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A SURVEY ON ANESTHESIA MANAGEMENT PRACTICE BY SMALL ANIMAL VETERINARIAN IN DKI JAKARTA AND WEST JAVA PROVINCES

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ABSTRACT

This study was conducted to indetify the anesthesia management practice of small animal veterinarian in DKI Jakarta and West Java Province. This study was designated to the members of the Indonesian Veterinary Medical Association (IVMA) in DKI Jakarta and West Java Province between May and August 2023. The sample size was calculated with the Slovin method which covered 260 respondents with a significance level of 5.4%. Questions was focused mainly on the respondent's identity, perianesthesia procedures, and anesthesia topic for continuing professional development. The majority of respondents performed ≤5 cases of anesthesia per week in dogs (76.9%) and cats (36.2%). Preanesthesia physical examination was carried out by >96% of respondents. Premedication was always given to dogs (66.2%) and cats (63.5%). IV catheter placement was always given in 41.2% of dogs and frequently in 38.5% of cats. Atropine was the most widely used premedication agent (>88%) and meloxicam mainly used for analgesic (>57%). The induction agent widely used was ketamine (>34), while the maintenance agent was isoflurane in dogs (43.5%) and ketamine in cats (37.3%). The anesthesia monitoring tools that are widely used were thermometers (89.6%) and pulse oximeters (38.8%). As conclusion, the majority of respondents were considered to have understood anesthesia management in accordance with recommendations, however, this understanding could be improved through continuing education.

Key words: analgesia, inhalation anesthesia, injection anesthesia, anesthesia monitoring, small animal veterinarian

ABSTRAK

Penelitian ini bertujuan mengidentifikasi pemahaman dan tata laksana dokter hewan praktisi terkait manajemen anestesi di Provinsi DKI Jakarta dan Jawa Barat. Metodologi penelitian ini menggunakan survei yang terdiri atas 62 pertanyaan terhadap anggota Perhimpunan Dokter Hewan Indonesia (PDHI) di DKI Jakarta dan Jawa Barat. Survei dilakukan pada 10 Mei hingga 10 Agustus 2023. Jumlah sampel dihitung dengan metode Slovin yaitu 260 responden dengan tingkat signifikansi 5,4%. Pertanyaan difokuskan pada identitas responden, prosedur perianestesia, dan topik anestesi untuk pengembangan diri. Mayoritas responden melakukan ≤5 kasus anestesi per minggu pada anjing (76,9%) dan kucing (36,2%). Pemeriksaan fisik praanestesi dilakukan oleh >96% responden. Pramedikasi selalu diberikan pada anjing (66,2%) dan kucing (63,5%). Pemasangan kateter iv selalu diberikan pada 41,2% anjing dan sering pada 38,5% kucing. Sebagian responden (>47%) tidak menggunakan intubasi endotrakeal. Atropin menjadi agen pramedikasi yang banyak digunakan (>88%). Agen induksi yang banyak digunakan adalah ketamin (>34%), sedangkan agen maintenance adalah isofluran (43,5%) pada anjing dan ketamin (37,3%) pada kucing. Meloxicam (>57%) menjadi analgesik yang banyak digunakan. Alat monitoring anestesi yang banyak digunakan adalah termometer (89,6%) dan pulse oksimeter (38,8%). Dapat disimpulkan bahwa mayoritas responden dinilai sudah memahami tata laksana anestesi sesuai dengan rekomendasi, akan tetapi pemahaman ini dapat ditingkatkan melalui pendidikan berkelanjutan.

Kata kunci: analgesik, anestesi per inhalasi, anestesi per injeksi, pemantauan anestesi, praktisi hewan kecil

INTRODUCTION

Anesthesia is an important aspect in veterinary medicine, it's used for restraints, diagnostics and surgical procedures. Safer anesthetic management and better monitoring of small animals is possible due to advances in technology, increased sensitivity, and reduced costs of certain devices (Nicholson and Watson 2001). Economic considerations are usually of little importance to small animal owners, therefore modern practice is able to promote better anesthetic management, comparable to that used in humans. Anesthesia includes four phases: preanesthesia/premedication, induction, maintenance, and recovery (Grubb *et al.* 2020). Several guidelines have been published, such as the Anesthesia and Monitoring Guidelines for Dogs and Cats, published by the American Animal Hospital Association (AAHA), including recommendations for best practices in preanesthesia examination, anesthesia monitoring, and analgesia (Lalonde *et al.* 2021).

