KANSAS STATE UNIVERSITY | College of Veterinary Medicine

SMALL ANIMAL
CLINICAL NUTRITION SYMPOSIUM

DECEMBER 9TH
2023

Conference Contact Information:

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KANSAS STATE UNIVERSITY | College of Veterinary Medicine

TIPS AND TRICKS FOR PROMOTING HEALTHY WEIGHT IN DOGS AND CATS

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TIPS AND TRICKS FOR PROMOTING HEALTHY W EIGHT IN DOGS AND CATS

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OVERVIEW

1. INTRODUCTION
2. ADDRESSING PET OBESITY
3. ASSESSING BODY CONDITION SCORE, MUSCLE CONDITION SCORE AND BODY FAT INDEX
4. STRATEGIES TO AID IN HEALTHY WEIGHT MANAGEMENT FOR PETS
5. HEALTHY WEIGHT CLINIC

5 VITAL ASSESSMENT

- Respiration
- Pain
- Temperature
- Pulse
- Nutrition

COMPLETE NUTRITIONAL ASSESSMENT

Animal-specific factors

- Age
- Physiological status
- Activity level
- Body weight
- Body condition score
- Muscle condition score

Diet-specific factors

- Preference
- Aversions Allergies
- Current caloric intake

Feeding management

- Method of feeding
- Frequency of feeding
- Location

WHY IT IS IMPORTANT?

Obesity stands out as the prevailing nutritional concern among companion animals in the present day. It's characterized by the accumulation of excessive adipose tissue in the body, often stemming from either overconsumption of food or insufficient energy expenditure, leading to a state of positive energy balance. Beyond the visible effects, obesity sets in motion subtle, persistent

inflammation and metabolic shifts that exert a significant impact on the pet's overall well-being. Multiple factors can contribute to an individual's susceptibility to obesity.

FACTORS MAY PREDISPOSE OBESITY IN DOG AND CATS
Some Diseases, pharmaceuticals, genetics, neutering, dietary factors, behavioral factors, etc.

HEALTH RISKS OF OBESITY IN DOG AND CATS
Arthritis, hormonal imbalance, skin issues, neoplasia, urinary issues, quality of life, etc.

HOW CAN WE EVALUATE BODY CONDITION, MUSCLE CONDITION, and BODY FAT INDEX?

Body Condition Score
- Word Small Animal Veterinary Association (WSAVA) BCS Chart
- Feeling the animal's ribs, waistline and abdomen
- Score 1-9

Muscle Condition Score
- WSAVA MCS Chart
- Normal to Severe
- Spine, scapulae, skull, and wings of ilea

Body Fat Index
- Hill's QuickReco Chart (https://quickreco.hillsvet.com/en-us?sso=true)

HOW CAN WE DETERMINE THE IDEAL BODY WEIGHT?
- ***Hill's QuickReco Chart*** (https://quickreco.hillsvet.com/en-us?sso=true)

- ***Equation***: $\frac{\text{Current BW kg x (100 – BF\%)}}{0.8}$

9 point scale	5 point scale	%BF	% Overweight
4	2.5	15 - 19	Ideal
5	3	20 - 24	Ideal
6	3.5	25 - 29	10%
7	4	30 -34	20%
8	4.5	35 -39	30%
9	5	40 - 45+	40%
> 9	>5		>40%

HOW CAN WE CALCULATE THE CALORIC INTAKE?

Based on the ideal body weight, obesity weight, product information, and current food intake

RESTING ENERGY REQUIREMENTS

RER= 70 x (ideal body weight in kilograms)$^{0.75}$

MANTENANCE ENERGY REQUIREMENTS

MER (kcal/day) = RER x adjustment factor= kcal/day

Adjustment factors for dogs	
Adult	
Intact	1.6 - 1.8
Neutered	1.4 - 1.6
Weight loss	1.0
Growth	
< 4 months	3.0
≥ 4 months	2.0
Gestation	
First 42 days	1.6 - 1.8
Last 21 days	3.0
Lactation /# of pups)	
1	3.0
2	3.5
3 – 4	4.0
5 – 6	5.0
7 – 8	5.5
>8	>6.0
Work	
Light	1.6 -2.0
Moderate	2.0 - 5.0
Heavy	5.0 - 11.0

Adjustment factors for cats	
Adult	
Intact	1.4 - 1.6
Neutered	1.2 - 1.4
Weight loss	0.8
Growth	2.5
Gestation	
At time of breeding	1.6
Gradual increase to parturition	2.0
Lactation (# of weeks)	
Week 1	2.3
Week 2	2.5
Week 3	3.0
Week 4	3.5
Week 5	4.0
Week 6	5.0

HOW TO CALCULATE THE AMMOUNT OF FOOD?

(Daily kcals ÷ kcal/kg) x 1000 = grams of food
Daily kcals ÷ kcal/cup = cups of food

Example:

Max

- 6-year-old Male
- Black Labrador
- Presently weighs 95 lbs
- Body Condition Score: 9/9

a) What is Max's %BF?
b) What is Max's ideal body weight?

c) What is Max's daily caloric intake?
d) How much food do we feed Max?

STRATEGIES TO AID IN HEALTHY WEIGHT MANAGEMENT FOR DOGS AND CATS

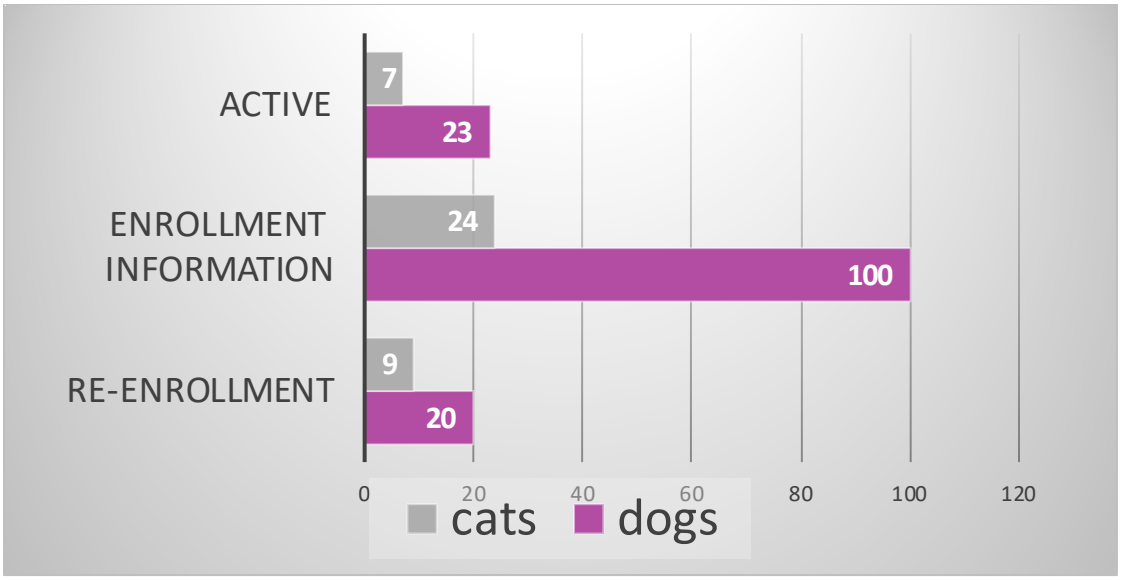
- Pet owners' commitment
- Appropriated feeding method
- Select Food and Calculate Daily Caloric Intake
- Exercise Plan
- Communication
- Patient Monitoring

HEALTHY WEIGHT CLINIC

Established in 2018 through a collaboration between Hill' s Pet Nutrition and K-State University, the Healthy Weight Clinic began as a joint effort to enhance our primary care department and incorporate nutrition science more comprehensively into the educational curriculum. Over the past five years, this collaboration has evolved into the successful Healthy Weight Clinic.

