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INNOVATION THAT TRANSFORMS DIAGNOSTICS
Why—and how—to build relationships with community pharmacists

Veterinarians are keenly aware of the errors and frustrations that can occur when working with a retail pharmacy. Building relationships with pharmacists can improve patient outcomes.

By Kate Boatright, VMD, and Lauren Forsythe, PharmD, DICVP

If you’ve been in clinical practice for more than a few weeks, you’ve probably worked with at least 1 retail pharmacy. Sometimes providing a script to an outside pharmacy is a necessity when your practice does not have the medication in stock. Other times, a client requests a prescription because the medication likely costs less at a retail pharmacy. According to the American Veterinary Medical Association (AVMA), veterinarians should honor all client requests for a written prescription.¹

Many clients are unaware of the headaches associated with these prescriptions, or the errors that may occur when a retail

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Incorporating dental x-rays in your practice

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How artificial intelligence is improving veterinary diagnostics

The use of deep learning algorithms for diagnostic imaging in your practice can improve the care you provide, save money for your clinic and clients, and enhance customer satisfaction.

By Neil Shaw, DVM, DACVIM

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Infectious disease
Exploring the pharmacokinetics of mefloquine in cats

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IMPORTANT SAFETY INFORMATION: METACAM (meloxicam oral suspension) and PREVICOX (firocoxib) Chewable Tablets are for use in dogs only. METACAM (meloxicam) Solution for Injection is approved for use in dogs or cats (not indicated for osteoarthritis in cats). Repeated use of meloxicam in cats has been associated with acute renal failure and death. Do not administer additional injectable or oral meloxicam to cats. As a class, cyclooxygenase inhibitory NSAIDs like METACAM and PREVICOX may be associated with gastrointestinal, kidney, or liver side effects. Dogs should be evaluated for pre-existing conditions and currently prescribed medications prior to treatment with METACAM or PREVICOX, then monitored regularly while on therapy. Concurrent use with another NSAID, corticosteroid, or nephrotoxic medication should be avoided or monitored closely. Please refer to the package insert or product website for complete product information.
Veterinary school applications skyrocket

Preliminary data reveal a whopping 19% increase in application rates compared with last year.

By dvm360® Staff

A

pplications for veterinary

medical colleges have been on the rise in recent years, averaging about 6% to 7% annual growth, but during the 2020-2021 admissions cycle the number of applicants rose by a whopping 19% compared with the previous year's cycle. According to preliminary data from the American Association of Veterinary Medical Colleges (AVMC), 10,273 individuals applied for veterinary school this year compared with 8645 last year. The subrate—the number of people who started and completed the application process through the Veterinary Medical College Application Service—also increased to 79% from a historical average of 72% to 73%.

Although there is no clear explanation for this surge in applications, AVMC says several factors may be at play. First, the application cycle was longer, opening in January this year rather than the typical May, and the AVMC has offered more informal webinars and increased communication with applicants. In addition, the coronavirus disease 2019 (COVID-19) pandemic has increased public awareness about the vital role of the veterinary profession in zoonotic disease research and treatment, including vaccine development. Additionally, more people spending more time at home during the pandemic has led to a greater appreciation for the human-animal bond and a consequent increase in pet adoption rates and veterinary clinic visits.

The transcription verification process is now complete, and AVMC will release final application numbers soon. dvm360®
A veterinary diagnostic company has announced the availability of its FastPanel Ringworm PCR test, which uses real-time polymerase chain reaction (PCR) to detect the most comprehensive group of ringworm-causing fungal organisms in dogs, cats, horses, rabbits, and small rodents. Ringworm treatment can be lengthy and expensive, but this new DNA-based test offers rapid results (within 1 to 3 business days of sample receipt) in addition to high sensitivity and specificity, allowing veterinarians to accelerate the start of treatment and prevent new and secondary infections. The FastPanel Ringworm PCR test detects Microsporum and Trichophyton fungal organisms at the genus level and the 3 most important species that cause ringworm infections in domestic animals: Microsporum canis, the Microsporum gypseum complex (now Arthroderma gypseum, Arthroderma falvum, Arthroderma incurvatum), and the Trichophyton mentagrophytes complex (now Arthroderma benhamiae, Arthroderma vanbreuseghemii). Additionally, veterinarians can access dog sample analysis alone or combined with dermatophyte culture using the same patient sample.

“The No. 1 reason pet owners visit a veterinarian is for an itchy pet, and ringworm can be the cause,” says Jennifer Oeger, DVM, MSc, MBA, MA, vice president of medical affairs at Antech. “For ringworm, key opinion leaders recommend PCR testing either in combination with dermatophyte culture or as a stand-alone diagnostic test to confirm infection and determine proper treatment. The combination of high diagnostic accuracy, fast turnaround time, and the option for confirmatory culture from the same sample make this particular DNA-based test uniquely valuable in delivering effective treatment quickly to affected animals, a critical factor toward safeguarding both animal and human health from this challenging-to-treat skin disease.”

Visit antechdiagnostics.com to learn more about this new test.

**NEW News**

**New comprehensive ringworm tests now available**

Antech's FastPanel Ringworm PCR test allows veterinarians to diagnose and treat ringworm quickly, thus helping to prevent new and secondary infections.

By dvm360® Staff

**CHEWABLE TABLETS**

**Brief Summary:** Before using PREVICOX, please consult the product insert, a summary of which follows below.

**Caution:** Federal law restricts this drug to use or order by or on the advice of a veterinarian. 

**Indications:**-download Chewable Tablets are indicated for the control of pain and inflammation associated with osteoarthritis and for the control of postoperative pain and inflammation associated with soft tissue orthopedic surgery in dogs.

**Contraindications:** Dogs with known hypersensitivity to firocoxib should not receive PREVICOX.

**Warnings:**-Firocoxib is a non-steroidal anti-inflammatory drug (NSAID), and as such, it may cause gastrointestinal, renal, and hepatic toxicity. Firocoxib is contraindicated in dogs with a gastrointestinal ulcer (clinical signs and/or histopathological changes suggestive of ulceration) or renal insufficiency. Firocoxib is contraindicated in dogs with known or suspected gastrointestinal perforation.

**Adverse Reactions:** - In controlled field studies, 129 dogs (67 days to 115 months old) were evaluated for safety following one-time oral administration of PREVICOX at a dose of 2.27 mg/lb (5.0 mg/kg) orally approximately 2 hours prior to surgery and once daily thereafter for up to two days. The following adverse reactions were observed: dogs may have experienced more than one of the observed adverse reactions during the study.

**Adverse Reactions Due to Soft-Tissue Surgery:** Postoperative Pain Field Study

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HOW ARTIFICIAL INTELLIGENCE IS IMPROVING VETERINARY DIAGNOSTICS

The use of deep learning algorithms for diagnostic imaging in your practice can improve the care you provide, save money for your clinic and clients, and enhance customer satisfaction.

By Neil Shaw, DVM, DACVIM

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An attitude of gratitude

With the holiday season almost upon us, and one of the worst years most of us have experienced coming to a close, we wanted to take this opportunity to thank all of you for your support. Without the hundreds of veterinary professionals who have provided content for us in 2020—whether on our website, in our magazines, or at our virtual conferences and other online events—we would not have been able to provide the information you need to thrive in your veterinary practice. And despite the upheaval wrought by the pandemic, you remain hungry to learn more about best clinical and business practices.

Time and again, our authors and speakers have delivered practical, high-quality content that can be put to use right away. And this issue of dvm360® is no exception. Starting on the cover, Kate Boatright, VMD, and Lauren Forsythe, PharmD, DICVP, share their insight on collaborating with retail pharmacists for better patient care and improved outcomes, including a number of tips to help you establish productive working relationships with pharmacists in your area. On page 20, Neil Shaw, DVM, DACVIM, discusses the latest on artificial intelligence in veterinary medicine, explaining how the use of deep learning algorithms for diagnostic imaging can help improve care, save your clients money, and enhance your customer service.

Michael D. Lucroy, DVM, MS, DACVIM (oncology), outlines the 3 overlapping spheres that must be addressed when managing patients with cancer (see page 34). And regular contributor and Editorial Advisory Board member Jan Bellows, DVM, DAVDC, DABVP, FAVD, continues his ABCs of veterinary dentistry series with an important article about incorporating intraoral radiography into your case workflow (see page 38). These informative, insightful articles and many more await you in this issue.

And, of course, we also offer our heartfelt gratitude for all of the veterinary practice owners, associates, technicians, practice managers, and other team members out there for staying strong and continuing to work on the front lines to care for the pets we all love throughout this unprecedented year. We hope that our content—courtesy of your colleagues around the world—has informed and inspired you, made you think, made you laugh, or in some way made your life a little bit easier.

—Mike Hennessy Sr
Chairman and Founder,
MJH Life Sciences™

Be a Jennifer

November is Pet Diabetes Month, a time to help spread awareness and educate pet parents about the signs of diabetes in dogs and cats, as well as how to manage the disease in their furry friends. But it’s not just that. This month is also a time for veterinary staff to learn the latest about diabetes mellitus diagnosis and management best practices. (Check out the article on page 30 to brush up on your diabetes knowledge.)

Many practices have that 1 veterinary technician who is the guru on diabetes mellitus. Ours was Jennifer, and she consulted with clients of newly diagnosed diabetic pets in the exam room. These conversations involved the family coming together to learn about insulin administration and at-home blood sugar monitoring.

We all should be a Jennifer in our practice. The responsibility for client education shouldn’t fall on just 1 passionate and knowledgeable team member. We need to work as a team from the very first phone call, to a diabetes diagnosis, to follow-up care. Confusion ensues quickly when clients do not receive the same message from all team members. One doctor may prefer to do a blood glucose curve in the hospital, whereas another prefers to measure serum fructosamine. Associates may be passionate about different insulin types. Some doctors recommend at-home blood glucose monitoring frequently while others may recommend using the Keto-Diastix (Bayer). Can you imagine the client confusion these divergent preferences might cause in a 4- to 10-doctor practice?

This month, why not take the time to develop a standard operating procedure for diabetes management at your veterinary hospital, so that all associates send a consistent message with regard to treatment, monitoring, and rechecks. To ensure uniformity, first create a doctors’ meeting to establish a well-defined written protocol. That way the support team has equal buy-in and greater compliance to execute successful follow-up care with your patients. This is also a good time to start streamlining your nutritional recommendations. Instead of 3 or 4 brands of prescription foods, recommend just 2 therapeutic diets and a good book on homecooked diets.

Back to our amazing technician, Jen. The strain she felt having to do all the diabetes consultations in a 10-doctor practice was enormous. So, we provided a lunch-and-learn so the entire hospital could be educated on doing this type of consultation. I strongly recommend this. Have the team write down questions they would want answered if they were the client. Develop an FAQ handout that clients can take home to review later. During the lunch-and-learn, provide an opportunity for all support staff to do a mock diabetes consultation. With the rapid adoption of telemedicine, utilize all your team members to handle the basic questions clients ask.

Setting expectations early in the diabetic consultation is paramount. Not all pet parents can administer insulin themselves. Be sure to provide clients with options for how to assist with this. We have done YouTube videos on what to expect when your pet has diabetes and how to handle insulin. This type of video coming from a trusted source (your practice) will help ensure better compliance and more effective communication.

Our patients and clients are all unique. To truly help move the needle toward better compliance with diabetes management, ask about clients’ experience with giving injections, and talk to them about their workload so you can make nutritional and insulin adjustments as needed. Make sure technicians are educated about the Somogyi effect, hypoglycemia, and blindness. These conversations could help make your time as a veterinarian more effective in the exam room with the understanding that all available scenarios are presented so pet parents aren’t surprised with an unanticipated hiccup.

Encourage pet parents to join a veterinary-moderated Facebook group on diabetic animals. There are fantastic resources out there for pet parents to feel more confident and empowered in making their diabetic patients comfortable and ensure a strong quality of life!

—Adam Christman, DVM, MBA
Chief Veterinary Officer

NEWS | Chairman’s letter

Be a Jennifer

NEWS | From the CVO
**HEALTH IS NOT JUST ONE THING. IT IS EVERYTHING.**

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Pandemics: Beyond “women and children first”

A One Health expert outlines the many factors involved in determining who will receive a vaccine and urges us—for the time being—to keep calm and mask on.

By Jenifer Chatfield, DVM, DACZM, DACVP

I am originally from the South (OK, Texas, but still…), and I grew up knowing that people with integrity put the safety of women and children first. For example, when a woman boards a full bus, a man likely gets up and offers her seat. If it’s raining, my husband drops me off at the restaurant door and then goes to park the car.

This practice applies not just in uncomfortable situations but unsafe circumstances as well. If the lawn mower is on its last legs and the blade may to break into smithereens and come flying out in all directions, then mom is certainly not allowed to mow the lawn. Dad cuts the grass until the mower is repaired or a new one purchased.

Now, let’s escalate these hypothetical situations further. If a shooter enters a room, some men will instinctively push any women and children behind them. But what if the person enters the room not with a gun but coughing, sniffing, and clearly suffering from a severe respiratory illness? There may be no bullets but, in 2020, this person is likely perceived as a clear and present threat to others.

The topic is currently being discussed around supper tables across the globe. What if a vaccine for SARS-CoV-2, the virus that causes coronavirus disease 2019 disease (COVID-19)—a proverbial bullet-proof vest—becomes available? Who gets to be at the front of the line?

The idea of women and children first is believed to have been coined in 1852 when the British troop ship HMS Birkenhead sank off the coast of South Africa. Of the more than 634 men, women, and children on board, only 193 survived the disaster, including all of the women and children. This logic doesn’t really translate well to pandemics, emerging pathogens, and vaccine protocols, does it? The question remains: Who gets the vaccine first when it becomes available, and who gets it if the supply is limited? And who decides who is at the front of the line?

Unfortunately—or fortunately depending on your perspective—only 50% of Americans intend to get vaccinated for SARS-CoV-2 once a vaccine is available. Public misperception surrounding the need for and safety of vaccination is a real problem globally. In 2019, well before COVID-19 came along, the World Health Organization (WHO) listed vaccine hesitancy as 1 of the top 10 major global health threats. With a COVID-19 vaccine being developed and brought to market at “warp speed,” the unknowns about adverse effects and overall longevity of efficacy are likely to be a huge stumbling block to vaccine administration to the masses. So, the line may not be as long as some think, yet the public is still concerned with who gets to go first.

