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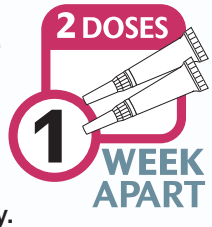

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How we got **here**...

A look at veterinary medicine—and *Veterinary Medicine*—through the years.

1879 — The first state-supported veterinary school opens—Iowa State College in Ames.
1905 — *Veterinary Medicine* gets its start with the November 1905 issue of the *Iowa-Nebraska Veterinary Bulletin*.
1913 — Top drug choices (compare with your inventory today!): Nux vomica, aloes, epsom salt, potassium nitrate, belladonna, chloral, arecoline hydrobromide, linseed oil, aromatic spirits ammonia and *Cannabis indica*.
1915 — Four "girls" graduate with veterinary degrees from McKillip Veterinary College in Chicago.
1920 — The journal is officially renamed *Veterinary Medicine*.
1920s — Large animal medicine practice begins to decline while companion animal medicine practice increases.
1926 — Purina Research Farm opens and becomes one of the first facilities focused on pet nutrition.
1929 — The first time the number of applicants for 13 North American public colleges exceeds capacity—1,089 students. In April, *Veterinary Medicine* publishes its first special issue devoted to small animal medicine.
1930 — Chloroform, ethyl chloride and ethylene become popular inhalant anesthetics.
1931 –1932 — At least 12 women are enrolled in veterinary schools.
1932 — Sulfonamides are introduced.

ILLUSTRATION BY RYAN KRAMER

1933 — The American Animal Hospital Association is established.
1943 — Penicillin begins to be mass-produced.
1950 — Tetracycline becomes available.
1951 — The AVMA approves recognition of the first two veterinary specialty organizations: the American College of Veterinary Pathologists and the American Board of Veterinary Public Health.
1960s — Small animal medicine is now predominant.
1964 — *Veterinary Medicine* is combined with *Small Animal Clinician* to form *VM/SAC*. (This continues until 1985.) Also, there are 21,919 qualified applicants for admission into veterinary schools; 190 women are studying veterinary medicine.
1966 — The Animal Welfare Act is signed into law.
1967 — Dr. J. Antelyes writes about the emerging awareness of the human-animal bond.
1968 — Insect growth regulator is discovered.
1975 — Ivermectin is discovered.
1977 — The first chewable tablet to prevent canine heartworm disease is released by Norden Laboratories.
1985 — Female veterinary students outnumber male counterparts.
2000 — *Veterinary Medicine* becomes the first clinical journal with a broad circulation base to focus exclusively on small animals.
2009 — Female veterinarians outnumber male colleagues.
2015 — Diversification of practice continues—currently 22 AVMA-recognized specialty organizations comprising 40 distinct specialties.
December 2015 — *Veterinary Medicine* announces an evolution … **>**

Sources
• 1,000th issue of *Veterinary Medicine*. *Vet Med* 1989;84(4):1-84.
• Rampey M. Editors' note: 100 years and counting. *Vet Med* 2005;100(1):10-11.
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Where we're going. . .

By Mindy Valcarcel, Editor, Veterinary Medicine

Online! OK, *Veterinary Medicine* is already there at dvm360.com, but now we'll *really* be there. If you hadn't noticed our introduction of the Essentials this year, here are, well, the essentials: Online, we are giving you an ever-expanding resource that will capture the details you need for any disease or condition or other veterinary clinical concern—and we'll continually update them. See our current list of curated content at **dvm360.com/essentials**.


Mindy Valcarcel

So this is your last print issue of *Veterinary Medicine.* But the clinical content only gets more intensive from here. We know how absolutely necessary the tie is to business content to get the job done. You *want* to practice veterinary medicine. You *need* to make a living at it. (We know many of you are struggling financially). We've included client communication tools and business tips with each Essential, but now we're going beyond that.

Get ready for *Vetted.* It's "Vet Ec + Vet Med, shaken not stirred," which gives a big hint about the tone of this new publication. Immediately practical clinical and business tips with a touch of humor. Yep, we're combining the forces of *Veterinary Medicine* and *Veterinary Economics* into one power punch of a print publication. We're invested in all things veterinary—how wondrous is this profession!—and invite you to join in and become *Vetted.* Visit **dvm360.com/vetted** for details and to subscribe.

So here's what to do to stay connected with *Veterinary Medicine* in 2016 and beyond:

- Read *Vetted.* (A no brainer.)
- Visit us daily on dvm360.com for new clinical updates every day.
- While you're on dvm360.com, keep coming back to our Essentials page to find out what new diseases we're delineating for you.
- Keep subscribing to the Medicine360 e-newsletter: **dvm360.com/em**.
- Keep coming to the CVCs—whether Virginia Beach, Kansas City or San Diego. We work with amazing clinicians. Let us hook you up. VM

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[1]http://www.fda.gov/AnimalVeterinary/Products/ApprovedAnimalDrugProducts/FOIADrugSummaries/ucm049823.htm

What to do about a code blue

How often do you perform CPR in your practice? If discomfort with the process is your concern, here are some guidelines to help. *By Garret Pachtinger, VMD, DACVECC*

Because of the gravity of the presenting situation, no one wants to deal with cardiopulmonary resuscitation (CPR). The prognosis is never "good" after cardiopulmonary arrest (CPA), but if CPR is performed correctly, you can increase your chances of stabilizing that patient in front of you.[1] Your crash cart is stocked and ready. What do you do with everything in it? Guidelines have been updated. Here's a quick look at what to do.

Cardiopulmonary arrest has a **<6%** *survival rate.*

CPA is associated with a poor prognosis, with a less than 6% survival rate reported in the literature.[1,2] Moreover, most of the protocols previously used in veterinary medicine were extrapolated from human guidelines from the American Heart Association.

The Reassessment Campaign on Veterinary Resuscitation (RECOVER) recently completed a systematic review of the literature relevant to veterinary CPR and developed the first evidence-based, consensus CPR guidelines for small animals.[3] The RECOVER initiative is one of the first in veterinary medicine to evaluate and create guidelines for CPR.

BASIC LIFE SUPPORT

Basic life support consisting of performing chest compressions, securing a patent airway and providing ventilation should be initiated as quickly as possible after CPA is diagnosed. While we were all previously taught basic cardiopulmonary resuscitation should follow the ABC rule—airway (A), breathing (B), circulation (C)—the new CPR guidelines emphasize the importance of CAB resuscitation—first initiate chest compressions (C), then obtain an airway (A) and finally start respirations or breathing (B).

Circulation: Chest compressions

Patients with CPA have no forward blood flow out of the heart. The resulting lack of delivery of oxygen to the tissues and removal of waste products from the tissues increases the risk for hypoxemia, ischemic organ injury and reperfusion injury if tissue blood flow is reinstituted. The goals of chest compressions are to provide pulmonary blood flow for oxygen uptake and waste elimination and tissue perfusion for oxygen delivery to restore

cellular metabolic activity. There are two theories when initiating closed-chest CPR.

Cardiac pump theory. This method is most often considered in cats, small dogs and keel-chested larger dogs (e.g. greyhounds, Doberman pinschers). With this theory, the heart is the true heart of the matter. The heart is compressed between the ribs, which manually opens the pulmonic and aortic valves, leading to the forceful delivery of blood from the ventricles through the pulmonic and aortic valves. Retrograde flow is prevented via the closing of both atrioventricular valves followed by artificial diastole (rest and recoil), which refills the ventricles.

Guidelines for this method:

- Apply compression directly over the heart (the ventral one-third of the thorax over the fourth through sixth intercostal spaces) with the patient in lateral recumbency.
- Use a rate of 100 to 120 compressions/minute.
- Perform ventilation at a rate of 10 breaths/minute throughout the compression cycle.
- Allow adequate recoil of the chest between compressions.

Thoracic pump theory. This method is most often considered in medium, large and giant round-chested breeds (e.g. Labrador retrievers, Rottweillers). The heart is a secondary not the primary element of this theory. The goal is to have the forceful compressions change the intrathoracic pressure, resulting in opening and closing of the heart valves and movement of blood flow. Retrograde blood flow is prevented by the increase in intrathoracic pressure collapsing the thoracic vasculature.

