



香港城市大學
City University of Hong Kong

專業 創新 胸懷全球
Professional · Creative
For The World

CityU Scholars

Perceptions and opinions of pet caregivers in mainland and Hong Kong China about surgery, pain management, and anesthesia in dogs and cats

Kim, Yoojin; Trindade, Pedro H.E.; Bęczkowski, Paweł M.; Steagall, Paulo V.

Published in:

Heliyon

Published: 15/04/2024

Document Version:

Final Published version, also known as Publisher's PDF, Publisher's Final version or Version of Record

License:

CC BY-NC-ND

Publication record in CityU Scholars:

[Go to record](#)

Published version (DOI):

[10.1016/j.heliyon.2024.e28428](https://doi.org/10.1016/j.heliyon.2024.e28428)

Publication details:

Kim, Y., Trindade, P. H. E., Bęczkowski, P. M., & Steagall, P. V. (2024). Perceptions and opinions of pet caregivers in mainland and Hong Kong China about surgery, pain management, and anesthesia in dogs and cats. *Heliyon*, 10(7), Article e28428. <https://doi.org/10.1016/j.heliyon.2024.e28428>

Citing this paper

Please note that where the full-text provided on CityU Scholars is the Post-print version (also known as Accepted Author Manuscript, Peer-reviewed or Author Final version), it may differ from the Final Published version. When citing, ensure that you check and use the publisher's definitive version for pagination and other details.

General rights

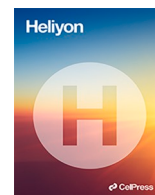
Copyright for the publications made accessible via the CityU Scholars portal is retained by the author(s) and/or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights. Users may not further distribute the material or use it for any profit-making activity or commercial gain.

Publisher permission

Permission for previously published items are in accordance with publisher's copyright policies sourced from the SHERPA RoMEO database. Links to full text versions (either Published or Post-print) are only available if corresponding publishers allow open access.

Take down policy

Contact lbscholars@cityu.edu.hk if you believe that this document breaches copyright and provide us with details. We will remove access to the work immediately and investigate your claim.



Research article

Perceptions and opinions of pet caregivers in mainland and Hong Kong China about surgery, pain management, and anesthesia in dogs and cats

Yoojin Kim ^a, Pedro H.E. Trindade ^b, Paweł M. Bęczkowski ^c, Paulo V. Steagall ^{c,d,*}^a Jockey Club College of Veterinary Medicine and Life Sciences, City University of Hong Kong, Hong Kong SAR, China^b Department of Population Health and Pathobiology, North Carolina State University, North Carolina, Raleigh, United States^c Department of Veterinary Clinical Sciences and Centre for Companion Animal Health and Welfare, Jockey Club College of Veterinary Medicine and Life Sciences, City University of Hong Kong, Hong Kong SAR, China^d Department of Clinical Sciences, Faculty of Veterinary Medicine, Université de Montréal, Saint-Hyacinthe, QC, Canada

ARTICLE INFO

Keywords:

Pet caregiver
Client perceptions
Client communication
Analgesia
Surgery
Anesthesia
Canine
Feline

ABSTRACT

Small animal caregivers' perceptions and previous life experiences play a pivotal role in patient care, making effective communication fundamental within the veterinary business. Despite the large and growing scale of the pet industry, data on small animal client-centered information about veterinary services in Mainland China (MC) and the Hong Kong Special Administrative Region (HKSAR) China are lacking. The objective of this study was to investigate the perceptions and opinions of small animal caregivers about surgery, pain management, and anesthesia in dogs and cats in these geographical regions through a validated online survey using content validity index. A total of 2080 valid answers were collected by convenience sampling over 45 days. Descriptive statistics were used to summarize data; the chi-square test and generalized linear models were used to test the associations between demographics and responses. Overall, caregivers appeared favorable toward the use of analgesia in their pets, with concerns over the potential adverse effects produced by analgesic drugs. Joint pain and ear infections were generally rated as conditions that would be less prone to require analgesia. Significant associations were observed for demographic factors such as gender, age, and geographical area, whether participants were healthcare providers, and whether their pets had undergone surgery before. Although many respondents expressed uncertainty in recognizing pain in their pets and administering analgesics, they also expressed a desire to learn and to be informed. This study highlights areas and factors that may determine the perceptions and opinions of small animal caregivers that form a unique human-animal bond in China. Client communication should be addressed on a case-by-case basis and adapted to the geographical area, as the individual background and demographics may have an ultimate impact on treatment goals and patient care.

* Corresponding author. Department of Veterinary Clinical Sciences and Centre for Companion Animal Health and Welfare, Jockey Club College of Veterinary Medicine and Life Sciences, City University of Hong Kong, Hong Kong SAR, China.

E-mail address: pmortens@cityu.edu.hk (P.V. Steagall).