In 1964, the Advisory Committee on Immunization Practices (ACIP) was chartered to provide expert advice and recommendations for vaccine use in the civilian American population to the US Secretary of Health and Human Services (HHS) and the Centers for Disease Control and Prevention (CDC). Today, the ACIP remains a globally respected gold standard for guidance on childhood immunization schedules, efficacy monitoring (think rabies titers) and, of course, pandemic priority populations for vaccination.

What if a vaccine for SARS-CoV-2—a proverbial bullet-proof vest—becomes available? Who gets to be at the front of the line?

What if a vaccine for SARS-CoV-2—a proverbial bullet-proof vest—becomes available? Who gets to be at the front of the line?

According to ACIP, when developing recommendations, the members use an explicit evidence-based method based on the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) approach. In April 2020, amid the expanding pandemic, the ACIP formed a 41-member COVID-19 work group charged with preparing for the introduction of safe and effective COVID-19 vaccines, reducing disease transmission and associated morbidity and mortality, helping to minimize disruptions to society and the economy, including health care capacity, and ensuring equity in vaccine allocation and distribution.

However, a second group has been appointed by the National Academy of Medicine at the direction of top US health officials to develop a framework to...
determine priority for vaccination. While the appointment of 2 prestigious expert panels to assess vaccination priorities could prove problematic, it is good to remember that both entities serve only to make recommendations and to advise the HHS secretary. The task of true decision-making and execution, once a vaccine is available, rests with the secretary alone.

Despite potential confusion over disparate recommendations, the ACIP work group recently made public early prioritization populations for SARS-CoV-2 vaccination. As reported, “...the work group has proposed that vaccine priority be given to health care personnel, essential workers, adults aged 65 years and older, long-term care facility residents, and persons with high-risk medical conditions.” This ranking of priority populations is much more sophisticated than women and children. It is based largely on the likelihood of exposure, the severity of illness, and the transmissibility characteristics of the virus itself.

It is prudent to remember that a vaccine is not yet available. Just as investigators are working at warp speed to develop a safe, effective vaccine, the virus itself continues to spread through community transmission with many recovering from the disease with immunity. It remains to be seen when the vaccine will be available and how many people in priority populations remain without naturally developed antibodies.

**Sound familiar?**

If all this sounds a little familiar, it should. The ACIP also determined priority vaccination populations during the (H1N1) 2009 pandemic. The CDC has extensive information available to the public related to pandemic influenza response and vaccine allocation. The CDC doesn’t play favorites with emerging pathogens, but influenza surely receives a large amount of respect and attention from public health officials, especially when compared with emerging coronaviruses. Mutagenicity, morbidity and mortality rates, transmissibility, and other factors combine to demand more attention from public health officials, especially when compared with emerging coronaviruses.

Researchers are working at warp speed to develop a safe, effective vaccine, the virus itself continues to spread through community transmission with many recovering from the disease with immunity. It remains to be seen when the vaccine will be available and how many people in priority populations remain without naturally developed antibodies.

### References


**Herd immunity and COVID-19:**

> Jenifer Chatfield, DVM, DACZM, DACVP, is board certified in zoological medicine and preventive medicine. She has been a practice owner, worked in zoos, and completed international fieldwork. Her peer-reviewed publications include pharmacokinetics, wild animal behavior, infectious disease, and assisted reproduction in endangered species. Chatfield loves French bulldogs, Himalayan cats, the dirtiest bulldogs, Himalayan cats, the dirtiest dirtiest species. Chatfield loves French bulldogs, Himalayan cats, the dirtiest dirtiest dirtiest dirtiest species.

**Herd immunity and COVID-19 (coronavirus):**


**About GRADE.** Centers for Disease Control and Prevention. October 23, 2019. www.cdc.gov/vaccines/acip/recs/grade/about-grade.html

**Herd immunity and COVID-19:**


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Exploring human drug for feline coronavirus

To set the stage for probing the human antimalaria drug mefloquine as an agent for combatting feline coronavirus and caliciviruses, researchers map out its pharmacokinetic profile in cats.

By Joan Capuzzi, VMD

**Fel**ine “coronavirus” refers to a single virus species but either of 2 pathotypes, distinguished by their individual paths of destruction. Feline enteric coronavirus, highly contagious via fecal-oral transmission, is usually asymptomatic but can cause mild diarrhea. Feline infectious peritonitis (FIP), on the other hand, is immune mediated and usually fatal.

The effusive (wet) form of FIP typically causes death days to weeks after onset of clinical signs. The noneffusive (dry) form usually kills in weeks to months. There are occasional survivors, despite limited treatment options.

Feline calicivirus, a common cause of upper respiratory tract disease and oral ulceration in cats, can occur in highly virulent forms that have recently kicked off outbreaks of often fatal systemic disease. Like FIP, feline calicivirus has outrun attempts to harness it with antivirals.

**The promise of mefloquine?**

These therapeutic voids underscore the need to investigate whether the 2 viruses fall under the treatment umbrella of other types of existing antimicrobials. The human antimalaria drug mefloquine was shown to suppress viral load of feline coronavirus in infected feline kidney cells in vitro, without cytoxic effects.

Previous studies evaluating the hepatic clearance of mefloquine in cats found no evidence of delayed elimination. Plasma protein binding, they found, is about 99% in both healthy and FIP-infected cats. Pharmacokinetic data on mefloquine is available for human adults and infants, but little information is available for cats.

To assess the antiviral potential of mefloquine in cats, its pharmacokinetic profile is prerequisite for developing a dosage plan. Researchers at the University of Sydney School of Veterinary Science investigated the pharmacokinetics of mefloquine in clinically healthy cats dosed at 62.5 mg twice weekly, for a total of 4 doses. The recently published study also documented changes in hematologic, biochemical, and physiologic parameters.

**Measuring mefloquine in the blood**

Seven healthy adult cats, ranging in age from 3 to 7 years with an average weight of 5.4 kg, were recruited from an animal research facility. Cats were housed individually and dosed orally with mefloquine 62.5 mg (one-quarter of a 250-mg tablet) on days 0, 4 (96 hours), 7 (168 hours), and 10 (240 hours). The first dose was administered without food; subsequent dosages were given with food. The cats were monitored for adverse reactions for 2 hours after dosing and then observed for 14 days.

To determine mefloquine plasma concentrations, the investigators collected serial blood samples into lithium heparin tubes from anesthetized cats at 0 (pretreatment), 1, 2, 4, 8, 12, 24, 48, 96, 168, 240, and 336 hours after drug administration. On mefloquine administration days 4, 7, and 10, blood samples were collected prior to dosing.

Mefloquine concentrations were measured by high-pressure liquid chromatography. Several data points were calculated, including peak plasma concentration (Cmax), time to reach Cmax (Tmax), elimination half-life, apparent volume of distribution, and apparent clearance.

Two cats were excluded from statistical analysis due to vomiting, and a third was excluded because of outlier results. Hematology and serum biochemistry values were obtained for 6 cats at 0 (pretreatment), 168, and 336 hours.

**Once in the body...**

The first dose of mefloquine produced an average Cmax of 2.71 µg/ml at 15 hours (Tmax). Spikes in mefloquine plasma concentrations occurred at 168, 240, and 336 hours. The overall highest plasma concentrations (4.06 µg) occurred at 240 hours. The apparent mean volume of distribution was found to be 17.4 L/kg, the apparent systemic clearance was 0.060 L/hr.kg (0–96 hours), and the elimination half-life—based on 24- to 96-hour time points—was 9.3 days (224 hours).

Hematology results were unremarkable for all 6 cats evaluated. Serum biochemistry data showed
mild increases in serum symmetric dimethylarginine (SDMA) at 168 and 336 hours, but creatinine concentrations did not rise significantly. Three cats had elevated liver parameter pretreatment, which in 1 cat continued to rise during the study. Although 2 cats vomited on the first administration of mefloquine, 1 was able to continue the study by being dosed with food. All other cats tolerated the medication well, as the last 3 doses were administered with food.

**Antimalarials as antivirals**

The only reported use of mefloquine in animals is as an anti-malarial for raptors and penguins. In vitro, however, antiviral activity has been demonstrated against feline coronavirus, feline calicivirus, pangolin coronavirus, and—in people—dengue type 2 and Zika viruses.12

The oral bioavailability of mefloquine in dogs was found to average 78%, and peak plasma concentrations in humans were reached at a mean of 17.6 hours. The current study found a Tmax of 15 hours, comparable to that in people. Also similar found a Tmax of 17.6 hours.13 The current study reached in the current study following 3 doses were administered with food.

**Addressing the gaps**

The main limitations of this study were the small number of cats included and the short duration for which they were observed for adverse effects. Also, only healthy cats were used, but mefloquine pharmacokinetics may differ between healthy and FIP-infected cats due to the preponderance of acute phase proteins in the latter.

Another limitation was the blood collection protocol used. Anesthetic drugs were given prior to blood collections. It is not possible to separate out their potential contribution to rising SDMA levels, which can signal early kidney compromise, from possible renal impacts of mefloquine.

Hepatic effects were also a little unclear, as 3 of the cats had elevated liver enzymes before treatment. Nevertheless, no significant increases in liver enzymes occurred following mefloquine administration.

Despite these constraints, this study establishes preliminary data for the pharmacokinetic profile of mefloquine in cats, and serves as a springboard for planning clinical trials of mefloquine in those with feline coronavirus and calicivirus.

**REFERENCES**

Zoetis announces 2020 American Humane Hero Veterinarian and Hero Veterinary Nurse Awards

The awards honor those who are making a difference for animals through their work.

By dvm360® Staff

Zoetis Petcare has announced the winners of the 2020 American Humane Hero Veterinarian and Veterinary Nurse Awards. This year’s recipient are Katherine Polak, DVM, of Boston, Massachusetts, and Julie Nettifee, BS, RVT, VTS (Neurology), of Raleigh, North Carolina.

The awards, now in their 7th year, honor veterinary professionals who dedicate their lives to making a difference in the lives of animals through outstanding care. The winners were announced on the Hallmark Channel last month.

“We are honored to recognize 2 outstanding veterinary professionals who go above and beyond to provide essential veterinary care to animals in need across the country and internationally,” says Tara Bidgood, DVM, PhD, DACVCP, executive director of veterinary professional services at Zoetis Petcare, in the announcement.

Polak specializes in shelter medicine and has dedicated her life to animal welfare around the world, including managing multiple stray animal care programs in Southeast Asia. Cats Matter Too in Vietnam provides veterinary care for thousands of cats and educates local children. As medical director of Soi Dog Foundation in Thailand, she helped train local veterinarians and founded a program in Bangkok that neuters more than 80,000 dogs a year. Polak also teaches in the Maddie’s Online Shelter Medicine program at the University of Florida, and conceived and co-edited Field Manual for Small Animal Medicine, a textbook for veterinarians working in areas with limited resources.

Nettifee has a long history of work. While volunteering on the East Coast after a hurricane, she befriended an elderly couple whose house had been destroyed. When Nettifee learned that they had lost 1 of their 2 dogs in the move to temporary housing, she drove the couple an hour back to where they had last seen their dog and helped them look. After searching for hours, Nettifee found the dog and reunited the family. In addition to being a Good Samaritan, she fosters stray pets and helps them find forever homes.

To learn more about the awards, visit americanhumane.org.

PetSmart Charities commits $2.1 million to assist at-risk pet parents

Grants are being distributed to animal welfare organizations and social services agencies throughout North America to help pet owners experiencing domestic abuse and other crises heightened by the pandemic.

By dvm360® Staff

In honor of Domestic Violence Awareness Month, PetSmart Charities announced in October its commitment of $2.1 million toward keeping domestic violence survivors and other at-risk individuals together with their pets during these unprecedented times. The funding is earmarked largely for pet-friendly domestic violence shelters, pet deposits for pet-friendly housing, emergency pet boarding, and other initiatives.

While quarantine protocols are designed to protect the public from spreading coronavirus disease 2019 (COVID-19), they have also left many victims of domestic violence trapped with their abusers. An estimated 20 people suffer from abuse per minute in the United States, a number that is likely now much higher due to COVID-19. And with as few as 10% of domestic violence shelters accepting pets, many survivors are faced with heartbreaking and dangerous decisions. In fact, nearly half of all domestic violence victims remain in abusive relationships because they fear what may happen to their pet if the animal is left behind.

“Not only are pets a common reason why victims delay leaving their abusers, animal abuse is often the first indicator of domestic violence within a household,” says PetSmart Charities President Aimee Gilbreath. “As an Arizona-based organization, we’re proud to not only support our community, but communities across the US and Canada to provide resources that bridge the gap to a safer environment for both people and pets—especially during the pandemic.”

PetSmart Charities has administered grants to various organizations throughout North America, including Street Outreach Animal Response in Indianapolis, Harbor House in Florida, Urban Resource Institute in New York City, and Nellie’s Shelter, Education & Advocacy in Toronto. To learn more, visit petsmartcharities.org.

REFERENCES
Your go-to for fighting *Pseudomonas* ear infections

**Non-Irritating Deep-Reaching Action**

**Enrofloxacin**
- Attacks on the inside
- Destroys bacterial DNA
- Effective against Gram (+) cocci and Gram (–) rods

**Silver Sulfadiazine**
- Attacks on the outside
- Breaks down cell walls/membranes
- Effective against Gram (+) cocci, Gram (–) rods and budding yeast

Only Baytril® Otic (enrofloxacin/silver sulfadiazine) Emulsion fights *Pseudomonas* with two mechanisms of action.

Stock Baytril® Otic for your toughest otitis externa cases.

**CAUTION:** Available only from a licensed veterinarian. Federal law prohibits the extra-label use of this drug in food-producing animals.

**Precautions:** The safe use of Baytril® Otic in dogs used for breeding purposes, during pregnancy, or in lactating bitches has not been evaluated. The use of Baytril® Otic in dogs with perforated tympanic membranes has not been evaluated. Therefore, the integrity of the tympanic membrane should be evaluated before administering this product. If hearing or vestibular dysfunction is noted during the course of treatment, discontinue use of Baytril® Otic. **Contraindications:** Baytril® Otic is contraindicated in dogs with suspected or known hypersensitivity to quinolones and/or sulfonamides.
Baytril® Otic
(enrofloxacin/silver sulfadiazine)
Antibacterial-Antimycotic Emulsion
For Otitical Use In Dogs

Cautions: Federal (U.S.A.) Law restricts this drug to use by or on the order of a licensed veterinarian.

Federal law prohibits the extra-label use of this drug in food-producing animals.

PRODUCT DESCRIPTION:
Each milliliter of Baytril® Otic contains: enrofloxacin 5 mg (0.5% w/v), silver sulfadiazine (SSD) 10 mg (1.0% w/v), benzyl alcohol (as a preservative) and oleyl alcohol (as a stabilizer) in a neutral oil and purified water emulsion. The active ingredients are delivered via a physiological carrier (a nonemulsifying emulsion).

