UNIVERSITI PUTRA MALAYSIA

FELINE AND CANINE VACCINATION PROTOCOLS IN PENINSULAR MALAYSIA AND VETERINARIAN PERCEPTIONS OF THE RECOMMENDATIONS BY THE WSAVA ASIAN VACCINATION GUIDELINES GROUP

SAMEERAH HANI BINTI MD TAHIR

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CERTIFICATION

It is hereby declared that we have read this project paper entitled "Feline and Canine Vaccination Protocols in Peninsular Malaysia and Veterinarian Perceptions of The Recommendations by The WSAVA Asian Vaccination Guidelines Group", by Sameerah Hani Binti Md Tahir and in our opinion it is satisfactory in terms of scope, quality, and presentation as partially fulfillment of requirement for the course VPD 4999 - Final Year Project.

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DEDICATIONS

I dedicate this thesis to those who are dear to me;

Husband

Hakim Narwawi,
A husband, a best friend, a gift from god

Ayah & Mama

Md Tahir Azhar,
The legendary dad

Naterah Ahmad,
The iron lady

Siblings, in laws, nieces and nephews

Taufik Tahir & Family
Faiz Tahir & Family
Farah Tahir
Shahir Tahir & Family
Nadzwan Tahir

May god bless you always, dear brothers and sisters

BFFTJ

Amirah, Hidayah, Nabilah, Syiqin

If only we have all the time and money in the world to spend time together, travelling the world

FELINE BUDDIES

Oren, Jelir, Boy, Girl, Kecik, Pok Pok, Cookie, Momo, Odie, Oogy, Bitbit, Bibit, Ciko, Choco, Blackie, Coffee, Pot Pot, Kitty, Handsome, Garfield, Stokin, Mikikus, Shiro, Mama, Hitler, Adolf.

I would have not been here if not because of you

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All thanks to Almighty Allah who has shown me the path of life, one that includes myself going through this roller coaster ride of a project. Words of mouth always say everything happens for a reason, and indeed it is true for I have become a better and improved person as I stand here at the finishing line.

فَبِأَيِّ آلَاءِ رَبِّكُمَا تُكَذِّبَانِ | "So which of the favors of your Lord would you deny?"

To Mama and Ayah, I would not trade anything in the world for your mere presence. Knowing that I can come back home seeing you both happy and healthy is enough to drive me through the days. You are both great parents in your own unique ways. I could have not gone through difficult days if it was not for my upbringing.

Hakim Narwawi; A husband, a bestfriend, a gift from god. What did I do to deserve you? I don't know. But I do know that I am the luckiest girl ever to have you in my life. I do not think I can go through this difficulty without your constant motivation.

When you are a quiet girl and have a low self esteem, all you need to have is the most amazing and out of the world supervisor, Dr Gurmeet. It was such an honour to have you as my supervisor. Thank you for accepting me and put your trust in me to carry out this project. Believe it or not, an out of the blue phone call from you is like a catapult that boost up my spirit to stand strong and keep moving on. Not to forget, my dearest co-supervisors, Dr Puteri Azaziah and Dr Farina. This project would have not been successful without your presence. Your 'ilm and your guidance are my flashlight when it is dark.

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%	Percent
=	Equal
AAFP	American Association of Feline Practitioners
AAHA	American Animal Hospital Association
APC	Annual practicing certificate
AVMA	American Veterinary Medical Association
CAV-1	Canine adenovirus type 1
CAV-2	Canine adenovirus 2
CCV	Canine coronavirus
CDV	Canine distemper virus
CIRD	Canine infectious respiratory disease
CIV	Canine influenza virus
CPD	Continuing professional development
CPiV	Canine parainfluenza virus
CPV-2	Canine parvovirus type 2
DBKL	Dewan Bandaraya Kuala Lumpur
DOI	Duration of immunity
DVM	Doctor of Veterinary Medicine
ELISA	Enzyme-linked immunosorbent assay
FCV	Feline calicivirus
FeLV	Feline leukemia virus
FIP	Feline infectious peritonitis
FIV	Feline immunodeficiency virus
FHV-1	Feline herpesvirus type 1
FPV	Feline parvovirus
IM	Intramuscular
MAT	Microscopic agglutination test
MDA	Maternally-derived antibody
MLV	Modified live virus
MSAVA	Malaysian Small Animal Veterinary Association
MVC	Malaysian Veterinary Council

PCR	Polymerase chain reaction
SC	Subcutaneous
SPSS	Statistical Package for the Social Sciences
UK	United Kingdom
UPM	Universiti Putra Malaysia
US	United States
UVH	University Veterinary Hospital
VAAE	Vaccine-associated adverse event
VGG	Vaccination Guideline Group
VAM	Veterinary Association Malaysia
WSAVA	World Small Animal Veterinary Association

ABSTRAK

Abstrak daripada kertas projek dikemukakan kepada Fakulti Perubatan Veterinar bagi memenuhi sebahagian daripada keperluan kursus VPD 4999 – Projek

PROTOKOL VAKSINASI KUCING DAN ANJING DI SEMENANJUNG MALAYSIA DAN PANDANGAN VETERINAWAN TERHADAP CADANGAN OLEH '*WSAVA ASIAN VACCINATION GUIDELINES GROUP*'

Oleh

SAMEERAH HANI BINTI MD TAHIR

2016

Penyelia: Professor Madya Dr Gurmeet Kaur Dhaliwal

Penyelia bersama:
Dr Puteri Azaziah Megat Abdul Rani
Dr Farina Mustaffa Kamal

Pemvaksinan kucing dan anjing merupakan salah satu komponen penting dalam program pencegahan penyakit haiwan kesayangan. Dengan adanya cadangan baru oleh WSAVA Asian VGG mengenai protokol vaksinasi yang amat berlainan berbanding protokol yang sudah lama terbentuk, pasti akan wujud keraguan, kritikan dan keengganan untuk menerima pakai protokol baru tersebut. Justeru, kajian ini perlu dijalankan bagi menentukan amalan semasa pemvaksinan kucing dan anjing di Semenanjung Malaysia dan bagi memahami pandangan para veterinawan terhadap protokol baru ini. Soal selidik yang diadaptasi daripada WSAVA Asian VGG telah digunakan dan diedarkan secara rawak kepada klinik persendirian di beberapa negeri di Semenanjung Malaysia. Sebanyak 42 klinik mengambil bahagian dalam kajian ini dan sebanyak 82% (n=34) responden pernah mendengar tentang garis panduan tersebut. Majoriti (53.3%, n=17) klinik mengesyorkan pemvaksinan anjing dimulakan

pada umur 8 minggu dan vaksinasi terakhir pula pada umur 16 minggu (77%, n=25). 50% (n=16) klinik mengamalkan pemvaksinan dalam anjing senior dan geriatrik, di mana 81% (n=26) daripadanya mengamalkan vaksinasi tahunan, manakala 19% (n=6) secara 3 tahun sekali. Sementara itu, pengesyoran bagi pemvaksinan kucing pula berbeza iaitu sebanyak 85% (n=36) klinik mengesyorkan vaksinasi pada umur 8 minggu. Pemvaksinan terakhir disarankan pada umur 16 minggu (77%, n=32). Semua responden mengamalkan vaksinasi tahunan dalam kucing dewasa. Terdapat pelbagai pandangan berbeza terhadap garis panduan WSAVA yang baru. 55% (n=23) mengatakan mereka akan mempertimbangkan untuk mengikut garis panduan itu sekiranya terdapat produk vaksin yang sesuai. Perbincangan yang lebih menyeluruh di kalangan veterinawan, penyelidik, industri farmaseutikal dan pihak penguatkuasa adalah wajar bagi membincangkan isu ini yang merangkumi kajian setempat mengenai tempoh immuniti.

