Description of Anesthesia Maintenance Drug Therapy In General Anesthesia Patients
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Ahmad Luthfi Virgiawan Habibi[1*], Made Suandika[1], Magenda Bisma Yudha[1]

[1]Anesthesiology Nursing Study Program Applied Undergraduate Program Faculty of Health Harapan Bangsa University

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***Corresponding author:**
Ahmad Luthfi Virgiawan Habibi

Anesthesiology Nursing Study Program Undergraduate Program Faculty of Health Harapan Bangsa University, Indonesia Jl. Raden Patah No.100, Ledug, Kembaran, Purwokerto, Banyumas, Central Java, Indonesia.

Email: aluthfi3008@gmail.com

Abstract

Background: The purpose of general anesthesia is analgesia, eliminating anxiety, amnesia, and loss of consciousness, and suppressing cardiovascular, motor, and hormonal responses to surgical stimulation. Administering sedative and analgesic drugs is an important component in treating all critical patients. Sedatives and analgesics are used for pain management, helping to relieve patient anxiety and discomfort during invasive diagnostic and therapeutic procedures. The main indications for the use of sedatives and analgesics are to treat pain, anxiety, and agitation, amnesia, help in adjusting breathing with mechanical ventilation, and overcome decreased cellular metabolism in patients. The choice of anesthetic drug should be based on patient characteristics and conditions related to surgery and costs. The patient's condition must be really good to receive anesthesia, therefore, to avoid undesirable effects from administering anesthetic drugs, the choice of anesthetic drugs should be based on patient characteristics and conditions related to surgery and costs. During surgery, patients receive various anesthetics as maintenance anesthesia. **Purpose**: To understand the description of anesthesia maintenance drug therapy in general anesthesia patients at RSI Purwokerto. **Method**: This research is descriptive quantitative research with a cross-sectional approach. The sample used in this study was 92 general anesthesia patients at RSI Purwokerto. The sampling technique in this research used purposive sampling. **Research Results**: The anesthesia maintenance drug used at RSI Purwokerto was Sevoflurane as much as 80 (87%), and midazolam was used as much as 2 (2.2%). **Conclusion**: Most of the anesthesia maintenance drugs given to patients at RSI Purwokerto are sevoflurane.

Keywords: anesthesia maintenance; general anesthesia; midazolam; sevoflurane

Introduction

The number of patients undergoing surgical procedures from year to year has increased significantly, in 2015 there were 140 million people who performed surgical procedures in all hospitals in the world, while in 2016 it increased to 148 million people who underwent surgical procedures. Data from the Ministry of Health of the Republic of Indonesia recorded surgical procedures ranked eleventh out of 50 diseases with a percentage of 12.8% in hospitals throughout Indonesia [1].

A surgical procedure is an invasive treatment action through an incision to expose the body segment to be treated and ends with wound closure and suturing [2]. During the surgical procedure, anesthesia is needed to eliminate all modalities of pain sensation, touch, temperature, and position which includes pre-, intra, and post-anesthesia [3]. A surgical procedure known

as anesthesia [3]. Prior to the surgical procedure anesthesia is performed by administering anesthetic drugs through intravenous, inhalation, and draw or combination [4].

Anesthesia is divided into three types, namely general anesthesia, regional anesthesia, and local anesthesia. Of the three types of anesthesia, general anesthesia is the administration of drugs before surgery that can cause loss of consciousness, during medical action the patient cannot be awakened even by very painful stimulation [2]. One of the anesthetic agents, propofol, has been widely used for induction and maintenance of general anesthesia. Using the recommended dose for induction can cause significant hemodynamic changes [5].

The pharmacokinetics of propofol is an intravenous anesthetic that has lipophilic properties where propofol easily penetrates the blood-brain barrier and is also quickly distributed to peripheral tissues which indicates a rapid onset of action, making propofol a popular hypnotic-sedative drug of choice for induction as well as maintenance of anesthesia in almost all types of surgery [6]. The dose of propofol for adult patients is 1-2.5 mg/kgb to induce general anesthesia [7].