Several studies regarding the management of anesthesia in animals have been carried out in several countries. Previous studies in the UK examined the use of anesthetic agents and monitoring equipment in relation to morbidity and mortality (Clarke and Hall 1990). A survey of practitioners in Vermont, USA, measured morbidity and mortality in dealing with workplace anesthetic gas and vapor pollution (Dodman and Lamb 1992). Another study focused on anesthesia morbidity and mortality in veterinary practices in Ontario (Dyson *et al.* 1998) and a veterinary teaching hospital in Colorado (Gaynor *et al.* 1999). A New Zealand study assessed anesthesia equipment used in veterinary practice, including the safety and function of the equipment (Scuffham *et al.* 1995). Another study to examine the use of anesthetic drugs used and monitoring devices used in Australia (Nicholson and Watson 2001). New research assesses the standards of anesthesia practiced by practitioners in New Zealand to improve education about anesthesia (Sano *et al.* 2018). There are several published guidelines outlining

minimum standards of care for anesthesia and analgesia (Gates *et al*. 2020). To date, there is no information available regarding the small animal anesthesia practice in Indonesia.

This study aims to evaluate the understanding and management of anesthesia including techniques, drug choices, aspects of anesthesia management, pre-anesthesia examination, analgesia, anesthesia monitoring carried out by small animal practitioner veterinarians. The benefit of this research is to increase the knowledge and understanding of practicing veterinarians regarding anesthesia management.

MATERIALS AND METHODS

Research Procedure

This study was aimed at practicing veterinarians in several veterinary clinics in the Provinces of DKI Jakarta and West Java. The sampling method used in this research was Simple Random Sampling method. Determination of respondent's number in this study used the Slovin method at a significance level of 5.4% (Sugiyono 2011). Based on calculations using the Slovin method, the sample size used was 260 samples or 260 practicing veterinarians at veterinary clinics in DKI Jakarta and West Java. Data on practicing veterinarians in DKI Jakarta and West Java was obtained from the the Indonesian Veterinary Medical Association (IVMA) with a population of 1049 people. IPB's School of Veterinary Medicine and Biomedicine issued a cover letter addressed to IVMA to obtain data on practicing veterinarians in each region.

The research methodology uses a survey conducted by filling out an online-based questionnaire (Google Form). The survey consists of 62 questions. The survey can only be completed once by each respondent (cannot be completed repeatedly). The criteria for respondents were all practicing veterinarians at animal clinics. Respondent information contained the veterinarian's name, gender, year of graduation, and work experience in the clinic. The identity of the respondent was kept confidential. Veterinary clinic information consists of small animal practices (number of small animals >65%) and mixed animal (number of small animals <65%).

The questionnaire was distributed from May 10th to August 10th, 2023, and an email reminder was sent on July 20th, 2023. Respondents were invited to participate voluntarily via social media, email and in-person visits. At each veterinary clinic, the questionnaire was filled by all practicing veterinarians who practice at the respective veterinary clinic. Filling out the questionnaire took place without coercion or pressure. Researchers assumed that respondents have a well-knowledge on anesthesia management and have followed guidelines properly.

Data Analysis

All the questions were subjected to the validity and reliability tests. The validity test aims to check the validity of the instrument or question items in the questionnaire. The test results showed that all questions have a calculated r value >r table (0.1), thus all questions were proven to be valid at a level of 5.4%. Reliability test was measured using a Cronbach`s alpha (α) formula (Sugiyono 2007). The criteria for data are reliable if the Cronbach's alpha value is >0.6.

Survey responses were transferred to the Microsoft Excel application. Responses to each question were aggregated and reported as whole numbers and percentages of the total number of respondents to each question. Free-text answers to questions were interpreted and then summarized. The statistical analysis carried out was a descriptive test of the responses.