Kata kunci: *pemvaksinan anjing, pemvaksinan kucing, WSAVA, Semenanjung Malaysia, pandangan veterinawan*

ABSTRACT

An abstract of the project paper presented to the Faculty of Veterinary Medicine in partial fulfillment of the course VPD 4999 – Project

FELINE AND CANINE VACCINATION PROTOCOLS IN PENINSULAR MALAYSIA AND VETERINARIAN PERCEPTIONS OF THE RECOMMENDATIONS BY THE WSAVA ASIAN VACCINATION GUIDELINES GROUP

By

SAMEERAH HANI BINTI MD TAHIR

2016

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Vaccination is one of the most important components in the preventive health care for dogs and cats. With new recommendations from the WSAVA Asian VGG on vaccination protocols that are vastly different from long established protocols, there may exist doubts, criticisms and reluctance to adopt these new protocols. This study was carried out to determine the current practices of feline and canine vaccinations in peninsular Malaysia and to understand the perceptions of veterinarians regarding the new protocols. A questionnaire adapted from the WSAVA Asian VGG was used and distributed randomly to private clinics in several states of peninsular Malaysia. 42 clinics participated in this study and 82% (n=34) of veterinarians were familiar with the guidelines. The majority (53.3%, n=17), of clinics recommends starting the puppy vaccination series at the 8th week of age, with the last vaccination recommended at 16th weeks of age (77%, n=25). 100% recommend a booster after one year and 96.8%

(n=31) practice annual vaccination following the first year booster. Only 50% (n=16) of the clinics recommend continuing vaccination for senior and geriatric dogs, with 81% (n=16) recommending it annually and 19% (n=6) recommending it triennially. The age of recommendation for the start of the kitten vaccination series is also variable with a majority of veterinarians (85%, n=36) starting it at 8 weeks of age. The last vaccination for the kitten series is recommended at 16 weeks of age (77%, n=32). All clinics practice annual revaccination of adult cats. The perception of veterinarians towards the recommendation varies. 55% (n=23) would consider following the recommended guidelines for the vaccination protocols, only if suitable vaccine products were available. More thorough discussions among veterinarians, researchers, pharmaceutical industries and the regulatory authorities are warranted, including local scientific studies on the duration of immunity (DOI).

Keywords: canine vaccination, feline vaccination, WSAVA, peninsular Malaysia, veterinarian perceptions

1.0 INTRODUCTION

Vaccination plays an important role in the control of infectious diseases; both for individuals as well as for the pet population. Apart from the core vaccines for feline panleukopenia (FPV), feline herpesvirus, (FHV-1) and feline calicivirus (FCV) for cats and canine distemper (CDV), canine parvovirus (CPV-2), and canine adenovirus (CAV-1) for dogs, some vaccine antigens are used to reduce the potential zoonotic spread of diseases, rabies for example. Routine and widespread vaccinations can be very beneficial as it can significantly reduce the incidence of highly pathogenic diseases (Pritchard, 2012).

The World Small Animal Veterinary Association (WSAVA) Vaccination Guideline Group (VGG) was established in the year 2006 as it recognized the need for globally applicable recommendations on best practice for the vaccination of dogs and cats. In 2007, the first global vaccination guidelines for veterinarians was published, followed by revisions in 2010 and 2015, making a total of three sets of guidelines available for reference.

In 2013, the WSAVA VGG also undertook a fact-finding visit to several Asian countries, with a view to developing advice for companion animal practitioners in Asia related to the administration of vaccines to dogs and cats. The committee members had meetings with various first opinion practitioners, small animal association leaders, academicians, government regulators and industry representatives from South Korea, Japan, China, India and Thailand. Later in 2014, the guidelines for Asian region was published (WSAVA, 2014).

According to the Association of American Feline Practitioners (AAFP) (2006), vaccination programs in companion animals have been major topics of discussion among veterinarians. This phenomenon is caused primarily because of concerns about vaccine safety, the number of commercially available vaccines, and an incomplete knowledge of the duration and extent of protection provided by certain vaccines, which brings us to the initiation of this project.

1.1 Objectives of study

Major advancements in vaccinology over the last decade with the production of more immunogenic vaccines, the recognition of adverse vaccine reactions and more scientific evidence on DOI, have resulted in new vaccination recommendations for cats and dogs that are vastly different from long established protocols. With change, there may exist doubts, criticisms and reluctance to adopt these new protocols. This study on current practices in feline and canine vaccinations, and veterinarian perceptions towards the new vaccination guidelines was needed to fill the gaps of knowledge in this area in Malaysia. It will further serve to better address the concerns regarding the new protocols, by the researchers, pharmaceutical industries and regulatory authorities and encourage more evidence-based local studies on diseases of importance.

Thus the objectives of this project were to:

1. determine the current vaccination protocols of cats and dogs being practiced in small animal clinics in peninsular Malaysia.
2. determine the level of awareness of small animal practitioners of the WSAVA Asian VGG recommendations on vaccination of cats and dogs.
3. identify the concerns of small animal practitioners in adopting the recommendations of the WSAVA Asian VGG.

2.0 LITERATURE REVIEW

2.1 The evolution of vaccines and importance of continuing professional development (CPD)

Vaccination in cats and dogs has been one of the most important components in the preventive health care of small animals. The reason being is that viral infections have been the major causative factor in diseases and deaths amongst feline and canine patients (Pastoret, 1993).

Since the late 18th century, techniques in the production of vaccines have been developed, which includes attenuation and inactivation, use of adjuvants and many more (Bonanni and Santos, 2011). Vaccine development is a complicated and a lengthy process that has evolved and expanded especially over the last few decades. The focus on vaccine development used to be centralized on the immunogenicity and efficacy of the vaccines, often for diseases that cause high morbidity and mortality. As once-prevalent and deadly disease is not as common anymore, the focus of vaccine development has shifted to the safety of vaccines and the duration of immunity each vaccine gives instead (Stanberry and Strugnell, 2011).

The constant evolution and expansion of knowledge and scientific findings in the veterinary field has brought the understanding that CPD is important for the betterment of veterinarians' professional standing, keep up with ever-growing knowledge and developments relevant to their field of practice (Veterinary Association Malaysia, 2014). To update practitioners on current topics in vaccinology and how evidence-based changes in vaccination protocols have come about, several seminars by invited experts have been organized by various organizations for the past 3 years in Kuala Lumpur and Selangor. Thus practitioners in this region have had some information on new vaccination protocols.

2.2 The Recommendation for Feline and Canine vaccination protocols by WSAVA VGG 2014 Asian Guidelines

Based on WSAVA (2014), the pragmatic vaccination programme for Asian practitioners for core vaccines is first to choose a safe and effective modified live virus product that provides the minimum combination of core antigens needed. For dogs, that would include CDV, CAV-2, and CPV-2, while for cats it is a combination of FPV, FHV-1 and FCV. If non-core vaccines are deemed necessary, it is recommended to use an alternative diluent rather than reconstitute the vaccine with core vaccines.

Vaccination generally can be given in a kitten or puppy starting at eight to nine weeks of age with a three to four week interval for the second vaccination and later with the third vaccine at 16 weeks of age or older. A booster vaccine should be given 12 months later or at 1 year of age.

For the revaccination of adult cat and dog, it is important for the veterinarians to discuss with the clients regarding the new global approach to core revaccination and obtain their consent for administration of core quality-assured MLV vaccine no more often than every three (3) years, or in other words, triennial revaccination instead of annual revaccination of the core vaccines. The single exception to this may be cats at very high risk of contacting upper respiratory viruses. These cats might be vaccinated annually, but the FPV component of the vaccine combination is not actually required (Day, Karkare, Schultz, Squires, and Tsujimoto, 2014).

The ideal vaccination programme for non-core vaccines would be different from the core vaccines. This includes *Leptospira*, canine infectious respiratory diseases complex (kennel cough), parainfluenza virus (CPiV), *Bordetella,* and canine influenza virus (CIV) for dogs and Feline Leukemia virus (FeLV), Feline immunodeficiency virus (FIV), *Chlamydia felis,* and *Bordetella* in cats.

Non-core vaccines are usually tailored according to the individual animal's lifestyle and exposure risk, which is why discussion with the

owner is vital prior to administration of the vaccines. The recommendation is then to choose only the vaccine with the desired antigens or the antigens in the least possible combination with other non-essential components. The puppy and kitten doses of non-core vaccines are generally given at two (2) to four (4) weeks intervals, followed by annual revaccination (Day *et. al*., 2014).

