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MEDICINE

When Things Go Wrong in the Feline Pancreas

CPD ARTICLE

Canine and Feline Urinary Tract Infection

Top Tips: Setting Up a Surgical Suite

Also in this issue

Up Your Communication Game with Younger Clients

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Editor's Note

This is a novelty for me - no print edition this month. And I am someone who doesn't even read books on a Kindle. We are all having to make many adjustments in this new era, so although there is no paper in your hand, I hope you enjoy the edition. We will post as soon as possible.

As we hear often enough, but regretfully don't always take on board in our daily routines, bacterial antibiotic resistance is a huge looming disaster. The article written by Dr Monique Engelbrecht neatly summarises new approaches to the management of urinary tract infections. Please read it - a lot has changed in the last few years. This is also our CPD article.

Quite apt for the moment, a short communication on some light at the end of the tunnel with FIP. Our business writer Andrew Christie has written something on retrenchment, something which unfortunately is more of a reality in many businesses in these times. Dr Ross Elliot has also provided some practical tips on how to maximise the comfort and efficiency of your surgical theater. And then, the ubiquitous otitis article. Yet we always grab at them, just hoping for something that can help us with this recurring problem in practice. This one has some nice practical tips.

Look after yourselves, social distance and wash those poor hands!

Regards

Liesel

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(Dr Liesel van der Merwe)

Madaleen Schultheiss

Up Your Communication Game with Younger Clients

Generational differences in thinking and communication styles are real, and catering to the styles of today's younger pet owners will put your practice on the path to building lasting bonds.

Many people view their pet as a member of the family, focusing intensely on their pet's health and wellbeing, and spending a lot of money doing so. This is especially true for younger clients who may not yet have children. What veterinary practices need to keep in mind is that younger clients may not fully grasp all that comes with pet ownership, and they communicate and receive information much differently than previous generations.

In light of these differences, successful veterinary teams adjust their communication style to better match that of their younger clients. Here are some tips to make it easier to educate and communicate with younger pet owners, and what tools are more effective

Educate and motivate

When it comes to education, delivering a message the way a client learns best is key. For younger generations, social media is the way to go, says Sarah Wooten, DVM, CVJ, a Colorado practitioner and Fetch dvm360 conference speaker. Dr. Wooten shares some methods and messages that can help:

- **Facebook is out**. This platform is not widely used by younger generations. Instagram, You Tube, TikTok and SnapChat are where it's at. These platforms aren't effective just for communication; they're also great for education about health topics such as the need for dental care and heartworm prevention.
- **Dry wit is in.** Ads, messages and education that are engaging and include a little humour will go a long way.
- **Find a personal connection**. Having trouble convincing your client about the importance of heartworm prevention? Dr. Wooten recalls a client who could not grasp the danger of heartworms. But when she changed her education to focus simply on "worms," the client was repulsed at the idea and eagerly agreed to whatever prevention was necessary. Diet challenges? Rather than highlight the dangers of obesity, focus on what the pet owner likes to do with their pet and what they need to do to make sure those activities can continue.

Appreciate the bond, acknowledge the limitations

While younger pet owners may sometimes be written off for not knowing enough about pet health, or not having the resources to provide certain levels of care, Bash Halow, CVPM, LVT, an independent business advisor with Halow Consulting, cautions that underestimating these pet owners can be a big mistake.

"They love their pets like family more so than ever before," Halow says. "I really believe we should recognise the pet owner and lead off with the thought that they really want the best for their pet—and we really have to try and get them that."

Halow offers some advice on how to make that happen.

- **Have empathy.** Appreciate that the cost of care may be a challenge for some clients and they may feel embarrassed.
- **Keep it down.** Don't hold discussions about finances out in the open at the front desk. Offer privacy and options.
- **Be specific.** When you make recommendations,

explain to the client exactly what should be done. "Don't focus on policy, focus on the pet and its owner," Halow says. "Be specific to them and their needs.

- **Don't use fear as a motivator.** "Fear motivation, or being scared of the consequences, has been big in veterinary medicine," Dr. Wooten says. "It's important to deliver the information, but not in a way that scares or causes guilt."
- **Avoid using scripts.** "Be careful with a script, because you may end up opposite of where you want to go," Halow says. "Scripts are excellent for kickstarting a thought, but nothing takes the place of people believing in the value of a recommendation. You need to believe in what you are selling and you'll be successful."

Instant gratification

Technology is key with younger clients, but even older clients have embraced the instant and mobile communication that apps and text messaging can offer. Text messaging is instantaneous and personal, and apps offer the ability to provide a variety of services remotely, from answering questions to refilling prescriptions. The most effective communication strategy is multifaceted, Dr. Wooten says. There are a lot of ways to improve communication through technology:

- **Touch base through text.** "Text messaging good. If pet is in hospital, status updates to clients are very popular. Pictures are ideal," Dr. Wooten says. "You can text lab results or what you are seeing to client."
- **Push it.** Use push notifications, calendar tools, and banner messages delivered to mobile devices. These can be used to notify clients about a new result, remind them of an appointment, or offer forward scheduling for next year's exam.
- **Use your resources.** Some veterinarians may think these are big tools to tackle, but Dr. Wooten says many overlook the 20-something kennel worker who is a gold mine. "You likely people within your practice who can communicate [in this way] better than you can."
- **Try it out.** "Practice owners need to go down to the vendor hall at trade shows and talk to those people about these tools. See and touch; get an example," Halow says. "Five to 10 minutes of education is all it takes. Ask for references to practices that have used this technology." Practices are not averse to onboarding these things, but they think it will take time they don't have to learn it, he says.
- **There's an app for that.** A host of apps are available, and Halow says the key is to just "swallow the pain" and start using one. Wooten suggests Pet Desk as one starting point, as it offers a variety of options for mobile pet care.

Prevent Perioperative Hypothermia

by Bringing the Heat to the Surgical Suite

Sarah Mouton Dowdy

When your patient's chills are multiplying during surgery, it can lead to a long list of problems, including a higher risk of infection and a longer recovery time. Here's how you can heat things up.

Helping your patients lose their cool is a vital part of caring for them during surgery. When a patient is induced, vasodilation allows warm blood from its core to cool down as it flows through the periphery. If your patient becomes hypothermic, several body systems can be negatively affected. For example, perioperative hypothermia can decrease metabolic function, which can prolong recovery time. The patient's immune system can also take a hit, leaving it at an increased risk of infection.

Warming methods include both passive and active options. Passive methods prevent heat loss and include items like blankets and bubble wrap. Active methods like conductive fabrics, circulating warm air blankets and inline fluid warmers provide heat to the patient.

Thermoregulation Facts

- Heat is produced by normal metabolism. The brain, major trunk organs and muscles are the main generators, with skeletal muscle only generating 20-30%.
- This pattern is affected by basal metabolic rate, thyroxine levels, activity levels and sympathetic stimulation.
- The core compartment, the head and trunk, is well perfused and has a stable temperature. The peripheral compartment, the limbs, is more variable with regards to temperature and is usually 2-4°C below that of the core compartment.
- Heat loss can occur through four methods:
- Convection: the transfer of heat from the body to the surrounding air.
- Conduction: the transfer of heat directly between the body and an in-contact surface.
- Radiation: heat loss to objects in the environment, which are not in direct contact with the body
- Evaporative: heat is lost when moisture evaporates.
- Heat loss in animals is mainly through convection and conduction, with evaporative loss also being very important with panting to prevent heat stroke.
- Fat is an effective insulator and conducts only 30% of the heat of other tissues. Fur acts as an insulator, trapping air against the skin, which has a low thermal conductivity . Wet fur however allows rapid heat loss as water has a high thermal conductivity.
- Predisposing factors for a patient to develop hypothermia include minimal body fat , wet fur, High surface area to body mass ratio, geriatric patients, neonate patients, immobility, underlying disease and lack of acclimatisation (if you're flying your patient up to Gauteng for surgery from the coast!).
- Hypothermia is classified as primary or secondary. Primary hypothermia is heat loss to a cold environment as with exposure.
- Secondary hypothermia is caused by an illness, injury or medication which alters heat production and thermoregulation in the individual. Common causes of secondary hypothermia include surgery and anaesthesia, trauma, critical illness and overkeen treatment of heatstroke.
- Clinical hypothermia can be classified as mild,moderate severe or profound. A retrospective study showed that patients were more likely to have complications as relatively higher tem

Classifications of hypothermia based on core temperature

	Primary Hypothermia	Secondary Hypothermia
Mild	32-37°C	36.7-37.7°C
Moderate	28-32°C	35.5-36.7°C
Severe	20-28°C	33-35.5°C
Profound	<20°C	<33°C

This topic will be covered in more depth in the following edition (Editor)

Reference:
Hypothermia and targeted temperature management in dogs and cats . Journal of Veterinary Emergency and Critical Care 27(2) 2017 pp 151-163

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Retrenchment in a Veterinary Practice: Implementation within a COVID-19 Economic Environment

Andrew Christie
BComm (Industrial Psychology, Business Management)

The Covid-19 pandemic and the resultant smothering of economic activity in South Africa has affected the veterinary profession severely. Much of the impact has been caused indirectly, by the government's decision to 'lockdown' the population, and because many veterinary clients have consequently experienced severe reductions in income. This was in addition to vets only being allowed to perform emergency procedures.

Many practices were forced to respond by addressing the biggest expense in almost all practices – salaries and wages – through the temporary layoffs of staff, the reduction of working hours, or even the temporary closure of the practice for much of the day.

As we move beyond a rigid lockdown and people gradually return to work in an environment where movement is far freer, every vet practice is obviously hoping that this will translate to an increase in profitability. The reality, however, is that it will take time for business to get back to pre-pandemic levels and it is possible that some practices may never reach those levels again.

With these two considerations, retrenchment can unfortunately become something to consider for a practice owner.

Dismissal in South Africa

It is useful to begin by looking at the three reasons why an employee can be dismissed under South Africa law:

1. **Dismissal for Misconduct** - Dismissal for serious misconduct, or for repeated offences. For example, an employee is caught stealing money from the practice.

2. **Dismissal for Incapacity** - Dismissal when an employee cannot perform their duties because of illness or injury. For example, an employee loses the use of their arms in a motor accident.

