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## **Emergency Medicine in General Practice: The Technician's Role**

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The technician plays a crucial role in managing emergency cases in veterinary medicine. In today's emergency setting there are many different types of equipment used to help us with diagnosing, monitoring and treating our patients; however, the veterinary technician cannot be replaced (Battaglia). Nothing can replace what technicians know clinically, what they observe and their gut instincts. They are the eyes and ears of the doctors, the communicator for their patients, the person to explain and answer questions the owners may have and many times a shoulder to cry on.

With a topic as broad as this one, I thought about all of the things that we do as veterinary technicians in emergency medicine and what our main goal is in every task. From triaging to nursing care to discharges, everything we do as veterinary technicians is for our patients. To put it succinctly, my main goal is to be my patient's advocate. I do this by thinking critically about what is going on with the patient before me and how I can make them more comfortable. I try to have the answers to the questions I think my doctor is going to ask before they do, with the intent of making our interaction smooth and brief so that we can both keep moving on with our respective mental lists. So, let's walk through all of the ways we advocate for our patients and how veterinary technicians are vital to any practice, with focus on emergency medicine.

### **Triaging and Client Communication**

As technicians, we are often the first person to talk with owners about their pets. Whether by phone or in person, it is our job to help answer their questions, address their concerns and guide them in the direction that's best for their pet. As an emergency practice we triage patients both in person upon arrival and over the phone. Oftentimes, the owner is wondering if their pet needs to be seen now or if they can wait. Since you cannot see or touch the patient during a phone triage, it is very helpful to have a few basic questions to ask at the beginning of the phone call. We must often read between the lines of what the owner is saying and weed out the "fluff;" starting with these questions (Figure 1.) will help keep the owner on track.

**Figure 1.**

Introduce yourself

Pet's name, species/breed, age and sex (altered?)

Main concern, How long has this been going on?

Pertinent medical history

Current medications

From there the questions should be in relation to the main concern. It is recommended that you familiarize yourself with your hospital's policy on what can or cannot be given out over the phone and discuss that with the owner (Norkus). For example, at DoveLewis our policy is that we cannot give out dosages of medications we have not prescribed (we legally can't) and we do not recommend inducing vomiting at home, due to the possibility of aspiration, esophagitis, gastroenteritis, uncontrolled dosing and a longer duration of emesis. If their pet needs to have vomiting induced we recommend they bring their pet in, letting them know it is safer for them to be monitored and has less side effects. If you have established a relationship with this patient it is important to look up their account and skim through it as owners may not remember all of the important details of their pet's medical history. For liability concerns, it is also very important to document all communications and recommendations from your phone calls in the event that you need these details for legal reasons. If in doubt or if the owner doesn't sound convinced that they should bring their pet in, just remember that they are concerned enough to call so you are concerned as well. Triage over the phone is not an easy task. It takes good communication and listening skills and becoming skilled and efficient at it takes time and practice. Remember that you are there to help their pet; take the time to reassure them of that fact, they will appreciate hearing it.

When a patient presents at DoveLewis they are greeted by one of our Client Service Representatives who then alerts the technicians. A technician will then greet the owner, introduce themselves, and find out their presenting complaint while observing the patient before touching them. During this time, I take mental notes on whether the patient was carried in, if they collapsed, or if they look scared or excited. If they are scared, I may ask if I can touch the pet. I also observe how they are breathing. There are many things that you can learn from your patient just by watching them. For example, say you have a cat that was called as a stat because he was panting but you observe his color is nice and pink. If the owner doesn't seem concerned, I may ask them if this is why they are here and if not, then I would ask if they think the car ride caused them him some distress. If that is the case, then I may escort them to an available room and let the cat walk around, knowing he will probably be more comfortable (and the owner too) waiting in a quiet room with his owner while I continue my triage. Depending on the symptoms the patient has presented for, I may start with checking their gums first or I may feel pulses first. If they

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are stable and not in need of oxygen therapy, vomiting induction, or pain medication immediately, then I will let them wait with their owner. This is more comfortable for both the pet and the owner.

### **Communication**

I want to emphasize that communication is key. When I advocate for my patients, I do by communicating. Whether on the phone, in the lobby with owners, or in the treatment area with the doctors and other coworkers, we are constantly communicating and helping our patients. Communicating clearly and effectively helps build trust with clients and makes them more comfortable.

Most of us went into veterinary medicine because we love animals and people are gross. While many of us are introverts, we still have to learn to communicate effectively in order to help our patients. This is where the technician's role as client educator and doctor interpreter comes in. When we keep owners informed on what is going on they have a better client experience and are more likely to follow through with patient treatment. It is not uncommon to have emergencies come in and pass up (e.g. an active young Labrador with vomiting and diarrhea). It is important for us to remember that many people are unaware of how an emergency room works, that the more critical patients are seen first. It can be very frustrating for owners to sit in the lobby and watch other pets and owners being helped into a room to talk with the doctor, especially when they have been waiting longer. If we remember to take the time to explain that their pet is stable, that they may be waiting for some time but will be seen, they will be more understanding (if still somewhat impatient). If we aren't mindful, transparent, and don't communicate effectively with the owner, they may have a bad experience, become frustrated, and leave with their pet.

As an emergency hospital, we have owners select a patient code status upon arrival, in the event the patients' health declines and needs intervention. In situations where we need to start treatment immediately, we can get verbal consent to start but we also go into more detail about the cost of stabilization on the check in form. Being able to get started on the stabilization or pain medication a patient may need is most important and being able to accomplish that quickly becomes my number one priority. I have learned to communicate and explain why this needs to happen in order to get permission from the pet's owner. This way I can take the patient to the treatment area, ask a doctor for a pain medication dose and let them know that the owner has consented to that treatment. Early on in my career I would forget to ask questions that are now second nature and now I don't have to stop and turn back to ask the owner more questions before I can facilitate the pain medication. Critical thinking has helped me to become more efficient in treating my patients.

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## Take Ownership

When a patient comes back to the treatment area and receives pain medication or some sort of stabilization right away, more often than not the person who triaged that patient and knows the most about it will be in charge of its case. It's very important to communicate with our co-workers and come up with a plan on who will take ownership over different cases and treatments. Our co-workers are our team and communicating and coming up with a plan for tackling treatments helps the day (or night) to go more smoothly. It also helps patients and treatments not slip through the cracks. Moving forward on that patient's treatment, I am watching for signs of distress or discomfort. It is my responsibility as that patient's nurse to evaluate and report my findings to the doctor. For example, if I find that the patient shows signs of nausea after giving them Hydromorphone, I am going to tell the doctor my findings and give examples of why I think the addition of Maropitant is warranted. I will do the things I can to help make my patient more comfortable even if it is not scheduled on the treatment sheet because it is my responsibility as their technician to give them the best care that I can. Another example of this is when a patient that is laterally recumbent needs to be repositioned and have range of motion added to their treatment sheet—I can start doing that and add it to their treatment sheet if it is missed.

As technicians, we are multi-taskers and our jobs require us to be detail oriented. We must pay attention to not only the patients we are responsible for but also the other patients that are around us. We are a team, and if we notice something that one of our co-workers did not then it is our duty to let our co-worker know. While we all get caught up with tasks and our own mental lists from time to time, we will be much more successful at giving the best care to our patients if we work together.

We can advocate for our patients in many ways, including effective and transparent communication with owners about their pets and efficient communication and planning with co-workers. Finally, the best thing you can do in any emergency situation is to try to be prepared. Thinking critically about cases, asking the right questions, and acting on them are a few great things to start with in stressful emergency situations.

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**Triage questions:**

- Introduce yourself
- Pet's name, species/breed, age and sex (altered?)
- Main concern? How long has this been going on?
- Pertinent Medical history
- Any current medications?
- How is the patient acting? (depressed? Still eating? Restless? Etc...)

**Breathing:**

- Increased rate/effort? (Open mouth breathing? Abdominal effort?)
- Gum color?
- Is there a history of heart issues or difficulty breathing?

**Neuro**

- Seizure(s)?
  - History of seizures? First seizure? And/or how many? (on any medications?)
  - How long? (grand mal? Did they urinate themselves?)
  - Anything they could have eaten or gotten into? (compost/slug bait/ meds etc)
- Ataxia? Anisocoria? Head tilt? (toxin ingestion/vestibular dz (ask about nystagmus)
- Back Pain? Unable to use hind end? (Weakness?)

**Ingestion of toxins/things they are not supposed to eat**

- Chocolate/caffeine: dark, light, size of dog/weight
- Grapes/raisins: bring in for vomiting/exam/diuresis
- Chicken bones: We will not induce vomiting but exam is a good idea. Could cause GI upset/obstruction vs. bulk up diet, keep close eye on appetite and bowel movements
- Compost/ Marijuana: Bring in (can induce vomiting if they are alert enough)
- Have them call pet poison hotline? (it is cheaper (and saves time), for them to call then for our dvm)

**Vomiting:**

- How long/often? (Still eating?)
- Actively producing? (What does it look like?)
- Any change in food?
- Any exposure to fish?
- Have they eaten anything not supposed to? (toys, food, chocolate, etc...)
- Are they coughing/hacking and "vomiting"?

**Diarrhea:** (similar to vomiting)

- Change in food?
- Have they eaten anything not supposed to? (toys, food, chocolate, etc...)
- Any change in food?

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- Any exposure to fish?
  - Straining, blood...?

**Trauma:** (remember compensatory shock, HBC dog may not show signs right away, should still be seen)

- What happened? How long ago?
- Actively bleeding?
- Do not pull objects out of area, do not recommend bandaging (can apply pressure on the way in)
- Offer advice on transportation and keeping the patient from bouncing around.

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## Canine and Feline Infectious Diseases in the Pacific Northwest: What are we looking for?

