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Overcoming Industry Challenges

by Katie Brooks, CEO (LVT,CVPM)

Dear Veterinarians,

Our thoughts are with you during this super challenging time. While we are grateful to be part of an industry that is still needed during the pandemic, we also know the
pressures that have been created by the current situation.

People bringing more pets home, increased awareness of illness or injury, and realizing in their isolation how important their companions are, need us all now more than ever. The relentless demand can be exhausting and few outside of the industry know the pressures our teams are currently under. Volume is high, patients are sicker, operations are tricky, and staffing can be challenging. Our teams are handling all of this along with the difficulties they face at home.

What we have on our side is passion and a group of highly dedicated, inventive employees that can help guide us through the adversity that we face, as well as a deep connection to they 'why' of what we do- preserving the human-animal bond that is so important to the well being of our clients and to us.

We are so grateful to work with such amazing colleagues and to be able to continue to partner throughout all the challenges we face to deliver the best support to you and service to your clients. We are here for each other.

Best,
Katie (Newbold) Brooks, CEO

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Meet Nathan Boyd, VMD, Resident in Cardiology!

Introducing Dr. Boyd! We are excited to welcome Nathan to our office inside of the Hope Advanced Veterinary Center in Vienna, VA. He is a great addition to our team and is committed to a partnership with family veterinarians in offering the highest level of care and service to our clients and their pets. Read his bio!
Vitals for Vets: Health Literacy and You!

Do Clients Really Understand Us?
by Bonnie Lefbom, DVM, DACVIM (Cardiology)

Have you ever felt like you are not getting the point across to a client? Do you find yourself answering questions that you thought you had addressed previously? We have all had those experiences. Here's why…

- The average American reads at a 7th grade level.
- Only 12% of Americans understand basic medical information.
The ability to understand basic medical information is called Health Literacy, and it is a lot worse than we thought – both in the US and across the world. Clients can be highly educated and yet understand very little of what we say. In fact, everyone prefers simple, clear, active tense communication – no matter what their level of education. The National Institutes of Health and the American Medical Association have developed great guidelines and simplified health topic information to improve patients' understanding of disease.

Veterinary medicine is just now starting to face the health literacy crisis. Recent evidence-based veterinary studies have uncovered the deficiencies in our client communication, including basic handouts we use every day (see references below). CVCA is now starting to tackle the health literacy issues in our written, electronic and verbal communication with clients. The website we are using to improve our explanations is https://www.nhlbi.nih.gov/health-topics

CVCA recognizes the challenges of effective communication. We want you to know that we are improving and simplifying our client reports. Our goal is to improve the readability of our reports and ultimately our client’s understanding of their pets’ cardiac disease. The client report is the first half of your full primary care veterinarian report we send to you.

Some examples of wording we have changed are:

- Respiratory → breathing
- Abdomen → belly

A few examples of simplified explanations we are using are:

- Hypertrophic cardiomyopathy (thick heart muscle disease)
- Congestive heart failure (fluid in/around the lungs)
- Pulmonary hypertension (high pressure in the lungs)

As a result of our committee work, we are proud to report we have dropped the grade level of our client reports from an average of grade 12 to grade 9. Not exactly the grade 7 we are targeting, but still a significant improvement that hopefully will improve the ability of our clients to understand heart disease in their pet. To learn more about this topic and how to improve your own communications, I included some references to get you started.
If you have any questions on the changes or on health literacy, please email info@cvcavets.com.

References:
1) https://centerforplainlanguage.org/learning-training/five-steps-plain-language/
2) https://health.gov/healthliteracyonline/checklist/
5) Royal K, et al; Readability Evaluations of Veterinary Client Handouts and Implications for Patient Care; TopicsinCompanAnMed33(2018)58–61
6) Sobolewski J, et al; Readability of consent forms in veterinary clinical research; https://doi.org/10.1111/jvim.15462
7) Magnani JW, et al; Health Literacy and Cardiovascular disease: Fundamental Relevance to Primary and Secondary Prevention; Circulation. 2018;138:e48–e74. DOI: 10.1161/CIR.0000000000000579

October 11-17, 2020 is Veterinary Technician Appreciation Week!