Guidelines for this method:

- With the patient in lateral recumbency, apply compression at the widest part of the thorax, generally between the seventh and eighth intercostal spaces.
- Depress the thorax by one-third.
- Use of a rate of 100 to 120 compressions/minute.

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- Perform ventilation at a rate of 10 breaths/minute throughout the compression cycle.
- Aim for a compression-to-relaxation ratio of 1:1.
- Allow adequate recoil of the chest between compressions.

While most patients will benefit from CPR performed in lateral recumbency, broad-chested dogs such as bulldogs may benefit from CPR performed in dorsal recumbency, similar to humans. When CPR is performed in dorsal recumbency, compressions should depress the sternum 1.5 to 2 inches.

Chest compressions should be delivered without interruption in cycles of two minutes. A new compressor should begin chest compressions after each cycle to decrease the likelihood of fatigue blunting the effectiveness of CPR. Be sure to minimize interruption in chest compressions to decrease the likelihood of a drop in coronary perfusion pressure (CPP). CPP is a critical determinant of myocardial blood flow and the likelihood of return of spontaneous circulation.

Airway and breathing: Ventilation

I know I *just* said to minimize any delay in chest compressions, but the patient should be intubated for airway control, oxygenation and ventilation as soon as possible. Although not conventional for most veterinarians, intubation can be performed in lateral recumbency to lessen the need for cessation of chest compressions during endotracheal tube placement.

If an endotracheal tube is not readily available, mouth-to-snout ventilation is an alternative to improve oxygenation and waste product (carbon dioxide) removal. To perform mouth-to-snout ventilation, hold the patient's mouth closed firmly with one hand and extend the neck to align the snout with the spine. This allows opening of the airway to achieve the best oxygenation and ventilation. Then place your mouth over the patient's nares and blow firmly into the nares to inflate the chest.

Important pointer: Be sure to allow adequate recoil of the chest between compressions.

Again, chest compressions should not be delayed during intubation or ventilation by the mouth-to-snout technique but rather performed simultaneously during ventilation. Intubated patients should be ventilated at a rate of 10 breaths/minute with an inspiratory time of approximately one second. The tidal volume can be assessed by using a spirometer, with the goal of approximately 10 ml/kg for each breath. Hyperventilation should be avoided as this may lead to hypocapnia and cerebral vasoconstriction, ultimately leading to decreased perfusion.

ADVANCED LIFE SUPPORT

Once basic life support has been initiated, the CPR team should initiate advanced life support, which focuses on drug therapy and electrical defibrillation.

Depending on the arrest rhythm, drug therapy may include vasopressors, anticholinergics or anti-arrhythmics, reversal agents, intravenous fluids and alkalinizing drugs. Thus, placement of a peripheral or central intravenous or intraosseous catheter is recommended.

Vasopressors

Vasopressors are recommended to increase peripheral vasoconstriction and improve cardiac output since even the most forceful chest compressions will not mimic the cardiac function of a healthy patient.[4] It is up to the clinician to then consider medications to improve perfusion to the vital organs including the heart, lungs and brain.

Epinephrine causes peripheral vasoconstriction by stimulating alpha$_1$-adrenergic receptors

as well as $beta_1$- and $beta_2$-adrenergic receptors. Low doses (0.01 mg/kg) are recommended initially. After prolonged CPR, a higher dose may be considered (0.1 mg/kg). While intravenous or intraosseous administration is recommended, epinephrine may also be diluted 1:1 with isotonic (0.9%) saline solution and given via a long catheter through an endotracheal tube (double the dose—0.02 mg/kg low dose; 0.2 mg/kg high dose).[5]

Vasopressin exerts its vasoconstrictive effects by activating the peripheral V1 receptors. This can be used in combination or in place of epinephrine at a dose of 0.8 U/kg intravenously or intraossesously. The potential benefits of vasopressin include efficacy in acidic environments in which $alpha_1$-adrenergic receptors may become unresponsive to epinephrine. However, vasopressin lacks $beta_1$-adrenergic effects, which may cause increased myocardial oxygen consumption and worsened myocardial ischemia upon return of spontaneous circulation. Vasopressin may also be administered via an endotracheal tube by using the technique described for epinephrine above.

Anticholinergics

Atropine is the most common anticholinergic considered in CPR and is a parasympatholytic medication. A dosage of 0.04 mg/kg intravenously or intraossesously is considered during CPR in dogs and cats when the cause is considered a result of asystole or pulse electrical activity associated with increased vagal tone. Atropine may also be administered via an endotracheal tube (0.08 mg/kg).

Anti-arrhythmics

Ventricular fibrillation, or pulseless ventricular tachycardia, should be treated as early as possible with electrical defibrillation. If electrical defibrillation is not corrective, drug therapy may be warranted. Consider amiodarone, dosed at 2.5 to 5 mg/kg intravenously or intraossesously.[3] If amiodarone is not available, lidocaine at a dosage of 2 mg/kg slowly intravenously or intraossesously is an alternative.

Side effects of amiodarone may include anaphylactic reactions, hypotension, peripheral vasodilation, wheals or hives. Treatment with diphenhydramine (2 mg/kg intramuscularly), anti-inflammatory corticosteroids (0.1 mg/kg dexamethasone sodium phosphate intravenously), or both is recommended if these side effects are seen following return of spontaneous circulation.

Reversal agents

Reversal agents are considered when reversible anesthetic drugs were recently administered. Naloxone (0.01 mg/kg intravenously or intraossesously) may be used to reverse opioids, flumazenil (0.01 mg/kg intravenously or intraossesously) for benzodiazepines and atipamezole (0.1 mg/kg intravenously or intraossesously) or yohimbine (0.1 mg/kg intravenously or intraossesously) for $alpha_2$ agonists.

Intravenous fluids

Administering intravenous fluids in euvolemic or hypervolemic patients is not recommended during CPR as it will increase right atrial pressure, resulting in decreased perfusion of the brain and heart. Conversely, in hypovolemic patients intravenous fluids are recommended to restore adequate circulating volume and increase the efficacy of chest compressions with improved perfusion.

When should I consider **open-chest CPR?**

As compared with closed-chest CPR, open-chest CPR results in improved output. But open-chest CPR is more invasive and expensive and requires significant planning after the return of spontaneous circulation. Indications for open-chest CPR include pericardial disease, pleural space disease and thoracic wall defects such as numerous rib fractures or a flail chest. If the patient has been anesthetized for an abdominal procedure, direct cardiac massage can be performed with an incision into the diaphragm. Finally, giant breed and very large chested dogs may not respond to closed-chest CPR, so open-chest CPR should be considered for these patients.

If there is return of spontaneous circulation, $ETCO_2$ will rapidly increase due to the rapid increase in circulation.

Corticosteroids

Corticosteroids during CPR in dogs and cats is not recommended. No body of evidence shows significant benefit. Moreover, side effects of corticosteroids include gastric ulceration, immune system suppression and reduced prostaglandin production in the kidney.

Alkalinization therapy

In patients with prolonged CPA (more than 10 to 15 minutes), consider alkalinization therapy with sodium bicarbonate dosed at 1 mEq/kg (diluted intravenously). The rationale for this therapy is that prolonged CPA results in severe acidemia (lactic acid, uremic acids and venous respiratory acidosis) due to poor perfusion and accumulation of carbon dioxide. The acidemia ultimately results in vasodilation and inhibition of normal enzymatic and metabolic activity.[6,7]

Electrical defibrillation

Electrical defibrillation is considered in patients with ventricular fibrillation or pulseless ventricular tachycardia. Defibrillators may be either monophasic (delivering a current in one direction across the paddles) or biphasic (delivering a current in one direction and then reversing and delivering a current in the opposite direction). The use of biphasic defibrillators is recommended because a lower current is required to successfully defibrillate the patient, decreasing the likelihood of myocardial injury.

Monophasic defibrillators are used at an initial dose of 4 to 6 J/kg, while biphasic defibrillation should initially be used at 2 to 4 J/kg. If the first defibrillation is unsuccessful, a second attempt can be tried by increasing the dose by 50%. After defibrillation, resume chest compressions immediately. Interruptions of basic life support and chest compressions during defibrillation and monitoring should be very brief .

A complete two-minute CPR cycle should be performed before reassessing the ECG after defibrillation to determine if additional defibrillation is required for continued ventricular tachycardia. Signs of return of spontaneous circulation following defibrillation may include palpable heart beats during compressions, more appropriate ECG complexes and improved femoral pulses.