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DoveLewis Annual Conference 2019 Speaker Notes

### UPPER RESPIRATORY INFECTIONS IN CATS

Infective agents:

- **Viral**
  - Feline Herpes Virus (FHV-1) [also called feline rhinotracheitis]
  - Feline Calicivirus (FCV)
- **Bacterial**
  - Bordetella bronchiseptica
  - Mycoplasma felis (this not the same as Mycoplasma Hemofelis)
  - Chlamydia felis
  - Streptococcus spp
- Bacteria causes secondary infections and are rarely the primary cause
- Up to 90% of infections are caused by FHV-1 and FCV.
- **Clinical signs:** depressed, lethargic, fever, sneezing, inappetence, nasal & ocular discharge
  - Less commonly: ulceration of the tongue, palate and oral cavity
- **Transmission:** Spread cat to cat via secretions from the eyes, nose, mouth and via sneezing. The virus can survive in the environment up to 18 hours. Infected cats become carriers where the virus goes dormant. There is no viral shedding during dormancy, but the virus can be reactivated during times of stress: pregnancy, environmental, illness, medications that suppress the immune system
- Infection can damage the nasal cavity causing chronic sneezing and nasal discharge
- FHV-1 causes more severe symptoms. FCV tends to cause milder disease symptoms but may be associated with chronic stomatitis in cats. There is a less common strain of FCV called virulent FCV (VS-FCV) that causes much more severe illness and has a high mortality (up to 60%). Outbreaks have been associated with overcrowding in shelters and a spontaneous mutation of FCV.
- **Diagnosis:** Based on clinical signs
- **Treatment:**
  - Minimizing clinical signs and improving quality of life
  - Treat secondary bacterial infections (antibiotics)
  - Educate client about remission and minimizing stress in the home (<https://indoorpet.osu.edu/cats>)
  - NSAID to reduce inflammation or corticosteroid?

- Topical medications to reduce nasal inflammation (Little Noses decongestant or saline) or ocular inflammation (various ophthalmic drops or ointment)
- Usually self-limiting and will resolve on its own in 7-10 days. Disease can last longer in kittens. FeLV + or FIV + cats can have more severe disease as can any immunosuppressed cat.
- L-lysine is no longer recommended
- Nutritional support. Cats do not eat if they cannot smell their food. Educate clients to clean the face, offer warm, canned food and humidification can be helpful to thin nasal mucus (take the cat into the bathroom anytime someone is taking a shower)
- **Prevention:**
  - Vaccination (FVR, FVRCP, distemper combo vaccine, 4 in 1)
  - Isolate new cats in the home for 14 days to monitor for signs of upper respiratory infection
  - Minimize stress in the home (see the Ohio State's Indoor Cat Initiative website)
  - Regular veterinary care and low stress at home is the best way to prevent relapses
- Brachycephalic cats can have much more severe disease and more susceptible to upper respiratory infections due to their anatomy.

### **FeLV and FIV (FELINE LEUKEMIA AND FELINE IMMUNODEFICIENCY VIRUS)**

Both are retroviruses (they infect cells and turn them into virus factories)

- **Infective agents**
  - FeLV (feline leukemia virus)
  - FIV (feline immunodeficiency virus)
- **Transmission:**
  - FeLV: "Friendly cat disease"
    - Saliva, nasal secretions
    - Possible but rare: urine, feces, milk, shared bowls and litterboxes
    - Cat to cat transfer via mutual grooming is the most common transmission route. Cat bites are route of transmission as well.
  - FIV: "Angry cat disease"
    - Saliva
    - Bite wounds are the main route of transmission
    - Non-aggressive contact is not efficient route of transmission
- **Risks:** kittens, unvaccinated cats, cats that fight with other cats, outdoor cats
- **Clinical Signs:** *FeLV*: can be asymptomatic
  - Early signs: anorexia, progressive weight loss, poor coat, enlarged lymph nodes, persistent fever, gingivitis/stomatitis, infections of urinary tract/skin/URTI and persistent diarrhea
  - Cats can mount a defense against FeLV and eliminate FeLV from the bloodstream, but not the body. Cannot spread the virus and will test



negative on ELISA test. The virus can reactivate in the future. Called a regressive infection and occurs in ~ 10% of infections.

- Progressive infections are when the cat tests positive and has clinical signs.
- *FIV*: same as FeLV plus neurological disorders, other infectious diseases present (Toxoplasmosis, *Mycoplasma haemofelis*, FIP)
- **Diagnosis**
  - ELISA (enzyme-linked immunosorbent assay) testing
  - SNAP test, Witness test
    - -Detects presence of FeLV antigens in the blood-stream. Vaccination does not affect test.
    - Detects presence of FIV antibodies in the blood-stream. Vaccination will affect test.
    - Testing kittens under 12-14 weeks can result in a positive FIV result due to maternal antibodies. Retesting at 6 months old is recommended.
    - Other testing is available for cats that test positive, but they are not the first tests to establish viral status.
      - IFA, PCR, bone marrow aspirates
- **Treatment**
  - No cure only management of infections and diseases that may develop.
  - Immunomodulators such as T-cyte?
  - Antiviral medications such as Interferon?
- **Prevention**
  - FeLV—vaccination
    - AAFP recommends all kittens be vaccinated with the initial series regardless of their indoor/outdoor status and re-evaluate in one year on whether to continue FeLV.
  - FIV/FeLV: keep cats indoors/spay/neuter to prevent fighting viral test new cats coming into the home the FIV vaccine was discontinued in 2017, but cats vaccinated will test positive
- **Care of FeLV/FIV positive cats**
  - Prevent endo and ectoparasites to prevent stress on the immune system
  - Keep the home stress free
  - Provide warm places to sleep
  - Keep bowls and litter boxes clean to prevent bacterial infections
  - Exam every 6 months to check for early onset of disease good nutritional support (no RAW diets)
- **Prognosis**
  - Median age of survival post diagnosis is 2.5 years
  - Cats can be healthy for years before diagnosis.
  - Death is from opportunistic infections and cancer (lymphoma)

**MYCOPLASMA HAEMOFELIS:** aka Hemobartonella, hemoplasmosis, hemotropic mycoplasmas, feline infectious anemia

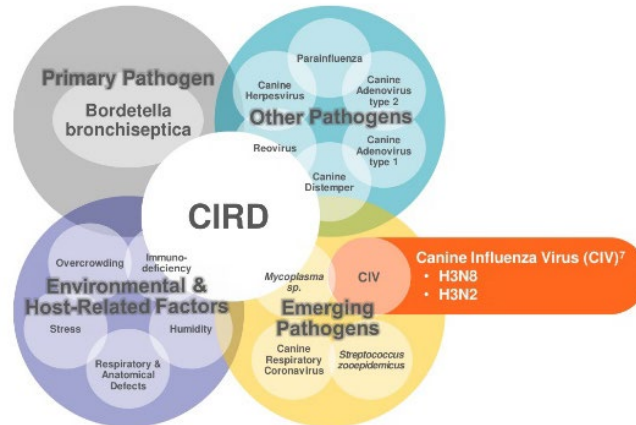
- **Infective agent**
  - Mycoplasma Haemofelis bacteria
    - Bacteria that parasitizes the red blood cells (this is not the same Mycoplasma spp involved in upper respiratory infections)
- **Transmission**
  - Infected blood (blood transfusions, contaminated needles/surgery instruments), cat bites that involve blood, vector transmission (lice, ticks, mosquitoes, fleas??)
- **Clinical signs**
  - Weakness, pale mucus membranes, dehydration, decreased appetite, weight loss, tachypnea, tachycardia, fever in acutely ill cats
- **Laboratory findings**
  - Anemia with moderate to marked regenerative anemia (increased number of nRBCs, polychromasia, anisocytosis, Howell-Jolly bodies and increased reticulocyte count), Coombs' test will be positive in acute phase only, organism may be seen in peripheral blood smear (< 50% of the time in acutely infected cats)
- **Treatment**
  - Supportive care (may include oxygen support and blood transfusions), antibiotic treatment to eliminate the bacteria (2-4 weeks of treatment needed)
- **Prognosis**
  - Good if treated. Earlier treatment provides a better outcome. One-third of cats that are not treated will die.
- **Prevention**
  - Transmission is not fully understood in regard to the role of vectors so it is recommended to prevent ectoparasites, keep cats indoors to prevent fighting with other cats
    - Cats that are pre-disposed are: male cats, outdoor cats, cats with history of cat bite abscesses, older cats and cats that are FeLV or FIV positive.

### **CANINE INFECTIOUS RESPIRATORY DISEASE (CIRD)**

aka: kennel cough, upper respiratory, canine infectious tracheobronchitis

- **Infectious agents:**
  - Bacteria: Bordetella bronchispetica, mycoplasma spp, streptococcus zooepidemicus
  - Viruses: canine herpesvirus (CHV), canine adenovirus-1 (CAV-1), canine adenovirus-2 (CAV-2), parainfluenza (CPiV), distemper (CDV), reovirus, coronavirus (CRCoV), canine influenza (CIV)
- Other factors: environmental/host related (stress, age, immune-system, anatomical defects, overcrowding)

## Etiology of CIRD<sup>6</sup>



<sup>6</sup> infectious respiratory disease. *Veterinary pathology*. 51, 492.

**ZOETIS PETCARE**

- **Transmission**
  - Direct contact with nasal/oral secretions, aerosolized virus/bacteria via coughing and sneezing, fomites (kennels/bowls/bedding/environment/clothing/unwashed hands, etc)
- **Clinical signs**
  - Coughing (dry and harsh or wet), sneezing, retching, nasal/ocular discharge (watery or mucopurulent), more severe cases can have fever, lethargy, inappetence and progress to pneumonia
- **Diagnosis**
  - Treatment started based on clinical signs
    - Canine Respiratory Panel to culture pathogen
    - 3 view chest radiographs to rule out pneumonia in more severe cases
- **Treatment**
  - Supportive care
    - Antibiotics for primary or secondary pathogen and infection
    - Antitussives to decrease coughing so the pet can rest
    - Anti-inflammatory medications +/-
      - Rest and exercise restriction for 10-14 days
      - Isolate from other dogs for at least 2 weeks, preferably 3-4 weeks
      - Hospitalization may be needed for pneumonia
- **Prevention**
  - Vaccination (DAP, DHLPP, DHPP, distemper combo, etc and Bordetella, CIV vaccines)
    - avoid dog parks and public spaces until dog is fully vaccinated
- **Risk factors**
  - Boarding in kennels/dog day cares

- Recently adopted dogs from shelters/rescues
- Dogs that travel and participate in shows/events
- Unvaccinated dogs
- **Canine Influenza Virus (CIV)**
  - Emerging pathogen—the US dog population has no immunity to this virus.
    - First appeared in the US in April 2015
    - CIV is viable in the environment up to 48 hours, on clothing for up to 24 hours and unwashed hands for 12 hours
    - Cats can become infected from dogs and may be asymptomatic or develop mild URTI signs. It is unknown if they can transmit CIV to dogs.
    - Imported from South Korean dogs where CIV is endemic. A 21-day in-home quarantine is recommended for all dogs coming from Southeast Asia.
    - Signs are like regular upper respiratory except they become sick very quickly and are more likely to have; a fever over 104 F, mucopurulent nasal discharge, lethargy, anorexia and signs of pneumonia
    - Incubation period is 1-5 days, but signs appear 2-8 days later. Dogs will appear fine but are shedding the virus.
    - All dogs exposed will become infected unless they have been vaccinated against this strain.
      - 80% of dogs will develop clinical signs and require some sort of treatment
      - 20% of dogs will not become sick, but will spread the virus
      - Mortality is 8-10%
  - Vigilance is important since this is a new virus.
    - Have a protocol for your clinic for any possible CIRDC dogs (ask owner to remain in their car outside the clinic and call when they arrive, have owner and pet come in a side door if possible, disinfection protocols in place, limit the number of staff that interact with the pet, check out client in the exam room, escort them out a side door, etc)
    - Know the signs of CIRDC
    - Have your vaccine manufacturer give staff a lunch and learn about vaccines and prevention
    - June 2019—Oakland Animal Shelter and the Oregon Humane Society prevented an outbreak due to their vigilance!