3. **Dismissal for Operational Requirements** - Dismissal is based on the business needs of the employer

It is vital to differentiate between these three – too many businesses are forced by the courts to pay past employees huge amounts of money because they tried to 'get rid of a bad employee' by retrenching them, hoping to avoid the process of a dismissal for misconduct. Even if an employee burnt your practice to the ground while swearing at you, you will be required to pay them out if you dismiss them for operational requirements rather than misconduct.

Fair Retrenchment in South Africa

Retrenchment is the commonly used term for "dismissal for operational requirements".
The courts will look at two aspects when assessing the 'fairness' of the retrenchment:

1. Substantive – whether the reasons were valid.

2. Procedural – whether the correct procedure was followed.

1. Substantive Fairness
The substance of the fairness lies in the definition of "operational requirements" . These are defined by the legislation as being 'requirements based on the economic, technological, structural or similar needs

of an employer' - in other words, the "business needs" of the employer. If the reasons for the retrenchment met one or more these requirements, it would be regarded as substantively fair.

- An example of economic needs would include a decrease in sales or services of a practice, or closure of the business.
- An example of technological needs could be new practice management software that replaces some office staff.
- An example of structural needs could be combining two practices, resulting in having two receptionists where only one is necessary.

2. Procedural Fairness

The law requires the retrenchment process to be a joint consensus-seeking process between the employer and the employees. The consultation process begins with the issuing of a 'notice to consult' to the affected employee/s. The following guidelines should be followed in creating the notice to consult:

1. The practice must give notice to the affected employee/s of the need for the proposed retrenchment.

2. This notice must be in writing and contain the necessary information for the consulting employee/s to make representations at the consultation.

3. The necessary information includes:
   - the reasons for the proposed retrenchment
   - options considered by the practice to avoid the proposed retrenchment and the reasons for rejecting
   - the number of employee/s likely to be affected and their positions
   - the proposed selection criteria for selecting employees for retrenchment
   - the time when the retrenchment is likely to take effect
   - the proposed severance pay
   - any assistance that the employer proposes to offer the employee/s who are retrenched
   - the possibility of future employment of the employee/s who may be retrenched
   - the number of employee/s that have been retrenched within the last 12 months.

4. If the information on the notice is insufficient, the consulting employee/s may request the practice to disclose more information. For example, the employee/s may request the annual financial statements, where the reason for the proposed retrenchment is for cutting costs.

The Retrenchment Package

- Severance pay – a retrenched employee must at least be paid 1 week's pay for each completed year of ongoing service. However, the employer must pay the retrenched employee the amount specified in any policy or his/her employment contract, if that amount is larger.

  Note that if an employee refuses alternative employment with the employer or other employer, at a comparable salary, they will not be entitled to severance pay. This would include a situation where, for example, the practice owner discovers that a friend at a supplier is able to appoint a person being retrenched by the practice to a position in their company. If the employee were to turn down the position, they would not be entitled to severance pay.

- Leave – an amount of money equal to the annual leave, or time off, that has not yet been taken by the employee must be paid out.
- Notice pay instead of working the employee's notice period -
- if the employee was employed for less than 6 months, they must be paid 1 weeks' notice pay
- if the employee was employed for more than 6 months but less than 1 year, they must be paid 2 weeks' notice pay
- if the employee was employed for more than 1 year, they must be paid 4 weeks' notice pay
- Once an employee is retrenched, they are entitled to claim unemployment benefits ("UIF").

A question that is often asked is "What if I can't afford to pay the retrenchment package?" . In this case, the practice would have to be liquidated and the retrenched employee would be treated as a creditor in being paid by the liquidators.

Finally

The labour courts are sympathetic to companies being forced to retrench – as long as the reasons and procedures followed are fair.

Nevertheless, even though it may be critical for the survival of a business, retrenchment is a terrible ordeal for an employee to suffer through. By adopting an ethical, and not merely a legal, approach the negativity of retrenchment can partially be offset but don't lose sight that people are losing their livelihood at a time when very few replacement jobs are likely to be available.

Andrew consults extensively to vet practices and other stakeholders within the industry, as well as conducting lectures on various aspects of business at Onderstepoort. His expertise has made him a successful and sought-after speaker on various aspects of the business component of the profession.

Tips for Setting Up a Surgical Suite

Dr. Ross Elliot (Partner)
B.v.Sc M.Med Vet (Surgery)
Specialist Surgeon

Setting up a surgical suite is an essential part of any veterinary practice. The basic concepts for a surgical suite are the same regardless of if you want to set up a small suite in a one-man practice to an entire theatre complex in a large referral hospital.

Getting started

When deciding on setting up a theatre or surgical suite not just the flow of the day to day activities of the practice need to be considered but the need to have an area that promotes aseptic principles.

A few basic principles need to be applied regardless of all others when it comes to a surgical suite or complex. These are non-negotiable as they form the foundation of aseptic principles.

1. The surgical suite should be a self-contained end area – i.e. there should be no thoroughfare through theatre.
2. Theatre is not a storage are for anything but surgical essentials
3. Laminar airflow is ideal but it is very expensive. Ideally there should not be ventilation coming from another area through theatre

A lot of talk is based on this concept of workflow. What exactly does this mean when it comes to a surgical suite?

To better understand this we need to follow a surgical patient through our hospital to decide on how to best design and position our surgical suite.

The beginning of the patient's journey is generally the same in most practices.

Patient in the waiting room
|
Patient taken to the consultation room — Patient goes home
|
Patient admitted for surgery

At this point the flow will change from hospital to hospital and clinic to clinic. All patients that are admitted will be identified, weighed and placed in a cage. The cage are will vary to a small single ward in a one-man practice to an induction or surgical ward in a large referral hospital.

In an ideal world surgical patients should be placed in a separate ward or area of the hospital away from the sick patients in the practice. Alternatively healthy surgical patients exposure to sick patients should be limited as much as possible. These surgical patients are undergoing a stressful surgical procedure so the exposure to potential pathogens should be minimised. This ward should be in close proximity to the induction area and the theatre suite.

Tip 1. A separate surgical ward in the hospital out of the general hustle of the practice and reserved for healthy surgical patients prior to and after surgery.

Patient placed in the surgical ward
|
Patient taken and induced for surgery
|
Surgical preparation

Induction of the patient for surgery and the surgical preparation are the next step in the flow of a surgical practice. This is one of the most important aspects of surgical asepsis. Ideally this area should be a separate area / table in the practice where only surgical patients are induced and prepared for surgery. You don't want to have performed a dental on a patient with severe dental disease then the next patient is induced on the same table with the same anaesthetic machine for a cruciate repair.

The equipment in this area should also be solely for the purpose of preparation of the surgical patients. You don't want to have shaved and lanced an abscess with the clippers and kidney dish that you are going to use to prepare and clean a closed fracture repair. This is a vital aspect of theatre practice and can and should

be applied in all veterinary practices no matter how big or small.

Tip 2. A designated surgical area \ table for surgical preparation of patients having surgical procedures. This area should ideally have it own equipment for induction, anaesthesia and surgical preparation.

Surgical preparation
|
Diagnostic imaging
|
Theatre

This leads to the next ideal scenario; most patients having surgery will require diagnostic imaging and intensive care post surgery. Try situating the theatre complex near the induction area so the transport of the patient to theatre does not compromise the patient. In short you don't want to be transporting a patient across the entire hospital to get from the induction area to the theatre. The trip should be as short as possible. Ideally the diagnostic imaging suite radiographs and CT should be in close proximity to the theatre suite and induction room. This will shorten the travel time between these interdependent areas and increase patient welfare. MRI is often situated away from the theatre complex given the complexity of MRI as an imaging modality and the needs or an MRI suite.

Tip 3. Have the all the interdependent areas in close proximity to get the best possible patient flow and ease of working.

Theatre

Finally the patient has arrived in the theatre and you are now ready to do the surgical procedure. There are obviously huge variations in the design of theatres form practice-to-practice and hospital-to-hospital. Not all of these can be discussed in detail but a few general concepts can help improve the function of a surgical suite.

Tip 4. A Door

This is one of the most overlooked and least used resources of any theatre be it in a referral hospital or a one man practice. All theatres should have a door and this door should be closed once the surgical patient enters and not opened until the surgery is complete and the patient is leaving the theatre. Once the procedure is complete and the theatre is cleaned the door must remain closed while the theatre is not in use. This plays a huge role in decreasing negative airflow into the theatre.

Tip 5. Separate cleaning and washing.

The theatre suite or complex should have designated cleaning equipment that is not used anywhere else in the hospital. Ideally a designated cleaner should be assigned to only clean and manage the theatre suite. This is obviously not possible in smaller practices but is a good idea to maintain surgical asepsis. The drapes, gowns and all blankets used in theatre should not leave the designated theatre are there should be a separate washing machine ideally run by a designated person in theatre. These garments should not be washed with the general hospital wash of soiled blankets form sick patients.

Fig. 1 - Do not store theater consumables in the theater, have a separate storage area

Fig. 2 - Instrument storage - only keep essentials inside the actual theater. There needs to be enough space in the theater for these trolleys.

Fig. 3 - Make the theater bigger than you think so there will be space for people and equipment

Tip 6. Make the theatre slightly bigger than you think you will need.

The assumption is often made that a small table just needs to fit into theatre. In reality you will need the surgical table, there will need o be an anaesthetic machine with anaesthetic monitors. In all cases there will need to be a nurse or veterinarian monitoring the anaesthesia.

You don't want to be falling over you anaesthetist while trying to do a stressful surgery. In a best-case scenario you will need all the supplies and consumables in the theatre on hand. This negated the need for your assistant to constantly run out of theatre to find suture material etc. This can compromise the anaesthetised patient.

The best bet is to have shelving in theatre to hold all the supplies or a Q-Kart is a viable option. Both of these will take up room in the theatre suite. Theatre trollies with the surgical packs will need to be in close proximity to the surgeon and in large orthopaedic operations there can be many of these surgical trollies. There is nothing more frustrating than a theatre that is undersized.

The current recommendation by the AVMA is to have a theatre at least 37 square meters. As long as your theatre is not the same size as a broom cupboard you should generally be able to make it work.

Fig. 4 - Separate washbasins for theater use are a must. They must also be separated/screened from the theater room itself.

Tip 7. Have a small scrub room or separate sink for theatre scrubbing / surgical scrub.

Having a small sink in a small area attached to theatre which is exclusively used to scrub for the surgical suite is ideal. This acts as aninterface between the prep room and the aseptic theatre environment. This prevents contamination of the theatre suite from the general flow of the hospital.