Additional monitoring

Commonly used monitoring devices for CPR include pulse oximetry, direct and indirect blood pressure monitors, continuous electrocardiography and end-tidal carbon dioxide monitoring ($ETCO_2$). Electrocardiographic monitoring is used to diagnose the arrest rhythm:

- Asystole
- Pulseless electrical activity
- Ventricular fibrillation

The ECG is also used to determine if there is a change in the cardiac rhythm during and following therapy.

$ETCO_2$ monitoring has several indications, including determining if endotracheal intubation was successful. If the endotracheal tube was placed mistakenly in the esophagus, there will be little to no reading. The presence of measurable carbon dioxide supports correct tube placement. Importantly, if there is return of spontaneous circulation, $ETCO_2$ will rapidly increase due to the rapid increase in circulation. Thus, it is used as an early indicator of return of spontaneous circulation during CPR. VM

Dr. Pachtinger is the trauma center medical director at Veterinary Specialty and Emergency Center in Levittown and Philadelphia, Pennsylvania. He is the House Officer Program Director for BluePearl Veterinary Partners and as well as the chief operating officer for VETgirl.

Find the references for this article at **dvm360.com/CPRupdate**.

Using **insulin detemir** to treat diabetes in dogs

Why they did it

Little information exists on the use of insulin detemir for the treatment of diabetes mellitus in dogs.

What they did

The authors prospectively prescribed insulin detemir to 10 dogs with naturally occurring diabetes mellitus. The median age of the dogs was 9 years, and the median body weight was 21.1 lb (9.6 kg). Diabetes mellitus was diagnosed based on clinical signs, fasting hyperglycemia (> 200 mg/dl), glucosuria, and serum fructosamine concentrations > 340 µmol/L. Six of the 10 dogs were newly diagnosed; the other four dogs had been poorly regulated with porcine insulin for a median of five months.

Dogs with recent administration of progestogens or glucocorticoids, as well as those with severe concurrent disease (e.g. hyperadrenocorticism), were excluded from the study. Dogs with diabetic ketoacidosis or pancreatitis were included once these issues were resolved.

All dogs were started on insulin detemir at 1 U/dog, which translated to a starting dosage between 0.02 to 0.13 U/kg, given subcutaneously every 12 hours for six months. The insulin dosage was adjusted as needed in increments of 0.5 to 1 U/dog. Dogs were reevaluated at one, two, four, 12 and 24 weeks, and a blood glucose curve, serum fructosamine concentration measurement and physical examination were performed at each visit. A diet low in simple carbohydrates and high in fiber was recommended for all dogs but was not required.

Parameters used to assess efficacy are listed in *Table 1*. A glucose curve nadir of 90 to 180 mg/dl and > 50% of the glucose concentrations between 90 and 270 mg/dl were considered ideal. Body weight stability (< 5% fluctuation), hydration and activity were also considered when assessing glycemic control.

What they found

The median dosage of insulin detemir at the end of the study period was 0.12 U/kg (range = 0.05 to 0.34 U/kg). Compared with pretreatment values, median glucose curve results were classified as good in three dogs, moderate in four dogs and poor in three dogs after six months of therapy. The blood glucose nadir was most often noted at

four, six or eight hours after insulin administration. Serum fructosamine concentrations were also significantly decreased ($P = 0.006$) at the end of the study period, with glycemic control classified as good in four dogs, moderate in four dogs and poor in two dogs. Subjective improvement in clinical signs was noted in all dogs.

Overall, six of 10 dogs experienced hypoglycemic episodes (blood glucose concentration ≤ 89 mg/dl) at some point during the study, and severe hypoglycemia (blood glucose concentration ≤ 60 mg/dl) was observed in three dogs. Signs characteristic of hypoglycemia were reported in four of the

These "Journal Scan" summaries were contributed by Jennifer L. Garcia, DVM, DACVIM, a veterinary internal medicine specialist at Sugar Land Veterinary Specialists & Emergency Care in Houston, Texas.

Visit **dvm360.com /JournalScan** every week for a new practical scan of the literature.

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TABLE 1

Parameters for assessing the efficacy of insulin detemir

	Good	Moderate	Poor
Median blood glucose concentration (mg/dl)	< 234	234 to 306	> 306
Serum fructosamine concentration (µmol/L)	< 450	450 to 550	> 550
Owner observation of polyuria, polydipsia	Absent	Present but improved	Present and unchanged

dogs. Two dogs with severe hypoglycemia (blood glucose concentration < 20 mg/dl) were treated with intravenous administration of dextrose-containing fluids and improved.

The authors of the study note that the potency of insulin detemir in dogs requires using doses that are much smaller than the doses typically administered with other insulins. They posit that administration of these small amounts of insulin may be problematic for owners and may increase the risk of overdosage and hypoglycemia. These small doses also pose a challenge when dosage adjustments are required and, as a result, greater increases in dosing are often made.

The study authors recognize limitations of the study such as the small number of dogs enrolled as well as the lack of standardization of diet and exercise. The researchers hypothesize that inconsistency of the diet may also have contributed to the variable glucose nadir observed among dogs.

Take-home message

Hypoglycemia was a significant concern among dogs in this study and underscores the need for prudent use of this insulin. The authors recommend that the first-line insulin choice should be an insulin approved for use in dogs with diabetes mellitus (i.e. Vetsulin). For cases in which insulin detemir is being administered, the authors recommend using a detemir-specific insulin diluent to allow better control of dosing, particularly in dogs < 10 to 15 kg. They note, however, that this diluent is not readily available, so they recommend not using insulin detemir in dogs weighing < 10 to 15 kg.

Dr. Garcia's take: Also note that this was not a head-to-head comparison with other currently available insulin preparations used to treat canine diabetes. Conclusions as to which insulin will provide optimal control cannot be drawn at this time. VM

Fracassi F, Corradini S, Hafner M, et al. Detemir insulin for the treatment of diabetes mellitus in dogs. *J Am Vet Med Assoc* 2015;247(1):73-78.

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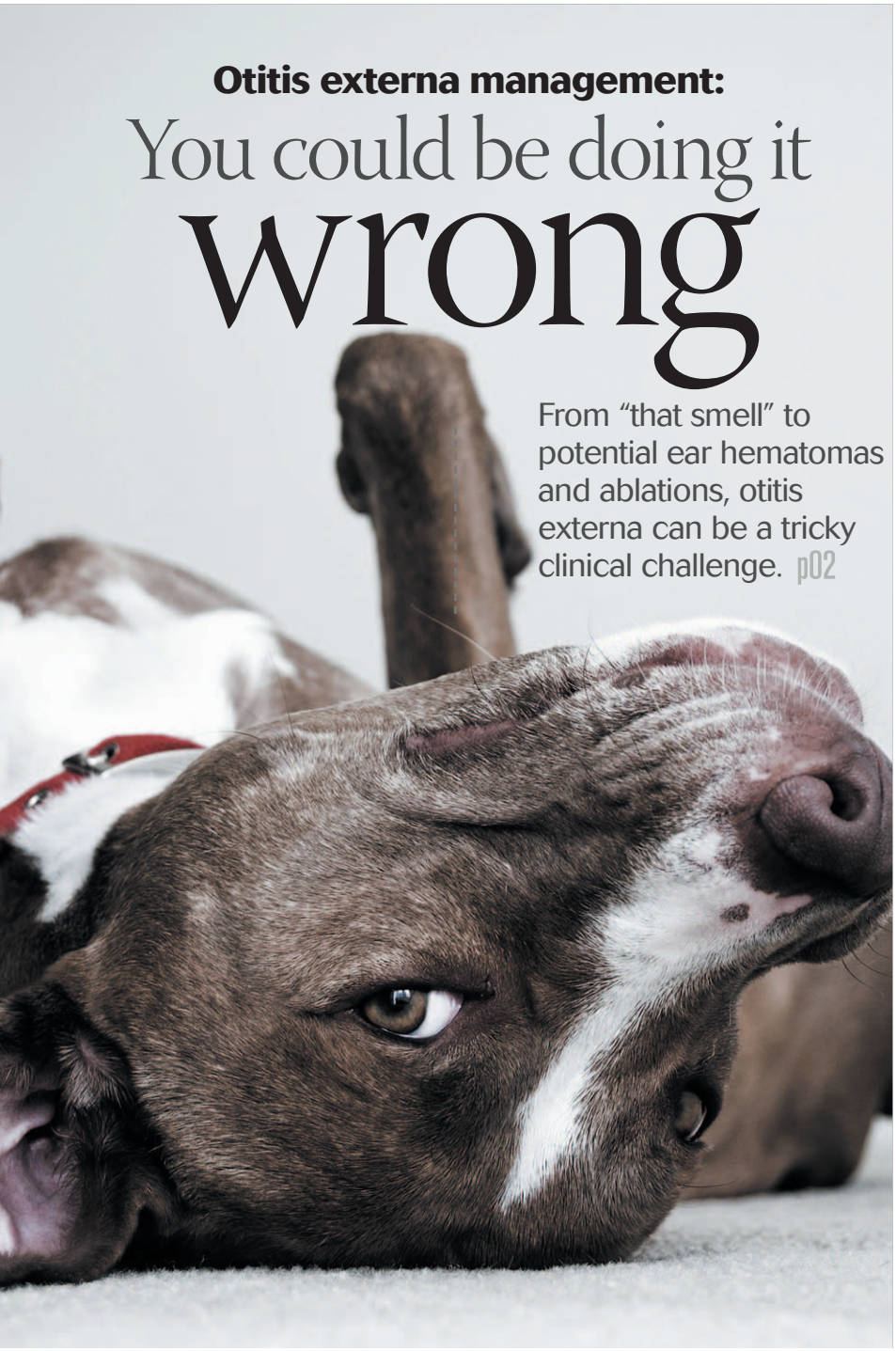