It is important to note that, FIV vaccination in cats was previously classified as not recommended, but the latest update by VGG in 2015 has re-categorized FIV vaccine as non-core due to the high prevalence and exposure risk of FIV. Given that this vaccine has been shown to have efficacy in some studies, but not in others, and might benefit some at-risk populations of cats, the VGG has re-classified the product as a non-core vaccine. However, Feline Infectious Peritonitis (FIP) and Canine Corona Virus (CCV) vaccines are still not recommended (Day, Horzinek, Schultz and Squires, 2015).

2.3 Herd immunity

Herd immunity is a form of immunity that occurs when the vaccination of a significant portion of a population provides a measure of protection for individuals who have not developed immunity. It arises when a high percentage of the population is protected through vaccination against specific type of diseases. This will result in fewer susceptible individuals in the environment making the spread of diseases difficult, as there are fewer individuals that can be infected. The aim should be to vaccinate more animals instead of frequent vaccinations of the same individuals. To achieve effective herd immunity, at least 75% of the herd of animals should be vaccinated, and this will lessen the chance for an infectious disease outbreak to occur (Day, 2014).

Through the establishment of good herd immunity, protection to individuals that cannot be vaccinated such as newborn puppies or

kittens that are too young to be vaccinated, geriatric animals or non-immune responders is improved. The proportion of the population that must be immunized in order to achieve herd immunity varies for each disease, but the concept is that once a sufficient number of individuals are protected, they help to protect vulnerable ones in the area by reducing the spread of the disease (Rupprecht, Hanlon and Slate, 2006).

The significance of herd immunity has been clearly demonstrated in the UK human populations where the administration of measles vaccination of children decreased from the late 1990s and in 2013, there was a major measles outbreak in Wales. In small animal medicine, the 1990 outbreak of Canine Distemper virus (CDV) infection in Finland was also attributed to reduced herd immunity in the canine population. During the CDV outbreak, herd immunity was no more than 50-65% due to low a low rate of vaccination. However, immunization rates increased in 1995, raising the herd immunity to 90%, which coincided with the ending of the epidemic. In 1996, the herd immunity was slightly above 70%, which was sufficient to control the disease (Rikula, Nuotio and Sihvonen, 2007).

2.4 Duration of immunity (DOI)

The duration of immunity is the period of how long the vaccination will confer protection to the animals after vaccination has taken place. Generally, the DOI varies according to diseases and vaccines. The DOI for vaccination against viral antigens are often life-long once the individual is vaccinated with modified live virus (MLV) vaccines. This is different than the DOI that develops from vaccination against bacteria, fungal or parasites diseases. The adaptive immunity developed will be slower and the DOI is generally shorter compared with viral vaccines (Schultz, Thiel, Mukhtar, Sharp and Larson, 2010).
A study conducted by Gill, Srinivas, Morozov, Smith, Anderson, Glover, Champ and Chu (2004), confirmed the three-year DOI for

CDV, CAV-2 and CPV components in a commercial multivalent MLV vaccine. In addition, the route of administration of vaccines, either intramuscularly (IM) or subcutaneously (SC) did not affect the level of protection for each component of the vaccine when dogs were challenged three years after vaccination.

Another study involving 1000 dogs that were vaccinated with products from all major veterinary biological companies in the United States (US), showed a three year or longer minimum DOI for the canine core products. Whereas feline core vaccines that include FPV, FCV and FHV-1 have shown a minimum DOI of greater than three years. In contrast, feline and canine non-core vaccines provide immunity for one year only (Schultz, 2006).

3.0 MATERIALS AND METHOD

3.1 The Questionnaire

A questionnaire adapted from the WSAVA Asian VGG was used for this project, with additional questions necessary in understanding the vaccination practice in Malaysia. An example of the questionnaire is in Appendix 3.

Basically, there were eight (8) sections as follows;

1. Section 1: About the veterinarian
2. Section 2: About the practice they work in
3. Section 3: About canine infectious diseases in the practice
4. Section 4: About feline infectious diseases in the practice
5. Section 5: About the vaccines they use
6. Section 6: About vaccinating dogs in the practice
7. Section 7: About vaccinating cats in the practice
8. Section 8: Others

3.2 Data Collection

A list of small animal veterinary clinics in Peninsular Malaysia was obtained from various sources, which include VAM, MSAVA, personal blogspots and social media (Facebook).

The clinics were informed of the project via mail, e-mail, phone calls and personal visits. A formal invitation letter with details of the project was provided together with a consent form and the questionnaire itself. Any unclear answers given by the veterinarians were personally clarified during the visit.

3.3 Data Analysis

The data was tabulated in Microsoft Excel and analysed with SPSS software. Simple descriptive statistics are used to represent the data.

4.0 RESULTS

A total of 42 clinics participated in the study during the five-week sampling period (18th January to 19th February 2016). The data was obtained from clinics in the central region (Selangor and Kuala Lumpur), northern region (Kedah, Penang, Perak), southern region (Negeri Sembilan and Johor) and east coast (Pahang and Terengganu). No data was obtained from Kelantan due to short sampling period. Perlis was not included as there are no private veterinary clinics presently.

4.1 Type of vaccines used

Of the 10 states, this study covered practices in Kuala Lumpur, Selangor, Negeri Sembilan, Melaka, Johor, Perak, Penang, Kedah, Pahang and Terengganu. The most common type of canine and feline vaccines used were modified live vaccines from reputable US-based companies, which accounts for 97.6% (n=41).

4.1.1 Feline vaccines

The most popular type of vaccine used by the veterinarians is the MLV 4 in 1 combinations of vaccine that includes FPV, FHV-1, FCV and *Chlamydophila felis*. The products vary according to manufacturing companies.

4.1.2 Canine vaccines

A different scenario scenario was seen with regards of to canine vaccines. Some of the clinics (31.25%, n=10) will only used vaccines from a single manufacturing company, while most of the clinics (68.75%, n=22) had vaccine products from different manufacturers. The type of vaccine used is MLV that ranges from combination of 6 in 1 to 10 in 1.

4.2 Vaccine-preventable diseases seen in practice

4.2.1 Feline vaccine-preventable diseases

Table 1 gives an overview of vaccine-preventable feline infectious diseases seen in veterinary practice. All the clinics surveyed reported seeing cases of FPV, FHV and FCV infections.

VACCINE-PREVENTABLE FELINE INFECTIOUS DISEASES SEEN IN VETERINARY PRACTICE	
DISEASES	**% CLINICS REPORTING**
Feline Panleukopenia (FPV)	100
Feline Herpesvirus (FHV)	90
Feline Calicivirus (FCV)	80
Feline Leukemia Virus (FeLV)	90
Feline Immunodeficiency Virus (FIV)	82
Feline Infectious Peritonitis (FIP)	97
Chlamydophila felis	67

Table 1: Vaccine-preventable feline infectious diseases seen in veterinary practice

Figures 1 and 2 show core-vaccine preventable feline diseases observed in practice (per month) and 17 clinics reported at least 1-5 cases of FPV seen per month, which is higher compared to FHV and FCV. Ten clinics reported a higher caseload of 6-10 cases of FPV seen per month. Cases diagnosed with FeLV, FIV and FIP also are also seen in the clinics at the range of 1-5 cases per month.