RESULTS AND DISCUSSIONS

The distribution of practice locations of veterinarians who were respondents is presented in Table 1. The total respondents, 95% came from Small Animal (SA) practicing veterinarians and 5% came from Mixed Animal (MA) practicing veterinarians. The age, experience, and gender of the responding veterinarian might have influenced the results. Younger veterinarians tended to use drugs and techniques based on what they had obtained during their education (Sano *et al.* 2018). The frequency of anesthesia cases handled within 1 week could be seen in Table 2. The highest frequency was ≤5 anesthesia cases per week, 76.9% in dogs and 36.2% in cats. Some respondents also handled more than 20 anesthesia cases, both in dogs (1.2%) and cats (3.8%).

Preanesthesia Examination, Anesthesia Management and Anesthesia Agents

The various preanesthesia examinations carried out on old and young animals could be seen in Table 3. Physical examinations were carried out by almost all respondents on both old and young animals, 96.5% and 97.7% respectively. Almost all respondents reported that they performed a physical examination as part of the preanesthesia examination, regardless of the patient's age. Pre-anesthesia examination must be carried out with the expectation that the results will be relevant to the patient's condition so that it could be treated optimally (Joubert 2007). This was a mandatory part of good anesthesia practice. Other supporting examinations were carried out more often on old animals compared to young animals, such as examining blood cells in old animals as much as 89.6%, while in young animals it was 64.6%. Likewise, with blood biochemical examinations which include Blood Urea Nitrogen (BUN), ureum, creatinine, Alanine aminotransferase (ALT), Alkaline Phosphatase (ALP), and others. The difference in blood biochemical examination in old and young animals appeared to be different, 71.9% and 22.3%, respectively. Blood biochemistry was becoming the diagnostic test of choice and could be used to assess the functional capacity of several organ systems considered important in anesthesia. Blood pressure checks were rarely performed in old and young animals, 17.7% and 6.5%

respectively. AAHA guidelines recommend a series of standard tests be performed before anesthesia. This was different from the statement by the Association of Veterinary Anesthetists (AVA) in 1998, which suggested that hematological and biochemical examinations were not needed if the animal had been declared healthy through adequate clinical examination. This AVA recommendation was also useful for reducing unnecessary costs. However, our survey did not ask about the health status of anesthetized animals. Therefore, this type of preanesthesia examination was more often performed on old animals than on young animals. Chest radiographs were performed more frequently in old animals (31.9%) compared to young animals (3.8%). This was related to the influence of age on the health of the thoracic cavity. Electrocardiography and echocardiography have rarely been reported in young or old animals. Meanwhile, urinalysis was performed more on old animals as much as 12.3%. This might be related to disorders of the urinary system of older cats (Dorsch *et al.* 2019).

As many as 56.5% of respondents always prepare emergency medicines for surgical procedures to be carried out to increase safety for patients, including epinephrine, atropine, aminophyllin, dopamine, vasopressin and furosemide. Premedication administration was divided into 4 categories (always (>70%), often (40-70%), rarely (<30%) and never. As many as 66.2% of respondents in dogs and 63.5% in cats always gave premedication before anesthesia (Table 4). Selection of appropriate premedication drugs could improve intraoperative cardiovascular stability,

Table 1. Number of respondents (%) based on location and type of practice in the survey of anesthesia management in DKI Jakarta and West Java Province

Location	Small animal (%)	Mixed animal (%)	Total (%)
Bekasi	67 (25.8)	4 (1.5)	71 (27.3)
East Jakarta	44 (16.9)	1 (0.4)	45 (17.3)
Bogor	35 (13.5)	5 (1.9)	40 (15.4)
South Jakarta	38 (14.6)	1 (0.4)	39 (15)
West Jakarta	19 (7.3)	0 (0)	19 (7.3)
Depok	17 (6.5)	0 (0)	17 (6.5)
Bandung	14 (5.4)	0 (0)	14 (5.4)
North Jakarta	8 (3.1)	2 (0.8)	10 (3.8)
Central Jakarta	5 (1.9)	0 (0)	5 (1.9)
Total	247 (95)	13 (5)	260 (100)

Table 2. Average number (%) of dogs and cats anesthesia cases every week handled by respondents in DKI Jakarta and West Java Province

