A CLINICIAN'S BRIEF SUPPLEMENT

Sponsored by an educational grant from Elanco

Clinician's Forum

Expert views from a roundtable discussion on feline infectious diseases

Feline Infectious Diseases & Vaccination Strategies

In the ever-changing landscape of feline infectious diseases, staying informed of current patient recommendations is critical for busy practitioners. Advancing vaccine technologies with expanded options and factors such as lifestyle risk assessment often require practitioners to make nuanced considerations for patients in their care. The following conversation provides insights from industry leaders on their approach to feline infectious diseases and vaccination.

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MODERATOR

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AAFP = American Association of Feline Practitioners

AAHA = American Animal Hospital Association

FeLV = feline leukemia virus

FISS = feline injection site sarcoma

FIV = feline immunodeficiency virus

FVRCP = feline viral rhinotracheitis, calicivirus, panleukopenia

PCR = polymerase chain reaction

RNA = ribonucleic acid

Dr. Miller: What is the current state of feline infectious disease? What's new and what's changing?

Dr. Sykes: There's been considerable development in the area of diagnostic testing, with new rapid tests for both feline and canine infectious diseases. There's also been interest in diseases that we previously thought were not very important in cats, like leptospirosis.

Dr. Lappin: There have also been some great advances in the treatment of some infectious diseases, like feline infectious peritonitis, for example, and I think our knowledge will continue to grow as we figure out how to keep those cats in remission.

Dr. Sykes: Our knowledge on the pharmacokinetics of drugs we've been using in cats is also growing. We have improved dosing information for cats for a variety of antimicrobial drugs, including antibacterials and antifungals.

Dr. Lappin: New, updated WSAVA vaccine guidelines are also in development for dogs and cats. So that'll be a hot topic as we go forward, too.

Dr. Moore: From the epidemiology side, the old epidemiologic triad has been the host, the agent, and the environment, but I think we are beginning to recognize that not all cats today may fit the same categories as in the last set of AAFP guidelines. For example, do cats go outside as much as they used to? So there may be changes to consider there as well.

Dr. Miller: Let's discuss FeLV. What makes it unique regarding its pathogenesis in cats?

Dr. Sykes: There's much to discuss about FeLV. It's such an interesting disease in terms of its pathogenesis; we thought we understood what happens in cats infected with FeLV, but we continue to be surprised by the way this virus behaves in some cats. New molecular tools—especially quantitative PCR, both proviral PCR and RNA-based PCR—have really shed light on its pathogenesis, how unique it is, the different strains involved, and how cats can go in and out of states of regression depending on their immune status. There are many different strains that can influence the outcome of infection. We also have host factors that are important in determining outcomes; for example, age-related resistance is a really important feature of FeLV-associated disease.

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Dr. Moore: There was a time when it was assumed FeLV always followed a very classic presentation, often not with a very good prognosis. Then, it seemed like perhaps the incidence of disease—or at least of clinically affected cats—was not as large as it had been, and the question was: was that due to a natural decline of infection somehow? A lower rate of exposure? Or a loss of a susceptible population? And then we also have cats that sometimes have clinical signs and clinical pathologic manifestations that would be very similar to what an FeLV-positive cat would experience but then test negative. Those cases are challenging for veterinarians, as not everyone is experienced in seeing these clinical cases and being aware of different test methods and their strengths and weaknesses.

Dr. Milden: Yes, being in the trenches, we see a lot of cats that have stomatitis-type signs that we used to attribute to FeLV. Originally, when we got a positive FeLV result, it gave the cat a death sentence. Now there's a much more in-depth conversation to be had. With PCR testing, we have a much better grasp on how to advise the owner going forward.

Dr. Miller: What do the vaccine guidelines in the United States recommend regarding FeLV protection?

Dr. Sykes: For cats younger than 1 year of age, AAHA/AAFP vaccine guidelines recommend FeLV vaccination as core, because, oftentimes, the indoor/outdoor status of that cat might not yet be known. After 1 year of age, the decision to vaccinate is based on risk for exposure to FeLV. Current vaccine guidelines have slightly different recommendations for the recombinant vaccine versus the inactivated vaccines. If a cat has ongoing exposure to cats that may be shedding FeLV or if the cat is otherwise at high risk for infection, then annual vaccination with the recombinant vaccine is recommended after the kitten series. For inactivated vaccines, boosters are recommended every 2 to 3 years, depending on the label for the inactivated vaccine.