We ❤️ all veterinary technicians! Keep a close eye on our social media during Veterinary Technician Appreciation week as we show our love for the hard work our technicians do every day!

Save the Date! Join BVNS & CVCA's Annual No-cost, Virtual CE in October!
Over 1000 people have registered for The Specialty Symposium. Are you one of them? There is still time to register.
Once you have registered, please download the Whova app to get the full experience of this virtual event. Lectures and speaker bios are now posted.
www.specialtysymposium.com

The Cardiology & Neurology Symposium is now
The Specialty Symposium
Sunday, October 18 & Sunday, October 25, 2020
9am-2pm
Follow us on Facebook and Instagram @specialtysymposium

Register NOW!

CVCA's 2021 Calendar Contest Starts October 2nd!

Annual CVCA Pet Calendar Contest
"The Secret Life of Pets"
Show us your pet's secret life!

Sponsored by CVCA Cardiac Care for Pets
Like us on @cvcavets
Hormones and the Heart: Cardiac effects of common endocrine disorders

by Sarah Lehman Holdt, VMD, DACIM (Cardiology)

Dr. Holdt sees patients inside of VCA SouthPaws in Fairfax, VA and the Hope Advanced Veterinary Center in Vienna, VA.

As pet ownership and ages increase, we are seeing more age-related comorbidities. This review discusses the cardiac impacts of common endocrine disorders in dogs and cats, reviewing diagnostic findings, treatment plans, and outcome.

Thyroid Dysfunction
The thyroid hormones T₄ and T₃ are formed and stored in colloid, then released via thyroid stimulating hormone (TSH) signaling from the pituitary. T₃ is physiologically more active, and contributes to tissue thermogenesis, decreases in systemic vascular resistance, and impacts on the renin angiotensin aldosterone system (RAAS). Downstream effects include decreased afterload and diastolic blood pressure, increased heart rate, cardiac contractility, and cardiac preload, and ultimately, increased cardiac output (determined by heart rate and stroke volume). It can also stimulate myocardial hypertrophy. ¹

Hyperthyroidism
Hyperthyroidism is caused by excess circulating thyroid hormone, typically due to a functional thyroid adenoma. Elevated total T₄ +/- free T₄ confirms the diagnosis. Excessive thyroid hormone causes a marked increase in metabolic activity, resulting in negative effects if untreated. Hyperthyroidism is most common in geriatric cats, who may present with:

- Hyperactivity, weight loss, increased appetite, polyuria, polydipsia, vomiting
- Open mouth breathing with stress, even in the absence of congestive heart failure
- Bounding arterial pulses (caused by an increase pulse width, due to increased cardiac output and decreased systemic vascular resistance)
- New onset murmurs or gallops
- One or more palpable thyroid nodule(s)

Cardiac-specific effects of hyperthyroidism include: ¹,²
- Increases in heart rate, contractility, and cardiac relaxation due to sympathetic nervous stimulation
- Systemic hypertension caused by an overall increase in cardiac output
- Arrhythmias: atrial or ventricular, conduction abnormalities (e.g. AV block)
  - Due to sympathetic stimulation, changes in calcium handling, +/- myocardial scarring
- Myocardial hypertrophy from direct protein synthesis or increased cardiac workload
- RAAS up-regulation, causing increased circulating blood volume and myocardial fibrosis via angiotensin II and aldosterone

The prevalence of systemic hypertension in patients with hyperthyroidism (and renal disease) supports blood pressure monitoring in all geriatric cats (Doppler methods being preferable due to superior accuracy in smaller patients). Treatment for systemic hypertension may include ACE-inhibitors, calcium channel blockers, angiotensin receptor blockers, β-blockers, etc.³

**Why, and when, is a cardiac evaluation warranted in hyperthyroid cats?**

Hyperthyroidism can sometimes lead to advanced cardiac disease, with a severely fibrotic and dilated heart, and variable degrees of contractility (often affecting all heart chambers), with or without arrhythmias. Acute treatment with methimazole or I-131 therapy may cause a sudden decrease in thyroid hormone, resulting in significantly depressed sympathetic drive and cardiac contractility, and subsequent decompensated heart failure. The stress of isolation following I-131 therapy could further exacerbate this risk in cats.