CHIEF NERVOUS STRUCTURE AND CONTENTS:

Silver Sulfadiazine
Benzenesulfonamide, 4-amino-N-2-pyrimidinyl-monosilver

Silver sulfadiazine (SSD) is synthesized from silver nitrate and sodium sulfadiazine. This compound has antifungal activity against cultured organisms. Baytril® Otic is effective when used as a treatment for canine otitis externa complicated by bacterial and fungal organisms susceptible to enrofloxacin and/or silver sulfadiazine (see Microbiology section).

EFFECTIVENESS:
Due to the combination of active ingredients, Baytril® Otic provides antimicrobial activity against bacteria and fungi (which includes yeast) commonly encountered in cases of canine otitis externa.

The effectiveness of Baytril® Otic was evaluated in a controlled, double-blinded, multi-site clinical trial. One hundred and sixty-nine dogs (n=169), with naturally occurring active otitis externa participated in the study. The presence of active disease was verified by aural cytology, microbial culture and otoscopic clinical scoring. Exit criteria were randomly assigned to either Baytril® Otic treatment (n=113) or to a comparable placebo-based regimen (n=56). Treatments were administered twice daily for up to 14 days. Assessment of effectiveness was based on continued resolution of clinical signs 3 to 4 days following administration of the last dose.

At study conclusion, Baytril® Otic was found to be a significantly more effective treatment for canine otitis externa than the placebo regimen. Based on the same system used to assess treatment response, therapeutic success occurred in 87.6% of Baytril® Otic-treated infections compared to 14% with placebo (P<0.001) after 14 days of treatment.

INDICATIONS:
Baytril® Otic is indicated as a treatment for canine otitis externa complicated by bacterial and fungal organisms susceptible to enrofloxacin and/or silver sulfadiazine (see Microbiology section).

CONTRAINDICATIONS:
Baytril® Otic is contraindicated in dogs with suspected or known hypersensitivity to quinolones or to sulfonamides.

HUMAN WARNINGS:
Not for human use. Keep out of the reach of children. Avoid eye contact. In case of contact, immediately flush eyes with copious amounts of water for 15 minutes. In case of dermal contact, wash with soap and water. Consult a physician if irritation develops or persists following ocular or dermal exposures. Individuals with a history of hyposensitivity to quinolone compounds or antibacterials should avoid handling this product. In humans, there is a risk of user photosensitization within a few hours after excessive exposure to quinolones. If excessive accidental exposure occurs, avoid direct sunlight.

PRECAUTIONS:
The use of Baytril® Otic in dogs with perforated tympanic membranes has not been evaluated. Therefore, the integrity of the tympanic membrane should be evaluated before administering this product. If hearing or vestibular dysfunction is noted during the course of treatment, discontinue use of Baytril® Otic.

Quinolone-class drugs should be used with caution in animals with known or suspected Central Nervous System (CNS) disorders. In such animals, quinolones have, in rare instances, been associated with CNS stimulation which may lead to convulsive seizures.

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pharmacists in your community can understand why these problems arise and building relationships with pharmacists in your community can help improve patient outcomes.

Why conflicts arise between veterinarians and pharmacists

Just as veterinarians are bound by ethical and legal obligations to govern the practice of veterinary medicine, pharmacists have professional requirements with which they must comply. Pharmacists are legally required to verify the accuracy and validity of each prescription they fill, and to advise clients about potential side effects and drug interactions. For medications intended for people, this is simple to do because pharmacists have the knowledge and resources to fulfill these requirements. Unfortunately, pharmacists do not receive training in veterinary pharmacology as part of their core curriculum. This lack of training opens the door for error because for some drugs large differences exist between humans and animals with regard to dosing and side effects.

Although it is easy to say that pharmacists should receive more education and have access to veterinary pharmacology resources, making this a reality is not so simple. The AVMA and National Association of Boards of Pharmacy (NABP) worked together to increase awareness of the problems for both veterinarians and pharmacists and encourage the addition of veterinary pharmacology education to pharmacy school curricula.1,4

The NABP also modified its model practice act to add a requirement that a veterinary drug reference be available in any pharmacy that dispenses veterinary medications.4 To date, only a handful of states have implemented this recommendation. If you are in a state that does not currently require a veterinary drug reference to be on hand in pharmacies filling pet medication prescriptions, consider reaching out to your state veterinary medical association. Encourage them to start a conversation with the state pharmacy board and advocate for this change.

Tips for building working relationships with community pharmacists

The results of a recent survey of veterinarians and pharmacists in Ohio showed that members of both professions felt that interprofessional collaboration was important to optimizing outcomes for veterinary patients.5 Sometimes, veterinarians became overwhelmed when working with pharmacies, developing a negative outlook on collaboration because of previous experiences. Here are several ways you can establish productive working relationships with pharmacists in your area:

- Open the lines of communication with local pharmacies by visiting them or sending a letter (the AVMA has a sample letter available at avma.org/model-letter-pharmacists). Introduce yourself and express your desire to work with the pharmacy for the best possible veterinary patient outcomes. Encourage the pharmacy team to contact you with any questions regarding pet prescriptions.
- Donate a copy of your favorite veterinary drug reference to your local pharmacy. Doing so may decrease the number of phone calls you receive from pharmacists regarding prescriptions.
- Provide handouts for pharmacists that can serve as a quick reference guide on common toxins (eg, xylitol, acetaminophen) and prescription concerns (eg, changes in insulin type, thyroid medication doses).
- Maintain patience when pharmacists call with questions. Use these conversations as a chance to educate pharmacists and encourage them to continue calling.
- Educate pharmacies about identification numbers. Many pharmacies will call asking for a national provider identifier (NPI) or Drug Enforcement Agency (DEA) number to fill a prescription. (The NPI is an identification number used for Medicaid patients.) Instead of saying “I don’t have an NPI number, and I won’t provide a DEA number for noncontrolled substances,” consider letting the pharmacist know why you don’t have an NPI and that the DEA opposes the use of a DEA number for identification purposes.6
- Always provide clear prescriptions. Written prescriptions are the best way to reduce miscommunication. Typed prescriptions are preferred, but legible, hand-written prescriptions are acceptable. Write out the entire prescription and avoid using abbreviations such as SID (once daily), which are not used in human medicine. Specify “no substitutions” when applicable, and write “must not contain xylitol” when prescribing suspensions, orally disintegrating tablets, and human chewable tablets.
- Reach out to local pharmacy groups or schools and offer to provide a lecture on veterinary prescriptions.

Even with relationship building and improved education, errors may still occur. In these cases, it is important to reach out to the pharmacy to advise them of the error and discuss how to avoid it in the future. Additionally, errors can be reported to both the AVMA and the state pharmacy board.

The bottom line

Ultimately, it will take veterinarians and pharmacists working together to improve the situation and prevent errors. Problems with pharmacies are common and frustrating for veterinary teams, but we encourage veterinarians to take the first step toward bettering working relationships. Neither the veterinarian nor the pharmacist wants to see a patient harmed, but it is only by working together that we can reduce conflict and maximize patient safety.

Kate Boattight, VMD, a 2013 graduate of the University of Pennsylvania, is an associate veterinarian and freelance speaker and author in western Pennsylvania. She is actively involved in organized veterinary medicine at the local, state, and national levels and is a former national officer of the Veterinary Business Management Association.

REFERENCES


For more information


To report a pharmacy error to the AVMA, visit avma.org/sites/default/files/resources/complaint_form.pdf.
Artificial intelligence (AI) has been employed in medical practice for several years, with applications sprouting up across specialties for nearly every aspect of care. One of the latest and potentially most beneficial uses of AI in medicine revolves around deep learning algorithms for diagnostic radiology. These types of AI systems are being used widely during the coronavirus disease 2019 (COVID-19) pandemic, as they have been shown to outperform senior radiologists in identifying patients with COVID-19 based on thoracic imaging results.1

Although the value of computer-based systems in medicine has been recognized for decades, with medical diagnostic decision support systems ubiquitous by the 1990s, veterinary medicine has only recently begun utilizing AI for diagnostic purposes.2-4 As is the case with many other areas of technological innovation, the drive for emerging AI applications in veterinary medical imaging derives largely from a desire among veterinarians and their clients for improved efficiency.

Filling the gaps
Imaging is an important component of veterinary medicine, providing essential information for routine prevention and evaluating illness and injury. Given that the demand for veterinary radiologists outstrips the ability for these radiologists to provide services, critical diagnostic results are often delayed, precluding prompt treatment.5 This scarcity of relevant resources also threatens to diminish the use of powerful imaging tools due to a lack of ability to interpret results in a timely manner.

While teleradiology has addressed these underutilization and inefficiency issues to some extent by enabling clinicians to share images rapidly with specialists, the ultimate value of teleradiology is still limited by the availability of those specialists.6 In other words, the workflow bottleneck currently exists not at the point of getting images into the hands of radiologists but rather at the point of image analysis.

The most effective solutions for imaging-related gaps in care will intervene at this vital juncture, enhancing the speed

How artificial intelligence is improving veterinary diagnostics

The use of deep learning algorithms for diagnostic imaging in your practice can improve the care you provide, save money for your clinic and clients, and enhance customer satisfaction.

By Neil Shaw, DVM, DACVIM
Augmenting specialists’ skills and improving care

Although initial AI applications in medicine proved inferior to humans in performance, newer deep learning algorithms match and even surpass human capabilities. Because deep learning algorithms can essentially view and retain enormous data sets of images, they can learn to identify patterns that may elude humans. A recent study evaluating a deep learning algorithm’s ability to distinguish between meningi-cal-based and intra-axial lesions in dogs using magnetic resonance imaging findings—a task often deemed challenging by veterinary radiologists—demonstrated accuracy levels of 90% and above. Despite their potential to help in specific contexts, these technologies are not adequate replacements for human expertise. Instead they should serve only as tools to help us overcome specific challenges in care delivery. Identifying specific software systems that can mimic expert output in even a fraction of circumstances can drastically improve the care we provide. For example, a recent pilot study demonstrated that diagnostic accuracy via thoracic radio-graphs was equivalent between deep learning algorithms and board-certified veterinary radiologists in nearly 800 cases of canine left atrial enlargement. These data point to a valuable role for deep learning algorithms in veterinary radiology.

Capitalize on opportunities while avoiding pitfalls

As AI becomes more commonplace in veterinary practice, it is important that we refine the uses of these technologies so that we can employ them where they add the most value. For example, one capability that differentiates deep learning algorithms from human radiology experts is the production of quantitative, rather than qualitative, evaluations of imaging data. Considering how we can best use these quantitative data to complement our skills will be critical for ensuring that we make the most of these powerful technologies. Identifying the most innovative solutions that provide not only accuracy but also user-friendliness will empower us to put deep learning to use to provide better care. Given that the use of these applications is already more widespread in human medicine, we should look to our human counterparts for key insights to avoid or overcome challenges related to implementing AI solutions for radiology services and how to best leverage those services.

As AI becomes more commonplace in veterinary practice, it is important that we refine the uses of these technologies so that we can employ them where they add the most value.

REFERENCES
The brick exterior of Bulger Veterinary Hospital is a nod to the old mill buildings common in Lawrence, Massachusetts. Lots of glass windows and sharper angles lend a more modern look to the building.

In an attempt to “future proof” the site, electric car charging stations were installed. Lots of dog walking areas and trees outside the hospital make for a more comfortable space for clients and their pets.

The spacious reception area features many windows at eye level and above, allowing for lots of natural light. Within the larger space, micro-spaces can be created with screens and flexible seating for private conversations or to separate dogs and cats while waiting.
Every hospital tells a story. No, not the ones about your clients, pets, and coworkers that you share over dinner. We’re talking about the story that the look and feel of your physical practice tells about the quality of medicine you provide, your atmosphere, your personality, and your attention to detail.

Bulger Veterinary Hospital in Lawrence, Massachusetts, tells a tale of high-tech, high-quality medicine, as read in the modern lines and features of the brand-new facility.

When the dvm360® Hospital Design Competition judges read Bulger Veterinary Hospital’s riveting story, they agreed it was a “bestseller” and awarded the hospital a Merit Award.

Prologue: The backstory
Bulger Veterinary Hospital’s history dates back to the 1930s when Ed Bulger, DVM, started the practice in his farmhouse. He lived on 1 side of the house, walked through the garage, and began his day on the other side in the veterinary practice. At that time, he was a doctor serving his local community from his home. In 1978, John Prentice, DVM, bought the hospital and expanded and remodeled the space. A few years ago, he sold the practice to Ethos Veterinary Health—an organization that owns more than 25 hospitals across the United States and is run by John Prentice’s son and CEO Ames Prentice.

“The practice had outgrown the space in every way,” says Ames Prentice. “Parking, exam rooms, everything. It was time for a new building.”

Unfortunately, the lot the original building sat on was not large enough to support a new building, so Ames Prentice and company found a new spot a couple of miles away in an old movie theater.

“We stayed close enough to not alienate current clients,” he says. “We did a zip code analysis of clients we’d seen over the last year, found the geographic center, and then we knew the radius we were comfortable moving to.”

The farmhouse was sold to a bank, which tore it down and built a new building. Prentice says seeing the farmhouse practice go was a bit emotional for him—it had served the community for a long time. Prentice explains that he had to let it go to make room for a new and improved Bulger Veterinary Hospital.

Your design tells a story
A modern tale with a nod to the past.
By Sarah A. Moser

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The next chapter in the Bulger Veterinary Hospital narrative jumps into the future while honoring the past. "We wanted the new hospital to feel modern, telling a story about high-quality, up-to-date medicine," says Prentice. "But we live in a city that has a lot of textile mills and old brick buildings, so we wanted to complement or match the historic buildings that the city of Lawrence is known for."

They chose to use brick combined with glass and metal to give the building a more modern face, and added sharp angles and lines to the exterior for a unique look.

Additionally, they expanded to include 21 exam rooms, a spacious reception area with the ability to create private communication spaces, 4 large surgery suites, and a mezzanine level for doctors’ offices. The 17,500-square-foot practice is a 24-hour emergency/critical care, specialty, and primary care veterinary hospital, and the new features have helped to enhance the level of care offered at the hospital.

"Creating spaces where our team can communicate effectively with clients is key," says Prentice.

To that end, they designed the lobby to have moveable seating with partitions, allowing for more private discussions with clients. Additionally, separate doctors’ offices and team workstations facilitate better conversations among staff members.