Dr. Moore: What's also important to know about FeLV with regard to testing is, a lot of the time, the first test in a healthy cat is going to have a false-positive result just because of the low prevalence of disease and positive predictive value issues. So retesting is really

important if you get a positive result. Then, if you do verify that the cat is positive through a second test, you have to remember that many of those cats are going to recover, and it's not necessarily a cat that's going to go on and develop FeLV-related disease. The other point would be to remember that a negative result doesn't mean that the cat is not infected, and a follow-up test needs to be done. Typically, we're doing that 2 months later.

Dr. Miller: The recent AAHA and AAFP vaccine guidelines deemed FeLV vaccination core for kittens and cats 1 year of age, yet in the Malter et al noncore vaccine compliance study, only 36.8% cats in this age group were vaccinated against FeLV.[1] Why do you think there is this disconnect?

Dr. Moore: It can be difficult to interpret in this study, but when we looked at the overall rates across all age groups, it did not surprise us that only about one-third of the cats had a recent vaccination. I think the surprise was that, between coverage in young cats and kittens as compared with older cats, the percentage of vaccinated cats was similar. To me, this suggests not necessarily a difference in how cats are classified but in how practices are choosing to implement their protocols and which cats they deem should receive this vaccine. I also think the age of the cat may create some problems in interpretation by veterinarians. If you were to ask in a survey across practitioners if the FeLV vaccine is core or noncore, I think many practitioners would consider it noncore and may not fully understand the importance of it in the kitten series.

Dr. Lappin: I think we need to readdress that risk-versus-benefit side of the equation concerning FeLV vaccination. I think there's still this belief that the FeLV vaccine poses a high risk for injection site sarcomas. However, based on newer information about sarcomas and FeLV prevalence, it looks to me like the risk for acquiring FeLV is much higher for at-risk cats than the risk for a vaccine side effect. Trying to recenter that discussion with owners and our colleagues is important.

Dr. Milden: Some practitioners I've spoken to do not include it as a core vaccine. They function off the theory that if it's going to be an indoor cat, it doesn't need to be vaccinated against FeLV. The problem, though, is that many families don't only own one cat over the lifetime of that cat. Those other cats can introduce risk, and it can be a struggle to remember that lifestyle, as perceived by the owner, can be fluid and is not necessarily representative of the lifetime risk for that cat.

Dr. Lappin: I think there is also a risk for overemphasizing age-acquired resistance to FeLV when making the decision to vaccinate. While I agree that age-acquired resistance occurs, we cannot accurately determine which cats are naturally immune to FeLV. So if age is used as part of the vaccination equation, some susceptible cats may be left unprotected.

Dr. Miller: How can veterinarians increase compliance with FeLV vaccination?

Dr. Milden: Pet owners come to us for our knowledge. While many clients are well informed, they are not often in the position to decide which vaccines their cats may need. So, you tell them what the guidelines are, what you're going to do, and answer any questions they have, but you explain the medical standard and why you're recommending it.

Dr. Lappin: For the most part, I think we're really good at making guidelines that are accurate based on the literature we have available. The problem I think we're seeing is in getting uptake on the implementation of those guidelines. Both the WSAVA and AAHA/AAFP guidelines are lengthy, so having ways to pass the key information to veterinarians is critical. How do we get those simple messages across and actually have other veterinarians agree? Because, if the veterinarian doesn't believe our recommendations, then they're not going to sell it to the owner.

Dr. Sykes: Understanding the barriers to guideline compliance is important. It might not be as simple as cat owners not wanting this vaccine or veterinarians not thinking it's important. Maybe there are other factors that also influence that decision, such as the convenience of stocking vaccines. Is it about people not even bringing their cats to the veterinarian? We need a better understanding of factors influencing vaccination compliance.

Dr. Moore: I think we forget that veterinarians are very busy people. It's hard to keep up with the information and the literature. For example, if we discuss the guidelines at a conference, is everybody really going to that conference or to that session? Maybe they never saw the guidelines online. Awareness is not there; there may not be a bias against the information, but really the uptake of knowledge is probably much slower than we appreciate. And perhaps the industry can help in different ways. The challenge is our lives are all very busy, and doctors are not all together in one room. Another consideration is how does a piece of information even get disseminated throughout a practice? Or will there just continue to be mixed messages within the same set of walls?