We take pride in announcing that we have supported over 100 pets and their families on their journey toward healthier weights.

HEALTHY WEIGHT CLINIC BY THE NUMBERS



WHY NOT TO GIVE A DIET THAT IS NO T SP ECIFICALLY FO RMULATED FOR PETS THAT ARE LOSING WEIGHT?

- Nutritional Balance: Controls calories while providing essential nutrients.
- Caloric Density: Lower calorie content compared to regular diets.
- Protein Focus: Higher protein to preserve lean muscle mass.
- Special Ingredients: Includes added fiber and other aids for weight management.
- Health Considerations: Addresses underlying health conditions contributing to weight.
- Long-Term Wellness: Aims for sustained nutrition and healthy weight maintenance.

REMEMBER

Each patient is unique, which means that adjustments are necessary throughout the weight loss program. The ideal body weight may not align with the patient's unique goal weight.

HEALTHY W EIGHT CLINIC HAPPY END

In our clinic, we have witnessed a transformation in overweight dogs and cats – as they shed those extra pounds, they not only feel better but also have less pain and stress. It is a win for successful weight loss, making our furry friends happier and healthier!

QUESTIONS?

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THE BUSINESS OF VETERINARY DIETARY RECOMMENDATIONS: HOW TO INTEGRATE NUTRITION SCIENCE INTO YOUR PRACTICE

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Introduction

Undoubtedly, nutritional assessments are underutilized in clinical veterinary practice. In one study, Lumbis (2020) found that only 30% of respondents always conduct a nutritional assessment during veterinary visits. Another recent article discussed that less than half of the surveyed practices obtained diet histories on their patients (Lumbis 2020 as cited in Alvarez, 2022). Furthermore, nutrition was only discussed in approximately 60% of veterinary visits (MacMartin 2018 as cited in Alvarez, 2022).

The absence of nutritional assessments and discussions results in fewer dietary recommendations. In fact, only 12% of veterinary visits included a suggestion for a long-term diet change (Lumbis 2020 as cited in Alvarez, 2022). Furthermore, this also leads to fewer pets receiving beneficial therapeutic prescription diets. Freeman (2006) found that only 2.5% of cats and dogs were fed a prescription diet despite numerous health conditions with indications for a therapeutic diet.

Additionally, without veterinary recommendations, owners may make pet feeding decisions that are not optimal for their pet or pose a health risk, in the case of incomplete, unbalanced, or raw diets (Evason, 2020). Pet owners may also make similar decisions regarding supplements. For instance, Freeman (2006) discusses a study in which 31% of dogs with heart disease received a variety of supplements despite a lack of scientific evidence for their use in certain disease conditions.

Veterinarians may suggest that nutritional consultations are not offered because pet owners are not asking for them. However, pet owners may not realize what their pets need. Steve Jobs, Co-Found and Former CEO of Apple, explained this well by saying, “Get closer than ever to your customers. So close that you tell them what they need well before they realize it themselves.” Clients do need nutrition consultations for their pets. Your veterinary team can be utilized to meet that need and it will be beneficial for the pet, your staff, the client, and the practice.

Pet Owner Expectations and Behaviors Regarding Nutrition

It has been known that there is a disconnect between pet owners’ interest in nutrition recommendations and the information provided by their veterinarian. For example, Aspros (2016) discusses that 90% of pet owners wanted a nutritional recommendation but only 15% recalled having received one (AAHA 2003 as cited in Aspros, 2016). This leaves the veterinary community with a great opportunity to meet owners’ pet nutrition needs and promote science-backed feeding recommendations.

Not only do pet owners want nutrition advice from veterinarians but the majority of pet owners trust and value their advice. For instance, Evason (2000) found that 76% of pet owners trust their veterinarians’ recommendations. A more recent study found that 85% of dog owners highly valued the nutrition advice they were given after their pet was diagnosed with cancer (Rajagopaul 2016 as cited in Alvarez, 2021). Additionally, over 90% of pet owners are willing to consider changing their feeding practices and behaviors based on their veterinarians’ recommendation (Alvarez, 2021).

Sources for Healthy Pet Nutrition Information

To try to bridge the aforementioned disconnect, it is important to first understand where pet owners are obtaining nutrition information. Currently, 43.6% of pet owners surveyed reported that the veterinary healthcare team was their primary source of diet or nutrition-related information. Nearly 25% of pet owners stated that internet sources were their primary source of information (Schleicher, 2019). It is also important to consider that this may change depending on their pets' health status.

Sources for Nutrition Information for Pets Diagnosed with Cancer

It is known that pet owners' information-seeking behavior changes after a pets' cancer diagnosis. Understandably, approximately half of owners of pets that have been diagnosed with cancer often search the internet for information about their pet's cancer diagnosis and treatment options. Some of these pet owners also search for nutritional information about diets and supplements (Stoewen, 2019).

One important difference in information-seeking behavior exhibited by owners whose pets have cancer is that they were more likely to rely on social media and blogs for pet health and nutrition topics and nutritional supplements, specifically (Bianco, 2019). Knowing where pet owners are seeking information emphasizes the need for veterinary healthcare teams to discuss this topic to ensure pet owners are obtaining accurate information.

Owner Behavior and Feeding Practices for Pets with Cancer

As with knowledge about their information-seeking behavior, it is also helpful to understand how owners' feeding practices change as a result of a cancer diagnosis. The literature supports the idea that a pets' cancer diagnosis does tend to result in diet or supplement changes. For example, Kramer (2022) found that dogs with cancer are more likely to be given homecooked food items. In some cases, the changes may be beneficial but in others, such as the use of unbalanced ingredients or in the case of homemade raw diets, it can be concerning. Bianco (2019) states that pet owners of dogs with cancer utilize over 270 different supplements while nearly 40% receive a homecooked diet and slightly less than 18% receive a homemade raw diet.

Veterinary Perceptions

On the other end of the disconnect is the veterinarians' perceptions and behavior regarding pet nutrition. Very few veterinarians surveyed by Alvarez (2022) stated having minimal interest in healthy pet nutrition. Furthermore, approximately ¾ of North American and International veterinary respondents believe that inappropriate nutrition is important to animal welfare.

Despite these beliefs and perceptions that nutrition is important, it is clear veterinarians are not routinely discussing nutrition and making recommendations. There are several possible reasons to explain this. Alvarez (2022) explored these barriers and found that there were different factors that contributed to why nutrition went undiscussed

during veterinary visits. For healthy pet veterinary visits, the most common reasons were the following: client resistance to brand changes, time constraints, online misinformation, and difficulty keeping up with products. For sick pet veterinary visits, client cost concerns, pets not accepting new food and time constraints were the main reasons. Additionally, Alvarez (2023) discovered that more than half of veterinarians received very little nutrition training in veterinary school. The lack of training is believed to contribute to veterinarians' discomfort with pet nutrition.

Bridging the Disconnect

Aspros (2016) states the following: "it strongly suggests that there is a communication disconnect between our profession and the needs and desires of pet owners. If there is, it is not for lack of concern." Therefore, in addition to understanding pet owners' expectations and behaviors as well as veterinarians' beliefs and perceptions, it is also critical to communicate nutrition information. This should be a two-way exchange; the pet owner should fill out a diet history form and the veterinarian should perform a nutritional assessment. This should serve as the starting point.