Tip 8. Have more power outlets in theatre than you could ever imagine you would need.

There are more machines in theatre than you can ever imagine. Just a basic starting point is that you will need a power outlet for you radiology screen / computer (see next tip), a suction pump, a cautery unit, monitors X 3 and a Bair hugger or warming system. Then add things like a ventilator in a large referral hospital, a C-arm, arthroscopy tower and the list goes on. In my experience you can never have enough power outlets in a theatre, as you will always need more.

Tip 9. Invest in good theatre lights

Theatre lights are a very expensive part of the theatre suite. However they have massive implications when it comes to surgery. First and foremost one needs light to see properly and do the job correctly. The effect of good lighting on a surgical site is paramount to enabling the surgeon to see what they are actually doing.

Secondly poor quality lights generate heat which can lead to tissue desiccation, which increases infection rate and poor outcomes. Roof mounted lights are ideal as they don't take up any space on the theatre floor. Roof mounted lights however require a mounted block in the roof which needs to be incorporated in the original design of the theatre during construction.

Fig. 5 - Good lighting is essential for proper surgery. Roof mounted lights take up less space.

Tip 10. Have a radiology screen or computer linked to your network in theatre.

This is essential for orthopaedic procedures to have the radiographs there in theatre to confirm measurements. It can be helpful in soft tissue procedures to have a point of reference like the position of the urolith prior to surgery. It is really an essential part of a modern theatre. The alternative is to send out a nurse to take a photo with a mobile phone to see which is less than ideal. It also allows the surgeon to check radiographs for a patient just operated on while not having to leave the theatre complex and hence starting with the next procedure. Or it allows radiographs to be checked for a case coming into theatre while busy with the current operation. This will increase the efficiency of theatre time.

Theatre - - - - - Radiology
| |
Recovery / Surgical ward

The flow of the practice should provide an easy rapid route to a warm recovery area or a surgical ward where the patient can be monitored during recovery. The majority of anaesthetic deaths are recorded in the recovery period of anaesthesia so this is the most crucial part of the whole procedure. The pre-surgery ward can be doubled up as the recovery ward as it should be out of the general flow of the practice and not too cold. Ideally a nurse or a veterinarian should be monitoring all patients during the recovery phase.

Tip 11. Having a room just off theatre that functions as a central sterilising department is ideal.

This room can have a washing machine and tumble dryer to clean all the theatre garments and linen as well as the autoclave to perform sterilisation of the theatre equipment. It can serve as a central storage unit for the essentials of theatre that are not needed on a daily basis for example spare Bair hugger blankets, sterile packaging for autoclaving of instruments. A designated person, often the person responsible for the cleaning and management of theatre, should run this room.

In an ideal world large, hospitals will have an entire theatre complex including change rooms theatres a prep room or area. This is only a reality in the biggest referral centres and academic hospitals.

Recovery \ Surgical ward
|
Discharge appointment

Tip 12. Have a discharge appointment for surgical patients

This one single step is probably the best tool to avoid owner complaints and issues when there is a surgical complication. The owners feel better if the trust built in the initial appointment is built upon in a discharge appointment where they get to see the radiographs and discuss any concerns they may have. These owners are more likely to understand when it comes to complicated cases.

The age-old adage is a surgeon who does not get complications is either a liar or not performing any surgery.

Hopefully the above guide can be used to increase the efficiency of a theatre suite in your practice. There is a massive difference in each theatre complex form practice to practice and these tips are aimed to provide guidelines to best adapt aseptic and flow principles to our situation.

Vaccine Aims to Nip FIP in the Bud

Sarah Mouton Dowdy

A new contender may soon be entering the ring in the fight against feline infectious peritonitis (FIP). Morris Animal Foundation–funded researchers from Colorado State University (CSU) are developing an oral vaccine designed to beat the disease to the punch by targeting feline enteric coronavirus (FECV)—the highly contagious and common virus that can mutate randomly into FIP.

"The vaccine attempts that have taken place in the past have focused against FIP, but that's really not the natural situation," said Gregg Dean, DVM, PhD, head of the Department of Microbiology, Immunology and Pathology in CSU's College of Veterinary Medicine and Biomedical Sciences, in an interview with dvm360. "We know that the enteric coronavirus replicates at an amazing rate, doing millions and millions of experiments. Given this opportunity, there's a chance that it will mutate into the FIP-causing virus—so this is happening inside the cat more than it's being transmitted between cats. If we could control that replication, we could hopefully prevent the emergence of the mutant."

Going with the gut

As a first step in understanding what a vaccine would need to do to stimulate a protective immune response against FECV, Dr. Dean and his team studied cats that were naturally infected with the disease, specifically looking at their mucosal immune responses. "The enteric virus is quite limited in where it replicates and that is in the intestinal tract as far as we know," he explained. "So that's where the immune response is really critical to understand."

The vaccine's design reflects this insight. It will be administered orally and includes the bacteria Lactobacillus acidophilus, a probiotic found in several foods and in the gastrointestinal tract of many animals. "The role of the probiotic is critical," said Dr. Dean. "Some probiotics stimulate the immune system naturally, and by combining antigens from the feline coronavirus with the natural immune-stimulating activity of the probiotic, we hope to induce a protective and durable immune response." He explained that probiotic's effect is amplified by the fact that it is live and replicating. "It's also producing the antigens—in our case, feline coronavirus antigens—so it's very economical," Dr. Dean continued. "We don't have to use expensive processes to make a lot of antigen. We're harnessing the natural activity of the bacteria."

Dr. Dean and his team plan to begin the first efficacy trial for the FECV vaccine this fall. "We'll deliver the vaccine to cats in a colony environment that has naturally circulating enteric coronavirus. We'll take new kittens, vaccinate them, and then we'll see whether they become infected with FECV," he said. "Nearly every cat, and probably every cat in this colony, gets infected."

Disease detection

In the meantime, Dr. Dean is leading another study funded by the Morris Animal Foundation with a different but related goal: to develop a new diagnostic test for FIP that is accessible, inexpensive and fast. "As we're moving closer to real, viable treatment possibilities for FIP, having an accurate diagnostic test is going to be an important part of that decision-making process," he explained. "And an early diagnosis will be important as far as how effective any treatment would be."

Instead of focusing on the cat's immune response or looking for the virus itself, Dr. Dean and his team are examining specific biomarkers that are unique to FIP infection. They've identified 18 proteins that appear to be common in cats with FIP thus far and are in the process of validating them. If successful, the test would require only a blood sample from the patient. "We still have quite a bit of work to do, but it's a top priority for us," he said.

It takes a village

With these exciting prospects in feline health on the horizon, Dr. Dean wanted to acknowledge the past and present work of his veterinary colleagues: "There are a large number of people working hard to solve these important problems in cats, and it's the excellent work of this larger community over time that is getting us all to this point."

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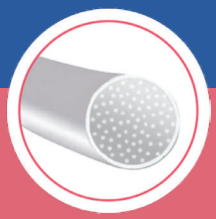

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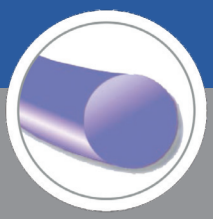

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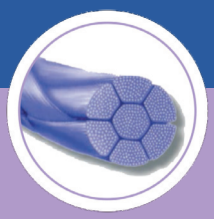

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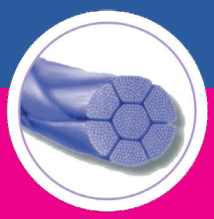

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Is it Pain or Dysphoria? How to Tell the Difference and What to do About it

Having a thorough understanding of analgesia, pain and dysphoria is necessary to provide appropriate management interventions that will help achieve a positive outcome for your veterinary patients.

Managing pain during an anaesthetic event is integral to veterinary patient care and recovery, and can be achieved via multiple modalities. Pure mu opioids, the foundation of pain management, induce a wide spectrum of positive and negative effects in animals. Aside from managing pain, positive effects of mu opioids include sedation and a sense of euphoria; negative effects can include nausea, vomiting/diarrhoea and dysphoria. The adverse effects of mu opioids are dose dependent and can be limited with use of a multimodal approach.

When the anaesthetist is faced with managing adverse effects of mu opioid administration, an understanding of the differences between analgesia, pain and dysphoria can guide the appropriate intervention and outcome.

Analgesia, pain and dysphoria defined

Analgesia is defined as the lack of a response to painful or noxious stimuli while in an awake state. The interruption of painful stimuli is integral to veterinary patient care, comfort and recovery.[1] One of the ways analgesia can be achieved is via administration of opioids and interruption of the pain pathway.

Pain is a noxious stimulus that potentiates a cascade of events. Untreated pain provokes myriad unwanted physiologic responses such as anorexia, self-trauma, central sensitization and maladaptive behaviors, all of which prolong recovery and add unnecessary stress.[1] Stress drives the sympathetic nervous system, which activates the flight or fight response.

Pain is unique to each patient and exists in different capacities, including chronic arthritic pain, neuropathic pain, acute pain and traumatic pain. Because further complications can arise when more than one type of pain is present, the anaesthetist must simultaneously plan for pain related to chronic problems and anticipate acute pain. For example, an older patient with arthritic hips that is going to be positioned for an abdominal exploratory requires hip support in addition to systemic analgesia.

Dysphoria, a feeling of discomfort or unease, often occurs with administration of pure mu opioids. Co-administration of anaesthetics, underappreciated pain or underlying behavioural issues can factor into the development of dysphoria.[2] Of note, administration of opioids in painful canine and feline patients is less likely to promote dysphoria, nausea and vomiting.

Rapidly delivered intravenous opioids—even at clinically appropriate doses—may promote excitement, which is generally brief and typically resolves without intervention.[2] By comparison, dysphoric patients are vocal, disruptive, and inconsolable.[3] An inconsolable patient does not respond to interaction. The dysphoric patient may be bradycardic, disinterested in food or water, and the third eyelids may be visible. Dysphoria can also be accompanied by anxiety, distress, or agitation.[4]

Dysphoria versus pain: Key points to remember

- Dysphoria and pain are different phenomena and necessitate different interventions.
- Inconsolable patients do not respond to interactions or manipulation of the affected area. These patients may present with visible third eyelids, minimal jaw tone and bradycardia.
- When uncertain about appropriate treatment method, first rule out pain.
- Once dysphoria is remedied, these patients still require appropriate pain management.
- Most importantly, sedation is not the correct intervention for every painful or dysphoric patient.