Cases frequency in 1 week	Dog (%)	Cat (%)
≤5 cases	200 (76.9)	94 (36.2)
6-10 cases	48 (18.5)	93 (35.8)
11-15 cases	8 (3.1)	49 (18.8)
16-20 cases	1 (0.4)	14 (5.4)
>20 cases	3 (1.2)	10 (3.8)
Total	260 (100.0)	260 (100.0)

Table 3. Number of respondents (%) carried out preanesthesia examinations on young and old animals

Preanesthesia examination	Age (%)	
	Young	Old
Physical examination	254 (97.7)	251 (96.5)
Complete blood count	168 (64.6)	233 (89.6)
Blood biochemistry	58 (22.3)	187 (71.9)
Blood pressure	17 (6.5)	46 (17.7)
Thoracic radiograph	10 (3.8)	83 (31.9)
Urinalysis	5 (1.9)	32 (12.3)
Electrocardiograph	1 (0.4)	15 (5.8)
Echocardiograph	1 (0.4)	10 (3.8)
Other	4 (1.5)	7 (2.7)

Table 4. Number of respondents (%) who performed premedication, IV catheter placement, endotracheal intubation, and administration of supplemental oxygen to dogs and cats during anesthesia procedures

Anesthetic procedure	Animal	Number of respondents (%)			
		Always	Sometimes	Rarely	Never
Premedication	Dog	172 (66.2)	41 (15.8)	31 (11.9)	16 (6.2)
	Cat	165 (63.5)	51 (19.6)	41 (15.8)	3 (1.2)
Venous catheter	Dog	107 (41.2)	60 (23.1)	56 (21.5)	37 (14.2)
	Cat	49 (18.8)	100 (38.5)	85 (32.7)	26 (10.0)
Intubation	Dog	52 (20.0)	43 (16.5)	51 (19.6)	114 (43.8)
	Cat	20 (7.7)	45 (17.3)	72 (27.7)	123 (47.3)
Supplemental oxygen	Dog	39 (15.0)	47 (18.1)	78 (30.0)	96 (36.9)
	Cat	31 (11.9)	50 (19.2)	86 (33.1)	93 (35.8)

perioperative analgesia and quality of recovery, so that premedication could improve patient safety. Premedication could be given intravenously, intramuscularly, subcutaneously and orally (Seymour and Tanya 2007). Combinations of premedication agents (sedative, analgesics, and anticholinergics) as first and alternative choices in dogs and cats were presented in Table 5. Xylazine was the first-choice sedative and most widely used in both dogs and cats, 43.5% and 56.5% respectively. Xylazine had good muscle relaxant and analgesic effects (Abouelfetouh *et al.* 2021). Methadone was the most commonly used analgesic of first choice in both dogs (11.2%) and butorphanol in cats (10%). Most respondents did not use analgesics as premedication. Respondents gave atropine to dogs (88.1%) and cats (91.5%). Atropine could reduce saliva secretion, preventing the effects of respiratory problems and vomiting during and after surgery (Sheen *et al*. 2014). Glycopyrrolate was not used as a first-choice premedication by respondents.

The first choice and alternative anesthesia induction agents given by respondents to dogs and cats could be seen in Table 6. Ketamine was the first choice most used in dogs and cats, with the ketamine-xylazine combination being the most widely used. The combination of ketamine and xylazine as an anesthesia induction was very popular for use in small animals in Indonesia. The protocol was generally preceded by administration of atropine sulfate as premedication. Ketamine produces anesthesia and analgesia with minimal depression of the cardiovascular system. Xylazine causes sedation and muscle relaxation and had analgesic properties. This drug combination had significant potential in reducing the dose of isoflurane required for maintenance anesthesia (David *et al.* 2022). In this study, propofol was used more frequently in dogs (19.2%). Okta *et al*. (2017) explained that propofol was often used because of the fast recovery time. The maintenance agents given to dogs and cats could also be seen in Table 6. Isoflurane was the first choice mostly used in dogs at 43.5%, while ketamine in cats was 45.8%. IV catheter placement was given by 41.2% of respondents to dogs in the always category, while 38.5% to cats in the sometimes category (Table 4). Providing fluid therapy during anesthesia was also one of the aspects asked about by respondents. Fluid therapy plays an important role in maintaining homeostasis (Hoste *et al*. 2014). As many as 40.4% of respondents stated that fluid therapy was given at <10 mL/kg/hour. This was in accordance with guidelines published by Davis *et al*. (2013), that in normovolemic patients, the appropriate administration is 3 ml/kg/hour in cats and 5 mL/kg/hour in dogs. This latest recommendation was given to avoid the adverse effects associated with hypervolemia, especially in cats (due to their small blood volume). A small number of respondents did not use an IV catheter, this may be because some surgical procedures on cats, such as castration, were carried out in a relatively short time.