Induction of anesthesia is a process of putting the patient to sleep through intravenous anesthetic agents to enter the stage of anesthesia. Where the induction of anesthesia consists of the rapid administration of hypnotic anesthetic agents via intravenous access [8]. The purpose of general anesthesia is analgesia, relief of anxiety, amnesia, loss of consciousness, and suppression of cardiovascular, motor, and hormonal responses to surgical stimulation [9].

In another research study in 100 surgery patients aged 20-60 years with physical status I and II, namely, a group I was given an injection of midazolam (0.08 mg/kg) 2 minutes before induction of anesthesia and continued induction of anesthesia by injection of ketamine (1.0 mg/kg) + propofol (1.0 mg/kg) + succinylcholine as a muscle paralyzer and hemodynamic monitoring was carried out at the time of tracheal intubation which showed very small hemodynamic changes, namely a decrease in diastolic blood by 0,35% and a decrease in systolic blood by 0.12% during induction of anesthesia and in the maintenance phase given propofol (2.0 mg/kg/hour) + ketamine (2.0 mg/kg/hour) and injection of vecuronium bromide as a muscle paralyzer, during monitoring showed hemodynamic stability in the maintenance phase. The main indications for the use of sedatives and analgesics are to manage pain, anxiety agitation, and amnesia, assist in adjusting breathing with mechanical ventilation, and overcome decreased cellular metabolism in patients [10]. One of the commonly used drugs is propofol with ketamine, this combination of drug maintenance shows the stability of the patient's hemodynamics after maintenance. Patients undergoing general anesthesia need assistance to maintain airway patency and positive pressure ventilation is also needed because they experience depression of neuromuscular function [11].

The use of combined propofol has several advantages, the main one being maintaining hemodynamic stability during surgery, in addition to achieving balanced anesthesia [11]. Anesthetic drugs such as anesthetic gases, sedation drugs, and opioids significantly decrease patient ventilation during surgery, which can lead to hypoventilation. Hypoventilation is the main cause of hypoxemia during and after general anesthesia. Oxygen administration is an effort to prevent hypoxemia. Oxygen administration in the operating room is determined based on the level of

hypoxemia, surgical procedure, and patient needs [13].

Patients who are indicated for general anesthesia are patients who are likely to experience significant blood loss or cause respiratory distress. In addition, general anesthesia is also indicated in minor to major surgical procedures such as laparotomy, colostomy, appendicectomy and others [2]

General anesthesia has an impact on the physiological changes of patients including changes in vital signs which include changes in heart rhythm, respiratory disorders, circulation disorders, and thermoregulation disorders [14]. According to Baenziger et al (2020) side effects that usually occur in patients after general anesthesia are temporary confusion, dizziness, urinary retention, nausea, vomiting, throat pain, and hypothermia.

Hypothermic conditions often occur in patients who are not given post-general anesthesia maintenance drugs because general anesthesia affects three elements of thermoregulation, namely afferent input elements, signal regulation in the central region and also efferent responses, general anesthesia can also eliminate the adaptation process and damage physiological mechanisms in thermoregulatory functions by shifting the threshold for the response process of vasoconstriction, shivering, vasodilation, and sweating.

The results of a pre-survey conducted by researchers at RSI Purwokerto found that the number of patients who underwent surgery with general anesthesia was 360 patients in the last three months in October-December 2023, if averaged, patients who underwent surgery with general anesthesia every month were 120 patients. The dose given to patients is also influenced by several factors, one of which is influenced by Body Mass Index (BMI) as much as 24%. Based on the above background, researchers are interested in conducting a study entitled "Overview of Anesthesia Maintenance Drug Therapy in General Anesthesia Patients at RSI Purwokerto".

Methods

This study included descriptive quantitative research with a cross-sectional approach. The sample used in this study were general anesthesia patients at RSI Purwokerto as many as 92 patients. The sampling technique in this study used purposive sampling. The research time and data collection in this study were conducted in June-August 2024 at RSI Purwokerto. This study has received approval from the Chairman of the Health Research Ethics Committee of RSI Purwokerto Number 22/ND/KEPK/RSIP/VII/2024.