Treatment

A systematic approach is recommended when determining whether pain versus dysphoria is present. If the anesthetist is uncertain about which treatment is indicated, pain should be ruled out first. A dysphoria management algorithm (Figure 1) provides treatment direction and options.

Treating dysphoria can partially to completely antagonize the untoward effects of pure mu opioids (Table 1). High doses of naloxone will antagonise the central effects of opioid agonists that may cause the animal to experience acute pain and associated sympathetic stimulation with serious consequences that include tachycardia, hypertension, pulmonary oedema and cardiac arrhythmias. It is best to administer naloxone to effect by careful titration, keeping in mind that multiple doses may be needed to maintain antagonistic effects due to its short duration of action.[2]

A common misconception about the painful or dysphoric patient is that the necessary intervention is a sedative or anxiolytic. Administering a sedative to a dysphoric patient does not resolve the dysphoria and potentially compounds existing problems (Fairfield, AF, personal communication, October 3, 2019). Similarly, painful patients will not be comfortable or euphoric after receiving a sedative. Table 2 details appropriate interventions after pain and/or dysphoria is treated or ruled out.

Complicating factors that may lead to difficult recoveries include older patient age and pre-existing anxiety. Interaction with and handling by the veterinary team, as well as the increased noise and lights inherent to a veterinary hospital setting, can also lead to rough recoveries. Interestingly, a having a full bladder can lead to a rough recovery as well.[6]

References available online: www.vetlink.co.za

A dog with classic signs of dysphoria following a surgical procedure
This dog shows classic signs of dysphoria following a surgical procedure: visible third eyelids, open mouth due to panting and the need for full body support by the technician.

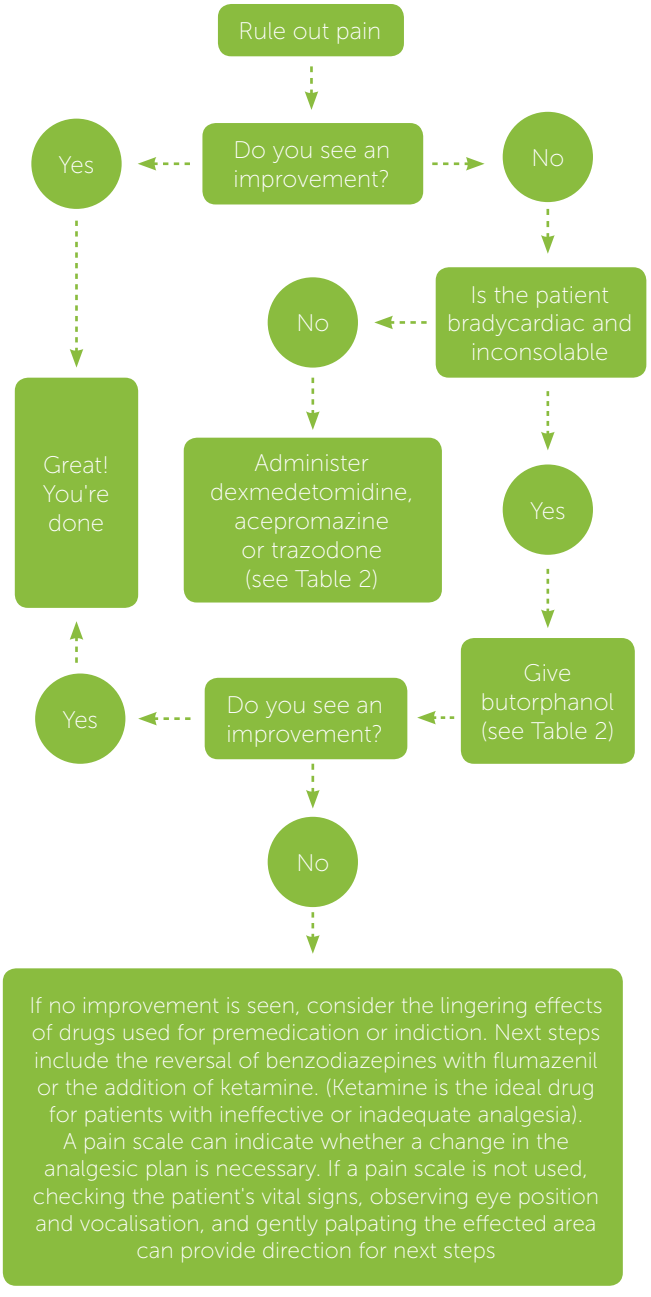
A dog after treatment with butorphanol for dysphoria
In this video, the same dog has been treated with butorphanol (inset), and her eyes have rotated centrally, the third eyelids are no longer visible and she can hold her head up.

Table 1 - Dysphoria treatment

DRUG	CLASS	DOSE
Naloxone	Pure *mu* antagonist	0.01 - 0.02 mg/kg IV titrated to effect (full reversal is achieved at 0.04 mg/kg)
Butorphanol	*Mu* antagonist/kappa agonist	0.05-0.2mg/kg IV

Table 2 - Sedatives/anxiolytcs used in veterinary medicine

DRUG	CLASS	DOSE
Dexmedetomidine	Alpha-2 agonist	0.25 µg/kg IV or IM*
Acepromazine	Phenothiazine	0.001-0.002 mg/kg IV
Trazodone	Seratonin antagonist/ reuptake inhibitor	3-10 mg/kg PO twice daily



Antimicrobial Stewardship Canine and Feline Urinary Tract Infection

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Internal Small Animal Medicine Resident

Introduction

The development of antimicrobial resistance is inevitable and poses important challenges on both human and animal health and it is clear that there is a need for improved antimicrobial use practices in veterinary and human medicine, and animal production.[10] The global community sits at the breaking point of a post-antibiotic era, where common bacterial infections are no longer treatable with the antibiotics available to us. Currently, there is no significant development of novel antibiotics and recent veterinary antibiotics are modifications of already established compounds. As many veterinarians prescribe antibiotics empirically prior to doing investigative diagnostics, there is a need for the determination of resistance patterns of common isolates in a specific geographic region to allow rational antibiotic choices. This, in addition to determining whether an antibiotic is in fact indicated, de-escalating therapy and ensuring the correct dose and route of administration may further improve responsible antimicrobial use. In human medicine, antimicrobial use guidelines are widely respected and provide excellent guidance to physicians on the management of several infectious diseases.

The scarcity of resistance monitoring data from small animal practice in South Africa lead to a study in which the compliance with prudent use practices by veterinarians was undertaken. Antimicrobial usage patterns in South Africa are influenced by many factors with owner economic incentives playing a massive role in current prescribing practices.[1] The dearth of availability of local epidemiological data, increasing rate of empirical antibiotic use and surge in treatment failures support that the development of antimicrobial resistance is an urgent issue in small animal veterinary practice in South Africa that warrants attention. General methods to reduce antimicrobial resistance include preventing disease occurrence, reducing overall antimicrobial drug use and improved antimicrobial drug use.[10]

Urinary tract infections are frequently encountered in companion animals and account for significant use of antimicrobials with inappropriate antimicrobial choice leading to a variety of patient health, economic, public health and regulatory concerns.

Sporadic bacterial cystitis

Previously termed simple uncomplicated UTI, this is a common condition in dogs and occasionally encountered in cats, in which a bacterial infection of the bladder results in inflammation and corresponding clinical signs.[8] The presence of a clinical abnormality as characterised by dysuria, pollakiuria, and/or increased urgency of urination in addition to the presence of bacteria in the urine classifies a clinically significant infection.[7] It is imperative that gross and cytological appearance of the urine, along with bacterial culture results are interpreted in combination with the patient clinical evaluation, as bacteria can be present in the absence of clinical signs. Clinical signs are non-specific and should not be used alone for the diagnosis of a UTI, an appropriate diagnosis can determine the need for antimicrobials and optimal drugs.[9]

Complete urinalysis including urine-specific gravity, urine glucose level determination (dipstick), and examination of the sediment is considered a minimum database for evaluation of suspected UTI. Cystocentesis is the preferred method for sample collection particularly for samples in which culture and susceptibility testing will be performed. Samples should be refrigerated immediately after collection and submitted to the laboratory as quickly as possible (within 24 hours). In most instances antimicrobial therapy is warranted to relieve patient discomfort whilst awaiting culture and susceptibly results. Initial therapy should consist of amoxicillin (11-15mg/kg PO q8h) or trimethoprim-sulfonamide (15mg/kg PO q12h).[9] However, there is evidence from humans that analgesics alone may be as effective as antimicrobials in uncomplicated cases. Consideration can be given

to prescribing an initial course of analgesics (e.g. NSAIDs) and adding antimicrobials 3–4 days later if clinical signs persist or worsen.[8]

Whilst amoxycillin/clavulanic acid (12-25mg/kg PO q8h) is a reasonable option it is not recommended initially because the lack of evidence regarding the need for clavulanic acid and the desire to use the narrowest spectrum while maintaining optimal efficacy.[9] Post-treatment urinalysis or urine culture is not recommended for sporadic cystitis when clinical signs have resolved.[8] If there is a lack of clinical response, therapy with the initial drug should be discontinued and treatment with an alternative drug be initiated. Evidence regarding duration of treatment is lacking. Classically, uncomplicated UTIs are treated for 7-14 days. However, support for shorter treatment durations in veterinary medicine have been reported and the current guidelines recommend treatment for 3-5 days.[2; 8; 11]

Recurrent bacterial cystitis

Previously referred to as a complicated UTI. In human medicine, recurrent bacterial cystitis implies a diagnosis of three or more episodes of clinical bacterial cystitis in the preceding 12 months or two or more episodes in the preceding 6 months. This definition has also been adopted in veterinary medicine. A recurrent bacterial cystitis may result from an infection that occurs in the presence of an anatomic or functional abnormality or a comorbidity which predisposes to a persistent infection, recurrent infection, or treatment failure[5]. The overall principles of diagnosis as discussed for a 'sporadic bacterial cystitis' apply here.

Additional investigative diagnostics must be performed to determine any underlying factors that could be related with recurrence or relapse. A complete blood cell count, serum biochemical profile, urinalysis, imaging and, if believed appropriate, endocrine testing should be performed.[9] A complete physical examination, including rectal palpation and examination of the lower urogenital tract in the bitch (vestibulum and vulva) is required. In the case of a relapsing infection, investigation into client compliance is recommended.[9] In instances in which the clinical condition of the patient permits, it has been suggested to wait for culture results before initiating therapy. However, if immediate therapy is indicated for patient care reasons, the guidelines as discussed for sporadic bacterial cystitis apply.