"These quiet, private spaces are serving us well, especially during this time of COVID-19 and distancing ourselves," says Prentice.

Bulger Veterinary Hospital’s story is still ongoing. Prentice thinks it will be a long time before it is complete.

"Coming from a hospital that started as a house/hospital combination that was then modified and added to over 70 years, we wanted to design our new facility to meet the growing demands of the practice's clients for the next 70 years," Prentice concludes.

Sarah A. Moser is a freelance writer in Lenexa, Kansas.

**Storytelling features**

A whopping 21 exam rooms help keep things moving efficiently at Bulger Veterinary Hospital. Especially during the pandemic, the doctors have appreciated having multiple spaces to safely separate clients and pets. Windows not only look outside, but also inward to give a view of what’s happening within the hospital, and allow for light to filter into the interior of the building.

Five large surgery suites offer plenty of space to work more efficiently. One is dedicated to orthopedics, 1 to soft tissue surgeries, 1 to ophthalmology, 1 to emergency, and another for general surgeries. The suites are larger in this new facility and enjoy a lot more natural light.

Staff members enjoy a large break room with multiple seating areas, a large-screen TV, lockers, and more.

The doctors enjoy private offices on the mezzanine level of the practice, giving them a refuge from the busyness of the practice to take a break, work on papers, or make phone calls while not being too far from the action below. Natural light pours into this space.

By the numbers:

**Bulger Veterinary Hospital**

Owner: Ethos Veterinary Health

Number of doctors: 28 full-time, 72 part-time

Exam rooms: 21

Total cost: $6,500,000

Cost per square foot: $382

Square footage: 17,500

Structure type: New, leasehold

Architect: Capone Architecture LLC
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Why contract enforceability is so hard to predict

Many factors are at play in determining whether employment contract terms will stand up in court.

It’s perfectly natural for a client seeking legal advice to want a definitive answer to a straightforward question. “Will I lose my license if convicted of this second DUI?” “Will my divorce take more than 6 months to finalize?”

Clients become frustrated when the truthful yet disappointing answer is, “It depends.” The immediate impression is that the attorney doesn’t have sufficient experience to render a confident and conclusive opinion. Or the client may believe that the lawyer is hedging their bet so that if the matter is not resolved to the client’s satisfaction, there can’t be any accusation that the client was promised a specific result.

However, the reality is that certain aspects of the law are extremely difficult to predict, and the refusal of a lawyer to provide a cut-and-dried answer to a seemingly simple question is a smart move because uncertainty is often built into our legal system. In no area of the law is this more true than in the realm of noncompetition/nonsolicitation law.

What questions arise most often?
Veterinarian clients frequently ask 2 types of questions. First, veterinarians preparing to take a job want to know if the proposed noncompete will actually be enforceable. Second, those who have already signed a contract containing a competition restriction want to know if it is possible to avoid having to comply with it.

Now and then, the answer is pretty clear and straightforward. But more commonly, the issue involves many more moving parts than the client realizes. Here’s why.

Inartful drafting
Some veterinary employment contracts are just plain abysmally written. When that’s the case, problems often befall the party trying to enforce the document. We see this often when an employer tries to create their own employment document or uses a boilerplate form from some internet site. And sometimes, a poorly drafted contract will be the product of an attorney who has minimal experience with such documents.

Poorly written contracts generally (although not always) tend to favor employees. And suppose the agreement is overly burdensome, such as a 4-year duration or a full state in geographic coverage. In that case, it can be pretty safe to assure the burdened associate that the document will not be enforceable, at least as written.

Other contracts are doomed to unenforceability if they violate accepted state contract law. This often occurs where the agreement includes a financial penalty for breach. Sometimes a contract will fail because enforcement would violate reasonable public policy, such as when an associate is fired after working 2 weeks, and the employer seeks to enforce the signed 2-year noncompete.

Most contracts are not that clear-cut
The real challenge in noncompetition law is figuring out how to advise clients when the contract in question is well crafted. These contracts are generally clear on their face, lack ambiguity, and comply with both state common law (such as adequate financial consideration) as well as legislative mandate (such as a duration no longer than applicable state statutes permit).

When faced with a well-written employment contract, an attorney attempting to avoid noncompete enforceability must contend with a whole gauntlet of unknowns.

Dearth of case law
Judges are required to follow similar prior appellate cases that were decided within their jurisdiction. For example, if a general dentist’s noncompete of 10 miles was held enforceable on appeal, then future lower court judges in the same county generally must enforce 10-mile noncompetes against general dentists.

Legislative guidance
Judges are keenly aware of the political and philosophical climate during their term. Many judges feel they have a moral or legal responsibility to decide cases, at least in part, with deference to what they see as the state’s legislative agenda. Whether they agree with it or not, many jurists will try to follow that lead. For example, a state legislature has been creating and implementing employee-friendly laws for a decade, a judge may feel compelled to align their decisions with that philosophy when interpreting contract terms. But not always. Other judges may adjudicate cases with an eye toward opposing an existing legislative agenda—and they are free to do so in the absence of relevant appellate guidance.

Sometimes a contract will fail because enforcement would violate reasonable public policy, such as when an associate is fired after working 2 weeks, and the employer seeks to enforce the signed 2-year noncompete.

For better or worse, the outcome of a legal disagreement, including one over noncompetition, may well be determined by the endurance of the litigants. I often ask my contract clients if they feel emotionally and financially prepared as their counterparty for noncompetition litigation. Sometimes the answer is surprising: An associate will go the distance, or the well-heeled employer will back down. More commonly, employers have the upper hand simply because they are more financially prepared for a court fight.

Inclination and wherewithal of the parties
For these reasons, there is a great deal more to interpreting a contract than merely reading what attorneys call “the 4 corners of the document.” And of course, the assignment of a certain judge, the state legislature’s political climate, and numerous other factors demonstrate the ubiquitous input of lady luck.

Christopher J. Allen, DVM, JD, is president of Associates in Veterinary Law PC, which provides legal and consulting services exclusively to veterinarians. He can be reached at info@veterinarylaw.com.
Ambrose Animal Hospital has grown significantly over the past 12 years. What was 2 doctors and a staff of 11 is now 6 doctors and a staff of 45. Merrick Ambrose, DVM, achieved this growth by practicing progressive medicine, hiring only top-quality staff, and being culturally sensitive. Ambrose believes diversity among team members leads to a greater sense of community and tolerance, and diverse races and sexual orientations are well represented among staff.

In the midst of the coronavirus disease 2019 pandemic, some of the clinic’s vendors started sending lunch for the front line veterinary workers. Curbside policies prevented the public from entering the hospital, and the staff was discouraged from going to restaurants on their lunch break. The team appreciated having lunch sent in as well as the newly social distanced break room.

Not long after the delivery lunch spreads began, some staff members asked to speak with Ambrose. They explained to the owner that 2 of the restaurants that provided staff lunches advocated distasteful and objectionable policies. One espoused religious beliefs that resulted in homophobic statements, and the other displayed its pride in big game hunting via displays in their restaurants. The staff felt that their diverse workforce should not have to be exposed to services provided by a homophobic company, and a restaurant chain that advocates the killing of non-endangered big game was not consistent with the hospital’s mission. Ambrose thanked them for their input and verified that the information about the companies was correct.

As the practice owner, Ambrose was not comfortable patronizing any business whose policies offended his team. He wrote a staff memo outlining his reasons for prohibiting staff from patronizing these restaurants during work hours. His memo was not as well received as he expected.

Several staff members said that although they disapproved of the restaurants’ policies, they did not feel their employer should dictate their choice of restaurants. One noted that 2 of the clinic’s staff members ate only kosher food. They always brought their own lunch and did not object to their coworkers’ choice of foods. Another commented that neither restaurant was doing anything illegal.

Ambrose understood why some of the staff thought he was taking a cancel culture stance toward these restaurants and respected them for sharing their thoughts. He explained that he would never ask his employees not to patronize a business during nonwork hours, but that as practice owner he had the prerogative to make the choice he did. He found the restaurants to be morally offensive and in good conscience could not allow their products on his premises. He understood there would be some whispering behind his back but chose to stick to the credo “to thine own self be true.”

Rosenberg’s response:
Most veterinarians would never turn away someone whose pet is in dire need of veterinary care based on the owner’s lifestyle choices. The animal, of course, is always an innocent victim. As repulsive as the pet owner may be, it is still our job to care for animals in need. Ambrose would never refuse to care for an animal presented by the owner of what he considered a morally offensive establishment. On the other hand, every individual—veterinarian or not—must decide when and whether they are going to take a stand based on their moral imperatives.

Ambrose felt that the only way he could tell these 2 restaurant owners that he disapproved of their advocacies was by not purchasing their products. He did nothing illegal or violent; he simply spoke up with his pocketbook. He was well within his rights as a practice owner to make this decision, but he also had to expect that some staff disapproval would be a price he had to pay for taking a moral stance. Bravo!

Do you agree with Dr Ambrose? Would you have made the same choice he did? We would like to know. Email your thoughts to dvm360news@mmhgroup.com.

Although many of the scenarios described in his columns are based on real-life events, the veterinary practices, doctors, and employees described are fictional.

Marc Rosenberg, vmd | THE DILEMMA

Cancel culture at the veterinary clinic
Do practice owners have the right to tell employees what and where they can eat while they’re on the clock?

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Supporting well-being during COVID-19 and beyond

Well-being is critical to veterinary professionals both individually and as medical practitioners, practice owners, and team members. This has never been more true than during the coronavirus disease 2019 (COVID-19) pandemic. Burnout, stress, and compassion fatigue can be challenges for veterinary professionals during normal times. The added complications and concerns that come with a global pandemic make it even more critical to keep an eye on our well-being.

Fortunately, we each have an opportunity—and an obligation—to help. As workplace leaders and practice owners, we can employ a number of strategies to make a real difference in the lives of our colleagues and teams. Small changes can shift our workplace environments in ways that lessen tensions, boost morale, and support each individual on the team more fully.

If we do this, we should see benefits to both individual team members and our businesses. Stressed teams often suffer from low engagement and productivity, which can impede the delivery of high-quality care and hinder practice performance. A practice that values a healthy and compassionate environment can boost productivity, increase job satisfaction, and help everyone focus on the important work of patient care.

What the data show

Even before COVID-19, there was a growing focus on veterinary well-being. Several studies taking a deep look at the issue have shown a decline in compassion satisfaction, and rising levels of burnout and secondary traumatic stress among veterinary professionals.

Notably, the Veterinary Well-being Study, done in partnership by Merck Animal Health, AVMA, and Brakke Consulting, found high levels of student debt, perceived low pay, job stress related to treating sick animals, and challenging client situations to be the leading causes of low well-being among veterinarians.

The latest data from AVMA's 2020 Census of Veterinarians survey show another trend: burnout and stress are rising much faster among associates than practice owners. In fact, these levels are at the highest we've seen since we started tracking the data in 2017. We also found that almost 40% of veterinarians are considering leaving the profession, citing a lack of work-life balance as the leading factor.

What we can do

As leaders in our veterinary practices and organizations, we can implement strategies to reduce stress and boost job satisfaction among team members. In fact, organizational leadership likely plays an even bigger role than changes an individual might make in their own life. We know this because studies looking at burnout among physicians found that interventions at the organizational level were more successful in lowering burnout than interventions at the level of individual clinician.

Change starts at the top

So, where to begin? We’ve found that employees who experience lower levels of burnout and work-related stress often have 1 thing in common with those who are engaged at work—leadership that’s focused on 1 or more items in a specific list of priorities:

• Engaging employees and developing a cohesive team
• Fostering a safe workspace that allows constructive and open debate
• Embracing change and transformational leadership
• Developing a strategy and successfully executing it

There are many ways to work toward these goals. Here are some ideas.

Empower the whole team

Veterinary technicians are critical but often underutilized members of our veterinary practice teams. As with any professional, when technicians’ skills aren’t recognized or employed in practice, they can become disengaged and dissatisfied. On the other hand, when we make full use of technicians’ skills, these valuable team members feel more satisfied at work, veterinarians are able to focus on the work only they can do, and our practices run more efficiently. It’s a win-win situation.

Implement efficient processes

One of the main sources of workplace stress is feeling that we’re exerting too much time or energy on a specific task. Particularly during COVID-19, our teams are being stretched thin, especially with the extra work that comes from following new safety guidelines and procedures. We should look for any opportunity to simplify and streamline our operations. Not only will this lead to more efficiency, it also demonstrates to team members that we care about them and want to make their jobs and lives easier. Once you take the time to look, chances are you’ll find plenty of opportunities to tighten up operations, from payroll and accounting to pricing and purchasing.

Examine workplace culture

Workplace culture directly affects both team members’ well-being and practice success. What might a healthy workplace look like? One that places individual well-being at the center of the organization; invests in building an empowered, cohesive team; and fosters honest and respectful communication. This is influenced by everything from diversity and inclusion efforts to giving and receiving employee feedback, and there are resources you can tap to help move your organization forward. AVMA’s online Workplace Well-being Certificate Program, for example, empowers anyone on the team to support a culture of well-being in the workplace.

Motivate and inspire

Finally, we can empower team members to take steps to improve their own health and well-being. As we all know, it’s easy to get wrapped up in our day-to-day work. There always seems to be something else to do. Without even realizing it, team members may be prioritizing patient care and job responsibilities but neglecting their own self-care.

When we implement changes at the organizational level, it can make healthy living more attainable at the individual level. These can range from quick improvements, like making nutritious snacks available, to more expansive changes, like revamping employee benefits. These changes can have both short- and long-term benefits. As an example, offering retirement planning to employees not only enables them to prepare for their future but also can give them peace of mind in the here and now.

What’s at stake

Burnout and stress are very real challenges right now. Current economic indicators point to a strong recovery across veterinary practices, but this also means staff are delivering care at a supercharged pace, requiring long and hectic workdays. (See my October column in dvm360®: “A new normal: Managing the ups and downs of COVID-19 recovery.”) Many are facing additional challenges at home, too, like overseeing remote education and childcare.

Now is the time to hyperfocus our efforts on improving veterinary well-being. It’s critical for the health and safety of our teams, the delivery of care to our patients, the success of our practices, and the future of the veterinary profession. AVMA offers a plethora of articles and websites to delve further into the workplace well-being strategies discussed in this article.

Matthew Salois, PhD, is chief economist and director of the Veterinary Economics Division at the AVMA.
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Treating diabetes mellitus in cats and dogs: What are your goals?

Nearly all veterinary patients with diabetes are managed with a combination of insulin therapy, diet, and weight management. Here’s the latest.