Selecting the right patient population to begin implementing nutrition recommendations is the next step. For instance, Kamleh (2020) found that it was more likely for cat owners to consider the veterinary nutrition care they received for their cat to be more effective. Selecting a condition that is common such as obesity is a good starting point. While there are several factors that contribute to obesity in cats such as spay/neuter status and age, dietary habits are also very important and can have a significant impact on the pet's health (Zhang, 2023).

The way the information is communicated affects the owners' willingness to make a dietary change for their pet. Coe (2007) suggests that providing examples of how the diet will benefit the health/well-being of the pet is an effective communication strategy. Alvarez (2021) found that discussing the diet in the context of the pet's health was the most effective method of communications while other ways to communicate information, such as by giving examples of what you feed your own pets, was less effective. Schleicher (2019) found that the pet food characteristics that are the most important to pet owners are the health and nutrition attributes of the product. Therefore, as an example, to make a strong nutrition recommendation to a pet owner whose dog was recently diagnosed which cancer, it is advisable to explain the health and nutrition characteristics of a complete/balanced and highly palatable diet formulated for pets with cancer in context of how it can affect their pets' longevity and well-being.

Technician Utilization

While veterinarians should take the lead on nutrition discussions, involving members of the veterinary healthcare team in those discussions is critical. It was found that both veterinarians and veterinary staff members were the most important source of recommendations to pet owners whereas the internet was ranked as a slightly to moderately important source of information (Schleicher, 2019). Lumbis (2020) also found that while veterinarians were the most frequent source of nutritional advice in practice (96%), veterinary nurses or technicians were also a valuable resource (61%),

followed by reception staff (23%). Engaging all members of the veterinary healthcare in nutrition discussions routinely should be highly considered. Anecdotally, technicians report wanting to feel like they are reaching their potential in the workplace. It is also known that improving technician utilization leads to better outcomes for both the staff member and the clinic (AVMA, 2021). Many human healthcare models delegate as much work to staff members as possible in order to keep costs low for patients (Lee, 2018). The veterinary profession should do the same to promote better economic sustainability.

Conclusion

In summary, pet owners want nutrition information, and they prefer to obtain that information from veterinary professionals. Veterinary professionals understand the importance of nutrition but are not routinely discussing it during veterinary visits. Discussing nutrition and educating pet owners about the potential benefits to their pet's health and well-being should be implemented in veterinary visits. Involving all members of the veterinary healthcare teams in these conversations is advisable. It is important to remember that while pet owners may not ask for nutrition consultations, it is our responsibility to start the conversation.

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THE FIRST FIVE MINUTES - LIFE-SAVING INTERVENTIONS IN EMERGENCY CASES

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The First Five Minutes Life Changing Interventions During the First Five Minutes of Common Emergencies

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Outline

- Overview of most impactful interventions during the first few minutes of common emergencies
  - Acute collapse
  - Gastric dilation and volvulus
  - Vehicular trauma
  - Seizures

2

Introduction

- Veterinary professionals see a lot of life-threatening emergencies
  - In some cases, prognosis is grave regardless
  - In some cases, our response may directly affect outcome
- Goals
  - Identify early interventions that may lead to a positive patient outcome
    - Will not cover entire case management
  - Utilize some common life-threatening emergencies
    - Not every emergency scenario would be covered ☺

3

THE ABCs is the Heart of Emergency Medicine

- Airway
- Breathing
- Circulation
- Important to evaluate for all patients in all cases

4

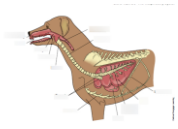
Triage Exam (also called Primary Survey or ABCs)

- Quick exam performed to identify life threatening abnormalities on any ER patient
  - Listen for airway obstruction
  - Evaluate for respiratory difficulty
  - Assess signs of poor perfusion (heart rate, pulse quality, CRT, mentation)

5

Airway

- Evaluation of upper airway obstruction
  - Characterized by "stridor" or loud noise on inspiration
    - Laryngeal paralysis
    - Laryngeal collapse
    - Tracheal collapse
    - Foreign body obstruction
    - Neoplasia



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Airway

Characteristic sound, rare need to fully examine oral cavity to diagnose

7

Airway

- Provide oxygen
- Venous access as soon as reasonably possible
- Provide sedation
  - Butorphanol 0.1-0.4 mg/kg IV or IM
  - Acepromazine 0.01-0.05 mg/kg IV or IM
- Active cooling if needed
- Consider intubation if patient decompensating
  - Generally, a good idea when it crosses your mind
  - Emergency tracheostomy

8

Breathing

- Easy to identify
  - Tachypnea
  - Increased effort
  - Cyanosis
  - Orthopnea
  - Anxiety and inability to get comfortable

9

Breathing

- Pleural effusion
- Pneumothorax
- Pulmonary edema
- Pulmonary contusions
- Pulmonary thromboembolic disease
- Allergic airway disease
- Pneumonia

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Breathing

- Point of care ultrasound is your best friend!
  - Easily identify pleural effusion
  - Detect pulmonary pathology
  - Assess size of the left atrium
  - Detect pneumothorax
- Consider early before radiology

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Breathing

- Similar concepts to airway
  - Provide oxygen
  - Provide sedation
  - TFAST with thoracocentesis if needed
  - Administer furosemide
  - Consider bronchodilator (cats >>> dogs)
  - Venous access as soon as reasonably possible

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Circulation

Inadequate oxygen delivery leading to cell death

Generally due to one or more

- Hypovolemia (hemorrhage, vomiting, diarrhea)
- Pump failure (cardiogenic)
- Maldistribution (sepsis, pancreatitis)
- Obstruction (gastric dilation and volvulus, cardiac tamponade)

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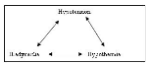
Circulation

- Poor oxygen delivery easy to diagnose
  - Tachycardia
    - Bradycardia in cats
  - Weak pulses
  - Pale mucous membranes
  - Prolonged capillary refill time
  - Cold extremities
  - Hypotension
  - Elevated lactate concentration



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Circulation

- Place intravenous catheter(s)
  - Large and short catheters
- Isotonic crystalloids
  - 20-25 mL/kg over 15 minutes in dogs
  - 10-15 mL/kg over 15 minutes in cats
  - Re-evaluate parameters and repeat dose up to 3 times
- Some animals may require blood transfusion and vasopressors

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Acute Collapse

- A common cause of ER presentation
  - Lots of potential causes
    - Pericardial effusion
    - Hemoabdomen
    - Hypoglycemia
    - Pheochromocytoma
    - Pulmonary hypertension
    - Arrhythmias

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Acute Collapse- First Five Minutes

1. Assess ABCs

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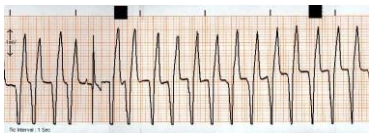
Acute Collapse- First Five Minutes

1. Assess ABCs
2. Evaluate ECG
   - Bradyarrhythmias
   - Tachyarrhythmias



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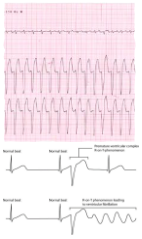
Acute Collapse- First Five Minutes



- Ventricular tachycardia
  - Commonly due to heart disease
    - Non-cardiac disease also possible (GDV, splenic mass, hypoxemia)
  - Rate is usually "fast" for that animal
  - Treat if tachycardia present
    - R on T, multifocal VPCs and clinical signs present
  - Lidocaine 2mg/kg IV, followed by a constant rate infusion. Procainamide if unresponsive to lidocaine
  - Sotalol 1-2 mg/kg PO q 12