It is recommended that a drug class different from that used to treat the prior UTI be used and continued treatment be based on results of culture and susceptibility. Combination therapy may be indicated in instances where two organisms are cultured and an antimicrobial effective against both is not available. Where possible, it is imperative that any underlying cause be managed appropriately. As for uncomplicated UTIs, evidence supporting the duration of therapy does not exist and 4 weeks of antibiotic treatment was previously recommended. In human medicine, several studies support short course therapy for acute and recurrent bacterial cystitis. No evidence in dogs or cats exists to support or refute this statement for recurrent cystitis in veterinary medicine.[8] Long-term therapy is not automatically warranted for recurrent cystitis, even in the presence of underlying comorbidities such as diabetes mellitus. Short (3–5 days) durations should be considered for re-infection. Longer courses (7– 14 days duration) may be reasonable in persistent, and potentially relapsing infections.[8] Response to therapy should be closely monitored. For short (3–5 days) durations of treatment, culture during treatment is not recommended. When longer durations of treatment are being used, urine culture should be considered after 5–7 days of treatment; however, the approach to a positive or negative result should be considered in advance.[8] Positive cultures indicate the need for evaluation of compliance and potential further diagnostic testing, to determine why the bacterium has not been eliminated, not simply a change in antimicrobial. Negative results could be used to help determine when to stop therapy if a long course of treatment is being used. There is inadequate evidence to recommend use of either pulse (intermittent) or chronic low dose therapy for prevention of UTIs.

Upper urinary tract infections (Pyelonephritis)

The incidence of pyelonephritis in dogs and cats is not well documented, owing to the difficulties definitively diagnosing this disease as the signs attributable to pyelonephritis can be vague.[8] As opposed to bacterial cystitis, where patient morbidity is comparatively low, pyelonephritis can result in severe and rapid kidney injury. Therefore, rapid diagnosis and treatment is imperative. A diagnosis of acute pyelonephritis can be suspected based on positive aerobic bacterial urine culture when accompanied by systemic signs such as fever, lethargy, and/or polyuria/polydipsia; renal pain on abdominal palpation; laboratory findings of azotaemia, cylindruria, and peripheral neutrophilia with or without left shift. Based on the predominance of Gram-negative Enterobacteriaceae in pyelonephritis, initial treatment should involve antimicrobial drugs known to have local or regional efficacy against such organisms. Treatment with a fluoroquinolone excreted in urine in the active form is a reasonable first choice. Treatment for 4–6 weeks has previously been recommended for veterinary patients. However, the recommended duration of therapy for acute bacterial pyelonephritis in humans is 7–14 days. In the absence of veterinary-specific data, the Working Group recommends 10–14 days of treatment.[8] A recheck examination that includes urinalysis and aerobic bacterial urine culture is recommended 1-2 weeks after cessation of antimicrobials.

Multidrug-Resistant Infections

The limited number of drug choices and the potential for zoonotic transmission of resistant pathogens is of major concern with the increasing number of multidrug-resistant pathogens. Urinary tract infections are frequently encountered in companion animals and account for significant antimicrobial use with inappropriate antimicrobial choices. The use of critically important antimicrobials can be justified if their use is prudent and proper and based on culture and susceptibility data. Very importantly, the presence of multidrug-resistant bacterium does not represent, by itself, an indication for treatment.

Subclinical bacteriuria

The presence of bacteria in the urine (as determined by a positive bacterial culture) in the absence of both clinical and cytological evidence (inflammatory response) of UTI is defined as a subclinical bacteriuria.[9] Treatment may not be necessary especially in the absence of clinical signs. Treatment may be considered in those circumstances in which there is a concern of an ascending or systemic infection or that the bladder may be a focus of extraordinary infection.

Urinary catheters

Indwelling urinary catheters are commonly associated with UTI and subclinical bacterial colonisation of the bladder. It is important to differentiate a UTI from subclinical bacterial colonisation, as the approach to management of infection versus colonisation is different. In animals with a urinary catheter and no clinical signs of infection, culture is not recommended. There is no evidence supporting the need to culture the catheter tip at removal, as results are not predictive of development of a UTI. Culture of urine may be indicated in patients in which the risks of UTI are high however, clinical monitoring and cytological examination to detect a potential UTI are preferred in patients with no clinical signs.

A UTI should be suspected in animals exhibiting clinical signs, however this may not be easy to identify. Infection should be suspected in cases where there are gross or cytological abnormalities and in all cases of fever of unknown origin or bacteraemia with an unknown focus. In these instances, urine culture should always be performed. Ideally, catheters should be removed, and a sample obtained by cystocentesis. Treatment is more likely to be successful if the catheter can be removed. If no relevant comorbidities are present following catheter removal, treatment as for a 'sporadic bacterial cystitis" is indicated.

Future therapies

Vaginal lactic acid-producing bacteria (LAB) have been associated with decreased frequency of recurrent UTIs in women, however, there is limited information available regarding the vaginal microbiota of female dogs. In a recent study, the vaginal microbiota of adult spayed female dogs with historical recurrent UTI was compared to healthy spayed female dogs without a history of recurrent UTI.[4] They hypothesised that spayed dogs with historical recurrent UTI would have decreased prevalence of LAB and increased prevalence of uropathogenic bacterial populations in the vaginal microbiota when compared with the vaginal microbiota of healthy, spayed dogs. However, despite vaginal LAB being associated with decreased frequency of UTI in woman, the vaginal microbiota of spayed female dogs with recurrent UTI was similar to that of the control population. Further investigation of the role LAB in the urogenital tract of dogs is warranted.[4]

In a human study, researchers investigated the administration of asymptomatic bacteriuria (ASB) E. coli 83972 into atonic bladders of patients with chronic bacteriuria secondary to spinal cord injuries as an alternative to antimicrobials. No patients developed signs or bacteraemia or sepsis and were reported to have an improved quality of life.[3] A recent prospective non-controlled clinical trial in dogs investigated the safety and efficacy of a live biotherapeutic product, ASB E. coli 2-12 for UTI treatment. Results suggested that asymptomatic E. coli 2-12 was safe, data from the pilot study were promising and should be investigated in larger control studies.[6] The mechanisms by which ASB E. coli provides protection for recurrent UTI are not entirely understood but may be due to immunomodulation or bacterial interference whereby the ASB strains colonise the bladder and halt colonisation with uropathogenic E. coli strains that cause inflammation and result in clinical signs.[6]

Conclusion

Urinary tract disease is frequently encountered in dogs and cats and accounts for substantial use of antimicrobial.[9] Guidelines have been developed by the Antimicrobial Guidelines Working Group of the International Society for Companion Animal Infectious Diseases to provide information to assist in the diagnosis and management of upper and lower urinary tract infections in dogs and cats. Guidelines should be interpreted as general recommendations that are reasonable and suitable for most cases and should in no way be considered as standards of care that must be followed in all circumstances. They should be considered on the basis of decision-making bearing in mind that different or additional approaches may be required in the minority of cases. It is imperative to bear in mind that whilst guidelines are designed as international guidelines, regional differences do exist.

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CPD Questions

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Antimicrobial Stewardship: Canine and Feline Urinary Tract Infection

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01. Which one of the following terms regarding uncomplicated urinary tract infections (UTI)is INCORRECT?

a. The new term for uncomplicated UTI is is sporadic bacterial cystitis.
b. Uncomplicated UTI is common condition in dogs and cats .
c. Uncomplicated UTI often presents with dysuria pollakiuria .
d. Bacteriuria is present is uncomplicated UTI.
e. Uncomplicated UTI may occur without any clinical signs .

02. Which one of the following statements regarding testing for a UTI is CORRECT?

a. Urine sediment evaluation is considered the full MDB for evaluation of a UTI.
b. Midstream flee flow collection is adequate , even for culture and antibiogram.
c. Samples , once refrigerated can be stored for several days
d. A cystocentesis is the method of choice for urine collection where culture is anticipated.
e. Urine samples , if refrigerated, will show a false negative on culture.

03. Which one of the following statements regarding the treatment of an uncomplicated UTI is CORRECT?

a. The initial therapy of an uncomplicated UTI could just be NSAIDs.
b. If clinical signs are present it is essential that antibiotics are started immediately.
c. Amoxycillin /clavulanic acid is broadspectrum and the initial antibiotic of choice.
d. Efficacy of treatment of should be determined by post treatment culture.
e. Delayed initiation of antibiotics while evaluating the efficacy of anti –inflammatories will result in an ascending infection.

04. Which one of the statement listed below regarding recurrent bacterial cystitis is INCORRECT?

a. The definition includes a diagnosis of three or more episodes of in the preceding 12 months.
b. The definition includes a diagnosis of two or more episodes in the preceding 6 months.
c. There is can be a predisposing anatomical or functional abnormality.
d. There can be a predisposing co-morbidity such as Cushings disease which predisposes to infection.
e. The MDB as discussed for an 'sporadic bacterial cystitis' applies here as well.

05. Which one of the statements below regarding the management of recurrent urinary tract infections is INCORRECT?

a. Culture of the urine is recommended 5 – 7 days after treatment is initiated.
b. Pulse antiobioticc therapy and low doseantibiotic therapy are recommended in the control of chronic UTIs.
c. A positive urine cultures indicates the need to change the antibiotic.
d. Combination therapy is recommended if 2 bacteria with different susceptibilities are cultured.
e. A full 4 weeks of antibiotic treatment is recommended.

06. Which one of the statements below regarding upper urinary tract infections is INCORRECT?

a. diagnosis of acute pyelonephritis can be suspected if a bacteriuria is accompanied by systemic signs such as fever, lethargy, and/or polyuria/polydipsia and renal pain on abdominal palpation.
b. The predominant UTI is gram positive Staphylococcus spp.
c. Treatment with a fluoroquinolone excreted in urine
in the active form is a reasonable first choice.
d. The current ecommended duration of therapy for acute bacterial pyelonephritis is 10 – 14 days.
e. Re-evaluation including a urine culture is recommended 1-2 weeks after the antibiotics have stopped.