<https://doi.org/10.1016/j.heliyon.2024.e28428>

Received 28 October 2023; Received in revised form 17 March 2024; Accepted 19 March 2024

Available online 22 March 2024

2405-8440/© 2024 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Surgery, pain management, and anesthesia are fundamental areas of small animal veterinary services that involve the collaboration between veterinarians and pet caregivers for adequate patient care. The experiences and perceptions of pet caregivers play an invaluable role in postoperative care, pain management, and evaluation of the Quality of Life (QoL) of their pets [1,2]. Therefore, a major responsibility of veterinary healthcare professionals is to equip the caregivers with the ability to recognize and prevent pain, and milestones related to postoperative care, making client communication and education the cornerstone of effective veterinary services. For this reason, the veterinarian-client-patient relationship (VCPR) forms the basis of all interactions in veterinary medicine and is critical for the overall health of the patient [3]. Thus, it is important for veterinarians to understand the client's cultural values and beliefs and the relationships between these caregivers and their animal companions. This enables animal health professionals to relate to the client's needs, anticipate common health problems in a particular region, and adjust their methods of communication accordingly [4,5]. Personalized recommendations and shared decision-making by providing information that, in the spirit of the spectrum of care [6], is tailored to the client's current situation are more likely to help clients develop a strong relationship with their veterinarian and therefore follow their recommendations [7]. Therefore, familiarity with the regional culture enables tailor-made support for caregivers in different circumstances, ultimately translating into better client satisfaction and, most importantly, patient welfare.

Client surveys have been used as an effective tool to recognize and evaluate the QoL of client-owned dogs and cats [1,8]. There have also been previous studies of similar nature that have evaluated the opinions of small animal caregivers in Finland [9], Canada [10], and the United States [11], which revealed important regional differences in perceptions and attitudes regarding surgery, pain management, and anesthesia. However, studies exploring small animal client-centered information about veterinary services in Mainland China (MC) and the Hong Kong Special Administrative Region (HKSAR) China remain scarce. The importance of addressing the clientele in this geographic region is evident as pet ownership has gained substantial popularity in China in recent years [12]. A government survey in HKSAR in 2019 revealed that nearly 1 in every 10 households kept a dog or a cat [13], and the number of registered veterinary surgeons in HKSAR had nearly doubled from 2010 to 2020 [14]. Meanwhile, in 2021, the number of dogs and cats in MC reached 100 million combined, while the scale of the pet industry surpassed 300 billion Chinese Yuan and remains in a growing trend [15,16]. Therefore, a similar explorative survey would provide a unique insight into how cultural, demographic, and geographic factors could influence the perceptions of small animal caregivers in China about some veterinary services and evaluate if differences exist between HKSAR and MC.

The objective of this research was to investigate the perceptions and opinions of small animal caregivers about surgery, pain management, and anesthesia in dogs and cats in MC and HKSAR China through a validated online survey. We hypothesized that the demographic profile of the respondent, such as gender, age, geographical region (i.e., MC versus HKSAR), and personal background would affect their perceptions on these topics.

2. Methods

This study was approved by the Human and Artefacts Ethics Sub-Committee of the City University of Hong Kong (H003174). All participants confirmed their eligibility and provided their informed consent prior to answering the questions. This study is reported according to the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) [17].

2.1. Questionnaire development

Survey questions were redacted and adapted from previous studies [9–11] and refined by two of the authors (YK and PVS) to fit the target population of the selected geographic area. Five veterinarians assessed the content and face validity of the survey to ensure the clarity and relevance of all questions. Each survey item was rated for its relevance as irrelevant (1), somewhat relevant (2), quite relevant (3), or highly relevant (4). Subsequently, the content validity ratio (CVR) was calculated using the following equation,

$$CVR = \frac{ne - \frac{N}{2}}{\frac{N}{2}},$$

where ne represents the number of evaluators who considered the item relevant (scores 3 or 4) and N the total number of evaluators [18]. Items with CVR values of 0.67 or above were approved, while others were either edited or removed completely. Additional comments regarding the readability and comprehensiveness of the survey were also taken into account in questionnaire refinement with a consensus between the same two authors. If the authors would not agree, the protocol included a consultation with a third author (PMB) for final decisions.

An internet-based questionnaire was created on an online survey platform (QuestionPro, www.questionpro.com). The survey was originally developed in English and was translated into traditional and simplified Chinese by two individuals, followed by a back translation to English by another two individuals who were not involved with the primary development of the questionnaire [18,19]. Both English versions were compared and changes in the traditional and simplified Chinese versions were performed if required for improved semantics. The final survey consisted of 23 closed-ended modified Likert scale questions in 4 sections. Section 1 evaluated to what extent the respondent considered their pet as part of the family. Section 2 evaluated their perceptions of the need for analgesics in different clinical scenarios, ranging from surgery (e.g., ovariohysterectomy) to medical conditions (e.g., ear infection). Section 3

evaluated their perceptions of the importance of an anesthesiologist and client communication in the perioperative period. Section 4 evaluated their perceptions of pain, analgesia, and euthanasia. The last page was reserved for the demographic data of the respondents (see supplementary material for the full questionnaire).