By David Bruyette, DVM, DACVIM

H uman and veterinary insulins are categorized by their onset and duration of action, as well as by the protein source from which they are derived. Short-acting insulins are typically used in the veterinary hospital for intensive blood glucose (BG) control, whereas intermediate- and long-acting insulins are used both in the hospital and at home for long-term, daily glycemic control. Based on the protein source, insulins are human, human analogue (synthetic insulin that is altered from the natural form but retains biological function), bovine, or porcine. Porcine and canine insulins have an identical amino acid sequence, whereas bovine and feline insulins differ by a single amino acid.

Traditionally, veterinarians have managed diabetes in dogs and cats with various veterinary and human insulins (Table). Veterinary insulins include porcine lente and protamine zinc human recombinant insulin (PZI). Human insulins or insulin analogues include neutral protamine Hagedorn (NPH), glargine, detemir, and degludec. Premixed combinations of short-acting lispro or aspart insulin with longer-acting protamine insulin are also available as intermediate-acting insulins.

Controlling diabetes in dogs

The overall goals for the treatment of canine diabetes include resolving polyuria and polydipsia, maintaining ideal body weight, preventing diabetic ketoacidosis, decreasing the risk for urinary tract infections, and slowing the development of complications (eg, diabetic cataracts) through excellent glycemic control. Accomplishing these goals while avoiding clinical hypoglycemia is ideal. For dogs, the American Animal Hospital Association recommends the use of porcine lente, PZI, or NPH insulin, plus a complete and balanced diet that lacks simple carbohydrates. A stable routine for meals, snacks, and exercise is crucial for good glycemic control. Advise pet owners to avoid frequent changes in types and amounts of food. Although the ideal diet for diabetic dogs has yet to be determined, recommendations include the following:

- High-fiber, restricted-fat diets, which are high in complex carbohydrates (>45%)
- Diets with moderate fiber and restricted carbohydrates (<30% metabolizable energy [ME]), which are higher in fat and protein
- High-fiber diets may help delay glucose absorption from the gastrointestinal tract and reduce postprandial hyperglycemia.

A number of prescription canine diabetic diets with increased fiber are available, although most have carbohydrate levels less than 45% ME. If used with NPH insulin, these high-fiber diets may exacerbate postprandial hyperglycemia in some dogs because peak gastrointestinal glucose absorption occurs after peak insulin action. High-fiber, moderate-fat diets may cause significant weight loss in some diabetic dogs, and thus are not suitable for most lean or underweight dogs.

A variety of commercially available, nonprescription, grain-free diets are lower in carbohydrates and higher in protein and fat, but they have not yet been used in clinical trials with diabetic dogs. Dietary fat restriction (<30% ME) should be considered for diabetic dogs with concurrent chronic pancreatitis.

<table>
<thead>
<tr>
<th>Brand name</th>
<th>Insulin type (manufacturer)</th>
<th>Strength</th>
<th>Origin</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apidra</td>
<td>Glulisine (Sanofi-Aventis)</td>
<td>U-100</td>
<td>Recombinant human analogue</td>
<td>10-mL vial, 3-mL pen</td>
</tr>
<tr>
<td>Levernir</td>
<td>Detemir (Novo Nordisk)</td>
<td>U-100</td>
<td>Recombinant human analogue</td>
<td>10-mL vial, 3-mL pen</td>
</tr>
<tr>
<td>Humalog</td>
<td>Lispro (Eli Lilly and Company)</td>
<td>U-100, U-200</td>
<td>Recombinant human analogue</td>
<td>10-mL vial, 3-mL pen</td>
</tr>
<tr>
<td>Humalog Mix 75/25 and 50/50</td>
<td>Lispro (rapid acting) plus lispro protamine (intermediate) (Eli Lilly)</td>
<td>U-100</td>
<td>Recombinant human analogue</td>
<td>10-mL vial, 3-mL pen</td>
</tr>
<tr>
<td>Humulin N</td>
<td>NPH (Eli Lilly and Company)</td>
<td>U-100</td>
<td>Human</td>
<td>10-mL vial, 3-mL pen</td>
</tr>
<tr>
<td>Humulin R</td>
<td>Regular (Eli Lilly and Company)</td>
<td>U-500</td>
<td>Human</td>
<td>10-mL vial, 3-mL pen</td>
</tr>
<tr>
<td>Lantus</td>
<td>Glargine (Sanofi-Aventis)</td>
<td>U-100</td>
<td>Recombinant human analogue</td>
<td>10-mL vial, 3-mL pen</td>
</tr>
<tr>
<td>Regular</td>
<td>Regular (many)</td>
<td>U-100</td>
<td>Human</td>
<td>10-mL vial, 3-mL pen</td>
</tr>
<tr>
<td>Novolin N</td>
<td>NPH (Novo Nordisk)</td>
<td>U-100</td>
<td>Human</td>
<td>10-mL vial, 3-mL pen</td>
</tr>
<tr>
<td>Novolog</td>
<td>Aspart (Novo Nordisk)</td>
<td>U-100</td>
<td>Recombinant human analogue</td>
<td>10-mL vial, 3-mL pen</td>
</tr>
<tr>
<td>Novolog Mix 70/30 and Mix 50/50</td>
<td>Aspart (rapid acting) plus aspart protamine (intermediate) (Novo Nordisk)</td>
<td>U-100</td>
<td>Recombinant human analogue</td>
<td>10-mL vial, 3-mL pen</td>
</tr>
<tr>
<td>ProZinc*</td>
<td>PZI (Boehringer Ingelheim Animal Health)</td>
<td>U-40</td>
<td>Recombinant human</td>
<td>10-mL vial</td>
</tr>
<tr>
<td>Tresiba</td>
<td>Degludec (Novo Nordisk)</td>
<td>U-100, U-200</td>
<td>Recombinant human analogue</td>
<td>10-mL vial, 3-mL pen</td>
</tr>
<tr>
<td>Toujeo</td>
<td>Glargine</td>
<td>U-300</td>
<td>Recombinant human</td>
<td>10-mL vial</td>
</tr>
<tr>
<td>Vetsulin/Caninsulin*</td>
<td>Porcine (Merck Animal Health)</td>
<td>U-40</td>
<td>Zinc porcine</td>
<td>10-mL vial, 2.7-mL pen</td>
</tr>
</tbody>
</table>

NPH, neutral protein Hagedorn; PZI, protamine zinc insulin.
* Veterinary-approved product.

TABLE Types of insulin used in veterinary medicine.
Now approved for cats and dogs*

THE PROVEN WAY TO TREAT CANINE DIABETES ONCE-A-DAY

The breakthrough you’ve been waiting for is here: now you can deliver glycemic control in most diabetic dogs WITH A SINGLE DAILY INJECTION.3 To learn more, contact your Boehringer Ingelheim Sales Representative or Professional Services Veterinarian.

PROZINC is approved for twice-daily use in cats.3

IMPORTANT SAFETY INFORMATION: PROZINC is for use in dogs and cats only. Keep out of the reach of children. Animals presenting with severe ketoacidosis, anorexia, lethargy, and/or vomiting should be stabilized with short-acting insulin and appropriate supportive therapy until their condition is stabilized. As with all insulin products, careful patient monitoring for hypoglycemia and hyperglycemia is essential to attain and maintain adequate glycemic control and to prevent associated complications. Overdose can result in profound hypoglycemia and death. The most common adverse reactions were lethargy, anorexia, hypoglycemia, vomiting, seizures, shaking (dogs only), diarrhea, and ataxia. Many of the adverse reactions, such as lethargy, seizures, shaking (dogs only), and ataxia, are associated with hypoglycemia. Glucocorticoid and progestogen use should be avoided. The safety and effectiveness of PROZINC in puppies, kittens, or breeding, pregnant, and lactating animals has not been evaluated. PROZINC is contraindicated during episodes of hypoglycemia and in animals sensitive to protamine zinc recombinant human insulin or any other ingredients in PROZINC. For more information, please see full prescribing information.

*PROZINC is approved for twice-daily use in cats.3

References:
1 Data on file at Boehringer Ingelheim.

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TOGETHER, WE ARE MORE THAN MEDICINE.
or persistent hyperglycemia. It is generally recommended to administer insulin within 1 hour of a meal and, in most cases, for convenience, the meal and the insulin injection are given at the same time.

Controlling diabetes in cats

The primary goal of treatment in feline diabetes is to obtain remission (ie, maintenance of euglycemia without the need for insulin therapy or other hypoglycemic drugs). Remission is possible in about 80% of cats newly diagnosed with diabetes if normal or near-normal BG concentrations are achieved shortly after diagnosis. The probability of remission is increased when a low-carbohydrate (<15% ME), high-protein diet (Hill’s m/d, Purina DM, or others) is used in combination with a long-acting carbohydrate such as glargine or detemir administered twice daily. Lower remission rates are reported using PZI or porcine lente insulin, or when feeding a moderate-carbohydrate diet. Rapid institution of excellent glycemic control, ideally in conjunction with home monitoring, contributes to remission, while the institution of tight control (approximately 6 months or more) following diagnosis is associated with significantly lower remission rates (84% vs 34%).

Because remission often occurs between 4 and 8 weeks of therapy when cats are optimally managed, weight loss is not a major factor in achieving remission. However, weight management is critically important for maintaining remission. Eating does not need to be coordinated with cats in insulin therapy, especially using a low-carbohydrate diet and long-acting insulin. The type and amount of food and snacks should be consistent each day, and snacks must be low in carbohydrates.

Patient monitoring

It’s imperative to consider owner-derived clinical information in conjunction with history and physical exam. Monitor the patient’s water intake, urination, body weight, physical activity, and signs of clinical hypoglycemia. It may be useful to check urine glucose and ketone measurements, but BG measurements are the most valuable, particularly when performed at home.

Fructosamine concentration can be useful if there is conflicting evidence for glycemic control (eg, the client reports good clinical control but in-clinic measurements indicate poor glycemic control). Fructosamine can also be useful when clinical information is inadequate or unreliable, or if the owner is unable to measure BG at home. Fructosamine concentration values are more useful for adjusting insulin in relatively stable diabetic cats that have been diabetic for months or years and are unlikely to go into remission. This is because the insulin dosage is adjusted less frequently in these animals, and knowledge of the average BG concentration over 2 to 3 weeks reflected by fructosamine is more relevant in these cats, but it is not useful for day-to-day insulin dosage adjustments in newly diagnosed diabetic cats. Fructosamine concentration gives no information on nadir or pre-insulin BG, only mean BG over weeks. Monitoring BG at home is invaluable for maximizing the probability of remission. Home BG measurements

Table 1. Adverse reactions seen in the safety population (276 dogs)

<table>
<thead>
<tr>
<th>Adverse Reaction</th>
<th>Number and Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypoglycemia</td>
<td>31 (11.3%)</td>
</tr>
<tr>
<td>Seizures</td>
<td>16 (5.8%)</td>
</tr>
<tr>
<td>Drowning</td>
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</tr>
<tr>
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<td>1 (0.4%)</td>
</tr>
<tr>
<td>Pancreatitis</td>
<td>1 (0.4%)</td>
</tr>
<tr>
<td>Allergic reaction to the injection</td>
<td>4 (1.4%)</td>
</tr>
</tbody>
</table>

For a complete list of all reported adverse drug reactions, please refer to the full prescribing information and the package data sheet (PDS) available from the manufacturer. For additional information about adverse drug experience reporting for animal drugs, contact FDA at 1-888-357-1440. To report suspected adverse drug events, for technical assistance or to obtain a copy of the Safety Data Sheet (SDS), contact Boehringer Ingelheim at 1-888-637-4251. To report suspected adverse drug events or to obtain a copy of the Safety Data Sheet (SDS), contact Boehringer Ingelheim at 1-888-637-4251.

Package Insert for Dogs

ProZinc® (protamine zinc recombinant human insulin)

PROZINC® is a sterile aqueous protamine zinc suspension of recombinant human insulin. (protamine zinc recombinant human insulin)

PROZINC® is contraindicated in dogs sensitive to protamine zinc recombinant human insulin.

Table 1 summarizes the adverse reactions reported in the study. Clinical signs of hypoglycemia may include weakness, tremor, collapse, panting, seizures, weakness, and ataxia. Table 1 also summarizes the adverse reactions reported in the study. Clinical signs of hypoglycemia may include weakness, tremor, collapse, panting, seizures, weakness, and ataxia.

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ProZinc® (proamine zinc recombinant human insulin)

<table>
<thead>
<tr>
<th>Amount</th>
<th>Description</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 International Units (IU)</td>
<td>Recombinant human insulin</td>
<td>40 IU</td>
</tr>
<tr>
<td>0.288 mg</td>
<td>Zinc oxide</td>
<td></td>
</tr>
<tr>
<td>10.00 mg</td>
<td>Glycerin</td>
<td></td>
</tr>
<tr>
<td>0.088 mg</td>
<td>Dibasic sodium phosphate, heptahydrate</td>
<td></td>
</tr>
<tr>
<td>3.78 mg</td>
<td>Phenol formaldehyde (preservative)</td>
<td></td>
</tr>
<tr>
<td>1.63 mg</td>
<td>Hydrochloric acid</td>
<td></td>
</tr>
<tr>
<td>0.005 mg</td>
<td>Water for injection (maximum)</td>
<td></td>
</tr>
</tbody>
</table>

PROZINC® is contraindicated during episodes of hypoglycemia.

Warnings: User Safety:
- For use in cats and dogs only. Keep out of the reach of children. Avoid contact with eyes. In case of contact, immediately flush eyes with running water for at least 15 minutes. If irritation persists or if there is any unusual reaction, see your veterinarian.
- Do not use PROZINC® if it has been frozen. Do not use after the expiration date. PROZINC® is sensitive to heat and cold.

Indications:
- PROZINC® is indicated for the treatment of diabetes mellitus in cats and dogs.
- PROZINC® is indicated for the treatment of diabetic ketoacidosis in cats.

Dosage and Administration:
- In cats, 0.7 IU/kg body weight every 12 hours. The dose should be given concurrently with or right after a meal.
- In dogs, 0.7 IU/kg body weight every 12 hours. The dose should be given concurrently with or right after a meal.

Precautions:
- Ensure that the patient is receiving adequate diet and treatment before starting therapy. If the patient is not responding as expected, and is not receiving adequate treatment, the veterinarian should consider other possibilities.
- Monitor for signs of hypoglycemia before and after each dose of PROZINC® is administered.
- Monitor for signs of hyperglycemia before and after each dose of PROZINC® is administered.