Dr. Miller: What challenges do veterinarians face when risk-assessing our feline patients, and how does that apply to core versus noncore vaccine recommendations?

Dr. Milden: I'm in a semi-rural area, and we have a very large feral cat population, and we have a significant prevalence of both FeLV and FIV in that population. My own cat learned how to use the doggy door, so what was an indoor cat now sunbathes on the back deck and wanders through the woods. So, especially with new cat owners, I tend to be a little jaded that a totally indoor cat will not necessarily be 100% indoor; there's risk that they're either going to get out or they're not going to be a solo cat. That's how I view everything. So, it's really tough sometimes to do a good risk assessment in cats.

Dr. Moore: And we have to remember that our risk assessment often asks questions phrased on the present or the past, but vaccines work to protect in the future.

Dr. Lappin: One of the things we need to do is make sure our paraprofessionals know how to do an accurate risk assessment for indoor/outdoor status, because they're frequently gathering that information for us these days. I think one of our key things is getting that message across and actually getting the cats in yearly so that we can do that risk assessment. To increase compliance of noncore vaccines, we need to see the pets, have the appropriate discussions, and determine which optional or noncore vaccines are needed.

Dr. Milden: With the new recommendations for vaccines, when you have mutliyear vaccines, it may inadvertently make it more difficult to get cats to come in to be seen every year. So now it's like, "Yeah, come in, because I really want to examine your cat to make sure it's not having a problem we haven't picked up on yet." That can be a hard sell in those middle-aged, healthy cats. The good thing is that, with FDA-approved flea and tick products, they have to have a current examination, so that's one way we get cats back in on a regular basis. One thing I have seen is that the message seems to be getting through to veterinary students, because when new guidelines come out and we get a new associate who's fresh out of veterinary school, they'll pop open that computer and all these guidelines are right there. So, for some of us, leaning into the younger generation who may be more familiar with newer guidelines can be a benefit.

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Dr. Moore: I think mindset around adopting these guidelines is also something to think about. Are the guidelines ready for adoption in our practice, or have we gone too far into the mindset of pushing for individualized patient care? I think really getting to the point where we accept them as a standard that should be applicable to most populations with minimal exceptions is key—accepting the need to consider lifestyle but not leaving it so open-ended that everything is changed or totally your choice and your option.

Dr. Sykes: When different groups publish conflicting recommendations, that doesn't help veterinarians to adopt guidelines. Conflicts between label recommendations and guideline recommendations can also influence adherence to guidelines depending on products being used in practice.

Dr. Lappin: WSAVA guidelines, ABCD guidelines, AAFP/AAHA guidelines—although there are a few nuances that I think each of the committees tried to make, they match for the most part. But we have problems when we start looking at global recommendations. In the United States, we are at such a great advantage of having a plethora of vaccine choices. Australians do not currently have a standalone FeLV vaccine, so they can't apply the AAFP guidelines for using an annual FeLV vaccine and not giving an FVRCP at the same time, because they don't have the option. So, it can be frustrating to look at guidelines and not have a product line that can lead to achieving those recommended guidelines.

Dr. Milden: The flip side of that is we have so many products available, and the guidelines are a little different for recombinant versus inactivated versus modified live vaccines. And the product labels themselves can be confusing or difficult to interpret when it comes to frequency of vaccination. It becomes a little bit of a logistic issue within each clinic. So maybe Australia has it right with just 1 product; you give it every year, and you're done! But of course that goes against everything many have been working on for the last however many years.

Dr. Miller: What is new with feline calicivirus?

Dr. Lappin: We do still see mutating strains with virulent systemic disease. This is not new and is likely point source mutations that we see randomly, not something that has reached epidemic proportions. I think vaccine companies that are reworking their FVRCPs are likely to be assessing these new strains and a vaccine's ability to crossprotect against more than the seed virus strain.

Dr. Miller: What are the main clinical signs that lead us to suspect feline calicivirus in our patients?