2.2. Sampling method

The survey was distributed to small animal caregivers residing in HKSAR and MC in collaboration with ActAsia, Animals Asia, Royal Canin, and the Society for the Prevention of Cruelty to Animals (SPCA) Hong Kong. Digital posters containing a brief description of the project and a QR code for the survey were disseminated via emails, social media platforms, and word of mouth. Convenience sampling was used without a limit to the number of participants and responses were collected for 45 days (from January 30 to March 15, 2023). A sample size of 2000 was targeted, accounting for the online nature of the survey which allowed it to reach a larger audience compared to paper-based questionnaires used in previous studies [9–11].

All participants had to fulfill the eligibility criteria prior to responding to the questions, which included that the respondent [1]: is or over 18 years of age [2], understands English, traditional Chinese, or simplified Chinese [3], has/had at least a dog and/or a cat [4], resides in HKSAR or MC, and [5] is not a veterinary healthcare professional or veterinary student, including veterinary nurse/technician student. All responses were voluntary and anonymous without incentives. No personally identifying information, such as emails or IP addresses, was collected. The information was handled by authorized personnel only and was used in accordance with the provisions of the Personal Data Privacy Ordinance and according to the policies and guidelines established by the City University of Hong Kong. No questions were mandatory, and participants were able to withdraw their responses at any time before submission.

2.3. Statistical analysis

Raw data were extracted from QuestionPro and exported into Microsoft 365 Excel (Microsoft, Redmond, WA, USA). Data analysis was carried out with R software within the integrated RStudio environment (Version 4.1.0; 2021-06-29; RStudio, Inc., Boston, MA, USA). The functions and packages used were presented in the format ‘packagefunction’ corresponding to the computer programming language in R. A significance of $P < 0.05$ was considered.

Answers were transformed into scores: scores 1 (“agree”, “always needed”, and “very important”) and 2 (“partly agree”, “likely to be needed”, and “important”) are discussed together, while scores 3 (“partly disagree”, “not likely to be needed”, and “not so important”) and 4 (“disagree”, “not needed”, and “not important at all”) are discussed as another. The chi-square test (statschisq.test) was used to investigate the relationship between each question and each qualitative demographic information. In addition, the effect of age on each question was evaluated with a generalized linear model adjusted by Poisson distribution (statsglm). Each question was used as a fixed effect in each model. The Bonferroni was used for adjustment after multiple comparisons to the post-hoc test (lsmeanslsmeans and multcomp).

3. Results

A total of 2085 responses were submitted, out of which 2080 fulfilled all eligibility criteria. There were 1540 complete responses with all questions answered, which was equivalent to a completeness rate of 74%. Responses that fulfilled all eligibility criteria and with at least one response to the questions ($n = 2080$) were included in the data analysis. There were 195, 267, and 1618 responses in English, Traditional Chinese, and Simplified Chinese, respectively. The age of respondents ranged from 18 to 79, with a mean and

Table 1
Demographic data of dog and cat caregivers in Mainland China and Hong Kong Special Administrative Region China who completed the online survey on their perceptions and opinions on surgery, anesthesia, and pain management.

Demographic data	Response	Number of responses	Percentage (%)
Gender	Female	1461	84.0
	Male	272	15.6
	Other	5	0.4
Inhabitant of	MC	1427	83.7
	HKSAR China	278	16.3
Pets currently owned	Dog	919	44.2
	Cat	1125	54.1
Pets previously owned	Dog	1150	55.3
	Cat	978	47.0
Pet had surgery before	Yes	1410	82.3
	No	304	17.7
Caregiver had surgery before	Yes	1021	59.6
	No	691	40.4
Caregiver works in the field of human health	Yes	380	22.0
	No	1344	78.0
Questionnaire comprehension	Easy	1406	81.3
	Somewhat easy	297	17.2
	Not easy	27	1.6

standard deviation of 36 ± 11 years. Detailed demographic data of respondents are described in Table 1. Responses from pet caregivers relating to survey sections 1 and 2, 3, and 4 are described in Tables 2–4, respectively.

3.1. Gender

There was an association between women and the use of analgesia for some specific conditions and answers. Women believed that analgesia is required for fracture repair ($P < 0.0001$), castration ($P < 0.0001$), ear infection ($P = 0.0002$), and teeth extractions ($P < 0.0001$). Women were also more likely to designate higher importance to knowing what to expect during their pet's recovery from illness, injury, or surgery ($P = 0.003$), and having a veterinary specialist in anesthesia perform anesthesia on their pets ($P = 0.02$). Women were more likely to agree with the following statements: "the cost of pain medications is a concern to me" ($P = 0.02$), "pain in dogs and cats is easy to recognize" ($P = 0.001$), "pain affects my pet's quality of life" ($P = 0.01$), and "pain affects my pet's behavior" ($P = 0.002$).