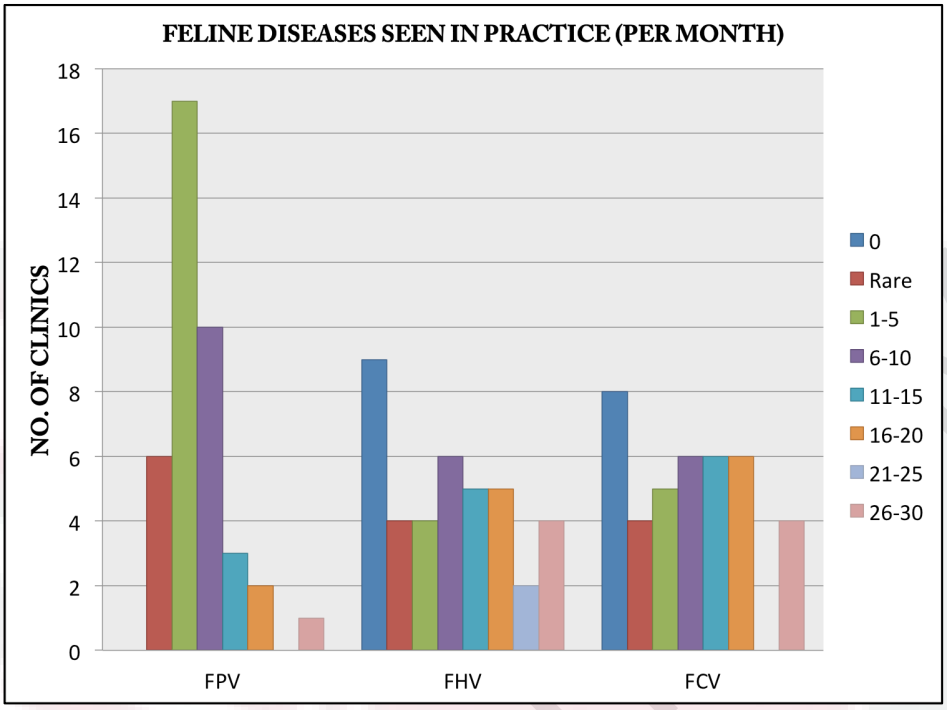

Figure 1: Core-vaccine preventable feline diseases observed in practice (per month)

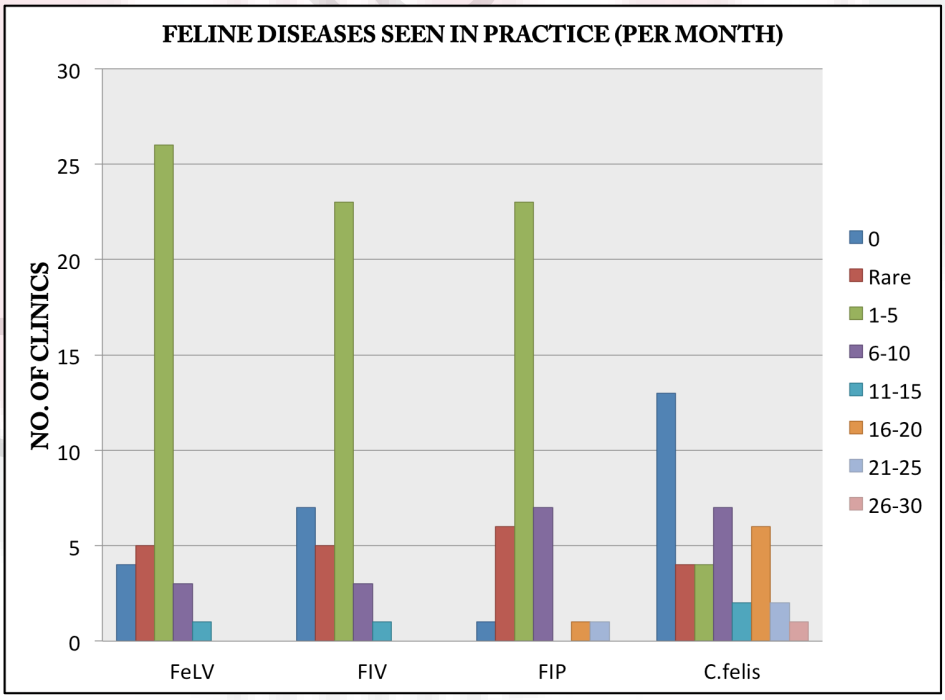

Figure 2: Non-core vaccine preventable feline diseases observed in practice (per month)

4.2.2 Canine vaccine-preventable diseases

For the vaccine-preventable canine infectious diseases, CPV-2 has the highest percentage, with 90% of the veterinarians seeing the diseases in their practices. CAV-1 has the lowest value of only 23% of the clinics reporting for the diseases. The data can be observed in Table 2 below.

OVERVIEW OF VACCINE PREVENTABLE CANINE INFECTIOUS DISEASES SEEN IN VETERINARY PRACTICE	
DISEASES	**% CLINICS REPORTING**
Canine Distemper (CDV)	77
Canine Hepatitis (CAV-1)	23
Canine Parvovirus (CPV-2)	90
Leptospirosis	50
Kennel Cough (CIRD)	77
Canine Coronavirus infection (CCV)	50

Table 2: Vaccine-preventable canine infectious diseases seen in veterinary practice

Figures 3 and 4 show core and non-core vaccine-preventable feline diseases observed in practice (per month). From the graph, 18 clinics reported that they receive 1-5 cases of CDV infection per month. In contrast, 23 clinics did not observe any CAV-1 cases throughout the month and, there was quite a variation for cases of CPV infection, ranging from 0 cases to 11-15 cases per month.

For the other diseases such as Leptospirosis, Kennel cough and CCV, 18 of the clinics reported that they receive at least 1-5 cases of leptospirosis per month, whereas 16 clinics claimed that there were at least 1-5 cases of CCV seen per month. Kennel cough is considered rare because only four clinics saw 1-5 cases per month.

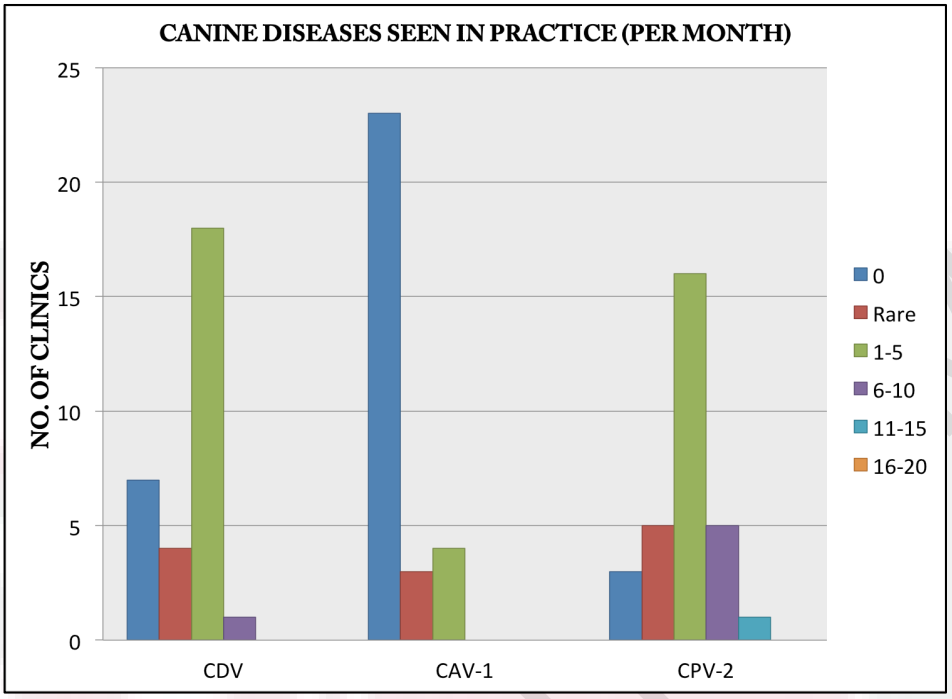

Figure 3: Core-vaccine preventable canine diseases observed in practice (per month)