Result

Table 1. Characteristics of respondents

Respondent characteristics	f	%
Gender		
Female	56	60,9
Male	36	39,1
Age		
17-25	8	8,7
26-45	57	62,0
46-65	27	29,3
Length of operation		
<1 jam	33	35,9
1-2 jam	55	59,8
>2 jam	4	4,3
Types of anesthetic drugs		
Sevoflurane	90	97,8
Midazolam	2	2,2
Total	92	100

Source: Primary Data 2024

Based on the data obtained from table 1, shows the results that most respondents with female gender as many as 56 (60.9%). The age of respondents was dominated by ages 26-45 years as many as 57 (62%). The majority of the length of

surgery is with a duration of 1-2 hours as many as 55 (59.8%) and the type of anesthetic drug most widely used is sevoflurane as many as 90 (97.8%).

Table 2. Types of drugs based on respondent characteristics

		Type of medicine					
		Sevoflurane		Midazolam		Total	
		f	%	f	%	f	%
Gender	Male	35	38	1	1,1	36	39,1
	Female	55	59,8	1	1,1	56	60,9
Total		90	97,8	2	2,2	92	100
Age	17-25	7	7,6	1	1,1	8	8,7
	26-45	48	52,2	1	1,1	57	62
	46-65	25	27,2	0	0	27	29,3
Total		80	87	2	2,2	92	100
Length operation							
<1 hours		21	22,8	2	2,2	33	35,9
1-2 hours		55	59,8	0	0	55	59,8
>2 hours		4	4,3	0	0	4	4,3
Total		80	87	2	2,2	92	100

Source: Primary Data 2024

Based on the data obtained from table 2, the results show that the type of sevoflurane anesthesia maintenance drug is most widely used in each characteristic, namely female gender as many as 55 (59.8%), then the use of sevoflurane in the age characteristics of 26-45 years as many as 48 (52.2%), and in the characteristics of the length of surgery with a duration of 1-2 hours as many as 55 (59.8%).

Discussions

Based on research that has been conducted at Purwokerto Islamic Hospital, it was found that there were a majority of respondents consisting of 56 women (60.9%). This is in line with Qur'ana's research (2022) which states that the number of preoperative patients between men and women is 12 people (44.4%) male and 15 people (55.5%) female. Research by in women as the most respondents, 76.2% of the 42 respondents.

In the opinion of the researcher, the majority of respondents are female based on several factors. According to higher levels of anxiety are women, because women are more emotionally sensitive, which will affect their feelings of anxiety. So, some of the female patients who performed surgery at RSI Purwokerto asked to be given general anesthesia even though they could use regional anesthesia on the basis of anxiety. Likewise, research conducted by Budikasi et al (2015) that of the 30 respondents, there were 16 people of the female gender.

Sevoflurane anesthesia maintenance drugs were most widely used in the age characteristics of 26-45 years as many as 48 (52.2%). Age is a calculation of age based on the biological maturity of a person. According to Frost [12], age is a factor that affects the recovery of patient consciousness, especially in pediatric and geriatric patients. Advanced age is often followed by various chronic diseases which are strong predictors of surgical risk.

The results of this study are in line with research conducted by [8] where it was found that the majority of respondents were aged 26-45 years (46.7%). These results are also similar to research by Irawati, et al (2020) that found the majority of respondents' ages were in the adult age range of 26-35 years (43.3%). Sevoflurane is an inhaled anesthetic drug that can be used in induction of anesthesia and

maintenance of general anesthesia in pediatric and adult patients. Sevoflurane is a fast-acting liquid volatile anesthetic, stronger than desflurane, anesthesia recovery generally occurs very quicklyIn the opinion of researchers, sevoflurane is widely used in patients aged 26-45 years because sevoflurane has the side effect of respiratory depression which will be more risky if given to elderly patients whose age is> 45 years. This is in line with the 2017 Emanuel Ileatan journal which says that sevoflurane inhalation anesthesia drugs are effectively used for maintenance in patients, because the pulse frequency is in conditions at the time of intra-anesthesia during surgery. All patients undergoing surgery are at risk for PONV. Patients with moderate and high risk of PONV are considered for combination use. No drug has been proven to effectively block all pathways to the vomiting center. In the opinion of the researcher, the administration of midazolam maintenance drugs in the IBS room of RSI Purwokerto aims to prevent post-anesthesia nausea and vomiting. Midazolam has a longer recovery time than sevoflurane, which can be a consideration for midazolam to be used less than sevoflurane.