## **SALMON POISONING**

- **Infectious agents**
  - Parasite: Nanophyetus Salmincola
  - Bacteria: Neorickettsia Helminthoeca
    - Found in freshwater fish in coastal streams in the Pacific Northwest (plus the Pacific Giant Salamander)
- **Clinical signs**

- Vomiting, diarrhea, bloody diarrhea, lethargy, dehydration, fever (> 104), lymphadenopathy, nasal/ocular discharge
  - Signs appear 6-10 days post exposure
  - If not treated up to 90% of dogs will die within 14 days of exposure
- **Diagnosis**
  - Made primarily on clinical signs and history of exposure
    - Parasitic eggs not consistently shed in feces
    - Lymph node aspirates may show rickettsial bacteria
- **Treatment**
  - Supportive care including IV fluids, antibiotics, anti-emetic if needed, deworming
- **Geographical area**
  - Pacific Northwest (Alaska to San Francisco) but prominent from Puget Sound to northern California
- **Immunity**
  - Most dogs will be immune after infection and treatment but can have a milder form of infection due to other similar infectious agents (Neorickettsia Elokominica and Stellanchasmus Falcatus).
- **Prevention**
  - Do not allow dogs to eat raw fish.
- **Affected species**
  - Dogs, cats, raccoons and bears are not affected. Bears that are relocated from east of the Rocky Mountains to west of the Rockies can be affected though.

## **GIARDIA**

- **Infectious agent:** Giardia protozoa (many different “strains” called assemblages)
  - Cats: Giardia F
  - Dogs: Giardia A1, C and D
  - Humans: Giardia A and B
  - Because we do not test what strain of Giardia in fecal tests, it does have zoonotic potential but almost all cases are spread between the same species
  - Giardia LOVES the Pacific Northwest
    - Can survive in the moist, cold environment for weeks to months
- **Clinical Signs:** Can be asymptomatic
  - Diarrhea (the big one)
  - Vomiting, weight loss, lethargy
  - Giardia is THE most common intestinal parasite in the Pacific Northwest.
    - 2018 Companion Animal Parasite Council (CAPC) data: Of 40,000 fecal samples tested 10% were positive for Giardia in Multnomah County. For the same timeframe only 1.87% tested positive for roundworms.
  - Symptoms can also be from Coccidia, Cryptosporidium and Toxoplasmosis
- **Diagnosis:** Fecal centrifuge (70% chance of detection)

Giardia antigen testing (95% chance of detection)

Based on clinical signs

- **Treatment:** No medications are approved for treatment of Giardia in dogs in the U.S.
  - Metronidazole 10-25mg/kg BID for 5-10 days
  - Fenbendazole 50mg/kg SID for 3-5 days
  - Both medications might be used together or alone
  - Praziquantel/pyrantel/febantel SID for 3 days
  - Bathe on last day of treatment to remove cysts on fur
  - Pick up all feces in yard to prevent re-infection
  - Don't take your dog to public places during treatment!
  - Retest fecal in 3-4 weeks to make sure infection has cleared, that re-infection has not occurred, and that patient does not have resistant/chronic infection (immunosuppression, drug resistance, inadequate drug levels, Giardia sequestration in the gall bladder or pancreatic ducts)
- **Prevention**
  - Pick up feces
  - Avoid high risk environments (dog parks, muddy environments, rivers/lakes and streams)
  - Do not allow pets to eat feces
  - Do not allow pets to drink from rivers, lakes, puddles, ponds, etc

## **HEARTWORM**

- **Infectious agent:** *Dirofilaria immitis* (heartworm)
- **Transmission:** The parasite is transmitted to the pet via the mosquito (the mosquito is required for transmission)
- **Clinical signs:**
  - Dogs: Persistent cough, fatigue after activity, weight loss, decreased appetite, Caval Syndrome (sudden onset of labored breathing, pale mucus membranes and dark urine in heartworm positive dogs). The adult heartworms impair the blood flow through the heart.
  - Cats: Atypical host for heartworm.
    - Most worms do not survive to adulthood in cats
    - The cat immune system is very efficient at eliminating microfilaria
    - Pulmonary signs rather than cardiovascular signs as in dogs.
      - HARD (heartworm associated respiratory disease)
        - Increased respiratory rate, coughing, dyspnea
    - Ascites
    - Sudden collapse or death
- **Diagnosis:**
  - Dogs: Antigen testing (in-house or to an outside lab)
    - Detects a protein produced by an adult female heartworm
    - Antigen will not appear until at least 5 months post infection
    - Reasons for a negative heartworm test:

- The dog is negative (yay!)
- The dog was infected less than 6 months ago.
- The dog has a low adult worm burden (less than 2 adult females or no adult females)
- Cats: Difficult to diagnose due to low worm burden and the cat's immune system eliminating the microfilaria.
  - Antigen and antibody testing are recommended
    - Antibody testing can be performed as early as 2 months post infection
    - Antigen testing can detect antigens 7 months post infection
- **Treatment**
  - Cats: There is no treatment, only supportive care for respiratory signs. Heartworm prevention is still recommended. Keep cats indoors.
  - Dogs: Treatment is difficult and may cause the dog's death. Surgery to remove worms from the heart may be required. I am including the link to the American Heart-worm Society treatment guidelines due to how extensive they are: <https://www.heartwormsociety.org/veterinary-resources/american-heartworm-society-guidelines>  
(The page long treatment protocols are on page 25)
- **Prevention**
  - Heartworm preventives (monthly oral, 6 or 12 Heartworm is in all 50 states
  - Climate change and urban heat islands are increasing mosquito habitats
  - Relocation of pets from natural disasters (Hurricane Katrina). The American Heartworm Society now has guidelines for relocating pets on their website.
  - Importing pets from other countries via rescue organizations

## **LEPTOSPIROSIS**

- **Infectious agent:** Leptospira bacteria
  - Over 250 serovars of Lepto
  - 10 important in dogs
  - 4 that we can vaccinate against
- **Transmission**
  - Via infected urine, soil, water, food or bedding. A bite from an infected animal.
  - Eating infected tissue.
  - From mother to fetus.
- **Clinical signs**
  - Fever, muscle tenderness/pain, increased thirst, dehydration, decreased urination, lethargy, anorexia, diarrhea and jaundice.
  - Less common: bleeding disorders
  - Infection can progress to renal failure and/or liver failure.
- **Diagnosis:** Can be difficult.
  - MAT (microscopic agglutination testing)
    - Detects antibodies

- Vaccination will also produce antibodies
- Paired titers are recommended
  - Convalescence
  - 2-4 weeks later
- ELISA (enzyme-linked immunosorbent assay)
  - Detects antibodies
  - Vaccination “may” produce a positive
- PCR (polymerase chain reaction)
  - Detects Lepto DNA
  - Whole blood and urine tested simultaneously
    - Blood is positive early in infection usually less than 5-7 days post infection
    - Urine is positive 7-14 days post infection
- **Treatment:** Supportive care (IV fluids, antibiotics, isolation from other pets, close monitoring of urine production).
  - Continuous renal replacement therapy (CRRT) in advanced cases may be needed
  - Consider treating other dogs in the household
- **Zoonotic potential**
  - Humans can become infected treating a Lepto patient (usually from contaminated urine). Infection can lead to renal failure, liver failure, respiratory illnesses and meningitis. Most infections are from contaminated water though.
- **Prevention:** Vaccination with the 4-way serovar annually.
  - Keep yard free of debris that can attract rats (carriers of lepto)
  - Remove standing water from yard
  - Remember this is not a “rural” disease anymore
- **Cats**
  - They can become infected, but they usually have no clinical signs and clear the infection on their own. It is unknown the extent they can contaminate the environment while infected.
- **Risks**
  - Climate change is increasing the risk of exposure to Leptospirosis due to flooding. Flooding leads to outbreaks.
  - Urban farmers (goats, chickens) attract rats to back yards and neighborhoods.
  - Active dogs are exposed while camping, swimming, hiking or at dog parks an infected dog has visited.
  - Late fall is peak season for infections
  - Exposure to streams, rivers, standing water
  - Areas with over 40” of rainfall a year

## **LYME DISEASE**

- **Infectious agent:** Borrelia burgdorferi spirochete bacteria



- **Transmission**
  - Western black-legged tick (*Ixodes Pacificus*). Bacteria is spread during tick feedings. Ticks must be attached 24-48 hours before transmission can occur.
- **Risks:** Habitats are moist environments with wooded leaf litter and tall grasses.
  - Dogs are 50-100 times more likely to be infected than humans.
  - Cats are fastidious groomers and less likely to allow tick attachment.
  - Lyme disease cannot spread from dogs to humans (ticks must attach and feed). A tick can move from a dog to a human before feeding.
- **Ticks have a 3-year life cycle that includes deer and mice populations.**
  - Reforestation of farmlands leads to increased deer and mice populations.
  - Suburbanization puts humans closer to forests and deer population.
- **Prevention**
  - Year-round tick preventives
  - Lyme vaccine?
    - Not recommended for general population
    - Vaccination must occur before exposure
- **Clinical signs**
  - Fever, lameness, anorexia, arthritis, fatigue, protein losing nephropathy (PLN), edema, Lyme nephritis (Lyme antibodies deposit in the kidneys and there are no clinical signs, but damage to the kidneys is occurring. This is a fatal complication and Labs/Goldens appear to be pre-disposed)
- **Endemic areas:** Northeastern US, Upper Midwest and California.
  - 50-95% of dogs in these areas will test positive for Lyme antibodies, but only 5-10% of those will develop clinical signs
  - Lyme disease is spreading due to:
    - Climate change
    - Travel with pets
    - Reforestation of farmlands
    - Lack of year-round preventives in use for dogs
- **Risk**
  - Living or travel to endemic area
  - Not being on year-round preventives
  - Dogs that hike, camp or hunt
- **Diagnosis**
  - Clinical signs
  - Lyme testing (antibody testing in-house, Quantitative C6 testing to an outside lab, Lyme Multiplex through Cornell)
  - Diagnosis is difficult due to long incubation periods, antibodies can persist for years, antibodies bind to connective tissue and escapes detection
  - The immune system needs 4-6 weeks to mount a response for a positive test. (The Lyme Multiplex can detect antibodies as early as 3 weeks post infection)
- **Treatment:** Antibiotics for 4-8 weeks (Doxycycline)

- The goal is a latent state without clinical signs. Eradication with antibiotics may not be possible. Relapse is possible in the future.