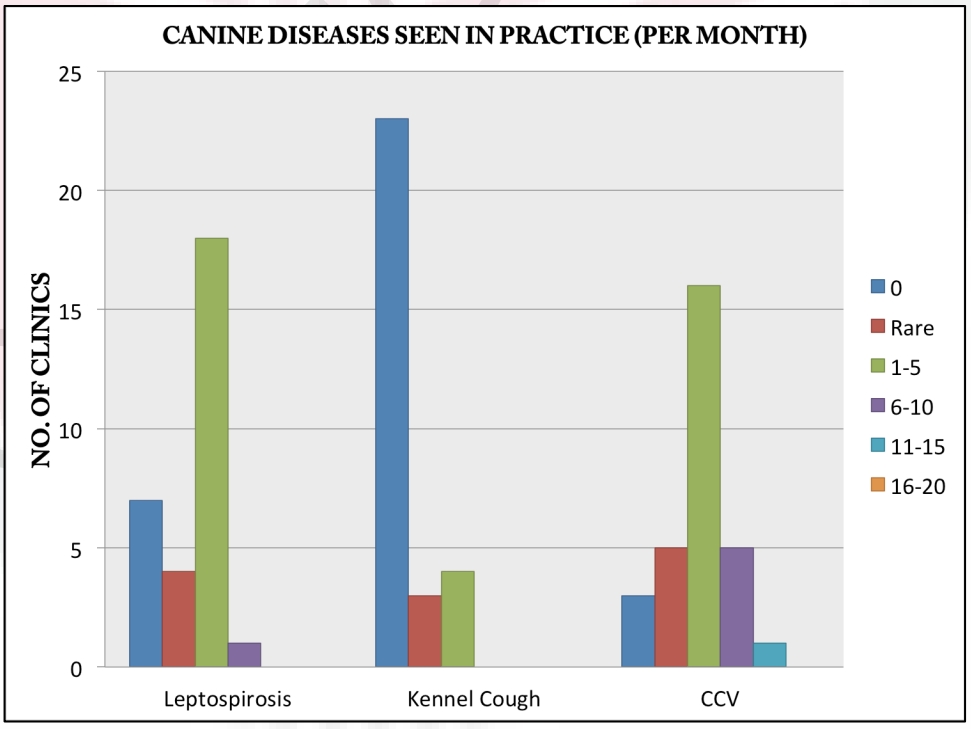

Figure 4: Non-core vaccine preventable canine diseases observed in practice (per month)

4.3 Adverse reactions due to vaccination

A number of the respondents (37.5%, n=12) reported seeing cases of adverse reactions following vaccinations in their clinics. The most common sign reported was fever (41.7%), followed by facial oedema (37.5%) and hypersensitivity, vomiting and inappetance, where 29.1% of the clinics reported to be have seen the signs. Table 3 shows the percentage of clinical signs seen by veterinarian who reported to have seen adverse reactions in their clinics.

SIGNS OF ADVERSE REACTIONS	
CLINICAL SIGNS	**%**
Fever	41.7%
Facial oedema	37.5%
Hypersensitivity (Pruritus, urticaria, wheal)	29.1%
Vomiting	29.1%
Inappetance	29.1%
Weakness	25.0%
Erythema, Granuloma, Pain at injection site	8.30%
Hypersalivation, Recumbency, Generalized blisters, drowsiness, bradycardia, pallor, angioedema, ataxia	4.20%

Table 3: Signs of adverse reactions observed following vaccination

4.4 Feline Vaccination Protocols

4.4.1 Feline Patients vaccinated

Out of the 42 clinics participated in this study, only 43% of them claimed that at least 70% of their feline patient population are vaccinated with core vaccines.

4.4.2 Recommended age to start kitten vaccination

A majority of veterinarians (85%, n=36) recommend to start the kitten vaccination series at the 8th week of age, while 10% (n=4) and 5% (n=2) of the clinics recommend to start at 6th and 12th weeks, respectively (Figure 5).

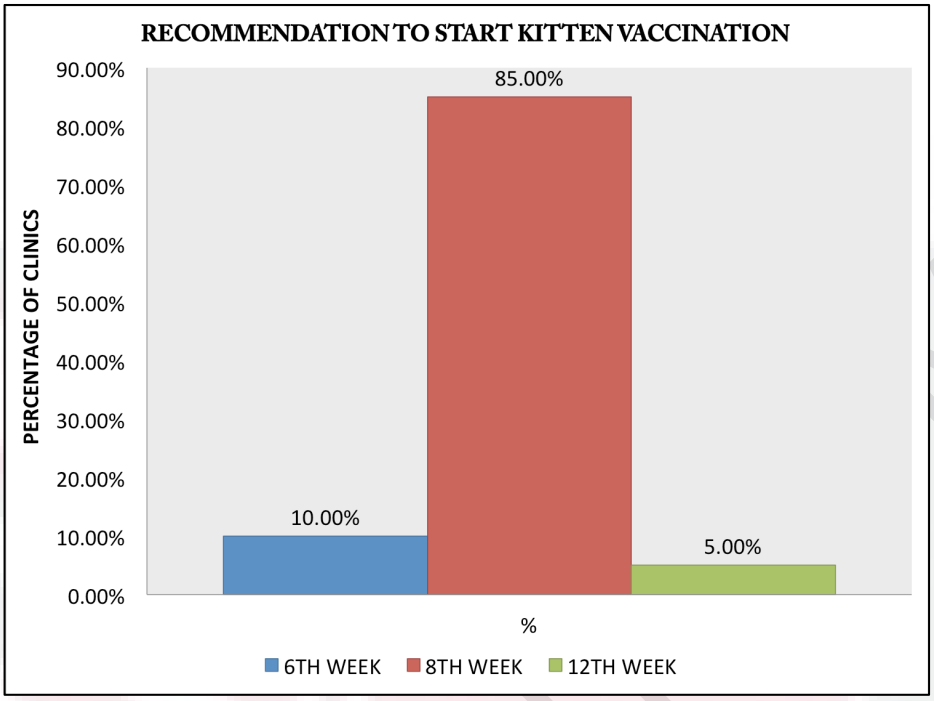

Figure 5: Veterinarian recommendations on age to start kitten vaccination

4.4.3 Recommended age for last kitten vaccination

For the last vaccination in the kitten series, 77% (n=32) of veterinarians recommend to give it at 16th week of age, whereas 10% (n=5), 2.6% (n=1), 7.7% (n=3), 2.6% (n=1) recommend to give the last kitten vaccination at 12th, 14th, 20th and 24th week of age, respectively (Figure 6).

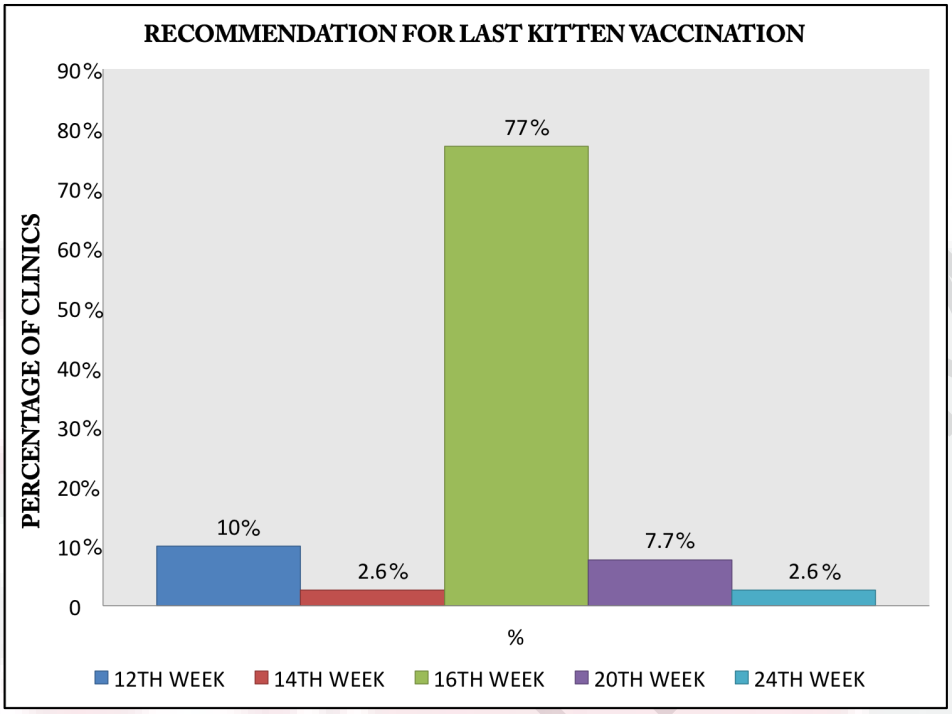

Figure 6: Veterinarian recommendations on age for last kitten vaccination

4.4.4 Adult cat vaccination

Following the completion of primary kitten vaccination series, 100% of the veterinarians surveyed revaccinate adult cats after 1 year, and thereafter practice annual vaccination.