Otitis externa management:

You could be doing it wrong

From "that smell" to potential ear hematomas and ablations, otitis externa can be a tricky clinical challenge. p02

TOOLS:

Practice tips
>> Manage expectations

>> Do your diagnostics

>> Don't bail. Schedule the freaking rechecks. p04

Feline focus
Expert Q&A: How do I manage ceruminous otitis in cats? p05

Client handouts
>> What did you say? Helping clients understand hearing loss

>> All ears over here: What's otitis externa? p06

Pictorial guide
Low-stress ear cleaning gets it right the first time p08

Expert audio clips
>> Dogs lie about ear disease

>> Undertreating ears is (partly) your fault

>> Ear problems so frustrating you want to ... do what?

>> Quit plucking that hair. p09

Takeaways
Five final tips to manage your nastiest ear cases p11

Otitis externa management:

You could be doing it wro

From "that smell" to potential ear hematomas and ablations, otitis externa can be a tricky clinical challenge. Wayne Rosenkrantz, DVM, DACVD, answers some of the most common questions about his approach to the management of this odorous condition.

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Q. To clean or not to clean ears in the clinic?

A. Cleaning ears is important, and most cases of otitis externa require some degree of ear cleaning or flushing before therapy. Excess debris and purulent material left in the ear prior to therapy can reduce the efficacy of your therapy. In addition, without cleaning you often are unable to perform a complete examination of the ear canal.

Q. What if you just can't see that tympanic membrane?

A. If the tympanic membrane cannot be visualized, then perform further cleaning and flushing. Most optimally, this should be done under sedation or anesthesia and may require a combination of tube flushing, ear loops and video otoscopy. If the tympanic membrane is documented to be ruptured or you suspect it is ruptured, this can influence the type of therapy that is applied into the ear canal. Certain cleansers and antimicrobials are more contraindicated when the tympanic membrane is ruptured and more likely to create an ototoxic reaction.

Q. Should we do culture and sensitivity testing on newly diagnosed cases?

A. I do not perform a culture and sensitivity in every case of otitis externa. I start with my otoscopic and cytologic examinations and my review of the history of medications previously used to base my decision on whether culture and sensitivity testing is indicated.

Culture and sensitivity testing does not always isolate the entire bacterial population or yield accurate sensitivity testing depending on the site or level in the ear from where the sample was taken. When I do take samples, I like to put a small amount of sterile saline solution in the ear, massage the canal, aspirate a small amount of the fluid out, and then use this fluid to do my culture and sensitivity testing.

Q. What are you finding are the most common pathogens causing infection in otitis externa cases these days?

A. The most common pathogens in dogs include yeasts (*Malassezia* species) and bacteria (*Staphylococcus*, *Pseudomonas*, *Escherichia* and *Proteus* species).

Q. What do you experience as the biggest obstacle for successful outcome of treating otitis externa?

A. Controlling the underlying primary cause for the otitis. If you identify and control the primary disease, then success is more common. Early identification and control of infection and underlying disease is critical to avoid more chronic proliferative changes.

Another important issue is owner compliance and getting clients to properly treat and medicate the ears.

Q. What are some common underlying causes of chronic otitis externa?

A. Both atopic dermatitis and adverse food reactions are common primary diseases for otitis externa. After looking at the history and physical examination findings, I may pursue one of these diseases more than the other. For example, adverse food reaction cases are more commonly year-round and may also have a concurrent history of gastrointestinal abnormalities.

Q. How important do you think it is to caution owners about the possibility of recurrence of otitis externa?

A. It is extremely important. This is particularly true when you are dealing with underlying primary diseases that are not well-controlled. Without proper control and management of the underlying disease, recurrences are highly likely. In clinical practice this is most commonly due to poorly controlled atopic dermatitis or adverse food reaction cases.

Tips to keep otitis from being a total pain in the ear? **Sounds good.**

Ear infections totally suck (and um, stink, while we're at it). Get clients on board with better care, and together you'll make otitis *ear-relevant*. *By Kathryn Primm, DVM*

We all know about ear infections and we have all had clients frustrated because of them. People like speedy resolutions and they think that if you are a good vet, you'll just "fix" it. But that's neither *ear* nor there. Turn otitis cases from a pain in the ear into a place where your care and compassion can really shine with these three tips.

1 Manage expectations.

Make sure that owners know that ear infections are no picnic. At the very first visit for the ears, warn clients that you are probably beginning a journey together. And no, not a walk in the park. Explain that there can be underlying factors for ear itching and inflammation that can only be managed, not cured—but that you are their partner in the process.

2 Do your diagnostics.

Offer to do all the suggested diagnostics: ear cytology, culture and sensitivity, etc. beginning at the initial visit. Clients might not agree to the entire workup at the start, but you are planting the seed right away. Make the standard full workup a part of your treatment plan and make sure all staff members understand those recommendations. Each step should be explained and every team member needs to be aware of the rationale behind the steps in order to answer client questions.

3 Don't bail. Schedule the freaking rechecks.

Make sure that you follow up with owners about their dog's response to treatment. Don't just leave them to their own devices—an easy thing to do when it comes to ear visits—which results in you feeling like a careless and ineffective veterinarian and veterinary team. DO NOT DO THAT. You need to know if the ears responded to your first-line treatment plan and you need a maintenance schedule. Build a recheck visit into the cost of your initial otitis examination so that when you call you can explain that follow-up was so crucial that it was already included in the price of the first visit. The maintenance plan, which can include applying drops or cleaning, helps the dog in multiple ways because it forces the owner to really look in the ears and to take ownership of some of the success (or failure) of your treatment plan.

GETTY IMAGES/ABDUL KADIR AUDAH

Don't forget about the cats!

Although you probably aren't seeing many cats with ear disease, check out this Q&A with Dr. Paul Bloom for more on otitis in cats.

Q I frequently see cats presented for wellness evaluations that have unilateral or bilateral ceruminous otitis externa. These cats' aural pruritus ranges from none to severe; most cats have minimal or no pruritus. Cytologic examination often reveals *Malassezia* species. Please comment on this problem—the cause, the therapy, and your views.

A Regarding the cause and treatment of ceruminous otitis externa in cats, remember that otitis externa, regardless of the type of discharge, is a sign of an underlying disease. So you need to consider both primary and perpetuating factors.