**RABIES-yes this is still a concern!**

- **Infectious agent:** rabies virus
  - Post exposure prophylaxis (PEP) costs the global economy 10 times the amount it would cost to eliminate canine rabies at the source (vaccinating dogs).
- **Transmission:** Via the saliva of an infected animal (bites or scratches)
  - Transmission can also occur via organ and corneal transplants, aerosolized saliva but it is rare
- **Rabies is 100% preventable**
- **Risk:** 5.5 billion people worldwide live with the daily risk of rabies
  - 59,000 deaths a year worldwide
  - Children are at the greatest risk
  - Most human rabies transmissions come from dogs
  - Why should we (the U.S) care about rabies?
    - It is preventable
    - Vaccinating is cheaper than prophylactic treatment
    - It saves lives
    - The US and Europe are now “importing” rabies from other countries.
      - Importing pets from rabies endemic countries with no rabies certificates or forged certificates
      - Travel to rabies endemic countries and we, as Americans (and Europeans) are not educated about rabies and its transmission. We can become infected, not seek treatment and bring rabies back to the US (or Europe).
    - There is no treatment. Once signs appear, rabies is fatal.
    - Anti-vaccination attitudes of clients
      - This puts veterinary support staff at risk
      - Educate your self about rabies transmission and laws regarding rabies to be able to educate clients
        - The Global Alliance for Rabies Control offers a free course about rabies (transmission, stats and how to prevent the spread of rabies)
          - <https://rabiesalliance.org/capacity-building/gep>
- **Treatment:** None (for humans or pets)
  - The Milwaukee Protocol is considered a failure by the medical community
- **Prevention:** Vaccination of dogs and cats
  - Dogs and cats are a barrier between humans and wildlife
    - 70% of dogs need to be vaccinated to protect humans from rabies exposure
  - Indoor cats need to be vaccinated as well

- Cats are now four times more likely to test positive for rabies than dogs
- Rabies vaccines are required by law (usually through state or county ordinances)
- Educate clients.
  - About rabies and the requirement for rabies vaccination. Mark in the chart if the owner declines rabies vaccination to protect yourself and business.
  - The Zero by 30 worldwide initiative was launched in 2015 to eradicate rabies in the world.  
<https://www.who.int/rabies/resources/9789241513838/en/>
- Do not handle fractious dogs and cats with no proof of rabies vaccine. It is not your “job” to get bit! Advocate for your patients and yourself.
- Know what your county requires when a human is bitten by a vaccinated pet and unvaccinated pet.
- Know what the wildlife vector is for your geographic area.
  - Bats, raccoons, and skunks are the big 3
- Don’t let the zombie apocalypse happen (it starts with rabies!)

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## **Pass on the Gas: Understanding Total Intravenous Anesthesia (TIVA) Techniques and Indications**

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DoveLewis Annual Conference Speaker Notes

### ***General Anesthesia***

The term “anesthesia” comes from the Greek word “anaesthesia” which means without feeling and can be further defined as a loss of sensation. Many associate the term anesthesia solely with general anesthesia. However, it is important to understand that there are various degrees of central nervous system depression with general anesthesia being the largest degree on this scale. Sedation can be defined as a drug induced state of *drowsiness* resulting from mild to moderate CNS depression. General anesthesia can be defined as controlled and reversible depression of the central nervous system in order to elicit *unconsciousness* and eliminate pain during periods of surgical stimulation. The most important distinction being; that when a patient is sedated, they can still respond to noxious stimuli but with general anesthesia, there is no response to noxious stimuli. Further, we can define and specify surgical anesthesia as a stage of general anesthesia where muscle relaxation and analgesia are sufficient to allow surgery without pain or movement. Inhalant anesthetics have become the primary modality of anesthetizing veterinary patients over the last several decades. While there are many options for inhalant anesthetics across academia and research, the most commonly used inhalant anesthetics in clinical practice are isoflurane and sevoflurane.

### ***Isoflurane and Sevoflurane: The Basics***

Both isoflurane and sevoflurane belong to a group of inhalant anesthetics known as halogenated ethers. The exact mechanism of action on the central nervous system by these drugs is not solidly understood. Both drugs are primarily metabolized by the lungs and enter the bloodstream via diffusion across the alveolar membranes when the patient inhales. They are eliminated in the same way when the patient exhales. Diffusion is controlled via a concentration gradient as well as lipid solubility. The cell membranes of the alveoli act as the concentration gradient. When inhalation of the agent begins, this concentration gradient favors the alveoli. This means more agent is present in the alveoli than in the bloodstream. During this period where the concentration gradient favors the alveoli, we see an increased rate of diffusion into the bloodstream. This slows as a balance in the concentration gradient is reached. Both isoflurane and sevoflurane are highly lipid soluble so they will rapidly enter the brain from systemic circulation to produce central nervous system depression and initiate unconsciousness or general anesthesia. When isoflurane or sevoflurane are discontinued, there becomes less and less of these agents available in the alveoli to diffuse into the bloodstream. Eventually, there is no agent

remaining in the alveoli available for diffusion into the bloodstream. This in combination with the majority of the inhalant in the bloodstream eliminated through exhalation, makes general anesthesia produced by these agents, quickly reversible. It is for this reason these agents became so highly utilized in veterinary anesthesia.

***Isoflurane and sevoflurane: What do they do to our patients?***

The attractive qualities of these agents come with a price. They require careful consideration with regards to their effects on the body. Isoflurane and sevoflurane have dose dependent adverse consequences on the cardiovascular and respiratory systems. Of all anesthetic agents, inhalants will cause the most profound effects on these systems. Isoflurane and sevoflurane are potent vasodilators and negative inotropes, meaning these agents cause significant myocardial depression leading to hypotension. Hypoventilation is a common occurrence with the use of isoflurane and sevoflurane. Hypoventilation leads to hypercarbia and respiratory acidosis. These effects trickle down to other body systems including the renal and cerebrovascular systems. Isoflurane and sevoflurane do not provide any analgesia to our patients. So, when used alone, they require higher doses to be administered to keep patients at an anesthetic depth appropriate for surgical stimulation. Potency of inhalants are defined by their minimum alveolar concentration or MAC. MAC is defined as the percentage of inhalant required to prevent movement and response to 50% of patients receiving surgical stimulation. MAC of isoflurane is 1.3% in the dog and 1.6% in the cat. MAC of sevoflurane is 2.3% in the dog and 2.6% in the cat. Across studies, the average dose of these two inhalants needed to keep patients at an appropriate depth of general anesthesia for surgical stimulation is 1.5-2 times MAC. This means that when used alone you likely need to have your patient on roughly 3% isoflurane or 4.5% sevoflurane to maintain adequate depth.

***Why is this less than ideal in a patient with co-existing disease?***

**Cardiovascular disease:** In the most basic terms, the primary function of the cardiovascular system is to deliver oxygen to tissues through the circulation of blood. Patients with cardiovascular disease already have a reduced ability to adequately deliver oxygen to the tissues and organs because of their co-existing disease. This includes reduced cardiac contractility, cardiac output, increased cardiac workload and increased myocardial oxygen consumption. Our goal with general anesthesia is to maintain homeostasis as much as possible. This becomes more difficult to achieve in patients with cardiovascular disease when considering the delicate balance of already present co-existing disease and the cardiovascular depression caused by inhalant anesthetics. Specifically, hypotension with subsequent decreased perfusion becomes a concern in patients with cardiovascular disease. Using higher concentrations of inhalant anesthetics in these patients can have a profound and certainly much more detrimental effect on these patients versus a patient with no co-existing cardiovascular disease. Additionally, cardiovascular disease can complicate how we approach treatment and blood pressure management in the face of hypotension. Large fluid boluses of crystalloids and colloids are contraindicated in these patients. Often times these patients are medically managed with beta blockers, ACE inhibitors, calcium channel blockers, sodium channel blockers, etcetera and these drugs

will impact treatment and efficacy of vasopressors and positive inotropic agents used to manage hypotension.

**Respiratory disease:** The respiratory centers of the medulla in the central nervous system serve as the drive for breathing. Therefore, central nervous system depression and subsequent respiratory depression caused by inhalant anesthetics, can have significant consequences in a patient with respiratory disease. The respiratory system is responsible for gas exchange in the bloodstream including the uptake of oxygen and elimination of carbon dioxide. There are many complex factors that contribute to effective gas exchange that could serve as a stand-alone lecture. Many patients with co-existing respiratory disease, specifically lower respiratory disease already have decreased ability to ventilate adequately and this becomes much more profound when using inhalant anesthetics. Additionally, we know from what we discussed previously that adequate gas exchange becomes essential for inhalant anesthetics to enter the bloodstream and make their way to the brain to elicit general anesthesia. Patients with lung disease such as atelectatic lung tissue or a lung mass are going to have less alveoli to participate in gas exchange and it becomes increasingly difficult to maintain a steady anesthetic plane when using inhalant anesthetics.

**Intracranial disease:** Patients with neurologic disease such as head trauma or brain tumors are at significant risk if intracranial pressure and cerebral blood flow are increased. Inhalant anesthetics, as potent vasodilators, will contribute to an increase in intracranial pressure in these patients with already diminished cerebral autoregulation. These complications can be further exacerbated by respiratory depression related increases of carbon dioxide levels in the blood. Autoregulation of both intracranial pressure and cerebral blood flow occurs when PaCO<sub>2</sub> is maintained between 30 and 40 mmHg. In patients with an increase in brain tissue mass such as, a tumor, hemorrhage or swelling, there is a pre-existing increase in cerebral blood flow exaggerated by co-existing disease. This compounded by vasodilation secondary to inhalant anesthetics, will predispose these patients to life threatening hypoxia.