Dr. Sykes: Feline calicivirus has the ability to cause a really broad spectrum of clinical manifestations. It causes signs of upper respiratory tract disease with conjunctivitis and serous to mucopurulent nasal discharge and sneezing, but also other syndromes, like stomatitis and oral ulceration. I also think we've had more evidence and support that gingivostomatitis is associated with calicivirus infection. It's also been documented as a cause of lameness. Virulent systemic disease is a multisystemic illness involving the liver, pancreas, skin, and lungs, so it has a huge, diverse spectrum of clinical manifestations, depending on strain and host immunity.

Dr. Lappin: That is such a key point. There's pretty good clinical evidence that there are different phenotypical things associated with different variant genomes. I just had another group of kitties that were pretty convincingly presenting with calicivirus, having signs of polyarthritis, or the limping syndrome, but they didn't have respiratory signs. It really is pretty convincing that there are strain effects on clinical signs, more so than we see with other important cat viruses, like herpes and panleukopenia.

Dr. Moore: I think the question also encourages us to dialogue with our diagnosticians, whether those are folks in anatomic pathology or in clinical pathology, about getting additional information regarding strains so that we're getting some information on these variants rather than just looking for a positive test result. We've seen that practitioners continue to only picture one set of clinical signs, when in reality we can have different manifestations of the disease.

Dr. Miller: Because calicivirus is known to mutate, what are some vaccination strategies to help increase broad protection against calicivirus?

Dr. Lappin: As new vaccines covering newer strains of calicivirus are introduced to the market, that should be something that weighs into vaccine choice for practitioners. If a company has data suggesting their current vaccines for calicivirus crossneutralize contemporary strains in a fashion superior to old seed viruses, those should potentially be considered preferentially for at-risk cats.

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Dr. Sykes: Often, virulent systemic outbreaks have impacted indoor adult cats that have experienced severe disease with high mortality, such as when veterinarians or veterinary technicians have come home with the virus on their clothing or hands and come in contact with their own indoor-only cats. This highlights the importance of getting indoor cats broad protection against feline calicivirus through vaccination. I think cats that go outdoors get exposed to a myriad of different strains that are out there, and that has the opportunity to boost their immunity. But it's cats that are largely indoors that don't have that exposure that are then at greater risk for severe disease, should they encounter a virulent strain.

Dr. Lappin: Yes, we talk about the high-risk cats being the ones that go outdoors all the time. Most of them are actually getting boostered already, so they're actually not as high risk as a cat that hasn't been vaccinated for 3 years living indoors and then becoming exposed.

Dr. Miller: When we think about vaccination, one element that's top of mind is vaccine safety. What advances have occurred over the years to improve vaccine safety?

Dr. Moore: We certainly know that cats are not little dogs. Cats have great immune systems, but that creates some unique characteristics with how they respond in different ways to both disease and preventive measures like vaccines. There is a challenge in the fact that vaccine manufacturers make products

for multiple species, which may not all have the same safety considerations. But, ultimately, we have reached a point where it has become economically feasible to create improved vaccines, which has yielded safer, purer vaccine options. The choice of alternative products is a good thing for having options but creates a quandary for veterinarians regarding which product to choose and how to determine the safety profiles of each. But we are seeing many placed together in combination vaccines, which is generally considered a benefit with regard to both ease of administration and reduced visits required by the client.

Dr. Miller: How do you feel vaccine adjuvants play a role in vaccine safety?

Dr. Moore: I don't personally think that's been defined as well as some people may think it has. I do understand that, in original work with sarcomas, when the pathologist saw a marker of a vaccine, which was an aluminum molecule, it was thought that it was somehow causative of the cancer itself rather than just evidence of vaccine administration. But association does not necessarily equate causation, so this remains debated. There is some work being done to reduce, or in some cases eliminate, adjuvants, although the case for that is not as strong as some people might presume. Adjuvants are placed as an immune stimulant, and in general, that has been fairly well-proven with research and is accepted within the industry. The question is whether that stimulation has a negative effect or not.

Dr. Lappin: Right. And does that vary amongst different adjuvant types? Turning adjuvants into something evil was natural because of the horrifying nature of sarcomas, but we have reason to believe that may have been overstated. We know that you can have injection site sarcomas with things that are non-inflammatory, like modified live vaccines. I personally believe that the data suggests that there are factors inherent to the cat and its susceptibility to loss of immune control, et cetera, that may be more influential than the primary event of the vaccination itself.