07. Which one of the statements below regarding the duration of antibiotic treatment in the various ttpes of UTIs' is INCORRECT?

a. Uncomplicated UTI should be treated for 7 – 14 days .
b. Uncomplicated UTI should be treated for 3-5 days.
c. Potentially relapsing infections should be treated for 7 – 14 days.
d. Pyelonephritis needs to be treated for 10 – 14 days.
e. Short duration recurrent infections can be treated for 3-5 days

08. Which one of the statements related to the treatment of UTIs in dogs is INCORRECT?

a. Urinary tract infections account for significant antimicrobial use with inappropriate antimicrobial choices.
b. The use of critically important antimicrobials can be justified if their use is based on culture and susceptibility data.
c. The presence of multidrug-resistant bacterium does not represent, by itself, an indication for antibiotic treatment.
d. Bacterial cystitis, should be treated urgently as it is a risk for an ascending UTI.
e. Pyelonephritis can result in severe and rapid kidney injury. Therefore, rapid diagnosis and treatment is imperative.

09. Which one of the statements below regarding indwelling urinary catheters in dogs and cats is CORRECT?

a. In animals with a urinary catheter and no clinical signs of infection, intermittent culture is still recommended as the patient is at risk.
b. Culture of the catheter tip on removal from the patient will be predictive for the development of a UTI.
c. A UTI should be suspected in cases where there are gross or cytological changes in the urine as clinical signs may be difficult to appreciate in this subgroup of patients.
d. Indwelling urinary catheters are uncommonly associated with UTI if placed aseptically.
e. Treatment is effective regardless of whether the catheter is removed or not .

10. Which one of the statements below regarding UTIs in dogs is CORRECT?

a. Vaginal lactic acid-producing bacteria (LAB) have been associated with decreased frequency of recurrent UTIs in female dogs
b. Colonisation of the bladder by non-pathogenic strains of E Coli has shown promising results in dogs
c. Pulse therapy of antibiotics has shown merit in patients with Chronic UTIs
d. Treatment of a urinary catheter related infection without comorbidities and removal of the catheter should be for 10 – 14 days , as with a recurrent UTI.
e. The presence of bacteria in the urine
(as determined by a positive bacterial culture) with cytological evidence (inflammation) is defined as a subclinical bacteriuria.

Ear we go Again: Improve Your Otitis Diagnostics

Sarah Mouton Dowdy

As one of the top reasons dogs come into your veterinary clinic, you certainly get a lot of practice diagnosing otitis. But because practice doesn't necessarily make perfect, veterinary dermatologist Dr. Ashley Bourgeois shares her solutions to some common diagnostic conundrums.

It's been said that only two things are certain in this world: death and taxes. But if we're talking about the veterinary world, that list should arguably expand to include otitis. "We know that otitis is the second most common reason dogs come into our clinics," said Ashley Bourgeois, DVM, DACVD, at a recent Fetch dvm360 conference session. "The first reason is itch, so derm is awesome because we get the No. 1 and 2 spots! And usually it's both—they have an ear infection because they have allergies and they're itchy."

But despite all of this forced practice, diagnosing otitis remains a painful process for both the pet and the practitioner—a reality that Dr. Bourgeois addressed by sharing her solutions to some common conundrums.

Problem: The patient is extremely uncomfortable during the otoscopic exam.

Treatment: The patient may just need a distraction, and you may need to tweak your technique." There actually aren't too many dogs, unless they're extremely painful or just aggressive on their own, that I can't do an awake otoscopy exam on," said Dr. Bourgeois. "Obviously I'm doing them all day, every day, so I have good practice, but we'll use things to distract them." If the dog doesn't have a food allergy, her diversion weapon of choice is a pretzel rod garnished with spray cheese.

But distraction is only one part of a better otoscopy exam. "Dogs tend to get uncomfortable when you put in the scope and hit the junction where the vertical canal meets the horizontal," explained Dr. Bourgeois. "Because the ear canal is L-shaped, you'll want to pull it up and out to straighten the canal. You'll be able to get deeper into the canal, and it will be less painful for the dog."

One more tip on otoscopy: Keep more than one size of speculum in your clinic—preferably three. "Three-millimeter cones are the most common, but we have at least three different sizes in our clinic because you don't want to use the same size cone on a Chihuahua as you do on a Great Dane," said Dr. Bourgeois. "You want the biggest area of visualization you can get, but you're not going to be able to jam the bigger cone into the Chihuahua's ear."

Problem: You suspect there's an infection, but the culture came back negative.

Treatment: Perform a cytologic examination *before* you culture. Dr. Bourgeois didn't mince her words: "Always do a cytology. **Always**. I don't care if you're seeing a recheck and you think it looks a lot better."

She explained that the exam provides a quick overview of the aural environment, as well as a foundation for therapeutic decisions and advanced diagnostics, and is the primary tool for identifying bacterial or yeast overgrowth. Accordingly, Dr. Bourgeois said that a cytologic exam should be performed before culture and sensitivity (C/S) testing because if only yeast is

noted, bacterial C/S testing isn't recommended. "Who wants to get a negative culture and then go back and perform a cytologic exam only to find it was just yeast to begin with? Culturing is not inexpensive, so you don't want to waste the client's money when it's only yeast that's present," she advised.

Performing a cytologic exam can also prove useful if the results of your culture don't end up matching what you saw. "Have you ever gotten tons of rods and you're for sure going to grow Pseudomonas, only to get your culture back and have it say, '1+ Staphylococcus'?" asked Dr. Bourgeois. "You need to make sure you're doing cytology and correlating it with the culture results because cultures can have issues too." If the two don't match up, you can call the lab to see if an error occurred.

If you're unsure how to best approach evaluating a cytology slide, Dr. Bourgeois has advice to offer. "I always suggest scanning at a lower power first to look for representative areas on the slide," she explained. "You want to look for areas that have inflammation present but that aren't just masses of cells on top of themselves. Avoid the globs." Once you find an area, Dr. Bourgeois continued, you can move into a higher power.

Problem: The patient's ear is hidden behind layers of gunk and biofilm.

Solution: Consider a thorough cleaning as part of your workup. Being able to visualise the ear is a vital component of the diagnostic exam, which means you may need to spend some time removing debris so you can really see what's going on. Perhaps, for example, the primary cause of a patient's otitis is a polyp that's hidden under several layers of gunk and biofilm. Flushing can also help you identify small tears in the tympanic membrane, said. Dr. Bourgeois. "If you see a bubble coming up through the tympanic membrane, that's an indication you have a microtear."

Dr. Bourgeois uses red rubber catheters and infant feeding tubes for deep ear flushes. "In the handheld scope," she noted, "I will try to use an 8-French catheter. You can't get anything that big in a fiberoptic video-enhanced otoscope, so I use a 5-French catheter." 5-French catheters have gone on and off backorder for a while, so Dr. Bourgeois has had to use polypropylene instead. "But you have to be careful with polypropylene catheters because they're more rigid and can indent and cause a myringotomy," she warned. "In fact, that's what we use them for." And while she doesn't typically use general anaesthesia for otoscopic exams, she noted that it can be very helpful for deep ear flushes, when possible.

When asked how long to wait between flushing the ear and applying topical therapy, Dr. Bourgeois recommended a period of five to 10 minutes. "I like to give the flush time to remove debris and clear away so the drop can penetrate the canal better, but you could probably apply the topical right after and be fine."

Sold on cytology

Dr. Bourgeois closed the session with a friendly reminder shared with the earnestness of someone who has learned a lesson the hard way: "If you take nothing else away today, please perform a cytologic exam every time." She's often shocked by what she finds in seemingly "normal" ears.

Culture and sensitivity testing is indicated when:

- A mixed infection is present. "For example, if you see a lot of cocci and rods on cytology, you need to find the sensitivities for those because it's not normal for a dog to have an abundance of bacteria and numerous types of bacteria," she explained.
- Suppurative inflammation (including with bacterial rods, cocci, or no visible organisms) is revealed during initial cytology. In such cases, you need to get to the bottom of what's going on quickly, said Dr. Bourgeois.
- Otitis media is suspected. "These are cases that need systemic therapy," she noted. "Remember that dogs have L-shaped ear canals, so to rely on an owner to be able to put a drop in the canal, have it travel all the way down the vertical canal, all the way down the horizontal canal and then get to the bullae isn't realistic."
- There's no response to appropriate topical and systemic antibiotic therapy.

If the eardrum isn't intact, she injects sterile saline into the middle ear and then aspirates it back up. "And that aspirate is what we culture," continued Dr. Bourgeois. "We don't culture the tube because it went through all of the external ear canal."

Culturing the middle ear

"If you're concerned about a middle ear infection, you definitely need to culture the middle ear," said Dr. Bourgeois. "And if you don't feel comfortable with it, try to get them referred."

She typically uses a polypropylene catheter through her video otoscopy unit, though she noted that you can use a sterile plastic catheter or spinal needle if using a handheld scope. "If the eardrum is intact, we'll do a myringotomy. We usually cut the end of the polypropylene catheter at an angle to make a little point and then we push it into the tympanic membrane until we get that lovely popping sound and it's gone through," Dr. Bourgeois explained. If the membrane is really stiff, it can take some time. "Don't keep trying to jam it in. Use slow and steady pressure."

When Things Go Wrong in the Feline Pancreas

Joan Capuzzi, VMD

Subtle, nonspecific clinical signs coupled with no identifiable trigger make pancreatic disease an elusive diagnosis

The pancreas is basically a bag of enzymes and hormones. The potent compounds it releases function as key activators needed for life. Sickness results when the pancreas becomes overzealous or, alternatively, slacks off.

The active pancreas

The pancreas has two functional compartments: The endocrine pancreas releases compounds into the bloodstream, and the exocrine pancreas delivers its products to target organs via ducts. The endocrine portion consists of alpha, beta and delta cells that produce glucagon, insulin and somatostatin, respectively. In cats, the main disease of the endocrine pancreas is diabetes mellitus, sometimes resulting from insufficient insulin production.

The larger component—the exocrine pancreas—consists of acinar cells that make and secrete enzyme precursors, or zymogens. When mixed with pancreatic proteases situated in the intestinal lumen, these zymogens transform into digestive enzymes like amylase and lipase. The pancreas also secretes bicarbonate, which neutralises stomach acid, antibacterial proteins, and intrinsic factor, which aids absorption of the vitamin cobalamin. Pancreatitis is the most frequently diagnosed condition involving the exocrine pancreas.