Table 5. Number of respondents (%) who choosed sedative, analgesic and anticholinergic drugs as main preferrence and alternative premedication agents for anesthesia procedures

Premedication		Dog (%)		Cat (%)	
		Main	Alternative	Main	Alternative
Sedative	Xylazine	113 (43.5)	81 (31.2)	147 (56.5)	82 (31.5)
	Acepromazine	59 (22.7)	37 (14.2)	34 (13.1)	39 (15)
	Medetomidine	23 (8.8)	34 (13.1)	28 (10.8)	29 (11.2)
	Other	65 (25)	108 (41.5)	51 (19.6)	110 (42.3)
	Subtotal	260	260	260	260
Analgesic	Metadon	29 (11.2)	24 (9.2)	25 (9.6)	22 (8.5)
	Butorphanol	25 (9.6)	17 (6.5)	26 (10)	21 (8.1)
	Buprenorphine	12 (4.6)	8 (3.1)	11 (4.2)	6 (2.3)
	Other	194 (74.6)	211 (81.2)	198 (76.2)	211 (81.2)
	Subtotal	260	260	260	260
Anticholinergic	Atropin	229 (88.1)	141 (54.2)	238 (91.5)	147 (56.5)
	Glycopyrrolate	0 (0)	2 (0.8)	0 (0.0)	1 (0.4)
	Other	31 (11.9)	117 (4.)	22 (8.5)	112 (43.1)
	Subtotal	260	260	260	260

Table 6. Number of respondents (%) who choosed induction and maintenance drugs as main preference and alternative agents for anesthesia procedures

Anesthesia agent		Dog (%)		Cat (%)	
		Main	Alternative	Main	Alternative
Induction	Ketamine	89 (34.2)	86 (33.1)	101 (38.8)	98 (37.7)
	Ketamine/Xylazine	63 (24.2)	63 (24.2)	93 (35.8)	59 (22.7)
	Propofol	50 (19.2)	43 (16.5)	21 (8.1)	38 (14.6)
	Tiletamine/ Zolazepam	28 (10.8)	18 (6.9)	35 (13.5)	20 (7.7)
	Other	30 (11.5)	50 (19.2)	10 (3.8)	45 (17.3)
	Subtotal	260	260	260	260
Maintenance	Isoflurane	113 (43.5)	50 (19.2)	97 (37.3)	58 (22.3)
	Ketamine	102 (39.2)	109 (41.9)	119 (45.8)	113 (43.5)
	Tiletamine/ Zolazepam	15 (5.8)	19 (7.3)	24 (9.2)	20 (7.7)
	Other	30 (11.5)	82 (31.5)	20 (7.7)	69 (26.5)
	Subtotal	260	260	260	260

Some respondents reported that endotracheal intubation was not used in dog (43.8%) or cat (47.3%) anesthesia, as can be seen in Table 4. Endotracheal intubation was more commonly performed in dogs than in cats. Endotracheal intubation was used to maintain the airway during general anesthesia, prevent foreign objects from entering the oropharynx, and deliver inhaled anesthetic gases appropriately to the patient. However, endotracheal intubation was also associated with an increased risk of anesthetic complications, such as tracheal damage in cats. Several factors need to be considered in performing this protocol, including the experience of the person performing the intubation, and the potential for complications (Hofmeister *et al.* 2007). This might be related to the majority of respondents' work experience in the field of practice for <1 year (23.1%) and 1-5 years (55.4%). A small number (16%) of respondents provided supplemental oxygen using a mask or flow-by to dogs and cats if they were not intubated. Since most anesthetic agents affect cardiopulmonary function, supplemental oxygen is considered mandatory for all but short procedures. The low number of respondents who provided oxygen during anesthesia was thought to be due to the short duration of anesthesia. In this study, we did not evaluate the duration of anesthesia given. One of the most common actions performed by veterinarians using anesthesia was elective surgery with a relatively short duration. From the data of 260 respondents, 6.5% stated that local anesthesia was always used in certain cases, 23.8% often, 53.8% rarely, and 15.8% never. Local anesthesia was rarely used by most respondents, indicating that respondents more often use general anesthesia in most surgical procedures. This is related to better animal welfare such as freedom from pain and discomfort.