Based on research that has been conducted by researchers at Purwokerto Islamic Hospital, it is found that the length of surgery for <1 hour is 35.9% and surgery for 1-2 hours is 59.8% while for surgery >2 hours is 4.3% this result is due to operator skills or operator experience and mostly due to minor surgical operations (light surgery) during researchers collecting data, so that the length of surgery is mostly completed within 1-2 hours. This is in line with a national web-based survey conducted by Yasunaga et al (2019) in several health departments, which states that experienced surgeons or surgical operators have faster or shorter operating times. The length of surgery is the length of time a patient undergoes surgery, starting from the time the patient is transferred to the operating table until moving to the recovery room. The length of surgery and anesthesia can have a big impact, especially with anesthetics that have a high concentration, especially fat contained in tissues and blood, solubility, and longer anesthesia time so that these agents must balance these tissues (15). Researchers assume that the length of surgery for each respondent will be different depending on the type of surgery performed. The length of time of surgery is calculated from the time the patient gets the first incision until after being transferred to the recovery room. The results of this study are also in line with research conducted by [7]]that the results obtained with the most length of operation are 1-2 hours (65.7%). In Andi Gunawan's research (2022) similar results were obtained, that the dominating length of surgery was 1-2 hours (50%).

Based on the data obtained from table 1, it shows that most of the anesthesia maintenance drugs used at RSI Purwokerto are Sevoflurane as much as 90 (97.8%) and midazolam as much as 2 (2.2%). This study is in line with the theory (Keat, 2015), for most cases intravenous (IV) is used for induction and inhalation agents are used for maintenance. Anesthesiologists at RSI Purwokerto more often use sevoflurane because the use of sevoflurane is an anesthetic that is protective and also causes the least airway irritation so it is suitable for use as an anesthetic maintenance drug. According to researchers, this is in line with the theory of [4]. Sevoflurane has the fastest induction and recovery process of all inhalation anesthesia drugs available at this time, this causes most general anesthesia operations at RSI Purwokerto to use sevoflurane as the most commonly used maintenance drug there. Sedative drugs that are often used in clinical practice in the intensive care unit include midazolam. In

this study, the maintenance drug used in addition to sevoflurane was midazolam. However, sedation with continuous infusion of midazolam in critical patients is at risk of causing drug accumulation and metabolites, due to the high volume of drug distribution and its lipophilic nature.

Based on the data obtained from Table 2, the results show that the type of sevoflurane anesthesia maintenance drug is most widely used in each characteristic, namely female gender as many as 55 (59.8%), then the use of sevoflurane in the age characteristics of 26-45 years as many as 48 (52.2%), and in the characteristics of the length of surgery with a duration of 1-2 hours as many as 55 (59.8%).

According to Mangku and Senapathi (2010), Sevoflurane is a halogenated ether that has the fastest maintenance process of existing inhalation anesthetic drugs. Sevoflurane is relatively stable and does not cause arrhythmia during anesthesia. Vascular resistance and cardiac output decrease slightly so that blood pressure also decreases slightly, this could be one of the reasons why sevoflurane maintenance drugs are most widely used in all characteristics.

The results of this study are in line with the research of Emanuel Ileaten, saying that sevoflurane inhalation anesthesia drugs are effectively used for maintenance in patients, because the pulse frequency is in conditions at the time of intra-anesthesia during surgery. To maintain the security and safety of patients, so that during the administration of anesthesia the patient's condition needs to be monitored intensively by nurse anesthetists. Things that need to be monitored are hemodynamic changes, one of which is changes in pulse frequency and further research is also needed regarding the effect of sevoflurane inhalation anesthetic drugs in terms of other hemodynamics, analgesics and postoperative conditions.