The endocrine and exocrine portions of the feline pancreas may conspire to produce disease, explained Scott Owens, DVM, MS, DACVIM, an internist at MedVet Indianapolis, at the Fetch dvm360 conference in San Diego. For instance, diabetes mellitus—more an issue of insulin resistance than deficiency in cats—can be triggered by pancreatitis. Though this association is unconfirmed in cats, one study links about 40% of diabetes cases with pancreatitis.[1-4]

The hyperactive pancreas

Pancreatitis is the culmination of inappropriate activation of zymogens within the pancreas that cause autodigestion.[5] Here, pancreatic endothelial membranes become damaged, microvascular circulation gets disrupted, free radicals are dispersed, and local ischemia, abscesses, edema and fat saponification result.

In dogs, this toxic cascade can often be traced back to a fatty meal or a trashcan raid. Most affected dogs vomit, demonstrate overt abdominal pain and stop eating altogether. But in cats, the disease usually has no obvious cause and is often silent.

"The signs are a lot less clear [in cats] than what we often associate with dogs," Dr. Owens said. Often, the only clues are mild lethargy, reclusiveness, decreased appetite and possible weight loss. Fewer than half of these patients vomit, and only one in 10 has diarrhoea.

Highly underdiagnosed in cats, pancreatitis is often acute-on-chronic once found. Necropsy studies have shown evidence of pancreatic inflammation in some 67% of cats, yet half of these had no history of associated clinical signs.

Dr. Owens shared the case of Gracie, a cat with a two-

day history of lethargy and diarrhea. On presentation, Gracie was quiet, drooling and febrile (40.8ºC). Blood work showed severe neutropenia (with left shift), thrombocytopenia, borderline-high bilirubin, and normal amylase and lipase.

Dr. Owens' differential diagnosis for Gracie was severe gastroenteritis, obstruction/intestinal perforation, pyelonephritis, feline panleukopenia and pancreatitis. The cat tested negative for parvovirus, but the Spec fPL (Idexx) was elevated at 19.1 µg/L (normal, 0–3.5 µg/L). Ultrasound revealed an enlarged pancreas with a thickness of 2 cm and a slightly dilated pancreatic duct. The diagnosis: severe pancreatitis.

Gracie was treated with fluids and broad-spectrum antibiotics (due to severe neutropenia), buprenorphine and an appetite stimulant. Within a few days, she was afebrile and her neutropenia was resolved. She went home on Hill's Prescription Diet i/d because of a food hypersensitivity she'd developed while hospitalised.

Gracie is just one face of pancreatitis, Dr. Owens said. While most cats with pancreatitis are dehydrated on presentation, only 7% are hyperthermic; 68% are hypothermic as a result of poor perfusion. Fewer than two in 10 manifest abdominal pain, but 38% are icteric due to either associated hepatic lipidosis or inflammation around the bile duct leading to post-hepatic obstruction.

Blood work may show azotaemia, neutrophilia/neutropenia and mild anaemia, Dr. Owens said. The Spec fPL is typically elevated, despite normal serum amylase/lipase; the SNAP fPL and the serum trypsin-like immunoreactivity (TLI) tests are less useful due to low specificity and low sensitivity, respectively. Pyelonephritis should be ruled out by urinalysis.

Ultrasound, despite its poor sensitivity for pancreatitis in cats, might show an enlarged, hyperechoic pancreas, dilated pancreatic duct surrounded by edema, and saponified fat indicated by bright mesentery.

Crystalloids should replace fluid deficits over 24 hours, and be continued thereafter to maintain blood pressure and diuresis, said Dr. Owens. "You need to replenish before you can flush out the toxins."

Colloids (Voluve or plasma) can be added if hypoalbuminemia and vasculitis/oedema are present.

Once hydrated, dopamine, dobutamine or norepinephrine may be used to support blood pressure. For pain, which is often present but inapparent in cats, buprenorphine and fentanyl are effective. Antiemetics and appetite stimulants are important. Eating enables reperfusion of the damaged pancreas and resolution of any associated hepatic lipidosis.

In the case of triaditis—inflammatory bowel disease, cholangiohepatitis and pancreatitis—corticosteroids are a potent adjunctive treatment. Dietary changes, if indicated, are aimed at reducing allergens (for inflammatory bowel disease) rather than fat.

The lazy pancreas

Exocrine pancreatic insufficiency (EPI) is often the antipodal end stage of chronic pancreatitis: The pancreas simply burns out.[6] In one study, 10 of 16 affected cats had a known history of pancreatitis. Uncommon in cats, EPI results from the loss of acinar cells and the enzymes they manufacture; it is not clinically apparent until about 95% of pancreatic function is absent.

Unlike dogs with EPI, which typically present with a ravenous appetite and voluminous stools, feline patients often manifest weight loss only, although polyphagia, diarrhoea and vomiting can occur. Diagnosis is confirmed by low serum trypsin-like immunoreactivity. Most cats respond quickly to supplemental pancreatic enzymes that can be sprinkled onto moistened food. Because EPI can hinder cobalamin absorption, serum cobalamin should be measured and, if low, treated with injectable vitamin B12.

Other pancreatic diseases

Pancreatic adenocarcinoma is uncommon in cats and typically diagnosed by ultrasound. Signs include anorexia, weight loss, and alopecia and shiny skin on the ventrum. It carries a guarded prognosis, especially if metastasised at the time of diagnosis. In one study, 11 of 34 cats diagnosed with pancreatic adenocarcinoma had metastatic disease on presentation.[7] The median survival for all subjects was three months, but it was slightly longer for those who underwent surgery and/or chemotherapy; 10% of cats lived for over one year.

Some less common feline pancreatic conditions include pancreatic cysts and abscesses (which are often secondary to severe pancreatitis) and parasitic infestation.

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The ABCs of Veterinary Dentistry

'V' is for Ventilation Monitoring

Monitoring ventilation is critical in dogs and cats undergoing dental procedures.

Jan Bellows, DVM, DAVDC, DABVP, FAVD

Ventilation is the process of gas exchange in and out of the lungs (i.e. bringing in oxygen and flushing out carbon dioxide). The goal of assisted ventilation is to provide adequate respiratory support, which improves oxygenation and stabilizes the plane of anesthesia.

What does ventilation have to do with veterinary dentistry? Whereas in human dentistry only local anesthesia is used for most procedures, veterinary dental procedures necessarily involve general anesthesia. Paying close attention to respiration, oxygenation and carbon dioxide levels increases the safety of our anaesthetic procedures and patient wellbeing.

Respiratory rate

Inhalant and injectable anaesthetics, including opioids and alpha-2 agonists, can lead to ventilatory suppression. In the absence of capnography, respiration can be observed subjectively by watching the anesthesia bag, the patient's chest wall and condensation in the endotracheal tube, as well as by auscultation of breath sounds.

Many patient monitoring systems default respiration readings to impedance respiration, using the indirect method of deriving respiration from the up-and-down movement of the patient's chest via the electrocardiogram leads. This indirect method is neither accurate nor reliable. Apnea monitors with loud alarms are also helpful in alerting the veterinary team to respiratory arrest.

An elevated respiratory rate may indicate progression from a moderate to light plane of anesthesia. Digital monitoring of respiratory rate and other signs of arousal during dental procedures can help avoid bite trauma to staff, radiography sensors or plates, and even monitoring equipment (Figure 1).

Figure 1. Monitoring respiratory rate and other signs of arousal digitally during dental procedures can help avoid bite trauma to staff, radiography sensors or plates, and even monitoring equipment Here, a respiratory rate of 45 breaths/min is visible on the monitor. (All images courtesy of Dr. Bellows)

Pulse oximetry

The pulse oximeter noninvasively calculates oxygen saturation of haemoglobin using light absorption in tissue. A probe from the oximeter emits red and infrared lights, which are detected by a photodetector that is placed across an arterial bed.

Oxygen saturation in an anaesthetised patient should be maintained between 95% and 100%, particularly if the patient is breathing 100% oxygen. Saturation readings of 95% or less indicate hypotension, insufficient oxygen flow, cardiac disease, pulmonary disease, vasoconstriction or shock. A patient with an abnormal reading may have an underlying problem that should be determined and corrected. The most common causes are prolonged attachment in the same area, hypotension and vasoconstriction due to temperature or drugs.

Pulse oximetry readings may be unreliable if the animal shows excessive movement, poor perfusion or pigment in the area where the sensor is placed.

Excessive hair between the sensor and the mucous membranes can also prevent accurate readings in animals. One of the most effective placements of the peripheral capillary oxygen saturation probe is on the tongue. Dental procedures by their nature involve movement and instruments in the mouth. Extraoral areas for probe placement include the prepuce, vulva, ear, toe webbing, digits, tail and rectum (the latter may be unreliable because of interference from fecal matter).

End-tidal carbon dioxide

The gold standard for evaluating ventilation is carbon dioxide monitoring. End-tidal carbon dioxide (EtCO2) is the concentration of carbon dioxide in the exhaled breath during exhalation. EtCO2 monitoring through capnography is often called the "anesthesia disaster early warning system." Vitally important, it is the only parameter that thoroughly reflects a patient's ventilatory status and can signal problems within two breaths. Interpreting the capnograph waveforms (capnograms) can also demonstrate the quality of the patient's breathing.

The device used to measure carbon dioxide should be a key consideration when choosing equipment to monitor veterinary patients during dental procedures. When selecting a mainstream device, make sure that the probe is solid state (no moving internal parts) to endure the rigorous environment of a busy veterinary practice. When using a sidestream device (Figure 2), pay close attention to the sample rate. Sample rates of 50 mm/min or less are recommended for small dogs and cats). If carbon dioxide monitoring is not currently in your practice's budget, check whether you current monitor is equipped to upgrade later.

The absolute carbon dioxide value is not as important to embrace as the capnograph waveform, which graphically demonstrates carbon dioxide levels during one inspiration and expiration cycle (see Capnogram Parameters). A normal waveform should have a baseline of zero during inspiration (i.e. inspiratory baseline). This is followed by an expiratory upstroke that contains initially little or no carbon dioxide and moves upward until it levels out at a plateau.

Carbon dioxide concentration continues to increase until it reaches its maximum just before the onset of inhalation (i.e. inspiratory downstroke).