4.4.5 Senior/geriatric cat vaccination

Considering vaccination in older pets, 45% (n=19) of veterinarians do not recommend vaccination of senior cats (over 11 years of age). The rest (54%, n=23) continue to administer vaccinations to senior and geriatric (over 15 years) with 76% (n=18), 14% (n=3), and 10% (n=2) vaccincating annually, triennially and tailored according to lifestyle, respectively.

4.4.6 Non-core vaccination

A majority of the clinics (76%, n= 32) offer FeLV vaccination, while a small portion of the clinics (26%, n=11) offer vaccination against FIV. These non-core vaccines are given annually to the feline patients.

4.5 Canine Vaccination Protocols

4.5.1 Canine patients vaccinatedd

Sixty-two percent of veterinarians surveyed claimed that at least 7 out of 10 dogs brought to their clinics are vaccinated against core-vaccine preventable diseases.

4.5.2 Recommended age to start puppy vaccination

Figure 7 shows veterinarians' recommendations' as of when to start puppy vaccination. One third (33%, n=14) recommend starting at 6 weeks of age and 53.3% (n=22) suggest to start at 8 weeks of age. Another 3.33% (n=1) 6.70% (n=3) and 3.33% (n=1) suggest to start puppy vaccination at 10th week, 12th week and tailored according to breeds, respectively.

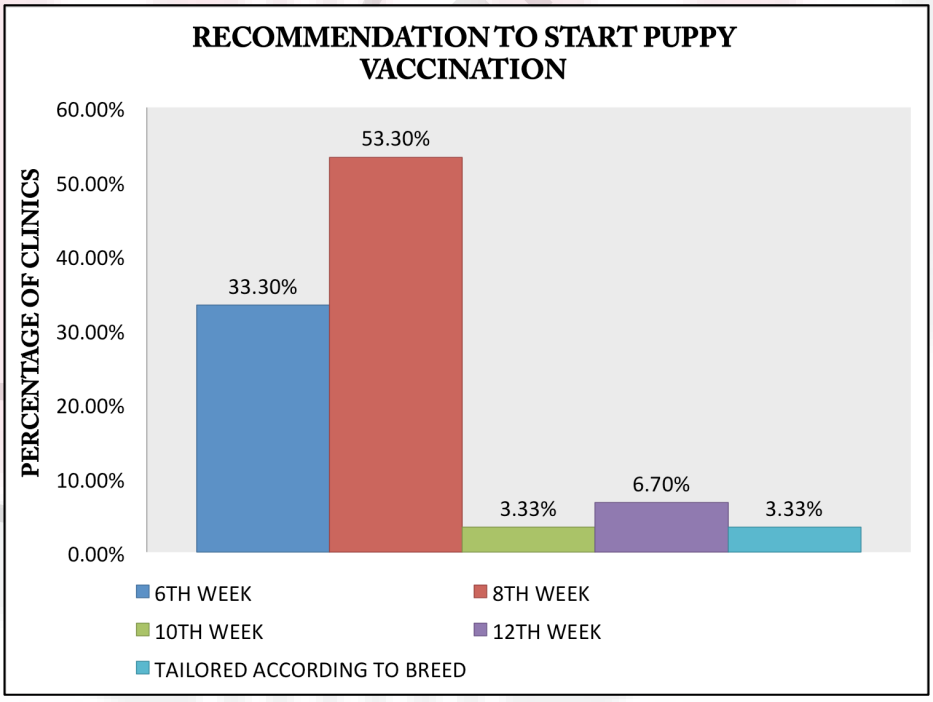

Figure 7: Veterinarian recommendations on age to start puppy vaccination

4.5.3 Recommended age for last puppy vaccination

Figure 8 shows that a majority (77%, n=33) of the veterinarians recommend to give the last puppy vaccination at 16 weeks of age. Remaining veterinarians interviewes gave varying recommendations. 3.33% (n=1) suggest to give the last vaccination at 14th, 18th, 20th and 24th week of age, while another 10% (n=6) will tailor the last vaccine administration according to breed of dogs.

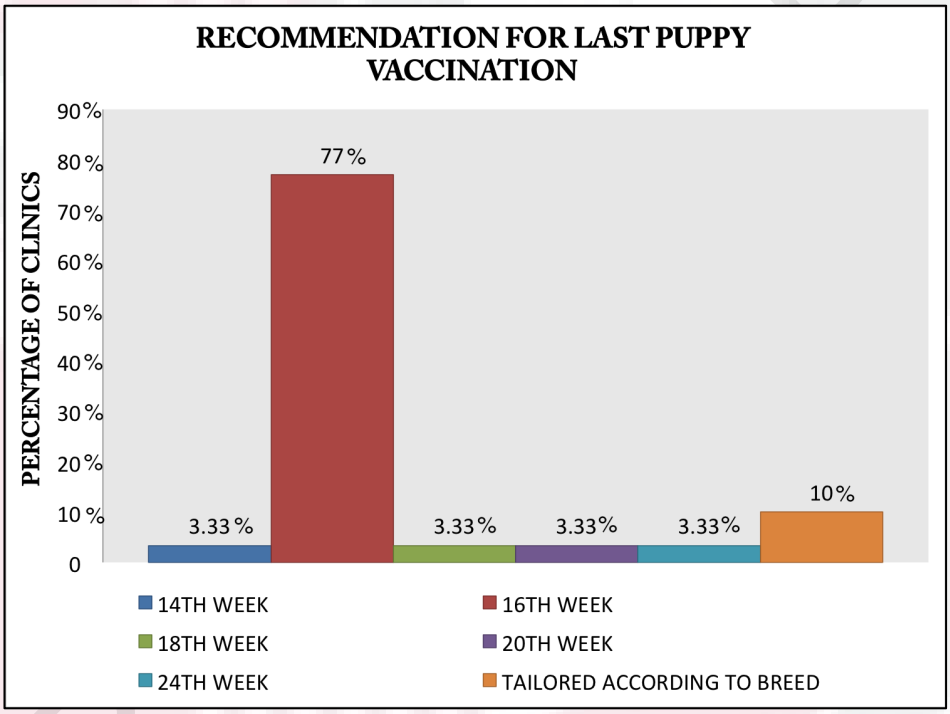

Figure 8: Veterinarian recommendations on age for last puppy vaccination

4.5.4 Adult dog vaccination

All veterinarians that participated (100%) recommend the first booster vaccination one year after finishing the primary puppy vaccination series. Following that, 97.6% will continue to give booster vaccination once a year, whereas 2.4% are already practicing triennial core vaccinations following the 12 month booster.

4.5.5 Senior/geriatric dog vaccination

For vaccinations in senior and geriatric dogs, 50% of veterinarians recommend continuing vaccinations, while the rest stop giving vaccinations.

For those that continue to administer vaccinations in senior and geriatric dogs, 81% (n=34) practice annual re-vaccination, while 19% (n=8) practice triennial re-vaccination.

4.5.6 Non-core vaccination

The non-core vaccines used by the veterinarians vary in antigen components ranging from antigens such as canine parainfluenza virus, canine coronavirus, *Bordetella bronchiseptica,* and different strains of Leptospira, such *as Leptospira canicola, Leptospira icteriohaemorrhagiae, Leptospira grippotyphosa* and *Leptospira pomona.*

4.6 Veterinarian Perceptions and concerns on the WSAVA Asian Vaccination Guidelines Group Recommendations

Of the 42 veterinarians surveyed, 81% (n=34) were well aware of the WSAVA 2014 Asian guidelines, and 55% (n=23) said that they would consider adopting the new WSAVA 2014 Asian guidelines into their practice.

4.6.1 Positive perceptions

A few of the veterinarians who participated in the study shared their perceptions and concerns on the WSAVA 2014 Asian VGG guidelines.

Firstly, from the pet-owner's point of view, triennial vaccinations are relevant and cost-effective.

The veterinarians also thought that these guidelines were good as there would be a lesser chance of triggering adverse reactions from the yearly vaccination.