3.2. Age

The mean and standard error (SE) of respondents' age for each questionnaire item are presented in Supplementary Table 1. Fracture repair (44 ± 3.0 years of age) and ovariohysterectomy (42 ± 1.8 years of age) were considered to be less subject to analgesia by older respondents. Older respondents were also more likely to disagree that "pain affects their pet's quality of life" (48 ± 3.4 years of age). Older respondents considered "having a veterinary anesthesiologist perform anesthesia on their pets" (54 ± 7.3 years of age) and "knowing the separate costs of anesthesia, pain management, and surgery" (41 ± 0.8 years of age) of less importance. Younger respondents considered analgesia for joint pain (34 ± 0.2 years of age), "having a veterinary anesthesiologist perform anesthesia on their pets" (35 ± 0.2 years of age), and "knowing the separate costs of anesthesia, pain management, and surgery" (35 ± 0.2 years of age) important in comparison to older participants.

3.3. Geographical area

There was a lack of significant association between the two regions and the respondent-rated need for analgesia in ear infections and joint pain. Neither was there an association between the geographical area and the following items: "knowing what to expect during my pet's recovery", "being informed of risks and procedures of anesthesia and surgery", "knowing the costs of anesthesia, pain management, and surgery", and "pain affects my pet's behavior". There was a significant association for all other responses, where respondents from MC were more likely to agree with or consider more important the items in Supplementary Table 2.

3.4. Pets with previous surgery

There was no association between whether or not the caregiver's pet had undergone surgery and the respondent-rated need for analgesia in ear infections and joint pain. On the contrary, caregivers with a pet with previous surgical experience were more likely to disagree with the following statements compared to those with pets that had never received surgery: "cost of pain medications is a concern to me" ($P = 0.004$), "pain after surgery is helpful" ($P = 0.04$), "pain in dogs and cats is easy to recognize" ($P = 0.0001$), and "I am afraid of giving pain medications to my pets" ($P = 0.003$). Caregivers of pets with surgery were also more likely to consider "knowing what to expect during my pet's recovery from illness, injury, or surgery" important ($P = 0.003$).

3.5. Caregivers with previous surgery

Caregivers with previous surgery did not present any significant association with their responses to the questionnaire, except for one item: caregivers that had surgery were more likely to rate a higher need for analgesia in ear infections ($P = 0.005$).

Table 2

Number of pet caregivers in Mainland China and Hong Kong Special Administrative Region China and the percentage of respondents regarding the extent to which they consider their pets as part of the family and the need for analgesia in selected clinical scenarios and their respective scores.

Survey question, procedure, or condition	Score 1 (Agree or always needed) n (%)	Score 2 (Partly agree or likely needed) n (%)	Score 3 (Partly disagree or unlikely needed) n (%)	Score 4 (Disagree or not needed) n (%)
I consider my pet(s) part of my family	1983 (97.3)	53 (2.6)	1 (0.05)	0 (0)
Surgery: fracture repair	1389 (72.6)	504 (26.4)	7 (0.4)	12 (0.6)
Surgery: ovariohysterectomy	1479 (78.2)	357 (18.9)	39 (2.1)	16 (0.8)
Surgery: castration	1341 (70.8)	418 (22.1)	105 (5.5)	30 (1.6)
Surgery: lumpectomy	1328 (70.1)	511 (27.0)	43 (2.3)	12 (0.6)
Ear infection	329 (17.4)	829 (43.8)	518 (27.4)	217 (11.5)
Lameness (joint pain)	670 (35.3)	1003 (52.9)	179 (9.4)	44 (2.3)
Teeth removal	1249 (66.0)	549 (29.0)	75 (4.0)	21 (1.1)

Table 3

Perceptions and opinions of pet caregivers in Mainland China and Hong Kong Special Administrative Region China regarding the importance of anesthesia and perioperative communication.

Survey question	Score 1 (Very important) n (%)	Score 2 (Important) n (%)	Score 3 (Not so important) n (%)	Score 4 (Not important at all) n (%)
Knowing what to expect during my pet's recovery from illness, injury, or surgery	1734 (93.4)	119 (6.4)	3 (0.2)	0 (0)
Being informed about procedures and risks involved in anesthesia and surgery	1737 (93.7)	110 (5.9)	6 (0.3)	0 (0)
Having a veterinary specialist in anesthesia to perform anesthesia on my pets	1602 (86.4)	228 (12.3)	24 (1.3)	1 (0.05)
Knowing the separate costs of anesthesia, pain management and surgery	1414 (76.4)	362 (19.6)	69 (3.7)	6 (0.3)
Assurance that all necessary techniques and pain medications will be used to prevent and alleviate pain in my pet	1601 (87.2)	225 (12.3)	10 (0.5)	0 (0)

Table 4

Perceptions and opinions of pet caregivers in Mainland China and Hong Kong Special Administrative Region China regarding pain and its management in their pets with their respective scores for each survey question.