The height, frequency, shape, rhythm and baseline

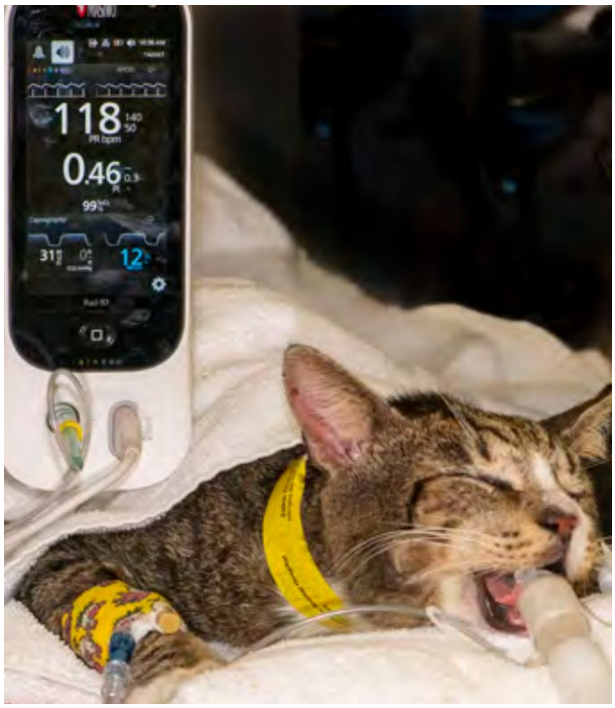


Figure 2. Sidestream carbon dioxide monitor.

position of the waveform should be monitored closely during anaesthesia. Carbon dioxide concentration in the sample is reflected by the wave height. Changes in the standard waveform should alert the anaesthetist to a problem with the patient, the airway or the anaesthetic circuit. Normal readings are in the range of 35 to 45 mm Hg (Figure 3A).

Hypercapnia, a result of hypoventilation (Figure 3B), is when EtCO2 exceeds 50 mm Hg. Hypercapnia can lead to vasodilation, a decrease in systemic vascular resistance and, subsequently, a reduction in blood pressure. Increased carbon dioxide readings may also occur because of faulty check valves, exhausted soda lime, mild to moderate patient airway obstruction and hypoventilation.

Hypocapnia, a result of hyperventilation (Figure 3C), is when the EtCO2 is less than 30 mm Hg. Hypocapnia is uncommon in anesthetized animals but may occur as a result of hypothermia, oesophageal intubation, extubation, disconnection from the breathing circuit, obstruction of the endotracheal tube or impending cardiopulmonary arrest.

Anaesthesia ventilators

Because dental procedures commonly take hours, the patient's head-down positioning can lead to poor ventilation secondary to abdominal contents pushing on the diaphragm. The ventilator delivers a

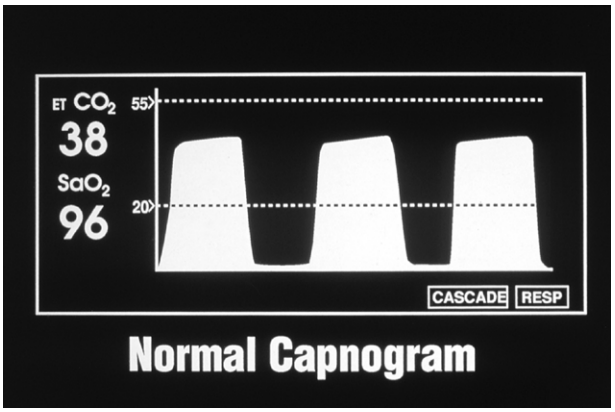


Figure 3A. Capnogram showing normal breathing.

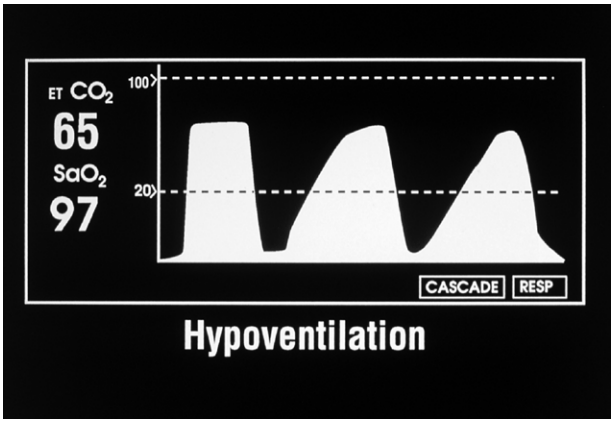


Figure 3B. Capnogram showing hypoventilation.

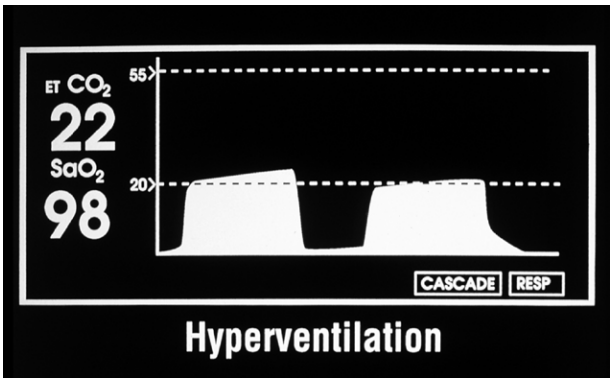


Figure 3C. Capnogram showing hyperventilation.

predetermined respiratory rate, volume and pressure during the entire procedure. Monitoring EtCO2 is essential if mechanical ventilation is used.

Mechanical ventilation is more efficient than spontaneous breathing at delivering even doses of inhalants and less time-consuming than manual ventilation. Anaesthetic planes are generally more consistent throughout the procedure.

Some practices use anaesthesia ventilators on all patients undergoing dental care, while others use them only when indicated due to possible effects on cardiac output.

Of note, there are drawbacks to mechanical ventilation, and each case should be evaluated individually. Positive-pressure ventilation may impede venous return and negatively affect blood pressure. There is also a risk for accidental over-inflation of the lungs and barotrauma from inappropriate ventilator settings.

"Bucking the ventilator," characterised by the patient attempting to breath around or against the ventilator, may indicate a light level of anaesthesia or high EtCO2. Check the patient first to assess anaesthetic depth and correct as needed to deepen the level. If the carbon dioxide level is too high, adjust the ventilator settings to increase the volume or pressure being delivered to the patient. Monitor closely as depth can change quickly.

It is not always recommended that patients be ventilated to a specific volume; instead, ventilate to a predetermined pressure and EtCO2. Turn the volume on the ventilator to the lowest setting. Set breaths/min to the desired frequency and increase the volume in small increments until the pressure on the manometer is reaching the desired pressure with each delivered breath. Turn on the ventilator, fill the bellows if necessary (Figure 4) and set the controls in the following manner:

- Set a reasonable respiratory rate based on patient size (typically, between 10 and 15 breaths/min).
- Adjust the inspiratory time to reflect an inspiratory-expiratory ratio close to 1:2. Physiologically, this is the most normal.
- Once you are ready to connect an anesthetized patient, fill the bellows (if necessary) by increasing the flow rate rather than using the oxygen flush valve. The flush valve will dilute out the anaesthetic gas concentration and may cause your patient to become light or wake up. Turn the flow rate down to the rate you intend to use.
- Turn on the ventilator and watch the pressure manometer and EtCO2 readings. Make sure pressure does not exceed the desired positive airway pressure and keep the EtCO2 setting between 35 and 45 mm Hg.

Having a thorough understanding of basic respiratory physiology is essential to grasp the importance of adequate ventilation and respiration in the anaesthetised patient. Monitoring your patient during and after anaesthesia is probably the most important consideration to create anaesthesia success (Figure 5).

Figure 4A. Ventilator with bellows being used to assist a cat undergoing full mouth extraction

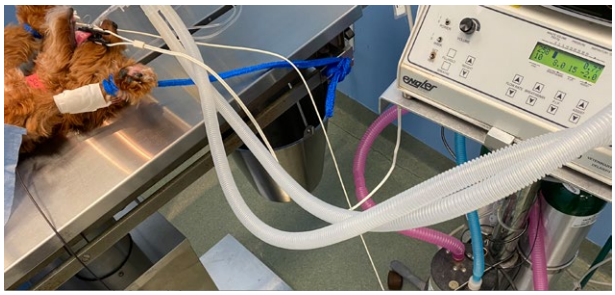
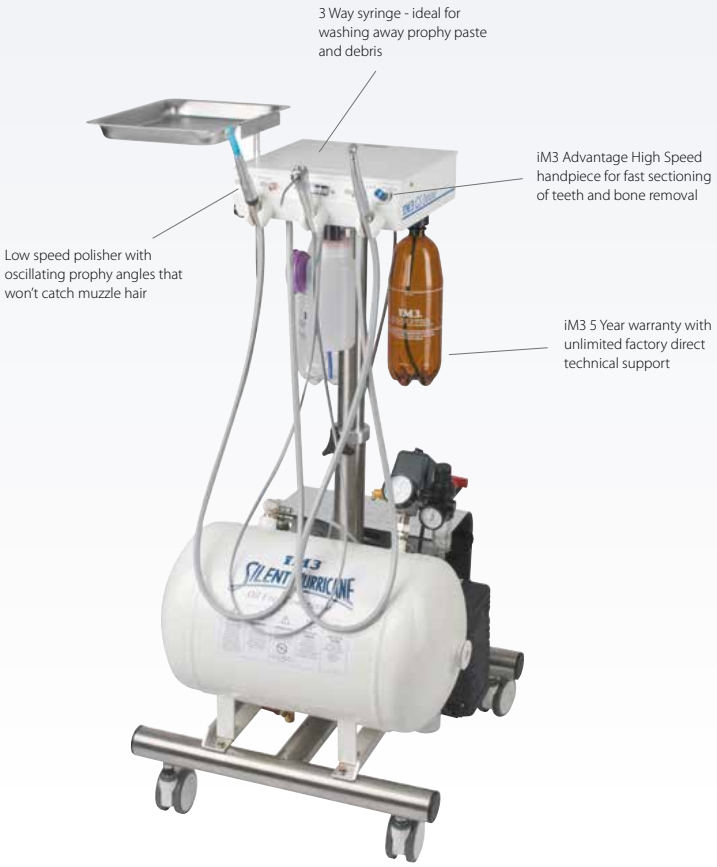


Figure 4B. Ventilator without bellows being used to assist anesthesia in a dog.

Figure 5. A veterinary assistant monitors a recovering patient's temperature, pulse oximeter reading and ECG.



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