Primary factors—such as *Otodectes* species, cutaneous adverse food reactions, environmentally triggered atopic dermatitis, and aural polyps—cause otitis externa. Perpetuating factors do not initiate the problem but will cause the disease to continue unless they are also treated. Perpetuating factors include:

>>> Bacteria (cocci, most commonly *Staphylococcus pseudintermedius* [acute infections]; beta-hemolytic streptococci and rods, most commonly *Escherichia coli, Pseudomonas* species [chronic infections]; and *Proteus*, *Klebsiella*, and *Corynebacterium* species)

>>> Fungi (*Malassezia pachydermatis*, which may cause a hypersensitivity reaction; therefore, small numbers may be relevant)

>>> Progressive pathologic changes (*e.g.,* fibrosis or hyperplastic ceruminous glands from chronic inflammation)

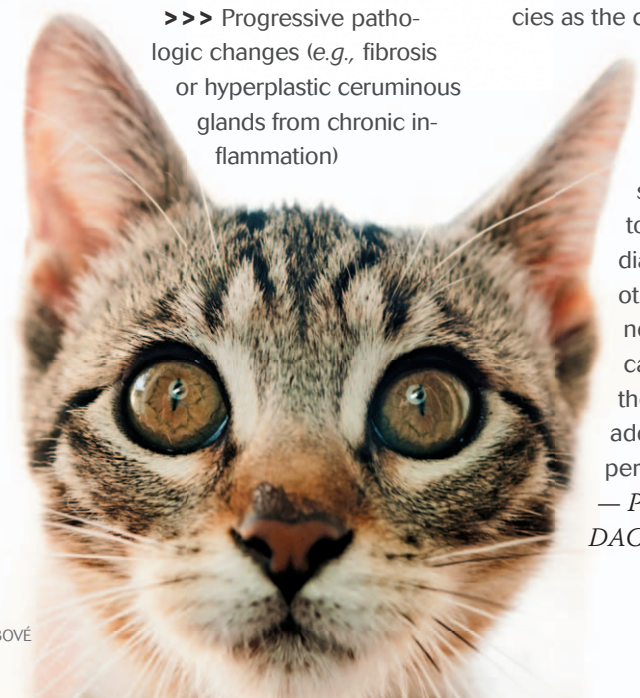
>>> Otitis media

>>> Contact hypersensitivity or irritant (identified when an owner reports at a recheck examination that the pet was doing well the first three to five days of treatment but now resents having its ear treated; typically on this examination an erythematous papular eruption is present on the pinna).

>>> Treatment errors (most commonly undertreatment)

So when I diagnose otitis externa in a cat that has never had skin or ear disease in the past, I eliminate *Otodectes* species as the cause and always treat the perpetuating factor. I also discuss with the owner the possibility of needing to perform other diagnostic tests if the otitis recurs or does not resolve. In those cases, I investigate the primary factor in addition to treating the perpetuating factor.

— Paul Bloom, DVM, DACVD, DABVP



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The incidence of ear disease in the cat is reported as

2-6%

much lower than in the dog.

Though no studies have compared chronic otitis I would speculate that is even much lower compared to dogs. The relative importance of *Otodectes* is also greater in cats than dogs which likely contribute to this observation. — Craig E. Griffin, DVM, DACVD.

What did you say?
Helping clients to better understand hearing loss

Scan the QR code to download this handout.

Dogs suffering from hearing loss can still live happy lives. Help pet owners learn how to care for their hard-of-hearing pup.

FROM YOUR VETERINARIAN

What did you say?
Understanding hearing loss

Dogs suffering from hearing loss can still live happy lives. Learn more about hearing loss and how you can help your hard-of-hearing pup.

What should I know?

Hearing loss is a common complaint from dog owners, especially as dogs grow older. The most common cause is an age related change called otosclerosis. This process makes the tiny components of the inner ear less pliable and unable to function as they should. Because the precise function of the ear is to transmit sound waves, the suppleness of the inner structures is critical to function.

A dog that has suffered from chronic recurrent otitis (inflammation of the ear) is even more likely to suffer from brittleness of these tiny structures because of scar tissue and swelling. Other causes that can impact hearing can include ototoxicity (adverse effects to the ear from certain drugs) and effects from loud noises.

What should I do?

If you think that your dog suffers from hearing loss, ask your veterinarian to make sure that there is no infection or other concern present. Your vet may suggest seeing a veterinary neurologist like Dr. Shull to be sure of the cause. Both Canine Cognitive Dysfunction and Otosclerosis are common in aging pets and can occur in tandem. Each issue needs to be addressed to improve quality of life.

There are things you can do to make a hearing impaired dog's life easier.

- **Teach her visual cues so that the impact of the hearing deficit is minimized in daily life.** Senior dogs can learn to respond to hand signals for rewards. Time spent teaching the new cues is a great investment in your relationship.
- **Investigate vibration collars designed for this purpose to rouse and interest your dog the way sounds used to.** Hearing loss can make the rituals enjoyed by both you and your dog (like greetings) different and impact your bond. Vibration collars are remote controlled and you can train your dog that the vibration means you are home, so he can meet you at the door.
- **Teach your dog appropriate responses to the cues so that he feels secure even without his hearing.** Dogs love consistency and knowing the response you want, makes for a calm and confident dog.

Hearing loss doesn't mean your dog can't lead a full and happy life, but you should be mindful of your dog's new challenges and ask your veterinarian about any concerns you have with your hard-of-hearing pup.

GETTY IMAGES

Whether caused by chronic ear infections, injury or plain old age, hearing loss doesn't mean a dog can't live a happy, fulfilling life. If you have patients suffering from hearing loss and clients who need information on how to cope, try using this handout. With it, pet owners will learn effective communication and proper care for their hard-of-hearing pup.

DON'T MISS THIS:

Licking, itching, scratching, biting, head-shaking, red-hot sore spots ... dermatology cases are beyond uncomfortable for the pet, the owner and often, the veterinary team. They can be confounding and frustrating for everyone (not to mention, every pet) involved. But we're encouraging you to approach your dermatology cases armed with all the tools you might need to bring about sweet relief from all that scratching. Get what you need at **dvm360.com/dermatologytoolkit.**

All ears over here: What's otitis?

Ear problems are no fun for dogs OR their owners. Educate your client about how otitis externa affects their dog and offer tips on kicking ear problems for good.

FROM YOUR VETERINARIAN

Ear for this: Learning about otitis externa

Ear problems are no fun for dogs—or their owners. Learn more about how otitis externa affects your dog and make sure he or she has an ear-to-ear grin again soon.

What the heck is this?

Otitis externa is an inflammation of the external ear canal that begins at the outside opening of the ear (called the pinna) and extends inward to the ear drum (tympanic membrane). Many things can cause and contribute to otitis including bacteria, fungi, debris, foreign bodies and allergic disease.

The environment in the ear is ideal for the growth of bacteria and fungi because it is moist and warm and a fairly protected hiding place. We forget that the ears are lined with skin and many dogs suffering from allergic disease will have inflamed and itchy skin. It stands to reason that the ears would be a place where itchy skin could lead to otitis externa.

What do I need to know?

1. Medication. All medication and treatments must be given as directed and on schedule. Please call if you cannot complete any of the treatments or doubt the adequacy of your treatment.

2. Diet. Otitis externa has been thought to be a symptom of food allergy or intolerance. A food trial may be necessary to rule out a food allergy.

3. Cleaning the ear. This is sometimes helpful if your dog can tolerate it. Let us guide you on which products are appropriate for your dog and how to use them.

4. Pain management. Because of the level of pain associated with otitis externa, general anesthesia is often necessary to allow thorough cleansing of the ear canal and to obtain specimens for culture. We can better choose the appropriate medication if we know the exact identity of the infection in the ears.

5. Recurring infection. The longer the infection has been present, the more difficult it is to clear up. In severe long-standing or recurrent infections, surgery may be necessary. We can help you know what is best for your dog.

Otitis externa is sometimes less of a curable condition, but instead must be managed. By following your veterinarian's recommendations, you have the best chance for an outcome you can both live with.

GETTY IMAGES

Ear problems in dogs can be notoriously difficult to treat, and often those difficulties boil down to seeing a dog for regular rechecks. Since we all know that getting clients back in for ear problems can be an uphill battle, it's imperative that you educate pet owners about otitis and the importance of regular rechecks. Here's where dvm360.com comes in—try giving this handout to your client after your next otitis diagnosis. It covers what clients need to know about medication, diet, ear cleaning, pain management and protecting against recurring infection.

Scan the QR code to download this handout now.

80%

of dogs who have environmentally triggerd atopic dermatitis have concurrent otitis externa.