Survey question	Score 1 (Agree) n (%)	Score 2 (Partly agree) n (%)	Score 3 (Partly disagree) n (%)	Score 4 (Disagree) n (%)	Score 5 (Don't know) n (%)
Cost of pain medications is a concern to me	483 (27.5)	739 (42.1)	233 (13.3)	276 (15.7)	24 (1.4)
Pain medications will help speed up recovery	751 (42.9)	669 (38.2)	145 (8.3)	73 (4.2)	112 (6.4)
Pain after surgery is helpful to limit my pet's activity	598 (34.3)	434 (24.9)	218 (12.5)	412 (23.7)	80 (4.6)
Side effects of pain medications are rare	206 (11.8)	450 (25.8)	414 (23.7)	253 (14.5)	421 (24.1)
Pain in dogs and cats is easy to recognize	269 (15.4)	386 (22.1)	456 (26.1)	522 (29.9)	113 (6.5)
Dogs and cats feel the same level of pain as people	807 (46.2)	341 (19.5)	178 (10.2)	233 (13.3)	189 (10.8)
Pain affects my pet's quality of life	1586 (90.9)	139 (8.0)	10 (0.6)	5 (0.3)	4 (0.2)
Pain affects my pet's behavior	1334 (76.7)	318 (18.3)	28 (1.6)	27 (1.5)	33 (1.9)
I am afraid of giving pain medications to my pets	136 (7.8)	383 (22.0)	463 (26.6)	693 (39.9)	64 (3.7)
Euthanasia is an acceptable method to end suffering in my pet when pain cannot be treated	791 (45.6)	630 (36.3)	139 (8.0)	103 (5.9)	71 (4.1)

3.6. Working in the field of human health

There was a significant association between individuals that work in the field of human health and the following items: the respondent-rated need for analgesia in fracture repair ($P = 0.009$), lumpectomy ($P = 0.006$), ear infections ($P = 0.0004$), and joint pain ($P < 0.0001$); "pain medications speed up recovery" ($P = 0.003$), "pain after surgery is helpful" ($P = 0.003$), "adverse effects of analgesics are rare" ($P < 0.0001$), "pain in dogs and cats is easy to recognize" ($P < 0.0001$), "dogs and cats feel the same level of pain as humans" ($P = 0.0004$), and "I am afraid of giving pain medications to my pets" ($P = 0.003$).

4. Discussion

Study findings demonstrated that the perceptions and opinions of pet caregivers are influenced by gender, age, where in China they reside, whether their pets have undergone surgery before, and whether they work in the field of human health. Moreover, caregivers consider pain management an important component of veterinary services. Almost all (99.9%) respondents considered their pets as part of the family, highlighting the importance of the human-animal bond in current society.

Caregivers indicated a higher need for analgesia for surgical compared to medical conditions. For instance, more than 97% of the respondents agreed that analgesia is "always needed" or "likely needed" for fracture repair, ovariohysterectomy, and lumpectomy, 94.9% for teeth extractions, and 92.9% for male castration. On the contrary, 88.2% expressed the same for joint pain and 61.2% for ear infections. Interestingly, similar results were obtained in the three previous studies, where caregivers assessed ear infection and lameness as conditions that are comparatively less subject to analgesia [9–11]. This is intriguing because the level of pain involved in osteoarthritis and ear infections in human medicine is well-established, and analgesics are routinely prescribed to manage this pain [20,21]. In a veterinarians' attitudes survey, canine and feline ear infections were described as one of the most painful chronic conditions alongside osteoarthritis and dental pain [22]. Moreover, otitis externa is one of the most common conditions in small animal practice [23]. There is an evident need for veterinarians to draw the client's attention to the level of pain involved in diseases such as osteoarthritis and ear infections for appropriate treatment.

While the majority of respondents (81.1%) agreed that the use of analgesia helps to hasten their pet's recovery, there exists a misconception that pain is helpful in limiting the patient's activity postoperatively, with more than half (59.2%) of the respondents in agreement to the statement. The belief that postoperative pain is beneficial appears to be a recurring theme, as reported in two previous studies in Canada [10] and the United States [11]. Further, over one-third (38.3%) of the respondents disagreed that adverse

effects of analgesic medications are uncommon, and 24.1% were unsure of the side effects altogether. This result, combined with the fact that 29.8% of the respondents are afraid to administer analgesic medications to their pets, suggests the importance of questioning the client's full compliance with postoperative pain management. This is especially relevant as pet caregivers may perceive the risk of analgesic medications to be greater than they really are [24], which may be more pronounced with chronic conditions that necessitate long-term administration of analgesics. In one study investigating the opinions of caregivers of dogs with osteoarthritis, many caregivers expressed concerns over the safety of non-steroidal anti-inflammatory drugs (NSAIDs) to the extent that some preferred to risk efficacy by underdosing their pets rather than observing NSAID-induced adverse effects [25]. It also raises the question of whether veterinary health professionals are prepared to take more time to explain the indication for pain management in greater detail to overcome these misconceptions, seeing that the lack of consultation time is often described as a challenge in today's veterinary practice [25,26].

In this study, 86.4% and 12.3% of the respondents considered it "very important" and "important" respectively, to have a veterinary anesthesiologist perform anesthesia on their pets. While similar patterns were observed in previous studies [10,11], the current study saw the highest occurrence of this response. This response was more likely to be seen in female, younger, and MC-resident respondents. As pointed out by Steagall *et al.* [10], it may be relevant to evaluate client understanding of the roles of veterinary specialists in anesthesiology [27,28], as well as the roles of that veterinary nurses can fulfill in surgical theaters [29].