**Renal disease:** Renal disease is a very common co-morbidity in veterinary patients presenting for general anesthesia. The profound effects on the cardiovascular and respiratory systems secondary to inhalant anesthetics can in turn increase complications in patients with underlying renal insufficiency. Cardiac output and blood pressure have significant impacts on renal blood flow and therefore renal perfusion. Careful monitoring to ensure that dangerous decreases in blood pressure are addressed immediately becomes an absolute necessity in the patient with renal disease. If allowed to persist, hypotension will result in irreversible damage to the kidneys. Even in a healthy patient with no renal disease, normotension and normovolemia are essential to maintain homeostasis. This becomes more difficult in a patient with renal disease because of the reduced ability to tolerate even the slightest insult.

### ***Balanced anesthesia***

Balanced anesthesia is the term applied to the concept of utilizing multiple agents to achieve general anesthesia. This enables us to use lower doses of each drug and therefore reduce harmful side effects. Balanced anesthesia is especially important in patients with co-existing disease specifically to reduce the concentration of inhalant anesthetics. While balanced anesthesia may seem like an elementary concept, it is significantly under-utilized in clinical practice across the board. Instead we see high doses of inhalant used widely to anesthetize veterinary patients increasing peri-anesthetic complications. Taking the concept of a balanced anesthetic protocol one step further, we can evaluate drugs available to us to that allow for elimination of inhalant anesthetics completely in certain patients with co-existing disease.

### ***Total intravenous anesthesia***

Total intravenous anesthesia is defined as the maintenance of general anesthesia using solely injectable agents intravenously. Remember, the primary goals of general anesthesia are to produce unconsciousness, analgesia, muscle relaxation and amnesia while maintaining homeostasis of the body systems. Keeping balanced anesthesia in mind, this can be achieved using multiple injectable agents that have less of a deleterious effect on patients with co-existing disease. Using a TIVA protocol does not negate the necessity of appropriate premedication and induction protocols. TIVA becomes a part of the balanced anesthesia protocol and specifically represents the maintenance phase of general anesthesia. In short, TIVA is replacing the inhalant agent. The incorporation of local blocks whenever possible, also increases the effectiveness of a TIVA protocol and allows for the use of a lower effective dose of each agent to keep the patient at an appropriate depth of anesthesia. Administration of maropitant (Cerenia) should be considered in patients receiving TIVA from both an analgesic and anti-emetic standpoint to reduce vomiting potentially associated with the use of injectable agents. Reasons TIVA is advantageous in specific patients presenting for general anesthesia include: improved hemodynamic stability (reduced cardiovascular depression, reduced respiratory depression and improved cerebral blood flow autoregulation), reduced post-operative nausea with certain protocols, adjustability and reversibility of the drugs, less dysphoric or rough recoveries, improved analgesia and improved stability of anesthetic depth during surgical stimulation. Additionally, TIVA eliminates veterinary staff exposure to waste anesthetic gases during procedures such as bronchoscopy or upper airway surgery. It is important to acknowledge that we are still producing general anesthesia in our patients when using a TIVA protocol. TIVA is not sedation. Meaning appropriate monitoring of patients on a TIVA protocol such as; heart rate and rhythm, ventilation and oxygenation, blood pressure, temperature and depth, must be at the highest standards and comparable to a patient on an inhalant anesthetic. Additionally, patients receiving a TIVA protocol should still be intubated and administered 100% oxygen supplementation if the procedure permits.

### ***Total intravenous anesthesia: How do we do it?***

Successful TIVA includes utilization of continuous rate infusions (CRIs) of multiple agents and specifically those agents with low potential for accumulation in the body. Continuous rate infusions are the use of low doses of the desired agent delivered to the patient at a



constant (but adjustable) rate. Because doses used for CRIs are significantly lower than those used for pre-medication and induction, an initial bolus or “loading dose” is always required to achieve peak plasma concentrations. Often times these initial doses are achieved during the premedication and induction phases of anesthesia. Some of these agents, when used peri-anesthetically, absolutely require administration via CRI due to short half-life. This is necessary for the agent to remain therapeutic. CRIs maintain appropriate plasma concentrations of the agent avoiding “peaks and troughs” associated with intermittent bolusing. When multiple agents are used as a CRI, it allows for much lower doses of each agent, again reducing undesired side effects. Intermittent boluses of these agents can be utilized to increase anesthetic depth if the patient is responding to surgical stimulation, similarly, to increasing the vaporizer dial with inhalant anesthetics. CRIs can be administered via a syringe pump or mixed with intravenous fluid therapy, although, there are special considerations for using agents mixed with crystalloid fluids. For example, in a patient with cardiovascular disease where fluid overload is of great concern. Additionally, CRIs mixed with fluids also require a second “clean bag” to be used for fluid boluses if indicated in the patient. It is also important, when selecting agents, that the anesthetist consider any potential drug interactions between agents being administered through the same IV line. For the most part, agents that are used for a TIVA protocol can be mixed in the same line. However, if there are additional medications used for blood pressure support, this may require a second IV catheter be placed in the patient.

***Total intravenous anesthesia: What drugs can we utilize?***

**Propofol and alfaxalone:** When utilizing a TIVA protocol, it is essential to choose one primary anesthetic agent to elicit general anesthesia. The two most common agents used for TIVA are propofol and alfaxalone. Propofol is considered a non-barbiturate general anesthetic that binds to GABA receptors to produce CNS depression and induce general anesthesia. Propofol will lead to significant respiratory depression to the point of apnea when inducing general anesthesia. This most commonly occurs when propofol is administered too quickly. Like inhalants, propofol is a negative inotrope and vasodilator although much less significantly so. Because of this, propofol can lead to hypotension so it might not be the best choice for a patient with cardiovascular disease. Cats have a decreased ability to metabolize some of the compounds in propofol when used too frequently. Prolonged or repeat use of a propofol (specifically a CRI) is not recommended in cats and can lead to Heinz body anemia. Propofol is rapidly metabolized and eliminated from the body. Additionally, the clearance of propofol from the body occurs independent of hepatic blood flow indicating that other tissues likely contribute to metabolism as well. This makes propofol a good choice in patients with hepatic disease. Propofol will decrease cerebral blood flow, intracranial pressure and cerebral metabolic oxygen demands making it the ideal choice for a TIVA protocol in a patient with intracranial disease. Alfaxalone is a neurosteroid anesthetic that binds to GABA receptors to produce CNS depression and induce general anesthesia. When used at appropriate doses, alfaxalone causes significantly less cardiovascular depression and apnea than propofol. Alfaxalone is considered to have a “safe” cardiac profile and is also rapidly metabolized and cleared from the body. Because of the almost non-existent depression of the cardiovascular system, when compared to

propofol, alfaxalone is almost certainly the first choice for a TIVA protocol in a patient with cardiovascular disease. Additionally, alfaxalone would be the first choice to use in a feline patient because of their reduced ability to metabolize propofol. Once it is decided which agent will be your primary anesthetic agent, it is important to select other agents to complete a balanced TIVA protocol.

*Loading doses:* ALWAYS to effect: propofol 4-6mg/kg, alfaxalone 1-5mg/kg  
*CRI doses:* propofol 1-7mg/kg/hr, alfaxalone 4-8mg/kg/hr

**Opioids:** Opioids, specifically pure mu agonist opioids, are ideal agents to utilize in a TIVA protocol. Opioids are utilized primarily from an analgesic perspective but also provide mild to moderate sedation depending on the agent. Opioids act on the pain pathway at transduction, modulation and perception. While they do cause dose dependent CNS depression similarly to inhalant anesthetics, this is much less significant and therefore more desirable in a compromised patient. Common opioids used in clinical practice for CRIs include hydromorphone, morphine, fentanyl and remifentanyl. Short half-life, increased elimination, adjustability and low accumulation in the body, make fentanyl and remifentanyl the most desirable agents of this list. Remifentanyl especially is ideal when used in the patient with neurological disease due to an “ultra-short” duration of action. Butorphanol can be used as a CRI as well, however, butorphanol will only agonize the kappa receptor so it should only be used for non-painful procedures. Buprenorphine is not a reasonable choice for a CRI for several reasons. First, it has a very slow onset of action of 30-45 minutes IV. Secondly, it will only partially activate the mu receptor making it inferior to a pure mu opioid for effective analgesia. Most importantly, buprenorphine’s duration of action is directly related to the dose. Meaning, higher doses will lead to longer duration of action. Lastly, buprenorphine has a “ceiling effect” which means that after repeated doses, efficacy will not improve. Any compromised patient including those with cardiovascular disease, renal disease, respiratory disease or neurological disease will benefit from an opioid used as part of their anesthetic protocol. There are no absolute contraindications with the use of opioids in patients with co-existing disease.

*Loading doses:* hydromorphone 0.1-0.2mg/kg, morphine: 0.3-0.5mg/kg,  
fentanyl/remifentanyl 3-5mcg/kg,

*CRI doses:* hydromorphone 0.02-0.07mg/kg/hr, morphine 0.1-0.3mg/kg/hr,  
fentanyl/remifentanyl 5-20mcg/kg/hr,

**Midazolam:** Midazolam is a benzodiazepine agent used to provide muscle relaxation and mild sedation. Midazolam inhibits GABA receptors to produce CNS depression. It is most effective in older and compromised patients. Half-life elimination is approximately 1-2 hours and midazolam does not tend to accumulate in the body. When used as a CRI, doses should be kept relatively low due to the potential for prolonged recovery and extubation times in patients receiving TIVA. To combat this, midazolam can be reversed with flumazenil once it is no longer needed. Administration of a midazolam CRI is generally not

indicated post operatively because it does not provide analgesia, although, there may be certain situations where it could be of use. Midazolam should be used with caution in patients with hepatic disease and avoided completely in patients with severe hepatic dysfunction. This is because midazolam is highly protein bound and primarily metabolized by the liver.