Last but not least, the veterinarians also commented that herd immunity was more important compared to frequent vaccination of the same individuals, as it is beneficial in reducing the incidence of vaccine preventable diseases.

4.6.2 Concerns

The most glaring issue concerning the triennial vaccination is that the vaccine products available in the market combine core and non-core antigens in the same vaccine. It is clear that only the core component DOI lasts for 3 years or longer, but the non-core components DOI only last for a year. Thus, triennial vaccination protocol will still be challenging to adopt in peninsular Malaysia, especially when there are dogs that have a high risk exposure to diseases prevented by non-core vaccines, such as leptospirosis.

One other concern expressed by the veterinarians (n=10) was that there would be fewer meetings with owner for health check-ups and client education if triennial re-vaccination were to be practiced.

5.0 DISCUSSION

5.1 Type of vaccines used

There are different types of vaccines available in the market, such as the whole live, attenuated, killed or inactivated pathogen vaccines. The most direct method for developing a vaccine is to use a whole pathogen, either killed/inactivated or attenuated. These complete organisms are likely to contain all of the relevant pathogen-specific protein and carbohydrate antigens for effective vaccination.

Moreover, live pathogen vaccines replicate and disseminate to their target tissue in a pattern similar to that occurring during a natural infection. The higher intensity of the innate immune responses, higher antigen content following replication and the more prolonged antigen persistence are the presumed mechanisms of how, generally, live, attenuated vaccines stimulate an effective and long-lasting immunity (Strugnell, Zepp, Cunningham, and Tantawichen, 2011). This might be one of the explanations in the preference of the veterinarians in choosing MLV vaccines in their vaccination practices. Also it eliminates the use of adjuvants, which can trigger adverse reactions.

5.2 Vaccine-preventable diseases seen in other countries

Table 4 shows the comparison of feline vaccine-preventable diseases in Malaysia with other Asian countries. From the table, we can see that all participating veterinarians in Malaysia have seen cases of feline parvovirus in their clinics, with Japan having the least number for the category. India shows the lowest percentage of veterinarians reporting cases of FIV (WSAVA, 2014). Cases diagnosed with FeLV, FIV and FIP also are also seen in veterinary clinics in Malaysia at the rate of 1-5 cases per month, reflecting the growing importance of these diseases. A study by Bande, Arshad, Hassan, Zakaria, Sapian, Rahman and Alazawy, (2009) reported a prevalence of 24.7% (FIV antibodies) and 11.8% (FeLV antigen) in 93 cats with clinical signs suggestive of FeLV /FIV.

It is important to note that the FIV vaccine is not registered for use in Malaysia, and is it has an unknown efficacy as there are questions over the cross-protection between subtypes of virus included in the vaccine and those subtypes and recombinants in the field in different geographical areas (Dunham, Bruce, MacKay, Golder, Jarett and Neil 2006). This warrants further research in this area and on the efficacy of the vaccine for the biotypes present here. Nevertheless, the WSAVA has recently re-categorized FIV vaccination from not recommended to non-core vaccines due to the growing importance of the disease.

OVERVIEW OF VACCINE PREVENTABLE FELINE INFECTIOUS DISEASES SEEN IN VETERINARY PRACTICE

DISEASES/ COUNTRY	FPV	FHV-1	FCV	FeLV	FIV	No. of respondents
%	100	90	80	90	82	42
Malaysia						
%	57.5	96.5	88.5	92	96.5	113
Japan						
%	71	-	29	74	15	144
India						
%	93	86	86	43	34	100
Beijing						
%	76	62	38	44	36	50
Shanghai						
%	88.4	71.2	71.5	75.3	68.9	267
Thailand						

Table 4: Overview of vaccine preventable feline infectious diseases seen in veterinary practice in Malaysia compared to other countries (WSAVA, 2014)

Table 5 shows the comparison of canine vaccine-preventable diseases in Malaysia with other Asian countries. Malaysia has the lowest percentage of respondents (23%) reporting for CAV-1. CAV-1 tests may not be readily available to clinics, and this may account for the low reported number of cases in most of the Asian countries. Although in Malaysia 50% of respondents reported seeing cases of Leptospirosis, it was not clear whether this was based purely on clinical signs and response to treatment or accurate diagnostic tests.

OVERVIEW OF VACCINE-PREVENTABLE CANINE INFECTIOUS DISEASES SEEN IN VETERINARY PRACTICE						
DISEASES/ COUNTRY	**CDV**	**CAV-1**	**CPV-2**	**Leptospirosis**	**CIRD**	**No. of respondents**
Malaysia %	77	23	90	50	77	42
Japan %	44.2	17.7	75.2	30.1	76.1	113
India %	73	76	100	56	28	63
Beijing %	100	34	93	23	87	100
Shanghai %	94	60	86	28	66	50
Thailand %	96.2	27.7	95.5	33.3	70.8	267

Table 5: Overview of vaccine preventable canine infectious diseases seen in veterinary practice in Malaysia compared to other countries (WSAVA, 2014)

From these two tables, we can see that the percentages of clinics reporting infectious diseases for dogs are lower compared to that for cats. This could be due to better owner compliance for vaccination for dogs compared to cats, resulting in better herd and individual immunity in the canine population. Also for dogs we should take into consideration that most pet dogs are now mostly confined to the compound by their owners because of regulations that exist, licensing laws and activity of council dogs catchers, and thus have a lower risk to contracting diseases from strays. No such regulations exist for cats and as such a majority of cats kept in Malaysia, are still allowed to roam outdoors and as such may have higher risk to disease exposure compared to dogs.

5.3 Adverse reactions due to vaccination

The result in Table 3 shows that quite a number of the veterinarians see cases of vaccine-associated adverse event (VAAE). It is stated that cats and dogs may show some mild side effects after administration of vaccine. The signs start within hours after the vaccination. However, there are some circumstances where more serious side effects can occur, such as allergic reactions. These usually occur within minutes to hours of vaccination. These conditions can be fatal if no emergency medical treatment is given. Signs that are considered as serious are persistent vomiting or diarrhea, itchy skin, swelling of the muzzle, face, neck or eyes, severe coughing or difficulty in breathing and also collapse (Scherk, Ford, Gaskell, Hartmann, Hurley and Lappin, 2013).

These signs were mostly reported in dogs in this study, and although the size of dog was not reported, it is known that dogs less than 10 kg have a higher prevalence compared larger dogs. A retrospective study by Moore, Guptill, Ward, Glickman, Faunt, Lewis and Glickman (2005), involved administration of vaccines to 1,226 dogs, and of these, 159 dogs showed evidence of VAAE. The rate of VAAE decreased significantly as body weight increased. Risks for VAAE was 27% to 38% greater for neutered versus sexually intact dogs and 35% to 64% greater for dogs approximately 1 to 3 years old versus 2 to 9 months old. The risk of VAAE is also significantly increased as the number of vaccine doses administered per office visit increased, where additional vaccine doses increase the risk of getting VAAE by 27% in dogs that is less than or equal 10 kg, and 12% in dogs more than 10 kg. Young adult small-breed neutered dogs have greater risk of VAAE within 72 hours after vaccination. Today, it is recommended that, especially in small breed dogs, that veterinarian consider delaying administration of non-core vaccine until 2 to 4 weeks after completion of the core vaccines. Then, administration of any non-core vaccine should be limited to those patients having a reasonable risk of exposure to the pathogen. These factors should be considered upon administration of vaccine and client must be well informed about this matter (Ford, 2003). And these are mostly due to the adjuvant part of

the vaccine, which is why non-adjuvant vaccines available in the market should be considered. There must also be a consideration whether leptospirosis vaccine is required in dogs that have low exposure risk. If it is needed, it needs to be given at a separate time (i.e 2 to 4 weeks) after core vaccination (Welborn, DeVries, Ford, Franklin, Hurley and McClure, 2011).

In addition, there is also no reported case of feline sarcoma from the veterinarians. It is either under diagnosed or not present perhaps because most clinics are using modified live vaccines, which eliminate the need of adjuvants.