Consider a cardiology referral if you note:

- A severe T₄ elevation (e.g. > 12 μg/dL) which may indicate a more chronic issue, with more pronounced cardiac effects (*this value is based on the experience of the author, not from a specific study*)
- A new onset loud murmur or gallop (low frequency / “thumping” 3rd heart sound)
- Cardiomegaly, pulmonary edema, or pleural effusion on thoracic radiographs
- An obvious arrhythmia on exam or ECG
- Moderate to severe elevation in NT-proBNP on lab work

A collaborative plan of carefully dosed methimazole or appropriately timed I-131 therapy, and concurrent treatment for cardiac disease and/or systemic hypertension, improves patient outcomes. Dietary or surgical management of hyperthyroidism may be considered in some cases. Fortunately, in those cats with milder cardiac pathology, some or all changes may resolve within 4 – 6 months. Clients should be notified that cats with severe
cardiac disease are unlikely to have a significant improvement in the structural changes, though their quality of life and prognosis can still be dramatically improved with appropriate therapy.

**Hypothyroidism**

Hypothyroidism is a decrease in circulating thyroid hormone despite an increase in TSH. More commonly seen in dogs, it typically results from lymphocytic thyroiditis (autoimmune follicular destruction) or idiopathic thyroid atrophy. Low circulating $T_4$ +/- free $T_4$ in the blood of symptomatic animals is suggestive of hypothyroidism, but it can be confirmed by testing for concurrent elevations in TSH. This may help identify animals with true hypothyroidism, versus those with euthyroid sick syndrome.4

Common symptoms and findings of hypothyroidism include:

- Lethargy, exercise intolerance, weight gain despite normal or decreased appetite
- Dry scaly skin, alopecia, poor coat quality
- Myxedema (thickening of the skin from accumulation of glycosaminoglycans in the dermis)
- Hypothermia
- Anemia (normocytic, normochromic), hypercholesterolemia, fasting hypertriglyceridemia

Cardiac-specific effects of hypothyroidism include: 5

- Bradycardia, decreased cardiac contractility, and decreased blood volume
  - Due to decreased sympathetic stimulation and RAAS deactivation
- Increased systemic vascular resistance (increased diastolic and mean peripheral pressures) resulting in poorer pulse quality
- Arrhythmias: atrial fibrillation and AV block have been reported (the pathology is poorly understood)
- Decreased vascular smooth muscle relaxation, with elevated circulating lipids and cholesterol, leading to poorer arterial compliance and risk for atherosclerosis

Fortunately, hypothyroidism is a rare cause of heart failure, and it is typically considered safe to start thyroid supplementation in animals with hypothyroidism, even without prior evaluation by a cardiologist. In patients with severe clinical signs of hypothyroidism, or those with documented arrhythmias, murmurs, or cardiomegaly on radiographs, cardiac referral is reasonable as additional therapy may be warranted. In
certain cases, some or all structural cardiac changes may resolve with thyroid hormone supplementation.

**Steroid-induced cardiac conditions**

Glucocorticoids and mineralocorticoids are steroid hormones produced in the adrenal cortex. The hypothalamic-pituitary-adrenal (HPA) axis controls secretion of glucocorticoids via adrenocorticotropic hormone (ACTH) signaling from the pituitary. Secretion of aldosterone, the primary mineralocorticoid, is mainly mediated by angiotensin II, but also by ACTH and local potassium levels. Mineralocorticoid-specific effects include sodium and fluid retention, and proinflammatory/ profibrotic effects on cardiomyocytes, endothelial cells, and vascular smooth muscle cells. Mineralocorticoid receptors bind both glucocorticoids and mineralocorticoids with high affinity, which may lead to negative effects in patients with underlying cardiac disease.