Adverse Reactions:
- Hypoglycemia: The most common adverse reaction observed is hypoglycemia. Signs may include: weakness, depression, behavioral changes, muscle twitching, and anorexia. In severe cases of hypoglycemia, seizures and coma can occur. Hypoglycemia can be life-threatening and may result in death. The attending veterinarian should evaluate other adverse reactions on a case-by-case basis to determine if an adverse reaction is appropriate, or if alternative therapy is considered.
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The attending veterinarian should evaluate other adverse reactions on a case-by-case basis to determine if an adverse reaction is appropriate, or if alternative therapy is considered.

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References available online at dvm360.com
When an oncology referral isn’t in the cards

You’ve just made a cancer diagnosis and offered an oncology referral to the owner, but they won’t go. Now what?

By Michael D. Lucroy, DVM, MS, DACVIM (oncology)

It is not uncommon to diagnose cancer in a patient and refer the client to an oncologist, only to have the owner decline your recommendation, and the reasons why are numerous.

Sometimes, it’s a function of the owner’s emotional attachment to the pet; they may not consider their dog or cat a member of the family.1 In other instances, it is related to presumptions or misperceptions about recovery from treatment, along with worries about how to care for a pet that has undergone major surgery or experiences an acute effect from radiation therapy.2 And, despite reassurances and the documented potential benefit for increasing survival, many pet owners have concerns about the risk of adverse events from chemotherapy.2 Other reasons include financial matters and the logistics of getting to the referral center for multiple visits.

Regardless of their reasons for declining an oncology referral, you now have another cancer patient under your care. Oncology cases can be challenging and sometimes heartbreaking, but they can also be rewarding. Fundamentally, managing a cancer patient is divided into 3 overlapping spheres: engaging the owner, treating the cancer, and supporting the patient.

Engaging the owner

Soliciting input from the owner is an important part of designing a successful cancer treatment plan. These conversations help define what success looks like for the family, from longevity to quality of life. Understanding why the client declined the referral may provide better insight into the client’s fears and motivations, which in turn helps drive the treatment plan. Many pet owners struggle with choosing the “best” treatment for their pet,3 and they may have feelings of guilt over not visiting an oncologist.

It is important to recognize that most owners prefer forthright communication about their pet’s condition presented in an unrushed, compassionate, nonjudgmental, and positive manner from staff with whom they have a relationship.4 Giving clients the truth about their pet’s cancer diagnosis builds trust, allows for informed decision-making, offers a sense of control over the situation, and helps them maintain hope.5 Unfortunately, the recent departure from traditional face-to-face practice resulting from the coronavirus disease 2019 pandemic has created new challenges with these difficult conversations.

Clients can be a great asset for at-home patient monitoring and ongoing decision-making. Having them use assessment tools to gauge quality of life (QOL) and pain in a continuous fashion helps you better evaluate the patient’s response to treatment and recognize when medical intervention is required.6 It also reinforces to owners they are an integral part of the cancer care team. Regular, objective assessment with QOL and pain scores also helps owners with the decision for euthanasia, if that becomes appropriate.

Treating the cancer

Although declining an oncology referral leaves the owner with fewer treatment options for their pet, plenty of available modalities may be appropriate and align with an owner’s preferences. First is palliative surgery. Keep in mind that not every cancer surgery is done with curative intent. For patients with primary bone tumors, amputation provides relief from chronic pain. For soft tissue sarcomas, even modest surgical margins can provide long disease-free intervals for low- and intermediate-grade tumors. Debulking oral tumors can improve food intake.7 Metronomic chemotherapy is an option many owners find more appealing than traditional maximum-tolerated-dose chemotherapy. Metronomic chemotherapy consists of a daily oral low dose of an alkylating chemotherapy drug (eg, cyclophosphamide, chlorambucil) and a nonsteroidal anti-inflammatory drug (NSAID). This type of chemotherapy has a low risk of adverse effects and requires infrequent trips to the clinic for monitoring blood work. Metronomic chemotherapy helps control cancer growth by inhibiting angiogenesis, reversing the tumor’s immune tolerance by depleting...
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regulatory T cells, disrupting cancer stem cells, and promoting tumor dormancy.1 The drugs used are typically compounded and can be sent directly to the pet owner, which simplifies compliance with regulations for practices that do not routinely handle cytotoxic drugs.

Autologous cancer vaccines (ACVs) represent a form of immunotherapy that can be administered in any practice setting. Because these vaccines are created from the patient’s tumor, they present the immune system with the entire spectrum of tumor-associated and tumor-specific antigens, along with an adjuvant to help reverse immunotolerance.6,9 ACVs are currently available to veterinarians as an experimental therapy under US Department of Agriculture regulations.10 A recently published study showed that 3 weekly subcutaneous injections of an adjuvanted ACV were well tolerated by dogs.12 The anti-tumor effect of that particular vaccine has been demonstrated in rodent models,11,12 and veterinary clinical studies are underway.

Supporting the patient
Pets diagnosed with cancer are often older and may have comorbidities that affect their overall QOL. The requirements for supportive care can also vary among patients. Pain and nutrition are areas that commonly require intervention in these patients.

Pain management
Clients often worry that their pets are in pain. Although many tumors are not painful upon palpation, the presence of many types of cancers can lead to chronic pain. A conservative estimate is that 30% of cancers in dogs and cats are responsible for pain at the time of diagnosis. Thought to be the most painful are tumors involving the oral cavity, bone, urogenital tract, eyes, nose, nerve roots, gastrointestinal (GI) tract, and skin.

Remember that patients with cancer may experience several forms of pain over time, and multiple types of pain may be present simultaneously. Acute pain may be associated with a biopsy procedure or the postoperative period, whereas chronic pain may be tumor-related (primary tumor or metastatic sites) or due to concurrent diseases like osteoarthritis.

As uncontrolled pain intensifies, physiologic changes in the central nervous system (CNS) lead to chronic pain. Various biochemical changes eventually result in the development of opioid-independent pain and a rewiring of the CNS, leading to central sensitization, allodynia, hyperalgesia, and wind-up pain.13,14 Identifying pain in dogs and cats, particularly chronic pain, is difficult. The use of a pain scale is helpful for both owners and veterinary staff. Colorado State University published several pain scales, including the 4-point scales for dogs and cats.15,16 Not only can most pet owners use these scales easily, but changes in pain score over time also help determine the efficacy of ongoing pain management strategies.

Cancer patients suffering from chronic pain often benefit from a combination of an NSAID, opioid, N-methyl-D-aspartate antagonist, and other adjuvants such as amantadine. Maropitant (Cerenia; Zoetis) may help alleviate cancer pain because of its action on the neurokinin-1 (NK-1) pathway.17 It may also help manage opioid-related GI issues. Bisphosphonate drugs such as zoledronate are useful for managing pain associated with primary and metastatic bone tumors.

When managing chronic pain, it is important to strike a balance between the adverse effects of these drugs that owners find problematic (eg, sedation, constipation, diarrhea) and the positive effect of pain control. In addition to owners monitoring pain scores, it is important for them to report any adverse events quickly so the drug protocol can be adjusted as needed. Owners must also understand the importance of administering pain medication on time and keeping their veterinary team informed about all medications and supplements they give to their pet.

Nutritional support
Maintaining adequate nutrition can be difficult in cancer patients, particularly cats. Cancer pain can activate the NK-1 pathway, causing nausea and vomiting, and concurrent medications may diminish a patient’s appetite. Tumors affecting the oral cavity and GI tract can also create obstacles for food intake, and histamine release from mast cell tumors can lead to gastric erosions and ulceration that also affect appetite. Medically, various strategies can be put in place to increase food intake, including managing pain adequately, controlling nausea and vomiting with drugs like maropitant, and using specific appetite-enhancing agents such as Autumne (Entoyce; Elanco). Glucocorticoids can boost appetite but do not provide any analgesia, and carefully weighing the potential positive impact on appetite against removing NSAIDs from the pain management regimen is important.

Enteral nutrition can be a useful tool to help maintain a patient that is not eating well. Although nasogastric tubes are easy to place, their small diameter limits the number of calories delivered per day. Gastrostomy tubes can easily accommodate a large volume of a liquefied diet, but they are more invasive, requiring endoscopic or surgical placement. Esophagostomy tubes may represent the best option because placement is straightforward, the tube diameter is large enough to provide ample calories, and they are well tolerated by most patients and easy for owners to manage.

Summary
Even if your client declines the offer of an oncology referral, engaging the owner, offering an innovative treatment approach, and supporting the pet through the course of its cancer can be rewarding for all parties involved. Caring for cancer patients helps build trust and strengthen the relationship with the owner.

Michael D. Lucroy, DVM, MS, DACVIM (oncology), is chief medical officer at Torigen Pharmaceuticals, a startup biotechnology company focused on cancer immunotherapy for the veterinary market. Before joining Torigen, he was director of clinical study of the communication expectations of clients accessing oncology care at a tertiary referral center for dogs with life-limiting cancer. J Am Vet Med Assoc. 2014;245(7):785-795. doi:10.2460/jvma.245.7.785


References
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The ABCs of veterinary dentistry: X is for intraoral x-rays

Most of the tooth is located below the gumline and out of view. Intraoral radiography can yield invaluable diagnostic information about your patients’ oral health.

By Jan Bellows, DVM, DAVDC, DABVP, FAVD

When a patient presents with chronic non-weight bearing lameness, you inform the owner that x-rays are needed to see what is going on. The same is true for patients that have been vomiting or coughing for a while, as well as a host of other reasons. It’s a given that your full-body radiograph unit is an integral diagnostic tool. But how many of your patients present with halitosis? How important are intraoral x-rays to your practice? How can you incorporate them into your workflow in every case? How should you communicate the safety, importance, and expense of dental x-rays to your clients? Read on.

The importance of dental x-rays

Covered by gingiva encased in the alveolus and located subgingivally, about 60% of the oral anatomy in dogs and cats is not visible to the naked eye.1 Because skull radiographs result in superimposition of teeth, they are nondiagnostic in most cases (Figure 1). After the learning curve, it is easy to incorporate intraoral radiography in any dental workflow, and it’s the key to unlocking a dental treatment plan.

Incorporating intraoral radiography into your workflow

Incorporating intraoral radiography into your practice elevates dentistry from a one-size-fits-all quote over the phone and a drop-off for “a dental” to practicing diagnostic dentistry. Each dental appointment should include at least 3 client conversations: before they leave their dog or cat with you, during the procedure once pathology is found, and at patient discharge.

The initial phone call

During the initial client conversation, discuss what will happen when the pet comes to the clinic, when results of the exam under anesthesia with intraoral films will be available, and what your client is able and willing to do at home with regard to daily plaque control. Here’s how it should play out.

When a client calls to schedule a professional teeth cleaning appointment for a pet with halitosis, the receptionist advises the client that the pet must see the doctor for a general examination and preanesthesia testing either days before or on the day of the visit. The receptionist also explains that the veterinarian will find the cause of the pet’s halitosis via a tooth-by-tooth examination that includes full-mouth dental x-rays and, while the pet is anesthetized, contact them to share the findings and recommend treatment options. Treatment can be performed during that visit or at a later time, depending on the day’s schedule and the client’s preferences. Finally, the receptionist shares the initial examination fees, preoperative laboratory testing, dental scaling, tooth-by-tooth examination, polishing, and intraoral radiographs. (In some practices the veterinarian discusses fees with the owner.)

The money conversation

It’s a shame animals do not walk into our offices holding credit cards with unlimited maximums to pay for their care. Fortunately, many payment options are available to allay clients’ money fears while allowing you to provide needed veterinary care.

If the client expresses cost concerns, discuss payment plan options and let the client know the entire team is dedicated to providing what their pet needs. A number of options are available today that enable clients to delay or divide payments over time, including CareCredit, Scratchpay, and Vetbilling, among others.

In addition, many wellness plans now include annual full-mouth dental radiographs as well as anesthetized dental scaling and polishing. These plans go a long way when you ask whether your client “wants” x-rays during an elective dental procedure.

The dental care visit

The following is a general timeline for an oral assessment, treatment, and prevention visit with a pet that has halitosis:

• 9:00 am: When the client brings their pet into the exam room, review the patient history and previous laboratory results, and examine the pet, focusing on the oral cavity. Discuss the client’s willingness and ability to provide daily plaque control. If the client has not been given a fee schedule, the doctor or assistant shares the fees for the initial diagnostics and dental scaling before

Figure 1. (left) Referral skull image of the mandibular canines. (center) A radiologist’s interpretation based on the skull image: probable tooth root abscess. (right) Intraoral radiograph shows no evidence of periapical disease, reinforcing the indication for intraoral radiographs.
the client leaves the exam room. The client agrees in writing that they understand that you will place their pet under anesthesia as well as the associated risks, and that there are likely to be additional fees for needed care. Discuss payment options openly. Inform the client what to expect over the course of the day and arrange a time to speak to the owner while the dog or cat is still anesthetized after determining the cause of the pet’s halitosis.

- **9:30 AM-11:00 AM:** The staff acquires preanesthetic test results to share with you, and then prepares the patient for anesthesia.
- **11:30 AM-12:45 PM:** Staff members anesthetize the patient, scale and polish the pet’s teeth, and obtain intraoral radiographs for the veterinarian to examine chairside. A team member then hands the veterinarian a dental probe to conduct the tooth-by-tooth examination and create a treatment plan, dictating the results to an assistant who creates the dental chart. The assistant tabulates additional fees, and creates and sends an email or text report to the client.
- **1:00 PM:** Review with the client your findings and the optimal treatment plan, explaining all associated fees and discussing payment options if needed.
- **3:00 PM:** Perform the necessary treatment.
- **5:30 PM:** Meet with the client to review the diagnosis and therapy. Have the client set a follow-up appointment to evaluate healing and create a tailored daily plaque prevention program. To leave clients with a lasting positive impression, send them home with a simple digital report that includes clinical before and after images and radiographs of their pet.

### Optimal vs functional care

Our patients do not need their teeth to live a full life, but they do need comfort. Root planing, local antimicrobial administration, and laser periodontal surgery are often recommended for optimal care but are not in the comfort range of some clients who cannot provide or afford needed follow-up care. In these cases, a treatment plan aimed at creating a pain-free functional mouth is the goal. You can make the pet comfortable by extracting teeth with complicated fractures and teeth affected by established periodontal disease.

One of the challenges in veterinary dentistry is getting the client to agree to your recommendations and having sufficient time to provide care during the same visit as the exam. When there is only 1 treatment table or extra time is not available, treatment staging becomes more imperative. In these cases, prepare your client that the diagnostics and teeth cleaning, polishing, and irrigation are performed during the initial visit, followed by a review of pathology with therapeutic recommendations, with the treatment itself performed 1 to 2 weeks later after the client agrees to the recommendation and has financial arrangements in place.