Postoperative Analgesia

Analgesic drugs used by respondents for post-ovariohysterectomy surgery in dogs and cats could be seen in Table 7. Postoperative analgesic drugs for ovariohysterectomy were divided into two groups, namely opioids and non-steroidal anti-inflammatory (NSAID) drugs. Most respondents did not use opioid analgesics after ovariohysterectomy surgery, similar to respondents' answers for premedication. However, fentanyl and tramadol were the most commonly used opioid drugs in dogs and cats, while meloxicam and ketoprofen were the most commonly used NSAID drugs in dogs and cats. Meloxicam was the most commonly chosen NSAID for dogs and cats. Most respondents reported that they gave NSAIDs after the patient was awake. The timing of NSAID administration after ovariohysterectomy in dogs and cats also varied. As many as 10% answered before anesthesia, 6.5% during anesthesia, 27.3% immediately after anesthesia, and 44.2% after the patient was awake from anesthesia. Postoperatively, patients would suffer from acute inflammatory pain caused by tissue injury. Therefore, NSAIDs play an important role in the management of mild to moderate pain in patients (Berry 2015). Respondents were aware of the potential complications of NSAID use if given preoperatively and the importance of pain management. As many as 68.8% of respondents always make special observations during the postoperative recovery period.

Anesthesia Machine

Most respondents did not answer questions related to inhalation anesthesia, so the researcher assumed that only a small number of respondents used the anesthesia machine. As many as 14.6% of respondents chose a weight limit of 7-8 kg between the closed/rebreathing circuit and semiclosed/nonrebreathing circuit systems, 49.2% chose not to know. The semiclosed system used by respondents can be seen in Table 8. Anesthesia machines installed with nonrebreathing circuits or rebreathing circuits function to channel oxygen and inhalation anesthesia to patients and to prevent rebreathing of carbon dioxide by patients. Nonrebreathing circuits were commonly used for cats and small dogs (patients weighing 3-5 kg) (Grubb *et al*. 2020). In this study, the Humphrey ADE was the most commonly used nonrebreathing circuit. The Humphrey ADE was designed as a low-flow anesthesia breathing system, with the ability to function as a Mapleson A, D or E system. The Humphrey ADE could be adapted to a rebreathing system with the addition of a CO2 absorber, and had a variety of modes in one system that make it popular in the veterinary field. The manufacturer recommends that in veterinary patients it be used as a nonrebreathing system for animals weighing <7-10 kg, and as a rebreathing system (with CO2 absorber) for larger animals (Gale *et al.* 2015).

The oxygen flow rate used in the closed system for patients weighing 10 kg was <1 L/m and 1-2 L/m, respectively by 22.3% and 20% of respondents. This was in accordance with the AAHA Anesthesia and Monitoring Guidelines for Dogs and Cats, that the oxygen flow rate when using a rebreathing circuit is 2 L/m. Low oxygen flow rates maintain humidity and heat. The types of vaporizers used could be seen in Table 8. Among the veterinarians who responded, the VP 500 was the most widely used vaporizer. However, most respondents did not mention the type of vaporizer or did not have a vaporizer. As many as 10.8% of respondents stated that they always use a ventilator, 15% often, 17.7% rarely, and 56.5% do not use a ventilator.