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Acute Collapse- First Five Minutes

- Bradyarrhythmia
  - Sick sinus syndrome, 2nd degree AV block, 3rd degree AV block
    - Atropine response test
    - Pacemaker almost always need

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Acute Collapse- First Five Minutes

1. Assess ABCs
2. Evaluate ECG
   - Bradyarrhythmias
   - Tachyarrhythmias
3. Evaluate QUATS and/or venous blood gas

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Evaluate Quick Triage Assessment Tests (QUATS)

- Evaluate PCV/TS, glucose, lactate
  - Very easy to do at the time of catheter placement
  - Easily and quicky identify
    - Hypoglycemia
    - Acute hemorrhage
    - Anemia
    - Poor circulation
- Venous blood gas (or a chemistry)
  - Identifies electrolyte abnormalities quickly

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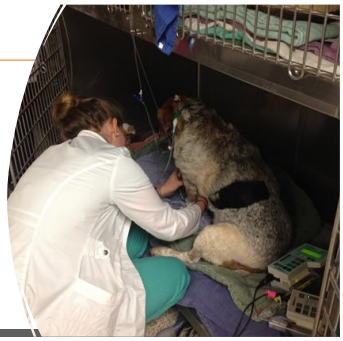
Acute Collapse- First Five Minutes

1. Assess ABCs
2. Evaluate ECG
   - Bradyarrhythmias
   - Tachyarrhythmias
3. Evaluate QUADS or venous blood gas
4. Thoracic and abdominal point of care ultrasound
   - Point of care ultrasound of thorax and abdomen



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Point of Care Ultrasound (POCUS)

- Important highlights
  - Decreases time to diagnosis when free fluid is present
    - Up to 75% of unstable patients in one study*
  - Non-invasive
  - Patient does not need to be moved
  - More sensitive than radiographs or PE for detecting free fluid
  - Reduces exposure to radiation

* McMurray 2015

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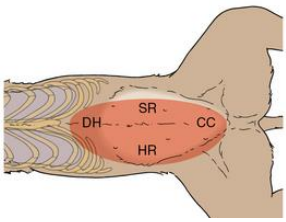
ABDOMINAL POCUS

- Identify quadrants
  - Diaphragmatico-hepatic (DH)
  - Spleno-renal (SR)
  - Cysto-colic (CC)
  - Hepato-renal umbilical (HR-U)



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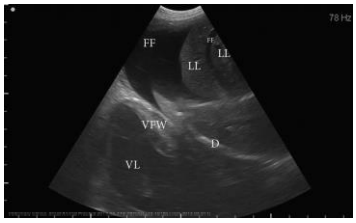
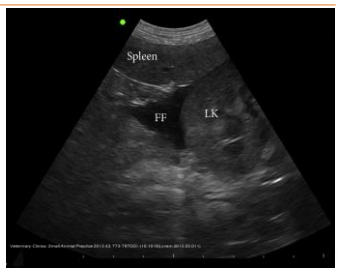
25

DIAPHGRAMATICO-HEPATIC VIEW (DH)



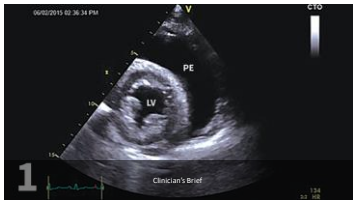
26

SPLENO-RENAL (SR)



27

TFAST- PERICARDIAL EFFUSION



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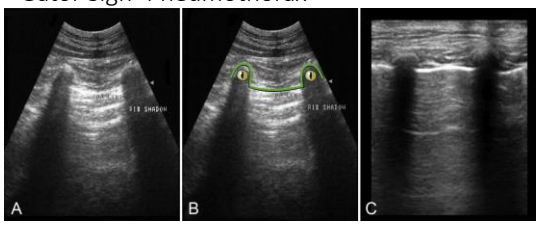
THORACIC POCUS- PLEURAL EFFUSION

Courtesy of Dr. Greg Lisciandro

Vetfolio.com

29

Gator Sign- Pneumothorax



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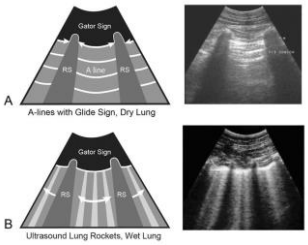
Lung Rockets- Pulmonary Disease



31

AFTER FLUID IS IDENTIFIED- THEN WHAT?

- Abdominocentesis
  - Potentially thoracocentesis or pericardiocentesis
- Ultrasound is not sensitive enough to tell fluid type
  - Always collect fluid and assess
    - Hemoabdomen
    - Uroabdomen
    - Septic peritonitis
    - Bile peritonitis

32

ABDOMINOCENTESIS

- Ultrasound-guided centesis

33

ABDOMINOCENTESIS

- Four quadrant centesis

34

Acute Abdomen- Free Abdominal Effusion

- Hemorrhagic effusion
  - PCV/TS always indicated
    - PCV of 2% may look very hemorrhagic
    - Look to see if it clots in syringe or red top tube
  - Common after trauma
    - Typically, no surgical intervention needed for cases of trauma
      - Liver or spleen
  - Non-traumatic hemoabdomen
    - Usually due to a mass
    - Surgery is always indicated
    - Anaphylaxis reaction is an exception

35

Gall Bladder Halo Sign and Anaphylaxis

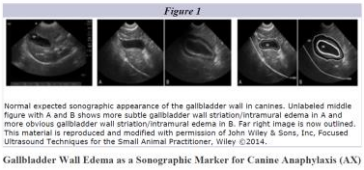


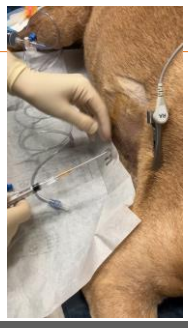
Figure 1

Normal expected sonographic appearance of the gallbladder wall in canines. Unlabeled middle figure with A and B shows more subtle gallbladder wall striation/intramural edema in A and more obvious gallbladder wall striation/intramural edema in B. Far right image is now outlined. This material is reproduced and modified with permission of John Wiley & Sons, Inc, Focused Ultrasound Techniques for the Small Animal Practitioner, Wiley ©2014.

Gallbladder Wall Edema as a Sonographic Marker for Canine Anaphylaxis (AX)

36

Pericardiocentesis



37

Acute Collapse- First Five Minutes

- Assess ABCs
- Evaluate ECG
- QUATS/Venous blood gas
- Thoracic and abdominal FAST
- Perform other diagnostics
  - CBC, chemistry, UA, thoracic radiographs, echocardiogram, abdominal ultrasound

38

First Five Minutes- Vehicular Accident (Hit by car)

- Important emergency for consistency in assessment
  - Varied levels of presentation
    - Minimally affected to life threatening clinical signs
    - Approach to these patients very similar

39

First Five Minutes- Hit by Car

- Assess ABCs
  - Breathing and Circulation most important
    - Pulmonary contusions
    - Diaphragmatic hernia
    - Pneumothorax
    - Hemoabdomen
    - Bleeding into fractures
    - Hemothroax
- Place intravenous catheter as soon as reasonably possible

40

First Five Minutes- Hit by Car

- Assess PCV/TS (glucose and lactate)
  - Low total protein suggestive of acute hemorrhage
    - Even in the face of normal PCV
    - 45%/4.0 vs. 39%/7.0
  - Elevated lactate suggestive of poor circulation
    - Assess other signs of perfusion and fluid resuscitation as required
    - May need to provide blood transfusion in some cases.