Source: Paul Bloom, DVM, DACVD

A pictorial guide to *Low-stress* ear cleaning

We're all ears to learn about this five-step, lower-stress approach to cleaning a pet's ears in veterinary practice.

By Ciera Miller, CVT


1


2


3


4


5

1 Gather your supplies

Before attempting to clean your patient's ears, be sure to have all necessary supplies ready. If you're using an exam table, put a blanket down to make it more comfortable. We used a pheromone spray on the blanket to help create a calmer environment. If your patient will take them, it's always a good idea to have treats ready to help your patient feel more at ease.

2 Remember less is almost always more

When you're able, try to use the least amount of restraint to help your patient feel calm and less defensive. Speak in a low and encouraging voice.

3 Treat the pet

Before attempting to clean the patient's ears, try offering treats to start the process off on the right paw!

4 Keep treating while you treat

Using minimal restraint and continuing to give treats, begin cleaning your patient's ears.

5 Treat a little more

Be sure to offer treats afterward as well to reward the pet's good behavior!

Ear cases getting you down?

Shake it off.

Famous (and famously funny) dermatologist Dr. Paul Bloom is here with genius tips that are both practical and clinical—and sure to help you with those frustrating otitis cases.

Dogs are liars.

We've all seen dogs who come in for routine exams that have ear disease—which is why you have to make checking the ears a priority, says Dr. Bloom, even when the client swears the dog isn't showing clinical signs. **Scan to listen to his tip.**

We're undertreating ears and it's (partly) your fault

Perpetuating factors of otitis externa come down to one root cause: Undertreatment of ears. Dr. Bloom suggests a few ways you can get better at rechecks—**scan to listen now.**

Ear problems make you wanna shoot yourself.

We've all been there ... you have a bad day and something scathingly honest slips out of your mouth. Dr. Bloom understands the frustration when it comes to treating ears—after all, a dog can "have pus pouring out of its ears" and the owners barely blink an eye. Hear his impromptu script on talking to clients about ears by **scanning the code, right.**

Quit plucking that hair.

In which Dr. Bloom warns against the rampant plucking of hair from dogs with normal, noninfected ears. Don't do it. **Scan to listen why.**

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Take Control of Otitis Externa

Treatment from start to finish

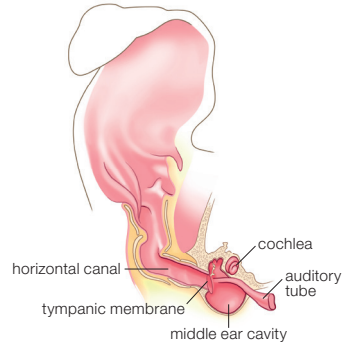
Otitis externa is an inflammation of the outer ear, including the pinna and the L-shaped ear canal. Ear infections are among the ten most frequent reasons dogs visit the veterinarian.[1] An estimated one in five dogs will experience the discomfort of otitis externa.[2]

Recurring problem

Canine otitis externa has a recurrence rate of 50 to 60 percent, and pet owners become frustrated when they see their dogs experiencing repeated pain and discomfort.[3]

A new, easy-to-use treatment option

OSURNIA® (florfenicol/terbinafine/betamethasone acetate) is a simple new treatment for otitis externa in dogs.* Two doses per ear should be administered in the veterinary clinic one week apart to maximize successful dosing. In-clinic dosing can also help ensure that appropriate follow-up occurs.



OSURNIA is administered in a premeasured, single-dose tube with a flexible, soft tip that is gentle on a dog's ears. OSURNIA is an adaptable gel — not a liquid or ointment — which spreads easily with gentle massage, and the active ingredients remain in the ear canal for weeks.[4]

*OSURNIA is indicated for the treatment of otitis externa in dogs associated with susceptible strains of bacteria *(Staphylococcus pseudintermedius)* and yeast *(Malassezia pachydermatis)*.

Important Safety Information

OSURNIA® (florfenicol/terbinafine/betamethasone acetate) is for otic use only under veterinary supervision. Do not use in dogs with known tympanic perforation or a hypersensitivity to florfenicol, terbinafine or corticosteroids. Adverse reactions observed during clinical trials include vomiting, increased liver enzymes and transient loss of hearing. Please see product insert on p.11 for full prescribing information.

"Pet owner compliance is one of the biggest challenges veterinarians face when treating otitis externa in dogs. With OSURNIA, effective treatment can be administered in just two doses. It's much more convenient for pet owners and will increase the likelihood that the entire treatment program will be completed."

Wayne Rosenkrantz, DVM, ACVD
Animal Dermatology Clinic
Tustin, CA

"Cleaning and medicating pets' ears once or twice a day for 10 to 14 days can be stressful for many pet owners. OSURNIA is a wonderful option because I professionally clean and treat my patients' ears over a period of a week. Clients are thrilled because they're no longer responsible for daily ear treatment. And I'm assured that the medication is properly administered."

Donna Solomon, DVM
Animal Medical Center of Chicago
Chicago, IL

Osurnia®
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For more information, talk to your Elanco sales representative or call 1-877-352-6261.

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1. "VPI reveals top 10 pet disorders." Apr. 2015. Vet. Pract. News. Accessed 10/29/2015. http://www.veterinarypracticenews.com/VPI-Reveals-Top-10-Pet-Disorders/. 2. Angus, J. 2004. "Otic cytology in health and disease." Vet. Clin. North Am. Small Anim. Pract. 34:411-424. 3. Kadence USA. Sept. 2013. "Gauging interest in a new OE treatment: quantitative results." 4. Elanco Animal Health. Data on file.

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Use these takeaways to manage your nasty ear cases with

ease.

1. **Infectious otitis** is a secondary occurrence and a perpetuating factor and needs resolution.

2. **Identification and treatment** of an underlying or co-existent problem is important in all cases of chronic recurrent otitis. Use a systematic approach to the diagnosis and treatment.

3. **Always base therapy upon results** of otic smears and bacterial cultures when obtained. Thoroughly clean and dry the ear canal before commencing treatment.

4. **Systemic therapy** is usually indicated in otitis media cases but may be beneficial in chronic cases of non-Gram negative otits externa and Gram negative problems excluding otitis media.

5. **Maintenance ear flushing** every 7-14 days can be helpful to avert recurrent infection in cases of chronic otitis externa.

For more, visit **dvm360.com/otitistoolkit**.

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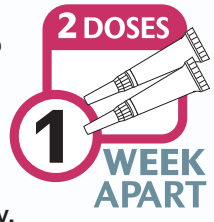
Treating otitis externa just got easier.

Just two doses per ear, dosed one week apart

done.

The simple treatment for otitis externa*, with easy application.

- Just two doses per ear, dosed one week apart
- Same dose for every dog
- Single-dose tube with soft, flexible tip is gentle on a dog's ears
- Easy application may lead to better compliance



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Important Safety Information

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***Associated with susceptible strains of bacteria (*Staphylococcus pseudintermedius*) and yeast (*Malassezia pachydermatis*).**

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Yes-sss! A review of better care for captive reptiles

While reptiles have been kept in captivity for many years, improper care is still the No. 1 reason they are brought into the veterinary clinic. Poor husbandry can lead to metabolic disease, immune suppression or behavioral problems. Growing awareness of the importance of animal welfare in zoos and aquariums has also translated to a better understanding of the needs of captive reptiles as well.

In this article, the authors explain that the goals of environmental enrichment are to "promote species-appropriate behaviors, provide behavioral opportunities, and to provide animals with control of their environment." In addition to proper husbandry techniques encompassing nutrition, lighting, temperature and housing, they share new information regarding environmental enrichment strategies to ensure the health and longevity of reptiles in captivity.

Reptile refreshments

Proper nutrition is integral to the health of captive reptiles. Not only does the caregiver need to identify and provide the correct diet choice based on natural diet and environment, the authors also discuss the ways in which food should be presented to promote proper nutrition. For example, food for snakes should be offered with tongs to encourage natural striking and coiling behavior. On the other hand, other species may be encouraged to eat by dragging prey through the enclosure, burying the prey item or using live fish or insects. Providing species-specific feeding strategies will also encourage activity, which can help with weight management as obesity is a common problem among captive reptiles.

Home sweet home

Housing is another area in which improvements can help decrease stress and minimize the risk of immune suppression and disease. New research has found that not only are reptiles able to learn, but they are eager to engage in learning activities. Stimulatory environments result in more activity and exhibition of more natural behaviors. For example, numerous hiding, resting and activity areas should be provided within the enclosure.