*Loading dose: 0.1-0.2 mg/kg*

*CRI dose: 0.2-0.4mg/kg/hr*

**Ketamine:** Ketamine is a cyclohexamine anesthetic used to induce general anesthesia. It is also referred to as a dissociative agent. Ketamine will actually stimulate the CNS, so it is not a “true” anesthetic. Instead, it works by causing a “dissociation” between the thalamus and limbic system of the brain to produce a trance like state. Ketamine works on the pain pathway at modulation. Ketamine is known to reduce central neuronal hypersensitization also known as wind-up. Wind up occurs in the dorsal horn of the spinal cord when there is an overwhelming amount of noxious stimuli that activate the many NMDA receptors located there. This in turn amplifies the signal to the brain. Ketamine is an NMDA receptor antagonist effectively reducing wind-up. Ketamine will initially depress the cardiovascular system; however, ketamine will indirectly stimulate the sympathetic nervous system. This may lead to increased heart rate, cardiac output and therefore blood pressure. Ketamine should be avoided in patients with certain cardiac conditions such as hypertrophic cardiomyopathy but can generally be used in patients with cardiovascular disease as long as the patient is not tachycardic. Ketamine causes an increase in cerebral blood flow, and intracranial pressure so it is not an appropriate choice for patient with intracranial disease. Ketamine at a moderate dose will have little impact on a patient with renal disease as it is primarily metabolized by the liver. However, ketamine is primarily excreted by the kidneys, so caution should also be used in patients with moderate to severe renal disease due to increased elimination times

*Loading dose: 0.5-1mg/kg*

*CRI dose: 0.12-1mg/kg/hr*

### **Lidocaine**

Lidocaine is a sodium channel blocker and is categorized as a class 1B antiarrhythmic. For these two reasons a lidocaine CRI may be helpful to use for certain patients in which there is concern for tachyarrhythmias. Lidocaine and other local anesthetics work on the pain pathway at transduction, transmission and modulation making them superior analgesics. Lidocaine can be of particular benefit in the patient with intracranial disease because it reduced cerebral metabolism and cerebral blood flow. One of the other benefits of lidocaine is that it is a prokinetic that can enhance gut motility helping to prevent ileus. A lidocaine CRI should never be used in a cat due to toxicity. When utilizing a local block as part of the TIVA protocol, it is important to consider total dosing to avoid toxicity.

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*Loading dose:* 1-2mg/kg

*CRI dose:* 1-4mg/kg/hr

***Careful Considerations with Total Intravenous Anesthesia***

While TIVA has many attractive qualities for patients compromised by co-existing disease, there are important considerations when using a TIVA protocol. Because these agents are solutions, great care must be taken in the patient with cardiovascular disease to ensure that fluid overload does not become a concern. In these patients, agents should be administered via syringe pump versus mixed with intravenous fluids. The volume per hour of each of these agents must be factored into the total over all fluid volume per hour including crystalloid therapy. Rates must also be adjusted if additional blood pressure support is needed via the addition of a vasopressor or positive inotrope CRI. Although, the majority of agents discussed previously have short duration of action and elimination from the body, recovery with a TIVA protocol may be longer versus those patients who have been anesthetized with inhalant anesthetics. This becomes a particular concern in patients with hepatic disease.

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## A Multi-Modal Approach to Mobility Issues

Sara Short, BS CVT CCRP

### DoveLewis Annual Conference Speaker Notes

#### **What does the term Rehab mean to you?**

In my mind it's an incredibly broad topic that consists of a lot of moving parts that requires team collaboration (referring veterinarians, surgeons, techs, assistants, owner/family, pet sitter, boarding care staff, etc.). I have found that when we come together as a team to rehabilitate our patients we are able to offer more encompassing care equaling the multi-modal approach.

Rehab is one the fastest growing markets within the Veterinary community. Its gaining popularity all over the world and being incorporated in general practices everywhere. Does it take a specialist like myself to do Rehab in your clinic? No, it does not and it's often why I teach owners certain things that they can do at home (exercises/home modifications) so that they are contributing to the multi-modal rehab plan. Doing combinations of therapies is what allows us to get complete coverage of care (nose to tail) and can result in shorter treatment periods.

#### **Common Mobility Issues**

Mobility issues can plague any pet of any species at any time in their life. They can arise from birth with a congenital deformity to old age osteoarthritis and EVERYTHING in between. Knowing this, almost every patient you see could benefit from rehabilitation therapy at some point in its life span. This is why it's so important to start fresh at the beginning with every patient to individualize their care and not get hung up on pre-set protocols. Guidelines or outlines can be helpful for some but, many of your patients and clients are not going to fit within these lines for some reason or another. I teach my vet students to look (visually evaluate) at their patients as a whole; not to fixate on the one specific injury or diagnosis and to think further about what the rest of the body is doing to compensate the deficit(s) that have occurred. So for example, you have a patient that just had some type of knee surgery. How long has this patient been experiencing discomfort and over using the other 3 limbs to make of for the weight % loss of the affected limb? What other areas of the body are sore as result of the uneven weight distribution? As a rehab practitioner it's not only my job to rehabilitate the injury (to get it functioning and strong again) but to alleviate overall pain and help the body perform at its highest potential. This includes those that have never experienced a specific injury but may not be able to participate in the activities they enjoy most because they are overweight, arthritic, etc.

→Hip OA, Hip Dysplasia, Legg-Calves Perth's, Iliopsoas sprains/strains, Quadriceps Tie-down/Contracture injuries, Osteosarcoma →THR, TPO, FHO, Amp

→Stifle/Hock OA, CCL, Stifle OCD, Tib/Fib Fractures, Angular Limb Deformities, Traumatic Amps, TPLO, TTA, LFS, MPL, ALD  
→Shoulder/Elbow OCD, Incongruency (MSI), ED (3factors), Forelimb Angular Limb Deformities, Rad/Ulnar Fractures, Brachial Plexus (ST injury), Tenosynovitis, Tendinopathies, Nerve Sheath Tumors→ALD (UO), FMCP, UAP, OCD, ESF, ISF, Amp  
→Neuro deficits caused by multiple factors: Wobblers, IVDD (Cervical, Thoracic, Lumbosacral), LSI, Back Fractures/Spinal Injuries, Brachial Plexus, DM→ISF, Hemilam, Cerv Slot  
→Generalized OA, IMPA, Cushing's, Obese, Collagen Deficiencies (ED)

### Where Do We Start?

How do we determine if our patients need rehabilitation and then how do we develop our approach?

We start by answering these questions:

- Has a complete work up been done?
  - History\*, Physical, Labs, Imaging
  - Has the patient been adequately assessed for pain? – This is where your history/routine can be very helpful info in conjunction with the physical examination.
- Is there a Diagnosis in play or are we working off of suspicions?
  - Acute Injury vs. Chronic Condition
  - Inconclusive work-ups, no \$\$ for diagnostics →treat symptomatically
- What are the client's goals for the patient?
- Have you obtained baseline information like goniometry measurements, muscle girth measurements, lameness scores, mobility video/visual data, and conformation/structural photographs?
- Do we have the non-therapy factors available?
  - Finances
  - Transportation
  - Time Commitment/Compliance
    - How does the owner feel about this process?
      - The owners' perspective is very important. The rehabilitation of a pet (family member) can be stressful as indicated by the factors listed above. If the owner is unable to be compliant for any reason (not any of their fault: emotional, physical, financial, etc.) then alternative approaches may need to be explored. Examples: Outpatient Drop-Off appointments (convenience factor), rehab/medical boarding, 3<sup>rd</sup> party or in-home care, relinquishment, or living (within reason of comfort) with lameness/disability.
- What do we have available to use for treatment (modalities)? How do we choose which of these to use?
  - Pharmacology

- Naturopathic/Homeopathic medicine
  - Nutrition
  - Thermal Therapy (Cold-Game Ready, Ice packing vs Hot-heating packing)
  - Manual Therapy
    - Joint Mobilization
    - Massage and Stretching
  - Laser Therapy
  - NMES, TENS, PEMF
  - Therapeutic Ultrasound
  - Extracorporeal Shockwave
  - Hydrotherapy
    - Pool and/or UWT
  - Therapeutic Exercises/Equipment
  - Assistive Devices
  - Environment/Behavior Modifications, Restrictions and Training

#### **Let's Talk About the Modalities (listed above)**

There are so many things (combinations/therapies) that can be done right and so little to be wrong within the rehab setting. As long as the outcome is to “do no harm” to your patients, then combining whichever modalities that work for you, the owner, and the patient at relieving pain and reestablishing/improving functionality or mobility to equal a better quality of life, then go for it. Be creative and positive and incorporate the team to ensure the best experience possible.

#### **Pharmacology**

As NATUROPATHIC as physical rehabilitation is, it can't relieve or cure everything. This is why pharmacology and naturopathic/homeopathic medicine is such an important modality for any rehabilitation plan. If your patient is suffering from pain then it is often times difficult to implement any other modalities due to sensitivity to being handled (touched), and/or moved. Therefore, pain relieving meds and/or anti-inflammatories may need to be factored in by the veterinarian. Pain can hinder progress and it's easy to fall behind on the control of pain. In addition, the start of physical rehabilitation can be painful at first. Sometimes the inflammatory cascade is restarted with therapy and pain can derive from this process. NSAIDs or anti-inflammatory drugs can be of good use for some of these cases in conjunction with your inflammation reducing modalities. If the client prefers the holistic approach and is working with a veterinarian well versed in eastern medicines, they would be able to provide direction and/or prescription to those homeopathic remedies and/or Chinese herbs that are best used for the treatment of inflammation. In recent human medical forums, Turmeric has been identified as a good source of anti-inflammatory support for joint pain all the way to enlarged lymph nodes. Case Ex: Dirk, 5yo Rott w/GI Lymphoma and ED/HD.

Anxiety and/or the “wind up” anticipation of something being done is also a factor. Sometimes, after a few treatments this subsides because your patient is feeling better.



Other cases stay nervous throughout your treatment period and medications (mild sedatives) or homeopathic remedies that help them relax is sometimes needed to get full benefit of the session and make progress. Case Ex: Compass, 9yo Mixed with end stage HD & severe travel anxiety.

Some modalities can require complete sedation because the treatment itself can elicit a painful response initially (delivery) and these may also be modalities that require your patient to be still. Although we prefer situations where mild physical restraint will suffice, treating injuries under tense restraint is contradictive to the end goal as well. While chemical restraint may be necessary for the modality, your combinations of modalities will be a little more limited with a sedated patient. Since our end goals are usually to relieve pain and improve mobility, I try to stay with light sedatives that either the owner can administer prior to the session or that can be reversed in your session time so that the patient walks out on the own accord. This will greatly depend on what you are treating and the patients' level of comfort. Ex: pharmacology, shockwave and massage work well together as opposed to shockwaving a patient and then trying to utilize hydrotherapy in the same session. No sedated patients in the water!

### **Superficial Thermal Therapies**

I like thermal therapies factored into most of my plans because it's simple and effective when done appropriately. And, most of all its cost effective when the owner can do it at home! For the reduction of inflammation/edema = reduction of pain (swelling/edema/seroma formation is painful), enhancing elasticity and making skin/muscles/ligaments/tendons/joints more receptive to stretch/ROM, and circulation of blood flow to proliferate tissues via vasodilation all results of **heat** therapy. This form is most common in my practice as we reserve cold applications for the acute injuries/traumas. Heat in a rehab setting is most beneficial because we want things to be able to move. Some of our other modalities can also be considered dual action in that they provide heat therapy such as Laser, NMES, and Hydrotherapy. **Cold** therapy will slow circulation (vasoconstrict) all while still reducing inflammation but also stiffening the tissues to protect from further trauma (stop bleeding). We do like to utilize a machine in my hospital called a Game Ready to administer cold therapy immediately after surgery, often in recovery. This machine circulates ice cold water through a hose and pressurized cuff that is placed over the injured limb.