### Interpreting oral x-rays and determining treatment

#### Periodontal disease

Radiographs, which provide a 2-dimensional view of a 3-dimensional object, are used to determine indirectly the degree of bone (tooth support) loss. The bone level in periodontal disease often decreases as inflammation extends and bone is resorbed. In order to visualize bone loss radiographically, 40% of the bone has to be affected. Distribution of bone loss is classified as either localized or generalized, depending on the number of areas affected. Localized bone loss occurs in isolated areas, whereas generalized bone loss involves the majority of the marginal bone. You can classify specific areas of bone loss as horizontal (perpendicular to the tooth) or vertical (angular along the side of the root).

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**Figure 2.** (left) Measurement of bone loss. (right) Stages 2, 3, and 4 periodontal disease.
Periodontal disease is classified into 4 stages based on radiographic and clinical signs. In the normal cat or dog without periodontal disease, the alveolar margin resides within millimeters apical to the cementoenamel junction. **Stage 1**, gingivitis, occurs when the gingiva appears inflamed. There is no periodontal support loss or radiographic change. **Stage 2, early periodontitis**, occurs when attachment loss is less than 25%, as measured from the cementoenamel junction to the apex. Clinically, early periodontitis is typified by pocket formation or gingival recession. Radiographically, stage 2 periodontitis appears as blunting (rounding) of the alveolar margin in addition to bone loss. There may also appear to be a loss of continuity of the lamina dura at the alveolar margin level.

**Because tooth resorption is not observed clinically in most cases, intraoral x-rays are important in the diagnosis and treatment planning for canine and feline tooth resorption.**

**Stage 3, moderate periodontitis,** is diagnosed when 25% to 50% of attachment loss occurs (Figure 2). The direction of bone loss is either horizontal or vertical (angular). Horizontal bone loss appears radiographically as decreased alveolar bone along adjacent teeth. Normally, the alveolar margin bone is located 1 mm apical to the cementoenamel junction. With horizontal bone loss, both the buccal and/or lingual bone plates, as well as interdental bone, are resorbed. Clinically, horizontal bone loss is typified by a suprabony pocket, which occurs when the epithelial attachment is above the bony defect. Vertical bone loss, resulting from infrabony defects, occurs when the pocket walls are within a bony housing. Periodontal disease may cause a vertical defect to extend apically from the alveolar margin. Alveolar bone expansion appears clinically as bulging alveoli around 1 or both maxillary and/or mandibular canines. Radiographically, this lesion appears as bone loss around the root and expands alveolar bone growth.

**Stage 4, advanced periodontal disease,** is typified by deep pockets and/or marked gingival recession, tooth mobility, gingival bleeding, and purulent discharge. Attachment loss is greater than 50% of the root length.

Furcation exposure results from bone loss at the root junction of multirooted teeth due to advanced periodontal disease. Unless there is a radiolucent area in the region of the furcation, it is sometimes difficult to determine radiographically whether the interradicular space is involved. Lack of radiographically detectable furcation involvement is not confirmation of the absence of periodontal destruction. Advanced furcation exposures, where both cortical plates are resorbed, are easily recognized on radiographs.

**Stage 1 furcation involvement** exists when the tip of a probe can just enter the furcation area. Bone partially fills the area where the roots meet. Radiographically, there may be decreased opacity of the bone at the furcation. **Stage 2 furcation involvement** exists when the probe tip extends horizontally into the area where the roots converge but does not exit on the other side. Radiographically, there will be bone loss at the furcation. **Stage 3 furcation exposure** lesions exist secondary to advanced periodontal disease. Alveolar bone has resorbed to a point that an explorer probe passes through the defect unobstructed. Radiographically, there will be an area of complete bone loss.

**Tooth resorption**

Because tooth resorption is not observed clinically in most cases, intraoral x-rays are important in the diagnosis and treatment planning for canine and feline tooth resorption. Radiographically, when the external resorption lesion is located apically, the apex will appear shortened, blunted, or square, and the lesion will be ragged or irregular. If the lesion is internal resorption, then the root canal system has an enlarged area and the margins of the lesion are sharp, smooth, and clearly defined. The canal is not present in the lesion, and the size is variable.

Classification of tooth resorption takes into account the extent of lesion progress, anatomic location, and etiology. The clinician should know whether the resorption is internal or external and, if external, whether it has extended to the oral cavity. Some investigators believe that 3 radiographic appearances of tooth resorption exist and have clinical significance related to therapy.

**Type 1** usually involves loss of alveolar bone adjacent to an often well-defined area of tooth resorption; normal periodontal ligament space is maintained at other areas of the tooth. If the lesion extends to the oral cavity, the entire tooth should be extracted (Figure 3).

**Type 2** involves loss of the periodontal ligament space and lamina dura due to fusion of the tooth root and alveolar bone (dentoalveolar ankylosis); the resorbing tooth structure may appear less radiopaque than the unaffected tooth (replacement resorption) (Figure 4). If the lesion extends to the oral cavity, the crown can be reduced in height below the gingiva followed by gingival closure.

**Type 3** includes features present in types 1 and 2. If the lesion extends to the oral cavity, the tooth should be extracted.

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Who needs dental radiographs?
Still not convinced that intraoral radiographs are vital for every patient? Check out these pairs of clinical and radiographic images. As you will see, it is very challenging to distinguish which patients need dental care based on clinical appearance alone.

The clinical image shows a discolored left maxillary first incisor, whereas the radiograph shows left maxillary incisor root resorption and an enlarged root canal compared with the adjacent teeth. Extraction is indicated for this patient.

This patient’s maxillary incisors appear clinically normal, but an x-ray reveals that the left maxillary first and second incisors have enlarged root canals consistent with nonvital teeth. Root canal therapy or extraction is indicated.

An uncomplicated crown fracture in the right maxillary fourth premolar is seen clinically, but an intraoral x-ray shows marked external tooth resorption of the distal root. Extraction is indicated.

Based on the clinical image, this cat’s right maxillary canine appears to have an uncomplicated crown fracture, but the radiograph shows marked root resorption and the need for extraction.

Clinically, the left maxillary third premolar is slightly discolored. In the radiograph, the same tooth appears to be affected by marked tooth resorption. Extraction is indicated.

The left mandibular first premolar is clinically missing. The radiograph is consistent with a dentigerous cyst with an unerupted first premolar present. Surgical removal of the first and second premolars is indicated.

These left mandibular crowns look normal clinically, but radiography reveals first molar support loss and periapical lucencies consistent with endodontic disease. Root canal therapy or extraction is indicated. The x-ray also shows that the second molar is affected by advanced periodontal disease.
Rehabilitation and canine osteoarthritis: a multimodal approach

Early recognition of degenerative joint disease combined with a multimodal treatment approach that includes a comprehensive rehabilitation plan can improve patient outcomes.

By Rebecca A. Packer, DVM, MS, DACVIM (Neurology/Neurosurgery)

How many of us have heard owners talk about their dog “slowing down”? “He’s just getting older,” they often say. Yet, according to Amber Ihrke, DVM, CCRT, CVA, CVSMT, CAC, CVPP, owner and medical director of Integrative Pet Care of Homer Glen in Homer Glen, Illinois, age alone does not cause pets to slow down. Instead, slowing down is a manifestation of underlying disease, and it is important to find the true cause and address it.

Commonly, the underlying cause is osteoarthritis (OA). OA affects 1 in 5 adult dogs and is the leading cause of chronic canine pain. It can lead to decreased quality of life, reduced performance and activity and, in some cases, eventual euthanasia. Ihrke told attendees at the American Veterinary Medical Association Virtual Convention that it is important to intervene before end-stage joint degeneration—preferably as soon as a patient’s activity level starts to decrease.

Pathophysiology and progression of OA

Ihrke first reviewed a bit about the pathophysiology and progression of OA. First, pathologic changes occur in the articular tissues, commonly manifested by thickened joint capsules. The synovial membrane then becomes inflamed, and the synovial fluid less viscous. Pain begins at this stage as a result of synovial inflammation, and it is during these early stages that intervening offers the most benefit. The next phase is cartilage deterioration. Finally, osteophytes develop and bone remodeling occurs. This mechanical failure of articular cartilage is the defining element of OA and is irreversible.

Clinical disease caused by these pathophysiologic changes can be quantified using the Canine OsteoArthritis Staging Tool (COAST), which categorizes OA into 5 stages (see Stages of OA on page 44). Owners typically start noticing reduced activity in their pets during stage 2, and patients are presented for evaluation most commonly during stage 2 or 3.

Confirming the diagnosis

Before we can develop a treatment protocol, Ihrke said, we need to confirm the diagnosis. A thorough and systematic patient evaluation is important and should not be overlooked. This includes signalment (to help guide the differential diagnosis), a thorough history, gait assessment, physical examination, and diagnostic tests. The history should include detailed questions about the pet’s ability to perform various daily activities (eg, getting into and out of their bed, going up or down stairs, walking around the yard).

“It’s important to compare the pet’s current and past activity levels,” Ihrke said. “Knowing that a patient can walk 1 mile at the time of evaluation is a seemingly good sign, but it can be misleading if a couple months earlier the pet was able to walk 2 or 3 miles.” Additionally, be sure to establish whether the patient is a pet versus a performance animal.

When evaluating gait, do so in several situations and from multiple directions, Ihrke advised. Assess the patient as they walk casually around the exam room and when moving on a leash at both a walk and a trot. Transitions from 1 position to another (eg, rising from lying down) can be telling, but these actions must be voluntary and without manual interference. Ihrke recommends using video recordings where possible and said use of a lameness scale is essential. “Many scales are available and will help objectively compare findings from 1 visit to the next, or assess accurately when evaluations are done by more than 1 associate,” she said. Importantly, the owner can conceptualize improvement more easily when they can see progress on a quantified scale.

The physical examination is clearly essential. The crepitus, range of motion, effusion, pain, instability
Managing OA

Ihrke presented a list of 5 management goals for dogs with OA:
- Intervene early
- Improve quality of life
- Reduce pain
- Decrease flare-ups
- Increase daily activity

These goals are best accomplished, she said, using a multimodal and comprehensive approach.

Medical management

One of the starting points of treatment is nonsteroidal anti-inflammatory drugs. Adjunctive therapies such as amantadine, amitriptyline, or gabapentin (or combinations thereof) may also be used. Disease-modifying agents such as polysulfated glycosaminoglycans may also be beneficial and are commonly used. Omega-3 fatty acid supplements, chondroprotective supplements, and diets rich in eicosapentaenoic acid are also beneficial.

Weight optimization

Ihrke said this term is often better received by owners than “weight loss” or “diet,” and can have a great impact. Weight loss of 6.1% has been associated with a subjective decrease in lameness, and improvement on kinetic gait analysis can be seen with a weight loss of 8.85%. As such, her goal for patients is a standard 10% reduction in body weight, as weight optimization alone may help reduce clinical signs of OA.

Rehabilitation

Rehabilitation is part of the multimodal approach, but in itself is also multimodal. Environmental modifications to improve traction in the home (eg, carpet, yoga mats, booties) is 1 component. There are also many therapeutic aids, in addition to manual therapy. Thermotherapy employs a combination of cold packs (to reduce acute-phase inflammation) on affected joints, with hot packs (to increase blood flow, improve connective tissue extensibility, and promote muscle relaxation) on soft tissues in the surrounding regions. Other therapies include transcutaneous electrical nerve stimulation, which provides pain relief and can be used at home; photobiomodulation (therapeutic laser); hydrotherapy, which can reduce the load on hip joints by 60% when water is at hip level; therapeutic ultrasound; pulsed electromagnetic field therapy; and extracorporeal shockwave therapy. All of these modalities are used to reduce pain and inflammation or improve muscle relaxation and mobility. As such, some may be targeted to the affected joint and others on the adjacent muscle groups.

Manual therapy remains the most essential aspect of rehabilitation. “Above all other rehabilitation tools, manual therapy is always a component—and the cornerstone—of the treatment protocol,” Ihrke said. Manual therapy includes releasing trigger points, improving joint range of motion, and decreasing pain through massage.

The second most important aspect of the rehabilitation protocol is a therapeutic exercise program. “Fitness in dogs is not achieved via self-directed activities,” Ihrke said. “Walking around the yard is not the same as an intentional plan to target a specific group of muscles or a specific movement.”

Much like rehabilitation aids can be used to improve a patient’s pain control or function, intraarticular injections (eg, hyaluronic acid or corticosteroids) do make the same. These are administered on a case-by-case basis and are always prescribed alongside a corresponding rehabilitation plan. Further, intra-articular injections of platelet-rich plasma or stem cells may have a role in the future, particularly in early OA.

Setting SMART goals

All of these aspects of evaluation and treatment circle back to setting goals for the patient. The goals set by a clinician must take into account the goals of the owner and the role of the patient (whether it is a pet, working dog, or performance dog). If the owner’s goals are unrealistic, there is a discussion to reach a reasonable consensus.

Ihrke advised setting SMART goals with clients: specific, measurable, attainable, relevant, and time-based. An example of a SMART goal is to improve weight-bearing of the right pelvic limb by 15% (relevant, measurable, and specific) in 4 weeks (time-based and attainable).”

Summary

Ihrke’s comprehensive patient evaluation plan includes signalment, a thorough patient history, gait evaluation, physical examination, and diagnostic testing. A multimodal treatment protocol, including medications, weight optimization, supplements, and rehabilitation, is best implemented in the earliest stages of joint progression when possible.

In this way, we can provide the most benefit to dogs suffering from OA that need our help to maintain a favorable quality of life.

Rebecca A. Packer, DVM, MS, DACVIM (Neurology/Neurosurgery), is an associate professor at Colorado State University College of Veterinary Medicine and Biomedical Sciences in Fort Collins. She is active in clinical and didactic training of veterinary students and residents and has developed a comparative neuro-oncology research program at Colorado State University.

Stages of OA

Stage 0: No risk factors, patient is clinically normal
Stage 1: At-risk dogs; clinical signs are difficult to detect, but physiologic factors of OA are present
Stage 2: Mild OA; clinical signs are intermittent and include obvious impairment of the ability to perform certain daily activities, consistent alterations in body carriage, and muscle loss
Stage 3: Moderate OA; patient has constant impairment of form and a diminished capacity to engage in activities of daily living
Stage 4: Severe disease, mobility is impaired, and the patient’s ability to move or jump is decreased compared with previous normal activity

REFERENCES

2. Fox SM. Multimodal Management of Canine Osteoarthritis. CRC Press; 2017
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Proper eyelid anatomy is essential for protecting the globe, as well as for distributing the tear film on the ocular surface. However, many dog breeds suffer from inherited eyelid abnormalities that affect their function. This article discusses surgical correction of some of the more common disorders of this critical organ.