41

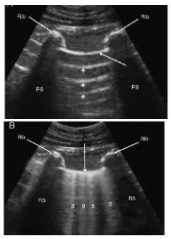
First Five Minutes- Hit by Car

- Provide analgesia
  - Has direct correlation on morbidity and mortality
- Opioids are **best** drug of choice
  - Patients are either unstable or there is question about hemodynamic instability
    - Pure mu receptor opioids (fentanyl, hydromorphone, methadone, morphine) all reasonable choices
    - Partial mu receptor buprenorphine for mild to moderate pain
    - Butorphanol? NSAIDS? Dexmedetomidine?

42

First Five Minutes- Hit by Car

- Point of Care Ultrasound
  - Very important in these patients
    - Pneumothorax
    - Pulmonary contusions
    - Hemoabdomen
    - Uroabdomen



Scalivet.ca

43

First Five Minutes- Hit by Car

- Once stable
  - Complete secondary survey
    - Full physical exam
    - Paying attention to
      - Ambulation
      - Neurologic status
      - Abdominal pain
- Thoracic radiographs recommended for all patients
  - Abdominal, pelvis and extremities as needed

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First Five Minutes- Vehicular Trauma

- Steroids?
  - No evidence that they are beneficial with trauma
    - Most steroids take at least 8-24 hours to work
    - Poor perfusion and risk for gastrointestinal ulcerations
    - Generally takes away from what the patient really needs
      - Intravenous fluids
      - Pain medications
      - Oxygen
      - Thoracocentesis

45

Summary- Vehicular Trauma 1st five minutes

01	02	03	04	05	06	07
Ignore the obvious broken limb/abnormalities	Assess ABCs (oxygen, fluid therapy)	Assess QUATS	Provide analgesia	Perform FAST scan	Perform full physical exam	Perform diagnostics

46

First Five Minutes- Gastric Dilation and Volvulus

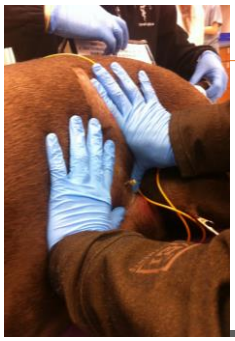
- Life threatening emergency
  - High mortality if prompt medical attention is not sought
- Approach is very similar to other emergencies
  - Diagnosis is generally made by history and signalment
  - Radiology is the last place these dogs need to be in

47

First Five Minutes- GDV

- ABCs
  - Especially circulation
  - Large distended stomach impedes venous return
  - Fluid therapy important for patients with evidence of poor circulation
    - Tachycardia
    - Hypotension
    - Elevated lactate
    - Cold extremities

48



First Five Minutes- GDV

- Analgesia
  - Pure mu opioid preferred
    - Fentanyl, hydromorphone, morphine, methadone
    - Buprenorphine if pure mu not available
- Decompression
  - Trocarization preferred
- Radiographs after patient is stable
  - Avoid V/D view if possible

49

First Five Minutes- Feline Urethral Obstruction

50

First Five Minutes- Seizures

Stop active seizures

- Benzodiazepines (midazolam, diazepam)
  - Intravenously, intranasal, rectal
  - Very effective but short acting
    - Do not prevent future seizures

Check blood glucose

- Hypoglycemia easy to treat

CBC with chemistry as soon as reasonably possible

51

First Five Minutes- Other Tips

- An intravenous catheter is always a good idea in an unstable patient
  - As soon as reasonably possible
- Don't be carried away by the obvious wounds in trauma patient
  - Address severe bleeding as soon as possible
  - ABCs still most important
- Calcium gluconate (1-1.5 mL/kg) slow IV for post parturient hypocalcemia
- Opioids are the king of analgesia even in unstable patients
  - Avoid NSAIDS, alpha-2 agonists until patient is hemodynamically stable

52

Questions?

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53

KANSAS STATE UNIVERSITY | College of Veterinary Medicine

GASTROINTESTINAL EMERGENCIES

DR. ADESOLA ODUNAYO
DVM, MS, DACVEEC

Gastrointestinal Emergencies

Adesola Odunayo, DVM, MS, DACVECC
Michael Schaer Endowed Professor of Emergency and Critical Care

1

Learning Objectives

- Stabilization of patient with gastrointestinal disease
- Fluid plan for gastrointestinal disease
- Analgesia for gastrointestinal disease

2

Jojo

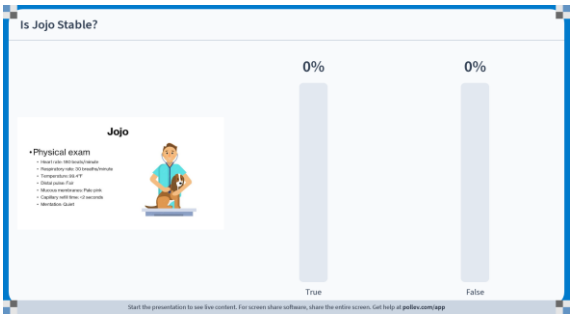
- 2-year-old female spayed Shih-Tzu
  - Diarrhea for 48 hours
  - Vomiting for 24 hours
    - Now lethargic and not eating
    - Hematochezia developed about 2 hours before presentation

3

Jojo

- Physical exam
  - Heart rate: 180 beats/minute
  - Respiratory rate: 30 breaths/minute
  - Temperature: 99.4°F
  - Distal pulse: Fair
  - Mucous membranes: Pale pink
  - Capillary refill time: <2 seconds
  - Mentation: Quiet

4



5

Jojo

- Physical exam
  - Heart rate: 180 beats/minute
  - Respiratory rate: 30 breaths/minute
  - Temperature: 99.4°F
  - Distal pulse: Fair
  - Mucous membranes: Pale pink
  - Capillary refill time: <2 seconds
  - Mentation: Quiet

6

Jojo

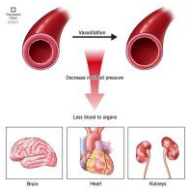
- Has evidence of circulatory shock
  - Tachycardia
  - Weak distal pulses
  - Hypotension
  - Prolonged capillary refill time
  - Pale mucous membranes
  - Cold extremities
  - Altered mentation
  - Elevated lactate

Hypovolemic

7

Gastrointestinal Disease and Shock

- Shock is NOT uncommon with gastrointestinal disease
  - Hypovolemia and distributive shock
    - Parvoviral enteritis
    - Gastroenteritis
    - Pancreatitis
    - Gastric dilation and volvulus
    - Acute hemorrhagic diarrhea syndrome



8

Treating Shock

- Goal is to restore oxygen delivery
  - Rapidly replace intravascular volume
    - Intravenous fluids, blood products, colloids
  - Restore vascular contractility if required
    - Vasopressors

9

Treating Shock

	Dog	Cat
Isotonic Crystalloid	20-25 mL/kg over 15 minutes	10-15 mL/kg over 15 minutes
Synthetic Colloid*	5-10 mL/kg over 15 minutes	1-5 mL/kg over 15 minutes
Red Blood Cells	10-15 mL/kg rapidly	10-15 mL/kg rapidly
Albumin/plasma products	Varies	Varies
Vasopressors (dopamine, norepinephrine)	Required if no response to fluid therapy	Required if no response to fluid therapy

