoped that the incidence of nausea and vomiting can be reduced.

## Conclusion

Preoperative fluid administration is associated with a lower risk of nausea and vomiting in patients recovering from general anaesthesia at the Anaesthesia Installation of Dr. Saiful Anwar Hospital in East Java Province, according to studies and analyses conducted there. With a somewhat strong positive connection, the second variable indicates that reducing the occurrence of nausea and vomiting following general anaesthesia may be achieved by adequately meeting the preoperative fluid needs..

## Ethics approval and consent to participate

The results of this analysis are then used to conclude a hypothesis which has been approved by the health research ethics commission of the RSSA with letter number 400/165/K.3/102.7/2024

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