Pain can be described as a cultural phenomenon that is heavily influenced by sociocultural contexts as well as personal experiences [2,30]. For instance, in the present survey, older respondents were more likely to disagree that pain affects their pet's QoL. This could be due to various reasons, one of which may be a lack of familiarity with the concept of QoL and its assessment in dogs and cats [31]. This is further complicated considering the different interpretations of the definition and responses to pain as well as varying acceptance of animal sentience in different cultures [2,32]. In this study, 13.9% of the respondents disagreed that euthanasia is an acceptable method to end suffering in their pets when pain cannot be treated. There are many possible reasons for an individual to oppose euthanasia, including guilt, religious beliefs, and societal reluctance to discuss matters about death [33–35]. Although this result cannot be readily compared to previous studies of similar nature as this is the first, to our knowledge, to contain a question regarding euthanasia, it provides valuable preliminary information about the perceptions of the clientele in China regarding end-of-life care. It highlights the need for veterinarians to listen to clients' concerns [36] and consider the owner's past experiences with pain, which could change the course of the patient's treatment goals and plan [37,38]. Further education on palliative care, end-of-life strategies, and the implications for animal welfare, when euthanasia is recommended but refused by clients, is required in the veterinary profession.

The survey revealed that most of the respondents (99.9%) consider their pets part of their family. Although 56% of the respondents expressed difficulty in recognizing pain in their pets, more than 95% of respondents emphasized the importance of being informed of the procedures, risks, and costs involved in anesthesia, surgery, and pain management. In other words, caregivers expressed a desire to be informed and to engage in the various decision-making processes involved in companion animal veterinary medicine. This suggests that even though pet owners may be unfamiliar with pain recognition and the concepts of novel or alternative methods of pain control, they are committed to patient care, including pain management [33]. Additionally, the results revealed that the elements of concern may differ according to the client's demographic factors and previous experiences. For instance, knowing the separate costs of surgery, analgesia, and anesthesia was less of a concern for older clients, while the assurance of the use of analgesia was considered a higher priority for clients from MC. Furthermore, caregivers whose pets have received surgery before were more likely to disagree that they were afraid of administering analgesics to their pets; in other words, caregivers with experience in giving analgesics to their pets were more confident in doing so. This highlights the need for the clinician to consider the client's situation and experience to provide a management plan that is suitable for both the client and the patient. Finally, there is an evident need for additional education about pain assessment to pet caregivers and pain scoring systems that is applicable to the home environment. Introducing user-friendly and efficient tools to pet caregivers, such as the Feline Grimace Scale [2], along with reliable online resources and veterinary consultations [38], may also be helpful.

This study has its limitations. Firstly, the lack of randomization in convenience sampling should be discussed. While this is a convenient and cost-effective method of sampling, it becomes exclusive to a target population with access to the internet and selected social media platforms in our case, leading to participant selection bias. Nevertheless, convenience sampling was chosen for its accessibility and its ability to provide valuable preliminary data, which suits the explorative nature of the study. Additionally, according to the CHERRIES, it is essential to discuss the extent to which the context of the website could pre-select and influence the sample [17]. This is especially relevant in the current study, given the voluntary participation of pet caregivers and the context of online groups that the survey was distributed to, which mostly consisted of animal support communities and pet caregiver groups, pre-selecting for animal lovers. There was a discrepancy in the proportion of respondents for gender, geographical area, and whether they work in the field of human health care. The difference in the population in MC and HKSAR, and the natural variability of the professions likely contributed to the latter two factors. Although female overrepresentation was also documented in previous studies [9,10], due to the use of convenience sampling and the voluntary nature of the survey, it is difficult to discern a precise explanation behind it. This also complicates the interpretation of the statistical analysis, as the relational significance could have risen from the pure discrepancy in participation, or from a true association. Further, the current and previous ownership of a dog and/or cat could not be used for chi-square statistical analysis as respondents could choose multiple responses that suited their situation.

The veterinary industry is made up of a complex ecosystem of stakeholders that brings changes and new challenges to the veterinarian, client, and patient alike. As the dynamics of the veterinarian-client-patient-relationship continue to evolve, effective client communication and understanding of their cultural background and personal experiences are ever more important to manage client expectations and optimize patient welfare. This study was able to provide valuable insight into the perceptions and opinions of

pet caregivers in MC and HKSAR. While caregivers appeared favorable toward the use of analgesia in their pets, misconceptions and uncertainty about postoperative pain and the adverse effects of analgesics remain. Although clients care about staying informed and getting involved in the decision-making process, the need for pain management for certain medical conditions, such as ear infections, osteoarthritis, and postoperative pain, may be overlooked if not addressed properly, highlighting the importance for clinicians to carefully consider the client's perceptions and past experiences, and communicate accordingly.

Ethics statement

The studies involving human participants were reviewed and approved by the Human and Artefacts Ethics Sub-Committee of the City University of Hong Kong. All participants provided their informed voluntary consent to participate in this study.