In age characteristics, sevoflurane is widely used in the age range of 26-45 years because these ages have the least risk factors. Sevoflurane has a MAC of 2%. Its effect on the respiratory system is the same as other inhaled anesthetic drugs, which also cause respiratory depression whose degree is proportional to the dose given so that the tidal volume decreases, but the frequency of breathing increases slightly [4]. This will be more risky if given to the elderly aged 46-65 years because the elderly have a degenerative decline, one of which affects the respiratory system.

In the characteristics of the duration of surgery, sevoflurane is widely used in the operating time range of 1-2 hours. The longer the duration of surgery, the greater the risk of postoperative nausea and vomiting. In the opinion of the researcher, this could be the reason why sevoflurane is often used in operations with a medium duration of 1-2 hours. This is in line with the research of Desvita Rosana et al, where there are results that the number of subjects who experienced nausea and vomiting in the propofol group was one patient, significantly lower when compared to the sevoflurane group of 15 patients.

Limitation

There are limitations in this study: it is a single center study which restricts the application of findings to other centers, the limited sample size of 92 patients, which reduces statistical power, and also, the descriptive quantitative approach that does not determine causal inference-the patient outcomes were not analyzed-and lastly, the cross-sectional design that does not allow for trends to be determined over time. Future research should have a larger sample size, multiple health center sites, be longitudinal in approach, and include patient outcome measures for a more

comprehensive understanding of the therapeutic management, in terms of drugs used for anesthesia maintenance, and their effects in the long term.

Conclusion

The findings indicate that the majority of patients receiving general anesthesia were female (60.9%) and predominantly aged between 26-45 years (62%). Most surgical procedures lasted between one to two hours (59.8%). Regarding anesthesia maintenance therapy, sevoflurane was the most widely used drug (97.8%), while midazolam was administered in only 2.2% of cases. The preference for sevoflurane can be attributed to its rapid induction and recovery properties, as well as its minimal airway irritation, making it an ideal choice for anesthesia maintenance [16]. Moreover, the drug was most frequently used among female patients, those aged 26-45 years, and those undergoing surgeries lasting between one to two hours [17-19]. These findings highlight the importance of selecting anesthesia maintenance drugs based on patient characteristics, surgical factors, and potential side effects. Furthermore, rigorous monitoring by medical personnel is essential to ensure the safety and effectiveness of anesthesia administration throughout surgical procedures.

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Conflict of Interest Statement

The authors have confirmed that they have no competing interests.

Data Availability

The datasets used or generated in this study are available from the corresponding author upon reasonable request.

Author Contributions

Ahmad Lutfi Virgiawan Habibi: Conception and design of the study, Search Data Base, Methodology, Analysis Risk of Bias, Data Analysis and Interpretation, Writing, Review and Editing. **Made Suandika:** Study conception and design, search database, methodology, data analysis and interpretation, and writing, review, and editing. **Magenda Bisma Yudha:** Conception and design of the study, Search Database, Methodology, Data Analysis, and Interpretation, Writing, Review, and Editing.

References

1. Kemenkes RI. (2018). Hasil Riset Kesehatan Dasar Tahun 2018. *Kementrian Kesehatan RI*, *53*(9), 1689–1699.
2. Townsend, C. M., Beauchamp, R. D., Evers, B. M., & Mattox, K. L. (2012). *Sabiston Textbook of Surgery E-Book*. Elsevier Health Sciences. https://books.google.co.id/books?id=nvz_mItQyM4C
3. Yao, F.-S. F. (2014). *Yao & Artusio's anesthesiology: Problem-oriented patient management: Seventh edition*.
4. Mangku, G., & Senapathi, T. G. A. (2017). *Buku Ajar Ilmu Anestesia*