End Goals of Resuscitation
Normal heart rate Normotension (systolic > 100 mm Hg) Normal pulse quality Normal mucous membrane color Normal capillary refill time Improved mentation Normal lactate concentrations

10

Back to Jojo

- Responded well to isotonic crystalloids
- Full physical exam performed
  - 6% dehydrated
  - Evidence of large volume hematochezia
  - Nausea when abdomen palpated
  - Physical exam otherwise normal

11

Diagnostic Plan for the Acute Vomiting and Diarrhea

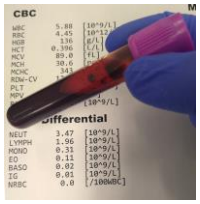
- Identify underlying cause

Acute gastroenteritis	Prostatitis
Cholecystitis/cholangiohepatitis	Pyelonephritis
Diabetes Ketoacidosis	Sepsis
Food allergies	Parasitic gastroenteritis
Foreign body obstruction	*Campylobacter*. spp
Hepatic disease	*Clostridia* spp
Hypoadrenocorticism	*Escherichia* coli
Kidney disease	*Salmonella* spp
Neoplasia (GI and non-GI)	Pythium spp
Pancreatitis	Histoplasma capsulatum
Portosystemic shunting	Various toxins

12

Diagnostic Plan for Acute Vomiting and Diarrhea

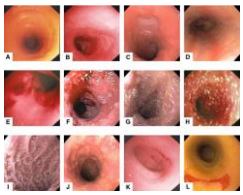
- Complete blood count
- Serum biochemistry panel
- Urinalysis
- Point of care ultrasound
- Fecal exam (flotation and smear)
- Parvoviral ELISA test
- Abdominal radiographs
- Urine culture
- Abdominal ultrasound



13

Diagnostic Plan for Acute Vomiting and Diarrhea

- Baseline cortisol
- Thoracic radiographs
- Rectal scraping
- Fecal culture
- Urine fungal antigen tests
- Endoscopy +/- biopsy
- Specific tests based on location



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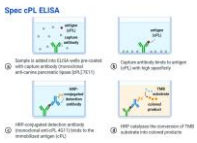
Canine Pancreas Specific Lipase (cPL)



- Canine pancreatic lipase immunoreactivity (cPLI) assay
  - Specific for pancreatic acinar cells
  - Refined using monoclonal antibodies in sandwich ELISA
  - Commercially available as Spec CPL (canine pancreas-specific lipase) assay

12/1/2023 15

15

SNAP cPL and fPL

- Sensitivities and specificity ranges
  - 74%-100% sensitivity in dogs
  - 59%-78% specificity in dogs
- Helpful to rule out pancreatitis
- Positive results reported with
  - Parvoviral enteritis, acute kidney disease, gastric dilation and volvulus


ORIGINAL RESEARCH

Prevalence of increased canine pancreas-specific lipase concentrations in young dogs with parvovirus enteritis

16

No Definitive Diagnosis Identified?

- Acute gastroenteritis
  - Inflammation of the gastrointestinal tract
  - Non-specific clinical signs and signalment
  - Very common diagnosis in dogs (less so cats)
    - Self limiting
    - Resolves in 2-5 days with supportive care

17

Acute Hemorrhagic Diarrhea Syndrome

- Previously referred to as hemorrhagic gastroenteritis (HGE)
  - Large volumes of hemorrhagic diarrhea
  - Small breed dogs predisposed
  - Specific etiology not determined
  - Sub-population may develop sepsis

18

Therapeutic Management of Gastroenteritis/Acute Hemorrhagic Diarrhea Syndrome

- Fluid therapy
  - Fluid resuscitation for shock
  - Intentional fluid plan for rehydration
    - % dehydration X body weight in kg= Fluid deficit in liters

% Dehydration	Physical Exam Findings
< 5%	No observable physical exam findings
5-7%	Dry mucous membranes, mild skin turgor
7-9%	Dry mucous membranes, skin turgor, +/- sunken eyes
9-12%	Dry mucous membranes, skin turgor, sunken eyes, dry corneas, +/- signs of shock
>12%	Signs of shock present

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Fluid Plan for Jojo

- 6% dehydration on a 5kg dog
  - Fluid deficit (L)= % dehydration **X** body weight in kg
  - Fluid deficit (L)= 0.06 **X** 5kg
  - Fluid deficit (L)= 0.3L or 300mL
  - Replace over 12 hours= 25 mL/hr.
  - Include maintenance rate of 60 mL/kg/day or 12.5 mL/hr.
  - Total fluid rate= 37.5 mL/hr. for first 12 hours

2X maintenance rate
25 mL/hr.

20

Antiemetics

- Consider 1st 24-72 hours
  - Reduced risks for esophagitis, aspiration pneumonia
  - Allows for earlier enteral nutrition

- Maropitant
- Ondansetron/dolasetron
- Metoclopramide
- Phenothiazines

21

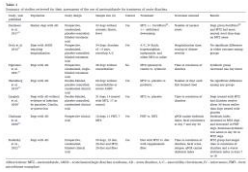
Gastrointestinal Protectants

- Routine use **not** indicated
  - Evidence of upper GI bleed (melena, hematemesis)
  - Reflux esophagitis
  - Portosystemic shunting
  - NSAID toxicity
  - Mast cell tumor prophylaxis

22

Antibiotics

- Recent studies suggest antibiotic therapy is NOT indicated for routine use



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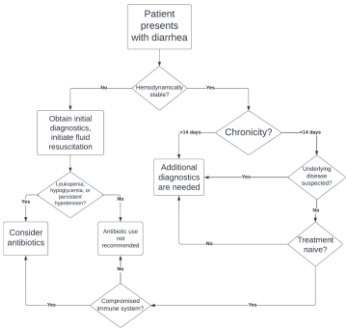


24

Analgesia

- Many reasons for pain
  - Inflammation of mucosal surface
  - Ileus
  - Peritonitis

- Negative correlation between pain and outcomes

25

Analgesia

- Opioids are mainstay
- Mu receptor agonists
  - Fentanyl, hydromorphone, methadone, morphine
    - Most effective
    - More likely to cause ileus
- Partial mu receptor agonist
  - Buprenorphine
    - Mild to moderate pain
    - Less likely to cause ileus

26

Opioids and Vomiting

- Stimulation of the chemoreceptor trigger zone
  - Thought to inhibit emesis once concentration is high enough in vomiting center
    - Route of administration
    - Dose
    - Species
    - Co-administered drug
- Intravenous administration unlikely to trigger vomiting

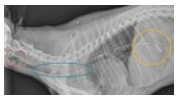
27

Ileus

- Ileus common
  - Systemic inflammatory response
  - Decreased blood flow to intestines
  - Medications (opioids)
  - Bacterial translocation
  - Abdominal surgery

28

Identifying Ileus



- Recurrent regurgitation
  - Vomiting vs. regurgitation
- Distended stomach/intestines on radiographs
- Distended stomach/intestines on point of care ultrasound
- High gastric residual volumes

29

Treating Ileus

- Prokinetics
  - Metoclopramide- 2mg/kg/day IV
  - Erythromycin/Azithromycin- 0.5-2 mg/kg IV q 8 hours
  - Cisapride- 0.1-0.5 mg/kg q 8 hours

30

Treating Ileus

- Prokinetics
- Minimize opioids
  - Switch to buprenorphine or oral meds when able

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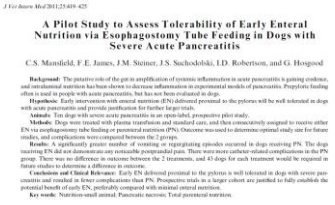
Treating Ileus

- Prokinetics
- Minimize opioids
- Increase walks (if able)
- Nutrition

32

Why Early Nutrition is Important



J Vet Intern Med 2011;25:419–425

A Pilot Study to Assess Tolerability of Early Enteral Nutrition via Esophagostomy Tube Feeding in Dogs with Severe Acute Pancreatitis

C.S. Mansfield, F.E. James, J.M. Steiner, J.S. Suchodolski, I.D. Robertson, and G. Hosgood

Background: The putative role of the gut in amplification of systemic inflammation in acute pancreatitis is gaining credence, and intraluminal nutrition has been shown to decrease inflammation in experimental models of pancreatitis. Prepyloric feeding often is used in people with acute pancreatitis, but has not been evaluated in dogs.