Anesthesia Monitoring

Respondents were asked about the anesthesia monitoring equipment used which was presented in Table 9. Thermometers were the most widely used monitoring equipment, as many as 89.6% of respondents and pulse oximeters as many as 38.8%. The use of appropriate anesthesia monitoring equipment by skilled anesthesiologists was likely to reduce morbidity and mortality. Most of the respondents use thermometers and pulse oximeters in their practice. These examinations were easy to use, non-invasive and relatively inexpensive. Thermometers were used to measure body temperature (Wright 2016). Pulse

oximeter was used to monitor the patient's respiratory system status. Pulse oximeter was useful in providing early warning of hypoxemia (Jubran 2015).

Careful monitoring, interpretation of physiological changes, and response to the patient's physiological status by trained staff are important. Monitoring reduces the likelihood of death from anesthesia (Grubb *et al*. 2020). Respondents had an anesthesiologist as the person who monitored while anesthesia was in progress. Of the 260 respondents, 53.1% had an anesthesiologist and 46.9% did not have an anesthesiologist. The presence of an anesthesiologist in the surgical team can reduce risks and complications during surgery.

Continuing Education Topics

Respondents were asked to choose topics of interest for further study as insight development. As many as 26.9% of respondents chose anesthesia monitoring, 25.8

Table 7. Number (%) of opioid and NSAID drugs used for analgesia after ovariohysterectomy surgery in dogs and cats by respondents in DKI Jakarta and West Java Province

Post-operative analgesic			Dog (%)	Cat (%)
Opioid	Fentanyl		62 (23.8)	60 (23.1)
	Tramadol		53 (20.4)	53 (20.4)
	Metadhone		14 (5.4)	13 (5)
	Never use opioid		109 (41.9)	114 (43.8)
	Other		22 (8.5)	20 (7.7)
		Subtotal	260	260
NSAID	Meloxicam		149 (57.3)	157 (60.4)
	Ketoprofen		34 (13.1)	44 (16.9)
	Carprofen		29 (11.2)	11 (4.2)
	Never use NSAID		29 (11.2)	32 (12.3)
	Other		19 (7.3)	16 (6.2)
		Subtotal	260	260

Table 8. Number of respondents (%) who used breathing systems and vaporizers on dogs and cats in DKI Jakarta and West Java Province

Anesthesia equipment			Total (%)
Breathing system	Humphrey ADE		36 (13.8)
	Mapleson A (example; Lack system)		22 (8.5)
	Mapleson D (example; Bain)		26 (10)
	Mapleson E, F (example; Ayre's T-piece)		7 (2.7)
	No equipment		169 (65)
		Subtotal	260
Vaporizer	VP 500		43 (16.5)
	Tec Mark 3		16 (6.2)
	Goldmann		15 (5.8)
	Tec Mark 4		15 (5.8)
	Drager		11 (4.2)
	Tec Mark 2		10 (3.8)
	Penlon PPV		8 (3.1)
	Tec Mark 5		4 (1.5)
	Stephens		3 (1.2)
	RWD		2 (0.8)
	No equipment		133 (51.2)
		Subtotal	260

Table 9. Number of respondents (%) who used anesthesia monitoring device on dogs and cats, espondents could select more than one answer

Monitoring device	Total (%)
Thermometer	233 (89.6)
Pulse oximeter	101 (38.8)
Electrocardiograph	72 (27.7)
Oesophageal stethoscope	49 (18.8)
Apnoea alarm	37 (14.2)
Doppler blood pressure monitoring	30 (11.5)
Invasive blood pressure monitoring	27 (10.4)
Oscillometric blood pressure monitoring	25 (9.6)
Capnograph	20 (7.7)
Other	9 (3.5)

cardiopulmonary resuscitation (CPR) and 18.1% pain management. The topics chosen by respondents indirectly indicate areas in which they feel they need to improve their knowledge and skills. This was related to the desire of practitioners to use supportive anesthesia monitoring equipment and better postoperative pain management.

CONCLUSION

Responses from practicing veterinarians who participated in this survey indicated that they had awareness of pre-anesthesia examinations that were in accordance with recommendations. Most respondents used injectable anesthesia and performed manual patient assessments and monitoring. Practitioners were encouraged to use better anesthesia equipment and anesthesia monitoring, including improvements in IV catheter placement, endotracheal intubation, and supplemental oxygen administration.

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