CRedit authorship contribution statement

Yoojin Kim: Writing – review & editing, Writing – original draft, Visualization, Validation, Resources, Methodology, Formal analysis, Data curation, Conceptualization. **Pedro H.E. Trindade:** Formal analysis, Data curation. **Paweł M. Bęczkowski:** Writing – review & editing, Methodology, Conceptualization. **Paulo V. Steagall:** Writing – review & editing, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper: The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Paulo V Steagall reports financial support was provided by Zoetis. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

This study was funded by Zoetis. The sponsor did not have any input or decision in the survey questions, methodology, statistical analysis, manuscript drafting or decision to publish. The authors would like to acknowledge the caregivers who took the time to complete our survey. We would also like to thank the team members of Animals Asia, ActAsia, Royal Canin and SPCA Hong Kong for their help with survey dissemination and promotion. We are also thankful to Drs. Paweł Bęczkowski, Stefan Hobi, Mandala Hunter, Beatriz Monteiro and Marta Garbin for participating in the content and face validity of the survey questionnaire.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.heliyon.2024.e28428>.

References

- [1] M.L. Wiseman-Orr, E.M. Scott, J. Reid, A.M. Nolan, Validation of a structured questionnaire as an instrument to measure chronic pain in dogs on the basis of effects on health-related quality of life, *Am. J. Vet. Res.* 67 (11) (2006) 1826–1836.
- [2] B.P. Monteiro, N.H.Y. Lee, P.V. Steagall, Can cat caregivers reliably assess acute pain in cats using the Feline Grimace Scale? A large bilingual global survey, *J. Feline Med. Surg.* 25 (1) (2023) 1098612X221145499.
- [3] The veterinarian-client-patient relationship (VCPR) [Internet]. American Veterinary Medical Association. [cited 2023Apr21]. Available from: <https://www.avma.org/resources-tools/pet-owners/petcare/veterinarian-client-patient-relationship-vcpr>.
- [4] R. Schoenfeld-Tacher, L.R. Kogan, M.L. Wright, Comparison of strength of the human-animal bond between Hispanic and non-Hispanic owners of pet dogs and cats, *J. Am. Vet. Med. Assoc.* 236 (5) (2010) 529–534.
- [5] C. McNeill, E. McNeill, Key challenges in the veterinary profession [Internet], Royal Canin (2022) [cited 2023Apr23]. Available from: <https://vetfocus.royalcanin.com/en/scientific/key-challenges-in-the-veterinary-profession>.
- [6] C.R. Brown, L.D. Garrett, W.K. Gilles, K.E. Houlihan, E. McCobb, S. Pailler, et al., Spectrum of care: more than treatment options, *J. Am. Vet. Med. Assoc.* 259 (7) (2021) 712–717.
- [7] C.H. McKay, N. Nichols, S.L. Lefebvre, Effectiveness of various language strategies for helping pet owners appreciate the value of preventive care, *J. Am. Vet. Med. Assoc.* (2023) 1–8.
- [8] J. Benito, M.E. Gruen, A. Thomson, W. Simpson, B.D.X. Lascelles, Owner-assessed indices of quality of life in cats and the relationship to the presence of degenerative joint disease, *J. Feline Med. Surg.* 14 (12) (2012) 863–870.
- [9] M.A. Väisänen, S.K. Tuomikoski-Alin, D.C. Brodbelt, O.M. Vainio, Opinions of Finnish small animal owners about surgery and pain management in small animals, *J. Small Anim. Pract.* 49 (12) (2008) 626–632.
- [10] P.V. Steagall, B.P. Monteiro, H.L.M. Ruel, G. Beauchamp, G. Luca, J. Berry, et al., Perceptions and opinions of Canadian pet owners about anaesthesia, pain and surgery in small animals, *J. Small Anim. Pract.* 58 (7) (2017) 380–388.
- [11] B.T. Simon, E.M. Scallan, D.J.F. Von Pfeil, D.T. Boruta, R. Wall, B.M. Nibblett, et al., Perceptions and opinions of pet owners in the United States about surgery, pain management, and anesthesia in dogs and cats, *Vet. Surg.* 47 (2) (2018) 277–284.