### **Manual Therapies: Joint Mobilizations and Massage/Stretching**

This is an area of physical rehabilitation that often takes a back seat to more extravagant modalities but is extremely effective when performed correctly. Admittedly, as a busy rehab practitioner, I often under-utilize these therapies and do not consider myself well practiced in performing them. When I determine that this modality is a necessity for my patient, I find myself referring to Debbie Gross-Sanders explanations and examples in the veterinary rehabilitation text cited for this paper. Much like other modalities that we are reviewing, this area of therapy could encompass an entire lecture on its own with discussion of relationships between bones, joints, and surfaces, grades of mobilizations, and treatment time/reps. Since the purpose of today's lecture is to discuss combination

therapy options for our mobility deficient patients, I will leave the in-depth explanations of the above factors to your reading pleasure and just touch on some basics of use of this modality. The book definition of this modality is very broad. It's based off of skilled hand movements to manipulate tissue in order to improve/increase/induce ROM and relaxation of the body/joints, and reduce pain/inflammation/restriction. Manual therapy is indicated for a variety of patients such as those with pain and loss of ROM associated with hip dysplasia, elbow dysplasia, and intervertebral disk disease. It should not be confused with massage and stretching, in that when we stretch we hold a low load on tissues for a specified amount of time to elongate them verses when doing joint mobilizations the load (force) is applied in oscillations for the reasons listed above (Sanders, 448). Since there are several ways to approach manual therapy and differences in types of motion of each joint, it's very important to pay attention to your patients' response by posture, pain patterns, and respiratory pattern during treatment.

Massage, another manual therapy and modality that can be utilized by many. Although seemingly simple and popular, it too is becoming more important and studied enough to be its own specialty in the veterinary field (more so in large animal). In the human field it continues to be explored and requires special schooling. The current working veterinary definition of massage is the manipulation of soft tissues of the body (Sutton/Whitlock, 464). Sounds simple enough, but does require some understanding of the biomechanics of the soft tissues in question. So, just as all other rehab modalities we discuss today, massage has huge benefits. When we are massaging a patient, we should be aiming for physical and physiologic changes. This is achieved by low repetitive loading in medium lengths of time that cause a non-permanent creep response (gradual relaxation and short acting) (Sutton/Whitlock, 465). If I have the assistance of students and/or technician, I will apply massage therapy and stretching to my multi-modal plans that use non-water therapies. This includes combinations of the basic massage techniques taught in the CCRP program (and also found in the cited text): stroking, effleurage, petrissage, compressions (trigger points) and percussions (clapping, hacking, and pounding). Case Ex: thoracotomies and respiratory cases.

### **Laser Therapy (PBMT)**

Also known in the beginning as Photobiomodulation Therapy, is quickly becoming the most available source of therapy offered in general practice settings. Laser therapy has endless applications in both large and small animal veterinary care and is a very effective modality for short acting pain relief, reduction of inflammation, and supplying cells with the energy to perform at their peak ability. Since laser therapy has actually been around for generations and has several classifications depending on its use, it alone could encompass its own lecture. But for the purpose of this lecture, I refer to a Class IV, near infrared laser, most commonly marketed today by KLASER and Companion Animal Laser Systems. Diving into the science behind the use of lasers throughout veterinary medicine would take all of our time today. However, in the process of my own research and what I have found most useful in data and explanation, is a text book titled *Laser Therapy in Veterinary Medicine*

by a collective of authors. This text is a good reference for any veterinary professional to have when educating and providing laser treatment services in their practice.

I like to utilize laser therapy whenever pain is suspected. I will use it pre-emptively to any of my hydrotherapies, massages/stretching and manual exercises in the office as my primary thermal therapy source (warm-up). Its fast, more effective (penetration), and longer acting form of heating in the office rather than wasting scheduled time on the traditional hot pack (better saved for owner at home). Example case application: 13yro SF GSP with late stage HD & suspect LS; presented with hind end atrophy, weakness and ataxia (delayed CPs) after long periods of rest. After 3 treatments over 2 weeks, patient was moving better with increased range of motion, less discomfort, attempting normal activities and no ataxia noted.

### **NMES/TENS/PEMF**

Much like laser therapy, this modality could also be reported on all by itself. So again, just the basics covered for the purpose of this lecture. This modality utilizes electrical energy to reduce pain/inflammation, stimulate muscle contraction and promote healing. They can be teamed up with thermal therapies, hydro and therapeutic exercises. TENS (Transcutaneous Electrical Nerve Stimulation) units can be bought on Amazon and used more on an over the counter basis for a mild pain reliever (stiff/tense muscles) on the human side. The electrical current generated with most TENS units is not usually substantial enough to elicit involuntary muscle contraction in our larger patients, hence why it is often sold/prescribed over the counter due to safety in self application. NMES (Neuro-Muscular Electrical Stimulation) can be used in several applications in general or specialty hospitals for: decreasing inflammation/edema post operatively, muscle contraction (muscle reeducation)/increasing muscle strength and tone like in cases of paralysis/disuse/neurologic deficits, and accelerated wound healing. In my experience, patients tolerate use of this modality much better immediately post-op when sedation is still on board. They do have to hold still for the treatment and it can feel strange, especially when electrodes are stuck to them, so not the best modality for high strung or overly energetic patients that are not subdued by methods of distraction. In my current position, working with board certified orthopedists and soft tissue surgeons; they like to utilize this modality coupled with thermal therapy (cold) and compression (provided manually or by the Game Ready) immediately following extubation on most limb surgeries. We call it a "3 for 1" treatment consisting of NMES, Thermal Therapy (cold) and Compression all performed at the same time for about 20 minutes or as patient will tolerate. Case Ex: Cookie, 4yo Mixed Doxie, chronic muscle spasms.

### **Therapeutic Ultrasound**

This modality is actually one of my personal favorites despite its need for more time and cooperative patients. It too, like most is sorely under-utilized. Therapeutic ultrasound is best described as a deep heating tool and is not like diagnostic ultrasound in that we are not using the sound beam to reflect an image but rather using the sound waves for their

deflection and absorption of energy in the tissues to generate heat (Levine/Watson, 328). The best use for this modality is for musculoskeletal applications (Case Ex: Nita, Gracilis Myopathy). The deep heating capabilities can help release restricted range of motion caused by contracture injuries (tie-downs, adhesions, scarring) and frequent muscle spasms. It can also be used for wound healing, as deep heating will increase blood flow to an area of injury to promote granulation. Because the ultrasound beam is generated in air and then reflected in air-tissue interfaces it requires a coupling agent to fill the gap between the sound head and skin (Levine/Watson, 328). This fun fact means you can actually use therapeutic ultrasound under water (water fills the gap). As we deep heat the tissues you want to begin stretching and/or massage as well to loosen/relax tissues and this sometimes can be best achieved under water so there is less weight applied (buoyancy) to the area of treatment and battling inflammation by way of additional thermal therapy and/or hydrostatic pressure.

### **Shockwave (ESWT)**

Extracorporeal Shockwave Therapy (ESWT) or more commonly referred to as just shockwave has been around since the 70's. Its function is best described as sound waves produced outside of the body and delivered to a target area by high pressure and velocity. They are different from the modality discussed previously because of being of lower frequency, minimal absorption and non-heating. This modality is using electrical energy delivered by a trode that converts it to mechanical by utilizing the reflection of the pressure of the wave on a focal point and then releasing energy within tissues as density changes (Durant/Millis, 381). Shockwave was initially used in veterinary medicine for breaking down uroliths and pancreatoliths until it was observed that it had bone healing effects on the pelvis of lithotripsy patients. So naturally that discovery opened up the door for so many more applications and today we use it more commonly on the large animal side of orthopedic/musculoskeletal injuries. For equine rehabilitation, we use ESWT for tendon and ligament calcifications, navicular disease, back pain, fractures and OA of joints. As for dogs/cats we reserve shockwave for nonunion fractures, severe tendonitis, and end stage osteoarthritis. Newer machines are smaller and make less noise but with the older units it can sometimes limit your patient pool. The shockwave machine that I currently use in my office is one of those much older models and is very obnoxious in sound. For this reason and due to the intensity of the treatment (discomfort of penetration through tissues) our small animal patients must be moderately – heavily sedated. This factor alone can sometimes make this modality expensive and inaccessible. Case Ex: Timber, end-stage stifle OA.

### **Hydrotherapy (UWT & Pool)**

So many good things can happen with hydrotherapy and could be easily considered the most effective therapy across the board for our patients of all sizes and species. Although an underwater treadmill and pool have several similarities in terms of advantages, there are a few things that each can provide or do better over the other. The difference is in the joint kinematics that happens with buoyancy and resistance.

**Pool** swimming is useful for a variety of different patients, take for instance, a patient with substantial neurologic deficits (lacking motor function) could benefit from assisted swimming. The kicking motion, although it may be significantly uncoordinated in the beginning, can be the start of muscle contraction, micro-engagement of muscles, and the stimulation of healing damaged nerves (Levine/Millis, 526). With repeated sessions in the water and other applied modalities, the hope is that this motion begins to translate on the ground into the walking function. Often times, for some patients, swimming is also mentally therapeutic. It's fun, exciting, playful and utilizes some of the pent up energy that many of our recovering patients have during long periods of restriction. When a swimming patient is submerged, they are engaging their core muscles and their limbs to paddle and keep themselves above water. This is great for our post hemilaminectomy patients as they rely on their core muscles to pull themselves up onto their feet while supporting their backs. The paddling is also beneficial for our patients that have suffered a limb injury because they're utilizing the water as support of their body weight while putting the limb through active/voluntary range of motion.

Now depending on the injury, **underwater treadmill therapy** (UWT) could be a more useful form of hydrotherapy in that we can determine the level of resistance with the water level (also controlling the buoyancy factor) which is what helps strengthen/tone/build muscle (through swing phase of gait) and also get an increased range of motion of specific joints. We also like hydrotherapy for its anti-inflammatory effects as water temp and hydrostatic pressure exerted on the limbs can reduce edema (Levine/Millis, 527). UWT therapy often times also reduces the risk of further injury, especially when working with canine performance athletes and/or service-working canines. These dogs when working in their disciplines can naturally apply a lot of concussive forces to their joints. In the water, we are able to support their body weight during exercise to reduce the impact on their joints/limbs. We are also able to utilize the factor of resistance with different water levels (surface tension) to condition/train muscles and muscle memory. A field trial competitor (popular in PNW) performs much better when muscles have been conditioned at varying levels of resistance (primed). Warm water also has been proven in both veterinary and human fields to increase circulation (which promotes healing alone), nerve conduction velocity (increased reaction times), elasticity of soft tissues, and improve coordination (neuro patients with cp deficits).