**Hyperadrenocorticism (Cushing’s Disease)**

In hyperadrenocorticism (HAC), there is excessive cortisol release due to increased ACTH production from the pituitary or a cortisol-releasing adrenal tumor. It is most common in older dogs, and its diagnosis may involve a combination of laboratory tests and diagnostic imaging. HAC can lead to an overproduction of all adrenocortical hormones, including mineralocorticoids, glucocorticoids, and sex hormones. Physiologic impacts of these hormones include polyuria, polydipsia, polyphagia, panting, a pot-bellied appearance, alopecia, and calcinosis cutis. However, significant sequelae can also develop, such as glomerulonephropathy, diabetes, pancreatitis, and hypercoagulability. Cardiovascular effects of hyperadrenocorticism include:

- Systemic hypertension in ~ 25% dogs (another reason to check blood pressures in geriatric pets)
- Left ventricular concentric hypertrophy in ~ 70% dogs (even if normotensive)\(^6\)
- Hypercoagulability; this may lead to aortic thrombi in situ, or pulmonary thromboemboli causing pulmonary hypertension and possible right heart failure

Testing for concurrent diseases that increase hypercoagulability should be considered, such as protein-losing nephropathy. In animals with pulmonary thromboemboli, with or without right heart failure, clinical findings include respiratory distress, syncope, cyanosis, abdominal distension secondary to ascites, and in some cases, sudden death. Treatment may include sildenafil to decrease the pulmonary pressures, thromboprophylactic therapy (e.g. platelet inhibitors like Plavix or Aspirin, or coagulation factor inhibitors such as rivaroxaban or enoxaparin), and heart failure therapy when indicated. Primary management of the HAC with Trilostane or Mitotane can be done concurrently.

**Exogenous steroid use and cardiovascular risk**

A common reason for veterinary cardiology referral is to assess a patient’s ability to safely receive steroid therapy for treatment of non-cardiac conditions, such as asthma or inflammatory bowel disease. This is especially true in cats, who seem to be more sensitive to side effects of exogenous steroid therapy. Few studies have explored this, but those available do offer insight as to how steroids may negatively impact the cardiovascular system. A 2006 study of methylprednisolone acetate administration in twelve cats showed
significantly increased serum glucose levels within two to six days, and a 13% average increase in plasma volume in all cats (greater than 40% in three cats). In animals with underlying cardiac disease, these negative effects may be amplified, resulting in heart failure.

The proposed cardiovascular effects of steroid therapy include: 7, 8

- Left ventricular hypertrophy
- Diastolic dysfunction and volume overload from combined glucocorticoid and mineralocorticoid effects
- Increased left ventricular preload and afterload due to vascular reactivity
- Diabetogenic effect of glucocorticoids (extracellular hyperglycemia) causing a fluid shift from the intra- to extra-cellular space

To avoid unexpected complications, carefully evaluate for pre-existing heart disease before starting steroid therapy, especially in cats and older patients. This may include:

- A thorough physical exam
- 2 view thoracic radiographs
- Echocardiogram
- NT-proBNP (this test is more likely to be helpful in cats rather than dogs)

If cardiac diagnostics cannot be done prior to steroid therapy, consider using only short-acting, lower dose steroids, and notify the owner of the potential for cardiac side effects. Ideally, educate owners on how to monitor breathing rates at rest to help prepare them should heart failure develop.

Summary
Though we often think of endocrine and cardiac disease in isolation, the intricate workings of the body often allow for crossover from one discipline to another. Maintaining a continued awareness of this allows for improved patient care in our beloved pets. The cardiologists and cardiology residents at CVCA are happy to assist with the cardiac care of your patients. Please do not hesitate to contact us to discuss or refer a challenging case. Together we can achieve the best outcomes for our patients and clients.

Works cited for ‘Hormones and the heart: Cardiac effects of common endocrine disorders”