- [12] X. Chen, H. Zhu, D. Yin, Everyday life construction, outdoor activity and health practice among urban empty nesters and their companion dogs in guangzhou, China, *Int. J. Environ. Res. Publ. Health* 17 (11) (2020).
- [13] Thematic Household Survey Report No. 66. Hong Kong Special Administrative Region: Census and Statistics Department, 2019.
- [14] Overview of Veterinary Services in Hong Kong, Hong Kong Special Administrative Region: Legislative Council Panel on Food Safety and Environmental Hygiene Subcommittee to Study Issues Relating to Animal Rights, 2021 (CB(2)1186/20-21(01)).
- [15] A. Huld, Investing in China's multi-billion-dollar pet industry – trends and opportunities [internet], China Briefing News (2022) [cited 2023Apr21]. Available from: <https://www.china-briefing.com/news/investing-in-china-pet-market-trends-and-opportunities/>.
- [16] 2021 Trends of Pet-Related Consumption in China, iResearch Global Group, 2021, p. 3.
- [17] G. Eysenbach, Improving the quality of web surveys: the checklist for reporting results of internet E-surveys (CHERRIES), *J. Med. Internet Res.* 6 (3) (2004) e34.
- [18] S.P.L. Luna, P.H.E. Trindade, B.P. Monteiro, N. Crosignani, G. Della Rocca, H.L.M. Ruel, et al., Multilingual validation of the short form of the unesp-botucatu feline pain scale (UFEPS-SF), *PeerJ* 10 (2022) e13134.
- [19] H.-Y. Chen, J.R.P. Boore, Translation and back-translation in qualitative nursing research: methodological review, *J. Clin. Nurs.* 19 (1–2) (2010) 234–239.
- [20] N. Shaikh, D.H. Kearney, D.K. Colborn, T. Balentine, W. Feng, Y. Lin, et al., How do parents of preverbal children with acute otitis media determine how much ear pain their child is having? *J. Pain* 11 (12) (2010) 1291–1294.
- [21] A.-M. Malfait, T.J. Schnitzer, Towards a mechanism-based approach to pain management in osteoarthritis, *Nat. Rev. Rheumatol.* 9 (11) (2013) 654–664.
- [22] A. Bell, J. Helm, J. Reid, Veterinarians' attitudes to chronic pain in dogs, *Vet. Rec.* 175 (17) (2014) 428.
- [23] C.A. Rème, D. Pin, C. Collinot, M.C. Cadiergues, J.A. Joyce, J. Fontaine, The efficacy of an antiseptic and microbial anti-adhesive ear cleanser in dogs with otitis externa, *Vet. Ther.* 7 (1) (2006) 15–26.
- [24] Assessing pet owners' attitudes to pain, *Vet. Rec.* 169 (7) (2011) 168.
- [25] Z. Belshaw, L. Asher, R.S. Dean, The attitudes of owners and veterinary professionals in the United Kingdom to the risk of adverse events associated with using non-steroidal anti-inflammatory drugs (NSAIDs) to treat dogs with osteoarthritis, *Prev. Vet. Med.* 131 (2016) 121–126.
- [26] P. Orpin, The art and science of managing clients, *In Pract.* 17 (10) (1995) 487–489.
- [27] A.E. Mitek, S.C. Clark-Price, B.L. Fischer, H. Phillips, T.A. Harper, D.J. Schaefer, Client perceptions of the value of veterinary anesthesiologist involvement with anesthesia and pain management, benefits of a preanesthetic consultation, and quality of care for dogs undergoing elective orthopedic surgery, *J. Am. Vet. Med. Assoc.* 255 (10) (2019) 1143–1149.
- [28] J.J. Lee, N.H. Lee, C.M. Park, S.J. Hong, M.-H. Kong, K.H. Lee, et al., Public awareness about the specialty of anesthesiology and the role of anesthesiologists: a national survey, *Korean J. Anesth.* 66 (1) (2014) 12–17.
- [29] K.E.A. McCormick, Public perceptions of the veterinary nurse, *Vet. Nurse* 13 (2) (2022) 97–102.
- [30] W.E. Rosa, Transcultural pain management: theory, practice, and nurse-client partnerships, *Pain Manag. Nurs.* 19 (1) (2018) 23–33.
- [31] N. Spofford, S.L. Lefebvre, S. McCune, L. Niel, Should the veterinary profession invest in developing methods to assess quality of life in healthy dogs and cats? *J. Am. Vet. Med. Assoc.* 243 (7) (2013) 952–956.
- [32] C. Orhan, E. Van Looveren, B. Cagnie, N.B. Mukhtar, D. Lenoir, M. Meeus, Are pain beliefs, cognitions, and behaviors influenced by race, ethnicity, and culture in patients with chronic musculoskeletal pain: a systematic review, *Pain Physician* 21 (6) (2018) 541–558.
- [33] R. Heuberger, M. Petty, J. Huntingford, Companion animal owner perceptions, knowledge, and beliefs regarding pain management in end-of-life care, *Top. Companion Anim. Med.* 31 (4) (2016) 152–159.
- [34] P.A. Leeco, Euthanasia: a buddhist perspective, *J. Relig. Health* 25 (1) (1986) 51–57.
- [35] R. Park, K. Royal, A national survey of companion animal owners' self-reported methods of coping following euthanasia, *Vet. Sci.* 7 (3) (2020) 89.
- [36] N. Janke, J.B. Coe, T.M. Bernardo, C.E. Dewey, E.A. Stone, Pet owners' and veterinarians' perceptions of information exchange and clinical decision-making in companion animal practice, *PLoS One* 16 (2) (2021) e0245632.
- [37] K.N. Davis, P.W. Hellyer, E.C.J. Carr, J.E. Wallace, L.R. Kogan, Qualitative study of owner perceptions of chronic pain in their dogs, *J. Am. Vet. Med. Assoc.* 254 (1) (2019) 88–92.
- [38] H.S. Lund, A.V. Eggertsdóttir, H. Jørgensen, S. Eggertsson, A.M. Grøndahl, Changes in the relationships between dogs, owners and veterinarians in Norway and Iceland, *Vet. Rec.* 165 (4) (2009) 106–110.