Case Video Ex: Oscar, Finley, Stretch, Lucy, Reggie, Peanut, and Carina

### **Therapeutic Exercises**

Many of the motions that your pet/patient does on a daily basis can be utilized or trained into a therapy related exercise. I like to teach these exercises based on balance and weight shifting to my owners so that they can do these at home and use their daily lifestyles/environment to contribute to the multi-modal therapy plan. It is also a more cost-effective way to manage your therapy times by performing the modalities that cannot be carried out at home (hydro, laser, and shockwave) during your in-office sessions. Although these exercises may seem simple, their value and effect on the recovery process should

not be discounted. If the owner/handler is unable to perform exercises (physically) then I will make time for them in my sessions because they are that beneficial. When we do things that shift weight between thoracic and pelvic limbs or transversely from left to right, we are using the patients' own body weight to engage muscles that may otherwise not be used consistently or at all in some cases. Working a patients core muscles just to be able to stand unassisted (static balance vs. dynamic balance) is hugely important, so do not discount doing them!

Therapeutic exercises also increase/improve proprioception (awareness of limbs in relation to body and space). Proprioceptive deficits can be found in many patients, not just those affected neurologically but also those experiencing pain and inflammation of joints. Our muscles, tendons, ligaments and skin are innervated, so when these are affected by trauma and the inflammatory cascade is in effect then conscious proprioception can be diminished. If there are CP deficits then the patients' ability to balance would be affected as well. That is why all of the therapeutic exercises that I use have tiny variations to cover training in weight application, balance, proprioception and ambulation.

Example: OSU SA Rehab's Master List of Therapeutic Exercises  
Example: Fitbone with Knife, Cookie & Myles, Wobble board video

There are some helpful pieces of equipment available to purchase and are specifically marketed for veterinary rehabilitation and I use several of these pieces in my office every day. Although the veterinary equipment made available today is designed to withstand the weight of various sizes of animals, teeth, toenails and hooves, I have found some less expensive human exercise equipment and household items to be just as useful. These options again make it easier on you client to contribute to the rehab plan physically and financially. And most clients are pretty receptive to learning how to take everyday motions and utilize them as therapy.

#### **Therapy Equipment for the hospital:**

- Physio-balls, BOSU ball, peanuts/therapy rolls, eggs
- Fitbones, Donuts/Rings
- Wobble Boards, balance discs, swings
- Tactile Pods
- Yoga blocks, steps/tables
- Pool Noodles
- Cavalletti Rails
- Stairs
- Therabands
- Weights, weighted vests, sleds
- Gaing Devices: caps, marbles, bandages, water-wings

This also where several of our **assistive devices** become required and very useful to help our patients with safety/stability when in engaged in rehabilitative activity and general life during recovery/after injury:

- Harnesses – Help Em’ Up’s, Ruffwear, and FitPaws
- Easy Walk Halters, Gentle leaders, leashes
- Slings – Belly slings, Walk-Abouts, towels
- Hoists/Lifts with Body slings
- Hobbles, Braces/Boots, Orthotics/Prosthetics
- Ramps
- K9 Carts, animal wheelchairs

### **Putting it all Together and Implementing Your Plan**

So you have decided what modalities to use that best fit your patients’/clients’ needs and goals based on what is available to you as the therapist. You have completed your first treatment. How often do you do therapy and for how long? This is most often determined by your patient and client. Every patient heals at different rates depending on severity, acute/chronic, and the compliance of their owners (emotionally, physically, and financially). Patients can recover and regain near perfectly normal mobility within some diagnosis/injuries but there are some where life-long maintenance therapy could be necessary. This where you decide based off of your examination, treatment and assessment of your patient, what would be the gold standard of care. I always tell my clients’ that it is my job to tell them what I think may be necessary (in terms of frequency and timeline) to reach their goals and explain that this plan could change as their pet improves, plateaus or does not respond. This also means that the modalities that you have chosen to start with may/could change as your patient responds or does not. No approach is set in stone. You may find that not every aspect of your plan is working, so changes can or will be made. It is important to document everything in your multi-modal approaches especially the changes between each treatment/session; and that you try not to change too many factors at once so that physical changes/improvements can be attributed to the right therapies for the patient. Utilize your history, physical and mobility/lameness evaluations from the start of your approach (baselines) and take more measurements/evaluations (physical, video and pictures) as you go so that progress or decline can be tracked and appropriately documented. This is also a must for those performing rehab plans without direct involvement of their case veterinarian. They have to be aware of the progress or decline at all times in case there is further injury or re-injury associated with rehab therapy so that they can help you and the client modify the approach.

Case Ex: Courage, GSD with suspected DM and IVDD.

### **The Clients and Patients and the End Results**

I think working in the Veterinary Profession is entirely rewarding. We all know that it can be emotionally draining and stressful in any area/department of the profession, but since dumping my heart and soul into the focus of rehabilitation of our furry friends, I am

rewarded daily. I get so much joy out of seeing how they begin, either in the event of trauma (in-hospital treating) or post surgically (outpatient) and their improvement process. Most are so happy to engage in therapy and feel so much better at the end of just one session. That wagging tail, exercise mastered joy/excitement, or 3 extra steps they took on their own gives you that reward because you helped achieved that response. You are also rewarded by the building of great relationships/bonds with them and their owners that seem to last a lifetime. I encourage everyone to be the advocate for the pet and utilize rehab in your daily practice of veterinary medicine or do not be afraid to refer to us that specialize in it. Working together is what makes the multi-modal approach work. Case Ex: Peanut, graduation post Ventral Slot and Tracheotomy

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## Lessons from Loss: A Reflection on The Cases That Change Us

Sarah Harris, CVT, VTS (ECC)

### DoveLewis Annual Conference Speaker Notes

*We all have that one case that sticks with us- maybe more. Morbidity and mortality case reviews, grand rounds, and debriefing can help veterinary professional's process loss. Prolonged and frequent immersion in suffering and loss can have a negative impact on veterinary professions psychosocial wellbeing. Knowing that veterinary professionals are changed by this environment, it is our obligation to work to create an environment of understanding and support, as we reflect on the most challenging cases.*

#### **Mental Health Considerations for the Veterinary Professional:**

- **Compassion Fatigue:** Deep emotional and physical exhaustion that leads to a pronounced change in a caregiver's ability to feel empathy. Compassion fatigue is typically linked to repeated exposure to death and trauma or frequent witness to others trauma or grief. Therefore, compassion fatigue is also known as secondary traumatic stress.
- **Burnout:** Physical and emotional exhaustion secondary to chronic stress. Not typically associated with trauma. Contributors can include low job satisfaction, underutilization, and being overwhelmed with work. Burnout can manifest as decreased productivity and increased cynicism.
- **Imposter Syndrome:** associated with feelings of inadequacy and a sense of intellectual fraudulence. High achievers and perfectionists are very susceptible to imposter syndrome secondary to chronic self-doubt.
- **Second Victim Syndrome:** specific to healthcare providers involved in unanticipated adverse patient event. Second victim syndrome may occur secondary to medical error or patient injury. Emotional effects include anxiety, depression, and guilt.

There is little research available that focuses on the mental and emotional wellbeing of support staff in veterinary medicine. Statistically, research has shown that veterinarians are experiencing significant psychological stress and contemplating suicide at rates much higher than other professions. Anyone who has worked in the profession can tell you that this is similar in the case of veterinary technicians and support staff. While we will likely see research and statistics specific to veterinary technicians in the future, we should not wait for it to begin implementing policies to support staff member's needs.

Discussions around compassion fatigue and burnout are much more common in the workplace. Knowing now that jobs in the veterinary field come with risks to mental and social wellbeing, employees should be aware of resources available to help them if they experience any changes to their mental health.

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### **Resources:**

- **Health Care Benefits:** Counseling sessions (# of sessions provider dependent)
- **Veterinary Social Work:** Clinics are now starting to employ grief counselors or social workers to support the needs of employees and clients.
- **National and State Organization:** Research and statistics, articles and blogs, workshops and yoga.
- **Social Media:** Facebook support groups
- **Structured in-person support groups:** Balint groups

Employees that are facing feelings of compassion fatigue and burnout are more susceptible to making medical errors than if they weren't experiencing degrees of psychological distress. In addition to compassion fatigue and burnout, other contributors to increasing frequency of medical errors are incomplete/rushed training, poor work conditions, increased patient to staff ratios, and verbal and visual distractions on the floor. Even knowing this, medical errors are unavoidable. In order to make the most of situations where a mistake was made, it is important to take a gentle, supportive role to those involved. Many employees are scared to report medical errors out of fear of repercussions. The way a leadership team responds to errors in practice can play a key role in creating a safe work culture that promotes openness and honesty.

Three options for communicating and supporting a veterinary team through errors and losses are detailed in this lecture. Although, individual teams may come up with strategies that are unique and customized to their own needs.

### **Communication Options for Discussing Challenging Cases:**

- **Morbidity and Mortality Rounds (M&M Rounds)**
  - an option for learning from complications and errors
  - allows for future modification of judgment and behavior
  - helps prevent future errors
  - provides education where needed
  - allows for healing of staff involved through openness and honesty
  - Challenge: must be very careful not to shame individual who made error
  - Challenge: may not be the best option for all employees involved
- **Grand Rounds**
  - Peer-led
  - Loosely structured
  - Allows presentation of current recommendations
  - Can be inclusive over departments
  - Leads to increased work engagement
  - Can be focused on challenging cases with losses or in cases where victories are celebrated
- **Debriefing**
  - Designated discussion leader (does not have to be DVM)

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- Inclusive over multiple departments
  - Impromptu, happens on the floor
  - Focuses on details leading up to death and emotions around the loss of the patient
  - Should occur after every patient death in hospital (not necessarily scheduled euthanasia)

Every case can provide a lesson if we look close enough at our emotions around the loss of a patient. Structured discussions can provide a safe place for employees to discuss the hardest cases and acknowledge the losses that impact us to our core.

### **National Suicide Prevention Lifeline 1-800-273-TALK (8255)**

*In memory of Dr. Andrea Wade  
September 21<sup>st</sup> 1973 - March 12<sup>th</sup>, 2019*