Dr. Miller: What can be done to lessen the risk for feline injection sites sarcomas (FISS)?

Dr. Moore: Unfortunately, some owners believe skipping all vaccines is the answer. But the goal should be to reduce the risk or likelihood of FISS. Our data is somewhat dated, and even the data from nearly 20 years ago was not directed toward sarcomas specifically. What we can do is reiterate that it's infrequent, if not uncommon, depending on how you wish to use those terms, as well as idiosyncratic. And we can emphasize that the diseases we are vaccinating against have a higher risk and prevalence than any documented prevalence and risk for injection site sarcomas at this time.

Dr. Sykes: I think we need innovative approaches to vaccine delivery; for example, we should consider vaccine types that are not administered by injection. For example, might it be possible to effectively immunize cats against rabies and FeLV through mucosal vaccination?

Dr. Lappin: What we can do to lessen the risk for FISS would be only inject when you need to inject. If there's a cat that's had a previous injection site sarcoma, the risk for them developing another may be higher, so opting for an alternate pathway such as an intranasal vaccine, if available, may be a better option. And we do have some mucosal vaccines for cats, such as FVRCP, but not a complete line at this time.

Dr. Miller: For veterinarians utilizing distal limb vaccination sites, how do low-volume vaccines impact that vaccine experience?

Dr. Milden: It's a must. We've had several discussions in our clinic about protocols, and everybody wants to use these tiny, little gauge needles on cats, and we know that's actually creating high pressure, which we want to avoid. Using a low-volume vaccine so you don't have a volume that creates the increased pressure can be beneficial, but I want to point out it's not the gauge of the needle, it's the bevel angle that makes the difference, so smaller gauge needles are

not always a better choice. To prove that, I pull out the microchip needle, which is large gauge, but it has a beautiful taper on it and the cats really don't even flinch at that because it cuts in nicely. With a needle with a nice sharp point and a nice bevel, you can actually administer it in a reasonably quick fashion without causing the pressure damage that a small-gauge needle will cause.

Dr. Miller: How does the use of combination vaccines impact the patient and the veterinary team?

Dr. Milden: Again, it's typically 1 poke for the cat. So the cat's comfort is recognized. It's also easier to get consent from an owner with 1 poke than if I'm saying, "Oh, I'm going to stick your cat with a distemper vaccine over here, leukemia vaccine over here, and a rabies vaccine over here." It's just easier all the way around and nicer.

Dr. Sykes: Regarding logistics, it's easier for a practice to stock and administer combination vaccines than many separate components. Paying attention to not giving vaccines too close together is important, especially with attenuated live products, where you have the potential to interfere with the immune response to a second vaccine. You really should space attenuated live vaccines out by no less than 4 weeks. The other point that we haven't really talked about is when the last in the kitten series should be given; the series should not be finished before 16 weeks of age because of the potential for maternal antibody interference.

Dr. Milden: I think you also have to consider shelter situations or multicat homes or those who breed or foster, because we vaccinate those as if we're doing shelter medicine because there's constantly new ones coming in. So there is a portion of the population out there that needs shelter medicine even as an individual client.

Dr. Miller: What are key points that you include in every vaccine discussion with clients?

Dr. Milden: Going through the process, it is a discussion of the disease caused by these viruses and communicating that the only way to prevent long-term disease is to vaccinate. You explain which vaccines are recommended, you explain how many injections it will take to administer protection against those viruses, and for the most part, that's 1 until we get to the rabies, which would be 2. Then we have a form that goes over what is expected, postvaccine reactions, and what's unexpected and would necessitate a phone call. So it's a very regimented protocol that we have so that we try and hit the whys, the hows, and the follow-ups. There are printed materials from the manufacturers that we utilize, which go into more detail about what each of the vaccines are. This is obviously after the lifestyle discussion, where we try to predict the future of the pet's lifestyle, but once you get to the, "It's 1 injection and we'll see you back in 3 to 4 weeks, then a year later," there's typically very little pushback in the cat community.