5.4 Current vaccination practices of veterinary clinics in Malaysia

From the results (4.4.1 and 5.4.1), 62% and 42% of clinics reported that at least 70 % of the canine and feline patient populations, respectively, were vaccinated... This is parallel to the report on infectious diseases in both dogs and cats, where more number of veterinarians reported they see more feline diseases per month, compared to the canine diseases. This suggests that compliance for vaccination of the pets is better in dog owners than cat owners. One reason is that dogs owners tend to have fewer dogs due to regulations on how many dogs one can keep within a stipulated size of compound, whereas for cats, owners tend to keep many cats, and thus expenses when it comes to vaccinations, are higher for cat owners for the sheer number of cats they have. Thus those who may not be able to afford it may tend to not comply. With the VGG recommendations, after the one year booster, the triennial vaccination recommendation may result in more cats owners being compliant.

Majority of veterinarians (73%) are following the puppy and kitten recommended protocols and all administer the booster after 12 months. Vaccination is recommended to start at 8 weeks of age and repeated at

3-4 week intervals due to the presence of maternally derived antibody (MDA) that is present in the blood of a newborn puppy or kitten. Only after MDA has declined to a very low level can the puppy produce its own antibodies (WSAVA, 2010). Older reccomendations were to start vaccinations earlier from 6 weeks of age. This may be suitable for kittens that have not received colostrum or if they are from a queen that has not received any vaccination. As such maternal antibodies may be low. Thus vaccination at 6 weeks may trigger the immune response. Starting at 12 weeks old is a risk, as MDA, can start to decline earlier than that and not render any protection from disease.

The reason why more than 70% of veterinarians are following the VGG protocols for the kitten and puppy series and the booster after 12 months could be from the fact that the veterinarians have had current updates on feline and canine vaccination protocols by WSAVA through talks organised by different organisations with experts presenting data and evidence for current recommendations to veterinary students as well as veterinarians. Also, all DVM graduates are made aware of the WSAVA guidelines during the Feline and Canine Medicine course.

Based on the results, some veterinarians still recommend starting vaccination in kittens and puppies at 6 weeks of age and ending at 12 weeks. This could be because they are not familiar with the guidelines, and are yet to change, as these were old recommendations from before the existence of the guidelines.

Again, earlier recommendations for cats were for the last vaccination to be given at 12 weeks as there was evidence that MDA waned and by 12 weeks, woud not interfere with trigerring a response in the kitten. However, newer evidence shows that MDA in cats do last as long as in puppies and the last vaccine in the kitten series given should be at minimal 16 weeks of age to ensure no interference with MDA. (WSAVA, 2010)

While vast majority of cats and dogs are capable in responding to the antigens in the vaccines, some dogs are genetically predisposed to a state of not responding to vaccines, which termed as low or non immune responders. Every breed has a small percentage of low or non-immune responder. These individuals are likely not to respond to just one type of antigen. In other words, a dog might not respond to CPV antigen, but can respond to CDV antigen. Dobermans and Rottweiler have a history of high number of individuals that did not respond to CPV in 1978. However, this phenomenon is not seen today, as most non-responders did not survive due to their genetic traits in the epidemics. Therefore, if a puppy that does not develop an immune response to two vaccines after 12 weeks of age, he is likely a non-responder (Schultz, 2005). In other findings, Black Labrador and Akitas are more likely to be non-responders to CPV, whereas greyhounds are more often non-responders to CDV. To date, there have been no documentation of non-responders in cases of CAV-2 vaccine, and relevant data are not available for FPV in cats. In such cases, antibody titer checks are warranted, and commercial kits are available currently that can be used to determine the antibody levels two to four weeks post vaccination.

The triennial vaccination recommendation of the guidelines is the one that is not followed closely by most veterinarians in this study, most preferring to give annual vaccinations. The main reason for is that the core-vaccines available currently in the market are combined with the non-core components in a single vaccine.

Forty-six percent and fifty percent of the veterinarians do not recommend continuing vaccinating senior cats and dogs, respectively. However the AAFP recommend continuing vaccinations at the normal recommended intervals because although immunosenescence resulting in the overall decline in the immune function does occur in cats and dogs, elderly animals generally have persisting vaccinal antibody titres

at protective levels and do respond to booster vaccination with elevation in titres. In other words, if a cat is routinely immunized throughout its adult years, then maintaining vaccination protocols at recommended intervals is warranted in senior cats. Intervals do not need to be decreased because titers are likely to be maintained between boosts; however, intervals should not be increased (AAFP, 2014). Again, if titres are questionable, a titre check can be done prior to vaccination to check if titres are at protective levels and if vaccination is warranted. This allows tailoring the vaccination protocol according to needs. Of course the lifestyle of the animal needs to be taken into account, but if geriatric or senior cats, by virtue of their age, are mostly kept indoors, the risk to disease exposure is also reduced.

5.5 Perceptions and concerns

One of the most common concerns for the triennial recommendation is the absence of separate core and non-core vaccines that hinders adoption of the WSAVA guidelines. For example, vaccines available now for dogs, are 9 in one or 10 in one, meaning that the non-core vaccine where DOI is a year is given in the same vaccine. This prevents all efforts to use this vaccines triennially especially for dogs that require yearly Leptospirosis vaccination, due to their higher risk of exposure. Also while on the inserts, a longer DOI is stated, manufacturers still recommend yearly vaccination on the labels. This is an area, where there needs to be clear product label recommendations supporting the guidelines, that veterinarians can confidently follow.

With the increasing of rat population in the environment, the veterinarians claimed that there is a high prevalence of leptospirosis in their area. Tamboo (2003) stated that in Kuala Lumpur itself, there is an estimated number of 6.8-million rat population. The number of leptospirosis cases in human population also has increased dramatically from 2000 cases in 2010 to 4000 cases in 2013. This raises more concern as the vaccine available in the market combines

core vaccines components with the leptospirosis component, which is considered as non-core. Therefore, they emphasize on the need of annual vaccination, as there is high-risk exposure to leptospirosis in dog patients, and the fact that the leptospirosis vaccines DOI is only last for a year.

One other concern of veterinarians was worry of the possibility of reduced number of annual health care visits, which are currently combined with re-vaccination, if triennial vaccination were to be adopted. The data obtained from the University Veterinary Hospital (UVH), Universiti Putra Malaysia (UPM) shows an increase of 0.16% of feline patients in 2013-2014, while in 2014-2015, the number increased dramatically by 17.98%. This suggests that either cat ownership is on the rise or cat owners are becoming more aware of the importance of veterinary visits. From personal experience and encounters, a number of cat pet owners keep more than three cats per household, making costs of vaccinations a concern with annual vaccinations. Perhaps triennial vaccinations will result in better compliance in cat owners in the future. However, it is important to emphasise to owners the importance of annual health checks and that vaccination is not the only reason for a client to visit the veterinary clinics yearly.

6.0 CONCLUSIONS

From this study the following can be concluded:

The majority (81%) of the small animal practitioners that participated in this project were aware of the WSAVA 2014 Asian VGG guidelines.

A majority of clinics that participated in this study have adopted changes to their feline and canine vaccination protocols in accordance to the WSAVA 2014 Asian VGG Guidelines as far as the primary kitten and puppy

vaccination series and the annual booster are concerned. However, most of the clinics still practice annual re-vaccination of adult cats and dogs.

The main concern of veterinarians regarding the triennial re-vaccination practice is the lack of separate commercially available vaccines for core vaccine and non-core vaccines components.

7.0 RECOMMENDATIONS

7.1 In order for better representation of the current vaccination practices, a larger sample size is recommended. Also the involvement of government clinics and hospitals would contribute to more complete data, enabling a more accurate representation of vaccination practices in the country.

7.2 The inclusion of Sabah and Sarawak in the study will also help establish more accurate data on feline and canine vaccination protocols. Plus, it would be of value to extend the project and focusing on the states included in the rabies belt for accurate representation of vaccination protocols for rabies on the ground.

7.3 Adoption of any new recommendation relies on time and effort taken in spreading information through CPDs, round table discussions, and can be further encouraged with more discussion among veterinarians, researchers, pharmaceutical industries and the other regulatory authorities, particularly to address the issue regarding the availability or options of vaccine products in the market.

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