dan Reanimasi. https://api.semanticscholar.org/CorpusID:80289763

5. Indra, B., Widodo, U., & Widyastuti, Y. (2016). Perbandingan Insidensi Hipotensi Saat Induksi Intravena Propofol 2 Mg/Kg Bb Pada Posisi Supine dengan Perlakuan dan Tanpa Perlakuan Elevasi Tungkai. *Jurnal Kesehatan Andalas*, *5*(1), 238–242. https://doi.org/10.25077/jka.v5i1.476
6. Katzung, B. G. (2017). Basic & Clinical Pharmacology, 14e. In *Basic &; Clinical Pharmacology, 14e*. McGraw-Hill Education. http://accesspharmacy.mhmedical.com/content.aspx?aid=1148432153
7. Dhiu, D. T., Utami, T., & Ndaong, N. A. (2021). Perbandingan Onset, Durasi Anastesi dan Masa Pemulihan dari Pemberian Kombinasi Anastesi Acepromasin-Propofol-Ketamin dan Midazolam-Propofol-Ketamin pada Anjing Lokal. *Jurnal Veteriner Nusantara*, *4*(1), 1–11.
8. Suranadi, I. W. (2016). Profil Penurunan Tekanan Darah Pasca Induksi Dengan Anastesi Umum Di Rsup Sanglah Periode Juli 2016-Desember 2016. *BMC Public Health*, *5*(1), 1–8.
9. Latief, S. A. (2010). Buku Petunjuk Praktis Anestesiologi Edisi Kedua. In *Anestesiologi dan Terapi Intensif FK-UI* (Edisi 2, Issue 2006).
10. Keogh, E., Hughes, S., Ellery, D., Daniel, C., & Holdcroft, A. (2016). Psychosocial influences on women's experience of planned elective cesarean section. *Psychosomatic Medicine*, *68*(1), 167–174.
11. Sirait, R. H., & Yuda, B. (2021). Profil Hemodinamik Pasien yang Menjalani Seksio Sesarea dengan Anestesi Spinal pada Primipara dan Multipara di RSU UKI Periode Tahun 2015-2017. *Bunga Rampai Santifika*, 2013–2015.
12. Simanjuntak, V., Oktaliansah, E., & Redjeki, I. (2013). Perbandingan Waktu Induksi, Perubahan Tekanan Darah, dan Pulih Sadar antara Total Intravenous Anesthesia Profopol Target Controlled Infusion dan Manual Controlled Infusion. *Jurnal Anestesi Perioperatif*, *1*. https://doi.org/10.15851/jap.v1n3.194
13. Rehatta, N. M. (2019). *Anatomi Sistem Saraf Buku Teks Anestesiologi dan Terapi Intensif.pdf* (pp. 18–48).
14. Smeltzer, S. ., Bare, B. ., Hinkle, J. L., & Cheever, K. . (2015). Handbook for Brunner and Suddarth's Textbook of Medical-Surgical Nursing. In *Lippincott Williams & Wilkins*.
15. Mubarokah, P. (2017). Faktor-Faktor yang Berhubungan dengan Hipotermi Pasca General Anestesi di InstalasiBedah Sentral RSUD Kota Yogyakarta. Politeknik Kesehatan Kementerian Yogyakarta
16. Pramudya Gurensky G, Sukmaningtyas W, Burhan A. Overview of Mean Arterial Pressure (MAP) Changes in Patients After General Anesthesia at Juanda Kuningan Hospital West Java: English. Java Nurs J. 2023 Oct 16;1(2):88–96.
17. Maryadi A, Rahmaya Nova Handayani, Eza Kemal Firdaus, Asmat Burhan. The Correlation between Body Mass Index (BMI) and Recovery Time on General Anesthesia Patient Using Endotracheal Tube (ET). Java Nurs J. 2024 Feb 1;2(1):1–6.
18. Mutia L, Novitasari D, Burhan A.

The Relationship Between Pre-Anesthesia Anxiety and the Incidence of Post-Operative Nausea and Vomiting (PONV) in Patients Undergoing General Anesthesia at Islamic Hospital Purwokerto. Java Nurs J. 2024 Feb 1;2(1):93–102.

19. Romdani Rm, Burhan A, Wibowo Th, Suandika M. Efektivitas Aromaterapi Cajuput Oil Terhadap Post Operative Nausea And Vomiting (Ponv) Pada Pasien Elektif Dengan General Anestesi Di Rsud Dr. Soekardjo Kota Tasikmalaya. J Kesehat Tambusai. 2024 Nov 29;5(4):11133–42.