Hypothesis: Early intervention with enteral nutrition (EN) delivered proximal to the pylorus will be well tolerated in dogs with acute pancreatitis and provide justification for further larger trials.

Animals: Ten dogs with severe acute pancreatitis in an open-label, prospective pilot study.

Methods: Dogs were treated with plasma transfusion and standard care, and then consecutively assigned to receive either EN via esophagostomy tube feeding or parenteral nutrition (PN). Outcome was used to determine optimal study site for future studies, and complications were compared between the 2 groups.

Results: A significantly greater number of vomiting or regurgitating episodes occurred in dogs receiving PN. The dogs receiving EN did not demonstrate any noticeable postprandial pain. There were more catheter-related complications in the PN group. There was no difference in outcome between the 2 treatments, and 43 dogs for each treatment would be required in future studies to determine a difference in outcome.

Conclusions and Clinical Relevance: Early EN delivered proximal to the pylorus is well tolerated in dogs with severe pancreatitis and resulted in fewer complications than PN. Prospective trials in a larger cohort are justified to fully establish the potential benefit of early EN, preferably compared with minimal enteral nutrition.

Key words: Nutrition-small animal; Pancreatic necrosis; Total parenteral nutrition.

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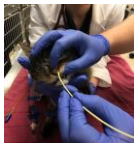
Early Nutrition- Summary

- Nutrition should be considered early in patients not voluntarily eating
  - Improves morbidity
  - Decreases mortality
  - Well tolerated
  - Easy to do

34

Nutrition



35

Jake

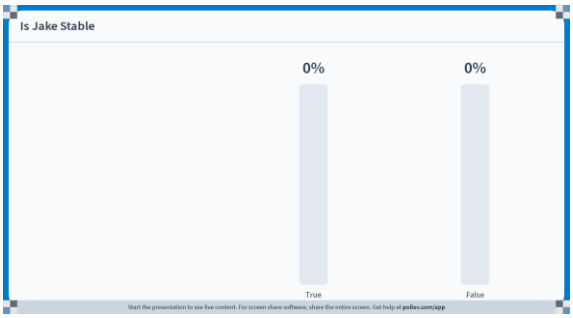
- 7-month-old male castrated Australian Cattle Dog
  - Vomiting
  - Diarrhea
  - Anorexia for 24 hours
- Current on preventative care, chews on his toys

36

Physical Exam Findings

- Heart rate – 110 beats/minutes
- Temperature- 100.4 F
- Respiratory rate- 24 breaths/minute
- Strong pulses
- Mucous membranes pink
- CRT less than 2 seconds
- Moderate abdominal pain

37



38

Diagnostic Testing?

- CBC and Serum Biochemistry profile
- Abdominal radiographs
- Fecal exam
- Parvo snap test?

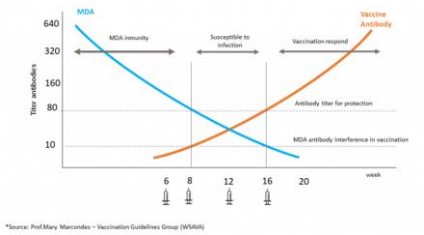
39

Canine Parvovirus Enteritis

- Common cause of enteritis in a wide variety of animals
- High mortality rates without appropriate treatment
- Species specific
  - All domestic and wild canids are susceptible
  - Ferrets, domestic cats, cheetah and Siberian tigers
- Vaccination helps provide herd immunity

40

Why are Older Dogs Susceptible



41

Risk Factors

- Failure of passive transfer
- Early waning of maternal antibodies
- Lack of vaccination
- Passive maternal immunity preventing an effective response
- Unsanitary environment
- Infection with concurrent endoparasites

42

Diagnosis

- Enzyme-linked immunosorbent assay (ELISA)
  - Detection of CPV virus in feces of affected dogs
  - Sensitivity ranges from 56%-82%, specificity of > 90%
  - Detects CPV-2b and CPV-2c with similar sensitivity
- Parvo vaccine cross reactivity

43

Diagnosis- ELISA

- False negative
  - Viral particles detectable about 4-7 days after infection
  - Binding of serum neutralizing antibodies to antigen in stool
- False positive
  - 3-10 days after vaccination with modified live virus vaccine

44

Diagnosis- PCR

- Real time and conventional PCR
  - Sensitive (93%), specific (100%)*
  - More reproducible
  - Allows quantification of CPV-2 nucleic acid in a few hours
  - Less risk of carry over contamination
  - Expensive, requires specialized equipment

* Desario et al, 2005

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Laboratory Testing

- Complete Blood Count
  - Leukopenia
    - Specifically lymphopenia early, followed by neutropenia
    - Survivors in one study showed an increase in lymphocyte count at 24 and 48 hours post admission*
    - Presence of left shift also an accurate predictor of better outcome*

*Goddard et al, 2008

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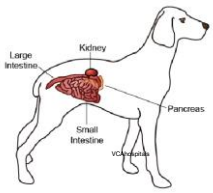
Laboratory Testing

- Serum Biochemistry Analysis
  - Non-pathognomonic
    - Hypoglycemia
    - Hypokalemia
    - Panhypoproteinemia
    - Hyperphosphatemia
    - Azotemia (usually pre-renal)
    - Hyponatremia
    - Increased ALP activity



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Laboratory Testing

- Abdominal Radiographs
  - Not typically performed
    - Intussusception
    - Gastrointestinal foreign body obstruction
    - Confirm nasogastric tube placement
  - Generalized ileus

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Initial Therapy

- Aggressive supportive care
  - Fluid therapy
  - Antibiotics
  - Anti-emetics
  - Nutritional support
- Hospitalization recommended for most dogs with CPV infection

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Antibiotics

- Naturally occurring model for sepsis
- Broad spectrum antibiotics
  - Gram positive
  - Gram negative
  - Anaerobic coverage
- Consider cartilage development in young dogs
- Utilize aminoglycoside in well perfused and hydrated dogs

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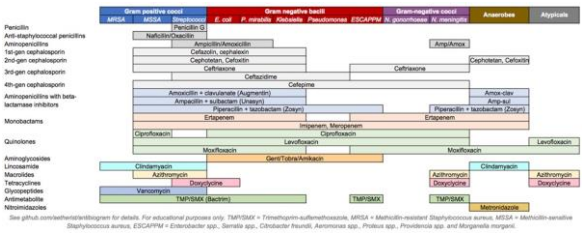

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Canine Parvovirus Monoclonal Antibody

- First (currently only) USDA-conditionally approved monoclonal antibody treatment
  - Single dose IV injection
  - Specifically targets canine parvovirus
  - Binds to and blocks canine parvovirus from destroying enterocytes and other host cells

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Canine Parvovirus Monoclonal Antibody

- Elanco's research study
  - No dogs died after being challenged with CPV-2b
  - Decreased clinical signs
- May decrease cost of care?