**Entropion**

Entropion, or inward rolling of the eyelid margin, causes eyelashes and facial hair to contact the conjunctiva and cornea (Figure 1), leading to conjunctivitis, keratitis, and possible ulceration. There are 3 types of entropion: conformational (caused by anatomic abnormalities of the eyelids themselves), spastic (caused by marked contraction of the orbicularis oculi muscle), and cicatricial (caused by scarring from an injury or previous surgery). Conformational entropion is by far the most common presentation. It usually affects both eyes, and more commonly the lower eyelid. Severe cases may involve the entire lid, but typically just a portion of the margin is affected. In brachycephalic dogs, conformational entropion is more notable at the medial lower eyelid, whereas in large, broad-skulled dogs it often affects the lateral part of the lower eyelid and the lateral canthus. Clinicians typically see upper eyelid involvement in dogs with very heavy brows, such as bloodhounds, Shar-Peis (Figure 2), and chow chows. Conformational entropion is believed to be inherited in a large number of dog breeds, including the chow chow, English bulldog, Irish setter, Labrador and golden retrievers, Saint Bernard, Shar-Pei, Rottweiler, Great Dane, and Chesapeake Bay retriever. Although conformational entropion may manifest soon after first eye opening, it often does not become clinically evident until later in life as the skull and associated facial skin gain their adult conformation. Conversely, maturation may also be associated with reduction or sometimes even resolution of entropion. For these reasons, surgeons should use temporary tacking and postpone definitive surgery until facial maturity is achieved, although such a delay is not advisable in severe cases.

**Surgical correction**

The surgical method chosen to correct entropion depends on the patient’s breed and facial maturity, mechanism and severity of the condition, and position of the eyelid abnormality. Of these, mechanism is perhaps the most important, as the entropion may be caused by excessively long or short eyelids, excessive facial skin, an overly tight or misdirected canthal ligament, or a painful process causing spastic entropion. Regardless of the procedure chosen, accurately assess the extent of skin resection before sedation, premedication, or anesthesia induction. Consider use of a dermatologic marker pen. Always apply topical anesthesia to eliminate other causes of spastic entropion before deciding on the extent of surgical resection. Keep in mind that the goal is to correct for the conformational or anatomic component only, not the spastic component. Correction of the...
conformational component will also alleviate the spastic component. The majority of simple, breed-related entropion cases can be addressed using the Hotz-Celsius procedure. For this procedure, make the initial incision parallel to the eyelid margin at the hairless-nonhaired junction while protecting the ocular surface with a lid plate (Figure 3). Avoid placing this incision too far from the eyelid margin. This is a common error that causes a significant loss of “mechanical advantage” and achieves less eversion. The length of this first incision is dictated by the length (extent) of inverted eyelid. First, apply gentle pressure with the thumb at the point of entropion to roll out the eyelid until the eyelid margin (meibomian gland orifices) can be seen along the whole length; this will help outline the full lateral and medial extent of entropion. Other clues are provided by the pale discoloration, blepharedema, and alopecia that occur secondary to rubbing of eyelid skin against the cornea.

Next, make a curvilinear incision joining the 2 ends of the first incision. The real art of entropion surgery is deciding on the amount of tissue to resect (ie, the distance between the first and second incisions). This was predetermined during the examination of the awake patient (using topical anesthetic) and can be confirmed during surgery by applying the same clues used to determine the length of the first incision. The most important point is to ensure that the widest tissue resection is planned for the most inverted section of the eyelid, even if this creates an asymmetric area of resected tissue.

Remember:

- Undercorrection with the need for a second operation is preferable to overcorrection, which may cause cicatricial ectropion.
- Do not remove the orbicularis oculi muscle; doing so increases hemorrhage, operating time, postoperative edema, and infection risk.
- Use 5-0 or smaller suture material with swaged-on, cutting suture needles to suture the 2 incision lines to each other.
- Place multiple, closely spaced sutures of small “bites” with the goal of excellent apposition. Sutures will not be under great forces postoperatively.
- Use an Elizabethan collar until at least 2 to 3 days after suture removal.
- Provide adequate postoperative analgesia for the first 7 to 10 days.
Figure 6 shows mild everted lower eyelids, which can be corrected by a wedge resection of the lateral eyelid. Figure 7 demonstrates severe everted lower eyelids, which can be corrected with a Wharton-Jones (V-Y) blepharoplasty.

The condition of entropion is seen in dogs with loose facial skin, such as retrievers, Saint Bernards, bloodhounds, and cocker spaniels. It can cause secondary lagophthalmos, keratitis, or conjunctivitis.

Depending on the severity of the entropion, it can be resolved using 1 of 2 techniques: wedge resection or V-to-Y blepharoplasty.

**Wedge resection**
When entropion is secondary to mild euryblepharon (elongated eyelids), shorten the lower eyelid by resecting a full-thickness wedge from the lateral end of the lower eyelid (Figure 5). Then, use a standard 2-layer closure to perfectly appose the sides of the eyelid margin.

**Wharton-Jones (V-Y) blepharoplasty**
The Wharton-Jones (V-Y) blepharoplasty procedure is used in moderate and severe entropion cases and for cicatricial entropion (Figure 6). Begin by outlining a triangular piece of skin with the base parallel to the eyelid margin and sufficiently wide to encompass the section of everted eyelid. Do not make any incision at the base of the triangle. Rather, incise the skin along the 2 sides of the triangle,

- Delay any decision regarding a second operation for at least 4 to 6 weeks.

**Temporary tacking**
A number of patients will benefit from some form of temporary relief of entropion until permanent blepharoplasty is performed. This has traditionally been achieved with a series of temporary tacking sutures placed so as to evert the eyelid. Temporary tacking sutures are used frequently in neonatal animals, especially foals and lambs. Surgical staples have been used recently in place of sutures for temporary tacking because they are quicker, less traumatic, less irritating, persist in the tissue longer than sutures, and can usually be applied without general anesthesia. Animals may be sedated, but do not infuse local anesthetic into the eyelids. This disrupts the eyelid anatomy and hinders corrective tacking. Place as many staples as necessary to evert the affected eyelid margin (and canthus in some patients). Each staple should be perpendicular to the eyelid margin. Leave the staples or sutures in place for as long as necessary. In some animals, tacking may have to be repeated several times until facial maturity is reached and permanent corrective surgery can be performed.

**Upper eyelid entropion**
Upper eyelid entropion is seen most commonly in dogs with excessive brow tissue, such as Chow Chows, Shar-Peis, Basset hounds, and bloodhounds. In these patients it is usually the upper eyelashes that irritate the cornea because of ptosis of the upper eyelid and the consequent “flat” angle at which these lashes approach the cornea. Therefore, standard entropion procedures such as the Hotz-Celsius technique may not alleviate the problem. Rather, these dogs usually require correction using the Stades technique.

To start the Stades procedure, resect a large, approximately semicircular or crescent-shaped piece of tissue from the dermal side of the upper eyelid (including the cilia themselves, avoiding the Meibomian glands). Then, bring down the dorsal wound border toward (but not meeting) the wound nearer the eyelid margin. Suture to leave an exposed strip of subcutis about 3- to 4-mm wide. This tissue is left to heal by second intention such that the contraction and cicatrization during this process further everts the upper eyelid and forms a relatively hair-free margin. Severe cases may benefit from highly involved stellate rhytidectomy procedures (skinfold resections from the top of the head) to alleviate the heavy skin contributing to the upper eyelid ptosis.

**Ectropion**
Like entropion, ectropion (eversion of the eyelid) almost always affects the lower lid only. Clinically significant ectropion is less common than entropion. The most common type is conformational or breed-related ectropion. The condition is seen in dogs with loose facial skin, such as retrievers, Saint Bernards, bloodhounds, and cocker spaniels. It can cause secondary lagophthalmos, keratitis, or conjunctivitis.

**Conformational or breed-related**
Ectropion is best corrected with a Wharton-Jones (V-Y) blepharoplasty.
and elevate a V-shaped flap of skin between them toward the base. Excise all scar tissue beneath and surrounding this flap. Then, suture the incision beginning at the apex farthest from the eyelid margin; use simple interrupted sutures of 3-0 to 5-0 braided nylon or silk to form a vertical line perpendicular to the eyelid margin. This vertical portion forces the triangle and eyelid margin toward the globe. The length of the vertical portion depends on how much elevation or inversion of the eyelid margin is required to return it to its normal position. To allow for subsequent wound contraction, it should be about 2- to 3-mm longer than required. Finally, suture the remaining parts of the 2 incisions to the free edges of the flap so that the sutured skin forms a Y.

**Lower medial entropion canthoplasty (brachycephalic ocular syndrome)**
A syndrome of eyelid, conjunctival, and corneal lesions is seen commonly in brachycephalic dogs. This so-called brachycephalic ocular syndrome consists of any combination of the following features:
- Lower medial entropion
- Breed-related exophthalmos
- Macropalpebral fissure
- Lagophthalmos or sleeping with the eyelids incompletely closed
- Medial caruncular trichiasis
- Nasal fold trichiasis
- Pigmentary keratitis
- Epiphora caused by kinking of the lower nasolacrimal canaliculi and puncta

Brachycephalic ocular syndrome is sometimes exacerbated by distichiasis and decreased tear production or quality. Medial canthoplasty neatly corrects many of the signs associated with this syndrome. It reduces the palpebral fissure size, removes the medial caruncle, and everts the lower medial entropion, thereby reducing corneal exposure, frictional irritation from trichiasis, and functional nasolacrimal apparatus obstruction.

Medial canthoplasty is recommended for dogs with this combination of signs, especially when the signs are related to progressive corneal melanosis. It is also suitable for patients with shallow orbits, exposure, or strabismus following proptosis, especially when these are associated with secondary corneal lesions. When performing this procedure, be sure to avoid the lacrimal puncta, meticulously remove all hair follicles from the medial caruncle, carefully incise the eyelids, realign the eyelid margins perfectly, and provide appropriate postoperative management as for other eyelid procedures.

**Small eyelid tumors (wedge resection)**
Full-thickness wedge resection is used to remove small eyelid tumors (Figure 7) or (as previously discussed) to shorten the eyelids from their lateral end when ectropion is due to euryblepharon. Always avoid the medial canthal area and nasolacrimal apparatus. Tumors larger than 25% of the eyelid length in cats and in mesaticephalic and dolichocephalic dogs, or more than 33% in brachycephalic dogs, should be removed using alternative surgical techniques. When performing a wedge resection, the height of the triangle should be approximately twice its base. Make the skin incision with a No. 15 Bard-Parker scalpel while supporting the eyelid with a Jaeger lid plate. Cut the subcutis and conjunctiva with straight Mayo or Stevens tenotomy scissors, so that the tissue wedge is resected completely. Then, appose the lid margin using the 2-layered closure.

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Here are some of the CE opportunities coming in the next several months.

NOTE: Many 2020 and early 2021 CE events are now being held online. Please visit individual event websites for details.

2020

December 4-6
Ortho, Small Parts, and Everything Else Ultrasound Lab
Anchorage, AK
info@sonopath.com
info.sonopath.com

December 5-9
AAEP 2020
Las Vegas, NV
aaep.org
859-233-0147
aaepoffice@aaep.org

January 7-9
AVMA Leadership Conference (virtual)
avma.org/events/veterinary-leadership-conference

January 16-20
Veterinary Meeting & Expo (live and virtual)
Orlando, FL
navc.com/vmx

January 24-27
Small Animal Alaskan Mushing CE Experience
Big Lake, AK
907-892-7899

January 25-29
Lake Tahoe Equine Conference
Incline Village, NV
laketahoeequineconference.com

February 11-14
Midwest Veterinary Conference
Columbus, OH
mcvinfo.org
info@mcvinfo.org

February 25-27
Fetch® dvm360 Virtual Conference
events@dvm360.com
800-255-6864

March 21-24
WSAVA World Congress
Warsaw, Poland
wsava2020.com

April 15-18
2021 VECCS Spring Symposium
Kauai, HI
veccs.org/spring2021/

May 3-5
United Veterinary Services Association Annual Conference
Scottsdale, AZ
tus.net/events/annual-conference/

May 12-14
Chicago Vet
Chicago, IL
us.vetshow.com/chicago

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us.vetshow.com/washington-dc
646-437-9080

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pacvet.net/long-beach/
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September 30-October 1
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We said goodbye to the last of their 2 Dachshunds today. I felt their tears as the black one fell asleep for the last time. Nearly a year of poor health was ending, and with it came the tender memories that would be too sensitive to touch for a while. Some people would say it was just a dog, but I beg to differ, and so would they. Those of us who are younger may be wise to see how the sunshine years hold a tribute to weenie dogs.

The dogs gave them something to care for—a living creature that still needed them for guidance and the basics of life. Yet bigger than that, it gave them meaning that carried over from years of raising children and grandchildren. You cannot just turn those emotions off as time changes its definition of wisdom and usefulness.

The dogs gave them stories to share with one another as the retirement years set in. Adventures hung in the air for hours and those short legs carried a long back into the mischievousness of puppyhood. Each new trick was story material for the next phone call with family. Lap time was special, with not a bump or change in skin texture going unnoticed.

And what about the exercise? The black dog was paralyzed in the hindquarters for almost 11 months. Improvement was slow, but it was coming. The surgery had been a success, and a good prognosis depended on much physical therapy at home. Imagine that—11 months of walking and exercising and moving those legs and swimming that critter in the bathtub and carrying it outside and tucking it into bed. It makes you wonder who got the most exercise. It also makes you wonder whether you have exercised at all.

No disappointment. This love is unconditional. So what if you go to bed at 8:30 PM? These dogs will be more than happy to stay right beside the bed until 5:00 AM when you start the next day. So what if you keep the house at 88 °F year-round? They’ve never known any different. So what if you drive 25 miles per hour on the interstate? They just love going for rides. So what if you tell the same story over and over? They love it as much the last time as they did the first.

Inside of me is a huge tribute to weenie dogs. I’ve seen their effect. I’ve laughed at those stories. I’ve helped you notice every bump and change in skin texture. I’ve monitored that exercise program. And I’ve seen that love in your eyes as you held a precious friend in your lap.

If the world has collapsed and there is no love at all, there would still be the love of a dog. They just don’t know how to do otherwise.
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