Arboreal species, specifically, will benefit from tall enclosures that will allow room to climb. The more room that a reptile has to move around in, the less chance of a self-inflicted injury and obesity and the more likelihood for improved overall health. The authors note that group housing is often not recommended as many reptile species are solitary in the wild. This type of housing can often create stress and lead to aggression or even cannibalism.

Snake charming, er, training

Behavior training is another key component of enrichment as it will facilitate daily care and feeding as well as reduce the fear and stress associated with medical interventions. The authors discuss training methods that include teaching an animal how to enter a crate by using a food reward as well as target training and desensitization. The most common desensitization technique is handling, and the authors note that care should be taken to provide a cue that handling is about to happen so as not to damage the trust between the animal and the caregiver.

Additional guidance

In addition to tips regarding husbandry and enrichment practices, the authors also provide a list of online resources for husbandry information, as well as a table containing the nutritional content of select invertebrate prey items.

Great strides have been made in recent years in the care of reptiles in captivity; however, the great variability among species highlights the need for education of not only reptile owners but also of the veterinarians who will be caring for them. VM

Wilkinson SL. Reptile wellness management. ***Vet Clin North Am Exot Anim Pract*** **2015;18(2):281-304.**

GETTY IMAGES/CHRISTOPHER JIMENEZ NATURE PHOTO

Tips for creating a **pet-friendly** practice

Creating a low-stress environment will not only make your patients and their owners happy, but will also help decrease the risk of injury to you and your staff. The authors of this article discuss why creating a low-stress environment will make patients easier to handle and increase office visits since "the perceived fear and distress an animal feels as a result of a veterinary visit is a major reason why owners avoid bringing their pets to the veterinarian."

Do some preliminary planning

Before you even lay hands on a patient, the authors describe assessments you can make to help ensure a more positive interaction. These include:

Assessing the environment. Reduce visual, olfactory and auditory stimuli by using low lighting, speaking softly and avoiding sudden movements. Also consider using calming pheromone sprays or diffusers.

Evaluating body language. This applies to the patient's body language as well as your own. The authors note that animals nonverbally communicate their emotional states clearly if we listen. The same can be said about our own body language, so the authors recommend things such as turning to the side rather than directly facing a dog, avoiding prolonged eye contact and avoiding leaning over a patient. The authors also provide a helpful table of common feline and canine body language postures and how to interpret them.

Making a handling plan. For example, consider staggering nonessential procedures over multiple, shorter visits if possible. This prioritization should also take into account the level of pain and invasiveness of the procedure. The authors recommend keeping a record of what worked and didn't work with respect to handling at each visit so that it can be used to guide future visits.

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Rethink restraint

The authors also review methods of restraint and recommend using "the least restraint necessary to safely perform the procedure." In addition to physical restraint, the authors discuss chemical restraint and provide protocols for both feline and canine patients. They discuss a variety of handling tools such as muzzles, pheromones, caps that limit visual stimuli, towels and Elizabethan collars, including multiple photos depicting many of these products in action.

Counter stress with counterconditioning

Using counterconditioning methods to help mitigate the fear and stress of the veterinary visit over time is also discussed. This involves coupling unpleasant or negative experiences with something positive such as a highly palatable treat (e.g. squeeze cheese or chicken or turkey baby food). Procedures that would benefit from counterconditioning measures include nail trims, otoscopic examinations, blood draws and injections.

Get owners involved

In addition to the methods discussed to decrease the fear and anxiety dogs and cats experience in the veterinary setting, the authors also provide information to help educate owners on things they can do at home to prepare their pets for veterinary visits. These include ways to make the carrier more attractive by using treats, familiar bedding and pheromones and by placing a towel over the carrier when getting in and out of the car or entering the clinic to decrease visual and olfactory stimuli. VM

Herron ME, Shreyer T. The pet-friendly veterinary practice: a guide for practitioners. *Vet Clin North Am Small Anim Pract* 2014;44(3):451-481.

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Never too **old** *for* **good** dental health

With individualized anesthesia protocols and appropriate monitoring, dental procedures are safer than ever before. Now, all senior patients can enjoy the benefits of good dental care. *By Heidi Lobprise, DVM, DAVDC*

The prevalence of periodontal disease increases as age increases and as body weight decreases (large dogs versus small dogs).[1] Similar to other chronic processes, particularly ones with tissue loss (gingival and bone), this disease is likely to worsen without intervention until the final phase of periodontal disease—tooth loss. The coinfluence relationship of dental disease with diabetes and renal disease underscores the importance of addressing issues in senior animals before they cause more problems.[2]

Dentistry and blood work can help support each other's efforts: if a recent senior diagnostic screening has been performed, now would be a good time to get the patient's dental work accomplished. If dental care is needed, now would be a good time to update the patient's laboratory values, especially if this screening had been declined in the past. While not common, it is possible to pick up on underlying, occult disease when performing a patient's preoperative screening.

AS PATIENTS GET LONG IN THE TOOTH

Periodontal disease has an increased incidence in senior animals, as do any of the dental conditions that can increase over time, such as tooth resorption or stomatitis in cats. Extensive periodontal disease that has destroyed mandibular bone at the level of the first molar can lead to pathologic fractures, sometimes bilaterally, that have insufficient osseous structure for stabilization (*Figure 1*).

Senior cats may exhibit a thickening of the alveolar bone surrounding the canine teeth, especially the maxillary ones, with a concurrent super-eruption of the teeth, making them look longer than normal. This chronic osteitis or alveolitis may

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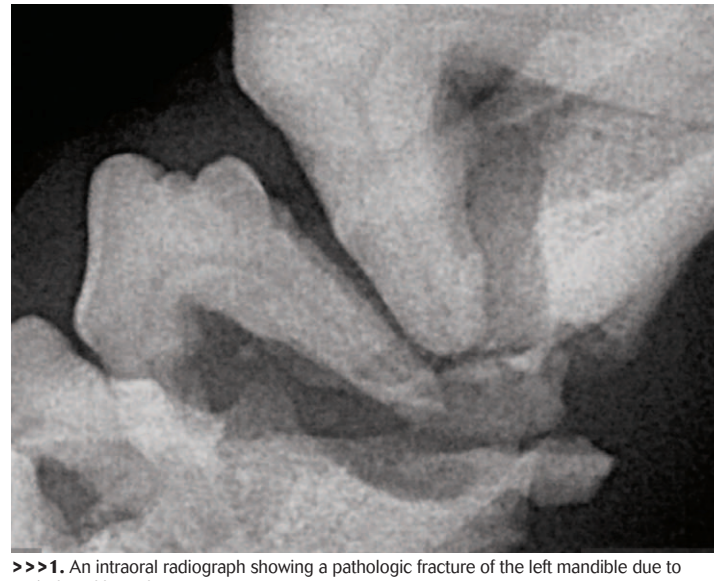
be minor, with periodontal management sufficient for treatment. If the tooth is mobile or the surrounding tissues are inflamed, extraction may be best.

Oral tumors are also seen more frequently in senior patients, and early detection and identification of any masses can provide the only possibility for adequate treatment. In dogs, melanocytic tumors, fibrosarcomas and squamous cell carcinomas are some of the most frequent masses found, while the three forms of squamous cell carcinoma (gingival, lingual, tonsillar) are the most common masses found in cats.



>>>1. An intraoral radiograph showing a pathologic fracture of the left mandible due to periodontal bone loss.

CONCURRENT CONCERNS TO CHEW ON

The increase in periodontal disease in senior animals warrants professional care, but comorbidities can make the necessary anesthetic procedures potentially risky. In rare instances, disease is so severe or unresponsive to management that dental care should be avoided completely.

However, most cases can be evaluated preoperatively to identify underlying issues, and those identified disease processes can be treated to return the patient to a more stable condition to decrease the risk the anesthetic procedure would entail. In each patient, the risk of retaining the dental disease and its potential effects on the rest of the body should be weighed against the risk of treatment. Typically, the benefits of treatment outweigh the risks.

THE DRILL BEFORE YOU DRILL

Individualized treatment plans are essential for senior and geriatric patients—from preoperative evaluation and stabilization therapy (if needed) to the immediately preoperative and perioperative periods. Comparisons can be made to guidelines for people for dental procedures, including the benefit of preoperative laboratory screening, but we have to realize that our patients cannot tell us how they are feeling.