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Outpatient Therapy

- Careful case selection
- 20-25% mortality rates*

*Sarpong et al 2017, Venn et al 2016

CanineDiabetes

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Outpatient Therapy

Evaluation of mortality rate and predictors of outcome in dogs receiving outpatient treatment for parvoviral enteritis

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OBJECTIVE

DESIGN

ANIMALS

PROCEDURES

RESULTS

CONCLUSIONS AND CLINICAL RELEVANCE

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Questions

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KANSAS STATE UNIVERSITY | College of Veterinary Medicine

DON'T FORGET THE GROCERIES, THE IMPORTANCE OF NUTRITION SUPPORT IN CRITICALLY ILL PATIENTS

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Don't Forget the Groceries: The Importance of Nutrition Support in Critically Ill Patients
Caitlyn Getty, DVM, PhD, DACVIM (Nutrition)
December 9, 2023

The Nutritional Assessment

- Physical Examination
    - Body Condition Scoring
        - Obesity is malnutrition
        - Can be indicative of chronicity and severity of disease and/or malnutrition
    - Muscle Mass Index/Muscle Condition Score
        - Dogs
            - https://wsava.org/wp-content/uploads/2020/01/Muscle-Condition-Score-Chart-for-Dogs.pdf
        - Cats
            - https://wsava.org/wp-content/uploads/2020/01/Muscle-Condition-Score-Chart-for-Cats.pdf
        - Cachexia and sarcopenia
            - Cachexia – Loss of muscle and body adipose stores with normal or abnormal intake, associated with ongoing stress or disease process
            - Sarcopenia – Age-related loss of skeletal muscle, not associated with ongoing disease process
    - Haircoat and Skin
    - Whole Body Assessment
- Detailed History
    - Medical and Nutritional
        - Medical history
            - Disease history
            - Weight loss
            - Muscle condition history
        - Nutritional history
            - Anorexia vs. hyporexia
                - Anorexia – "the loss of desire for food before caloric needs have been satisfied. Anorexia may be partial or complete. The anorexia is complete if a patient consumes no food for a period beyond that considered normal. The anorexia is partial if the patient consumes some food but less than that considered a normal daily intake" (SACN 5th Edition)
                - Hyporexia – Similar definition as partial anorexia, may be used interchangeably. Somewhat depends on your hospital culture and training, which can lead to confusion.
            - Polyphagia – increased appetite and food intake, may or may not be above calorie requirements depending on disease process
            - Picky eating

- Clinical signs around mealtime?
- Relation of GI signs to meals

- Quantitative Evaluation
  - CBC/Chemistry/UA
  - Other Pertinent Laboratory Analysis
    - TAMU GI Panel
    - MSU PTH Panel
    - Others

Metabolism and Biochemistry

- Cats vs. Dogs
  - Protein and Amino Acid Requirements
    - Arginine and Taurine
  - B-vitamin Metabolism
  - Complications
    - Hepatic lipidosis
- Metabolism of the Fed Animal
- Metabolism of Starvation and Critical Illness
  - Altered utilization of nutrients
    - Respiratory quotient
  - Simple starvation
  - Stress starvation/critical illness

Nutrients of Concern

- Water
  - Required for normal functioning of metabolism
  - Considerations based on disease/injury
    - Renal disease
    - Hypoalbuminemia
    - Concurrent management of sodium toxicity
    - Etc.
- Protein
  - Required for tissue regeneration and healing, normal drug metabolism, transport of fatty acids, maintenance of lean muscle, production of inflammatory cytokines, etc.
  - Target levels are life-stage and disease-dependent
    - Growth vs. reproduction/lactation vs. adult
    - Renal disease
    - Hepatic disease
    - Post-surgical repair
  - Protein source
    - Plant vs. animal
    - Novel or hydrolyzed?
    - Specific amino acids
      - Arginine

        - Glutamine
        - Taurine
        - BCAAs
    - Palatability
- Carbohydrates
    - Species and disease-dependent
    - Length of disease/starvation
    - Source considerations
        - Sugars and starches
        - Fibers
- Fat
    - Species and disease-dependent
    - Length of disease/starvation
    - Increases calorie density
    - Palatability
- B-Vitamins
    - Required for intermediary metabolism
    - Increased consumption during illness
    - May already have deficiencies secondary to disease
- Others:
    - Fat soluble vitamins
    - Electrolytes
    - Antioxidants
    - Omega-3 Fatty Acids
- Non-nutrient Nutritional Factors:
    - Food Form
    - Feeding Frequency
    - Calorie Density

General Macronutrient Levels in Cats and Dogs:

	Protein (g/100 kcal)			Fat (g/100 kcal)			Carbohydrates (g/100 kcal)		
	High	Mod	Low	High	Mod	Low	High	Mod	Low
Dogs	> 7	5-7	3-4.75	> 5	3-5	< 3	--	--	< 10
Cats	> 11	8-11	5-7.5	> 6.5	4.5-6.5	< 4	--	--	< 3?

Diet Selection and Creating a Nutrition Support Plan

- Encouraging Voluntary Intake (if possible)
    - Environmental considerations
        - Treatment times
        - Day vs. night
        - Bowl type
    - Temperature/consistency of food
    - Animal treatment plan
        - Repeated anesthesia?
        - Fasting for testing?
- Route of Nutritional Support
    - Voluntary vs. Assisted Enteral vs. Parenteral
    - Client Communication
- How Much to Feed?
    - Calories
        - How long has the animal not been eating or not eating enough?
        - How much has the animal been eating?
        - How critical is the animal?
            - Assessing risk
            - Some conditions (burns, growth, weight loss, etc.) increase the calorie requirement
        - Calculating requirements
    - Volume
        - Stomach volume shrinks with prolonged reduced intake or anorexia
- Selecting a Diet for Voluntary Intake or Assisted Feeding
    - Critical Care Foods
        - Nutrition Profile
            - Moderate-high protein
            - High fat
            - Low carbohydrate
            - Added micronutrients such as carnitine, arginine, and antioxidants
        - Texture
            - Canned pates are designed to be blended and administered via feeding tube (esophagostomy or other open-tip tube)
            - Stew texture foods may be blended depending on formulation
            - Some kibble formulations
        - Highly palatable
    - Other Therapeutic Foods or Wellness Foods
        - May be desired based on target nutrient profile
    - Liquid Diets
        - Veterinary vs. Human Liquid Nutrition
            - Protein levels tend to be much lower in human nutrition products
            - Mineral levels

            - Most often do not include sufficient arginine and taurine for our feline patients
            - Carbohydrate sources
        - Veterinary formulations come in liquid and powdered forms
            - Powdered forms are not suitable for CRI feeding and extra caution should be used to ensure feeding tubes are flushed adequately

- Calculating Water Intake
    - IV Fluids and Enteral Nutrition Support
        - Determine water requirement of the patient →
        - Determine amount of water coming from the food →
    - Provide additional water via IV fluids or per os
        - Utilize feeding tube if able
        - Measure voluntary water intake

Managing Complications

- Refeeding Syndrome
    - Insulin-mediated
    - Hypokalemia, hypophosphatemia, hypomagnesemia
    - Dextrose in IV fluids?
    - Management
        - Stop feeding →
        - Correct electrolytes →
        - Evaluate nutrient profile of food and/or start feeding at a lower rate
- GI Intolerance
    - Volume intolerance
    - Diarrhea
- Mechanical Complications

References Available Upon Request