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Dr. Sykes: One of the other things I would add is making sure that owners are aware of the limitations of vaccination, that vaccination in some cases can completely prevent disease, such as with panleukopenia, but for other pathogens like calicivirus and herpesvirus, it's not a 100% guarantee that their cat is not going to acquire those infections.

Dr. Miller: What are some successful strategies you've had to increase vaccine compliance in cats?

Dr. Moore: In university and medicine referral, we're not in a position where we're doing a lot of community practice-style vaccinations, but there's been some work that came out of Colorado State in the last few years about the understanding of the veterinarian's receptivity to vaccination versus the client's. Part of that is an understanding of the disease or the risk for disease and a recognition of the impact of disease. For example, do we communicate other pieces of information about vaccines that should be given, like the real risk for disease? I can remember in clinics, more so in Europe than in the US, a poster of a rabid dog with a foaming mouth conveying the danger and impact of rabies. Using visual aids can be powerful. I think it's important to help our veterinarians communicate information about the diseases in a brief but attention-getting way so they can understand that we're bringing this up not because it's a profit genera-

tor for us but because it's the best care for their pet to protect against infectious diseases.

Dr. Sykes: Many clinics do have posters and visual aids, but I think there also is a paucity of materials that are posted on walls in veterinary practices as compared with human doctor offices. I also think there's opportunity to think about factors that can influence human behavior; having owners really understand what we're trying to prevent is critical—being able to tell them stories about other patients that you've seen with those diseases and maybe how expensive the bill was when an animal had that problem. I also think letting owners know how many vaccinations you perform in the clinic can be helpful so they comprehend just how many other owners are having their cats vaccinated without adverse effects. Saying that you vaccinate your own cat also could help, if relevant.

Dr. Moore: I once heard the phrase "data tells, but stories sell." It's a method used even in marketing of nonveterinary products. Someone giving a personal experience is an important tool, and I think helping convey it's not just what we recommend but what we also do for our own cats carries more weight than we think.

Key Takeaways

- The landscape of feline infectious diseases is always changing, and new diagnostic and vaccination strategies are key in the fight against disease.
- Understanding the recommended vaccine protocols and performing lifestyle assessments are key to protecting patients against FeLV.
- Communicating the importance of vaccinating indoor cats against diseases such as feline calicivirus can be a challenge in clinical practice, and creative communication strategies should be employed.
- The risk for FISS should be weighed against the often-serious risk for disease when making vaccine recommendations.
- Options such as combination vaccines and low-volume vaccines can improve the patient experience through fewer injections and allowing for distal extremity injections, respectively.

Dr. Lappin: I think it's important to lean on our guidelines so owners realize that it's not our clinic's recommendation; it's actually a national guideline. It came up in some clinics we were visiting in South Africa; some pet owners were under the impression that some veterinarians are only vaccinating to make money, so it's critical to differentiate that these are actually national or even international guidelines. And it's really important to have clients understand the importance of the yearly examination because of the health reasons, not just because of vaccines. I like using stories to get my point across, but it's important to emphasize that it's not about the vaccines, it's about overall health. It's a good message for our community practice team.

Dr. Milden: There's a big difference I find in which story you tell to which client. There are some people who want the warm and fuzzy story, then there's the computer guy who wants the analytics and statistics.

Dr. Sykes: It's such a good point about different audiences. This is where building relationships with clients and getting to understand your client's behavior and how they react to different pieces of information that you give them is so critical. You also have to consider cats that are not being brought in to see you and how to get more cats vaccinated. We really need to understand why some animals are not being brought in and how we can vaccinate more cats.

Dr. Lappin: I think, as we strategize on how to get more cats in, obviously, letting our clientele know some of the cat-handling technique materials that are available with AAFP, et cetera, is critical. One of the things that I'm passionate about is actually having our incoming third-year students take cat-friendly certificate courses. We require all of our veterinary students that get admitted to CSU to do Fear Free® training to learn some of the tricks of the trade and how to communicate with owners about simple things they could be doing at home, like letting the cat carrier be part of the furniture. These certifications and communicating these tips to owners may make them more likely to come back or bring in their other cat in the household. ●

Reference

1. Malter KB, Tugel ME, Gil-Rodriguez M, et al. Variability in non-core vaccination rates of dogs and cats in veterinary clinics across the United States. *Vaccine*. 2022;40(7):1001-1009.

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