Anesthetic risk classification

Identifying the patient's American Society of Anesthesiologists (ASA) physical status classification is a good starting point when evaluating patients in the mature, senior or geriatric categories. This classification will help you determine which assessments should be performed. Patients classified as ASA I or II might require basic blood work, a urinalysis and an electrocardiogram (ECG), while patients classified as ASA III, IV or V might require additional diagnostic testing. Urine output (1 to 2 mg/kg/hour is normal) monitoring is seldom performed but can provide beneficial information.

Preoperative medications and fasting

It is important to discuss preoperative medications with owners, including identifying which medications could affect

anesthetic and analgesic drugs. Decisions may have to be made about which medications can be given the day of the procedure.

Discuss fasting with owners of diabetic patients. If a small morning meal is necessary to maintain glucose concentrations, it should be no more than half the typical amount, and induction of anesthesia should be delayed by at least four to six hours. The morning insulin dose should also be halved, though water can be offered until presented at the clinic.

Check blood glucose concentrations at induction and recovery; if a procedure is prolonged, intraoperative concentrations may be checked as well. Consider a constant-rate infusion (CRI) of regular insulin and dextrose fluids to maintain a consistent hyperglycemia.[3]

For most patients, food should be stopped the evening before, but small amounts of water can be given until they are admitted to the hospital.

Antibiotics

Antibiotic use and selection will always generate plenty of discussion. Again, while dental recommendations for people should be considered, our patients have the additional complication of anesthesia, with possible hypovolemia, hypotension or hypothermia, so each patient's treatment plan should be individualized.

If the patient has some systemic risk (e.g. cardiac disease, borderline renal disease), it may be appropriate to give that patient a broad-spectrum antibiotic (e.g. amoxicillin-clavulanic acid) just before the procedure (four to six hours) or to administer intravenous ampicillin or amoxicillin during the procedure. In my experience, in some patients with extreme dental infection, a course of antibiotics in the weeks or days before the procedure, such as clindamycin, has greatly improved the health of the patient's dental tissues—and also the patient's health.

Pain management

Another important aspect of dental care is pain management. Appropriate administration of preoperative agents can reduce the patient's anxiety and stress in the preoperative stage, which could have a positive effect on stress-induced immunosuppression. If a patient is given appropriate, effective preoperative, multimodal analgesia combined with local and regional blocks, then the dose of general anesthetic needed for the patient can usually be reduced significantly. If nonsteroidal anti-inflammatory drugs are given (only to patients with no evidence of renal malfunction), perfusion with fluids is important.

For local and regional anesthetic blocks, calculate the total dose, particularly in small dogs and cats. Bupivacaine (0.5%) premixed with epinephrine (1:200,000) provides analgesic effects for longer with some hemorrhage control but should not be given to patients with contraindications (cardiac arrhythmias, hyperthyroidism). It also needs to be placed 10 to 20 minutes before the extraction or periodontal procedure for maximum effectiveness. Lidocaine does not last as long but provides analgesic effects more quickly.

WHILE YOU'RE AT IT: PERIOPERATIVE CARE

Perfusion before and throughout the procedure is critical in dental anesthetic cases to maintain adequate blood volume, particularly for renal function. An initial appropriate intravenous crystalloid fluid bolus (5 to 10 mg/kg) may be provided preoperatively with 5 to 10 mg/kg/hour for a maintenance dose. Cardiac patients might have decreased ability to compensate for normal and excessive fluid volumes, so monitor patients closely for any signs of overhydration, including increased pulmonary sounds or even abnormal packed cell volume. Intraoperative fluid replacement will offset the loss of water from evaporation and third space losses into traumatized tissues and will even replace volume lost to hemorrhage in some cases.

Maintaining a patient's body temperature during a dental

procedure can be quite challenging: many patients are old and small, and the oral cavity is constantly wet or being rinsed. Geriatric patients in particular can have exaggerated hypothermia with a decreased basic metabolism rate. Body temperatures less than 98 F (36.7 C) can alter mentation, the patient's immune competency and wound healing. Decreased body temperature can also affect recovery time.

Keep the patient as dry as possible and provide patient warming devices when appropriate. Passive and active surface rewarming with warm water blankets, air warming devices or conductive fabric blankets can be helpful, as can active core rewarming with warmed isotonic fluids.

Patient monitoring

The reason I have confidence in safe anesthesia is the combination of individualized analgesia and anesthesia protocols and the level of patient monitoring that can be provided. General anesthesia depresses many systems that may already be compromised—respiratory, cardiovascular, central nervous, thermoregulatory, hepatic and renal, to name a few. Monitoring should be constant throughout the procedure and into the postoperative period, where most unexpected deaths occur.

And keep in mind that with all the advances in monitoring equipment available, the best monitor is still a good technician. Observing the general parameters and readings from monitoring equipment provides the best assessment of the depth of anesthesia and indicates when intervention is needed. Heart and respiration rates recorded every five minutes can be combined with pulse oximetry and blood pressure values, carbon dioxide concentrations, capnograph readings, body temperature and continuous ECG readouts. Central nervous system evaluation of the muscle tone of the jaw and eye position or palpebral reflex are more subtle indicators of anesthetic depth.

Keep in mind that with all the advances in monitoring equipment available, the best monitor is still a good technician.

Lengthy procedures

A dental procedure can be lengthy, which may lead to concerns about decreasing body functions as time goes on, particularly in senior patients. Maintaining perfusion and blood pressure with fluids can decrease body temperature, as can moisture associated with the dental procedure. Keep anesthetic concentrations as low as possible to help maintain blood pressure without waking the patient.

Some situations—either because of the patient's body systems, the length of time needed or the extent of treatment needed—could necessitate staging the procedure, completing a portion of the surgery at a later date.

Anticipate emergencies

Anticipate emergency situations ahead of time with printed protocols for the common drugs that may be needed in such events (visit csuvth.colostate.edu/emergencydrugcalculator). Regular monitoring should highlight any trends in parameter changes that could precede an emergent event, and if patient response is inadequate, immediate recovery should be instigated.

A GENTLE RECOVERY

Patient monitoring should not end when the anesthesia is turned off or when the endotracheal tube is removed. In fact, since the patient is not observed as closely as during the perioperative period, recovery is often when adverse events

happen, sometimes leading to the patient's death.

Brachycephalic patients, in particular, should be closely monitored. Because the challenges to their air passages return once the tube is removed, the tube should remain in place for as long as possible.

Any swelling, hemorrhage or pain flare-up can add to the patient morbidity. In patients with emergent delirium, a very low dose of dexmedetomidine (no more than 0.1 ml in a large dog) may be administered (if it is not contraindicated) to help relieve anxiety, stress and pain for a smoother, slower recovery. If a patient shows marked pain beyond that, additional opioids may be required.

If the patient had issues with hypotension during the procedure, fluid administration and even inotropes may be considered postoperatively, with close monitoring. Bradycardia may be present because of the effects of anesthesia, as well as any prolongation of hypothermia. If any medication (e.g. an alpha$_2$-adrenergic agonist) was given, a reversal agent is recommended, and an anticholinergic may be given with caution. Providing a safe means of keeping the patient warm and dry is also recommended.

Monitoring urine output—either a specific measurement or encouraging conscious voiding—can help you determine if additional fluids are needed. With small patients and, certainly, those with diabetes mellitus, monitoring blood glucose concentrations during and after anesthesia can point out those patients that might need additional treatment.

FOLLOW-UP CARE: NOT JUST LIP SERVICE

Returning patients to normal function as quickly as possible helps the recovery process. Discuss proper administration of postoperative medications (analgesics, antibiotics) with owners and have the owners encourage patients to eat and drink small amounts that evening, though the food may need to be softened. Supplemental feeding may be necessary (e.g. syringe feeding, percutaneous endoscopic gastrostomy tube), depending on the patient. A phone recheck the next day and a physical examination in two weeks allow you to continue monitoring the patient and develop a plan for ongoing management.

A LAST BITE OF ADVICE

While senior animals may present with particular circumstances that make anesthesia planning more complicated, in most instances, appropriate patient evaluation and care will provide an opportunity for good dental care. If dental health can be improved in a senior patient, its overall health is likely to improve as well. VM

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