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INTRODUCTION

What is a cat? What characteristics are different for this species than we are or dogs are? Only by better understanding our patients can we provide better nursing care.

Cats are obligate carnivores. They diverged from canids approximately 30 million years ago, evolving metabolically into carnivores with unique strategies for the utilization of protein and amino acids, fats and vitamins. This concept must be at the centre of trying to understand the nutritional needs of cats and planning dietary therapies for health disorders.

Working with a species that has not evolved with a social structure similar to ours provides interesting challenges to the practitioner of veterinary science working with cats. Cats are able to function completely efficiently as a solitary creature. Cats do have complex and changing social interactions which make for a changing structure, much more intricate than that of a herd or pack species. Cats are also small predators. This has affected their anatomic and physiologic development, which has remained unchanged over several million years. While being predators, their size also makes them prey to other species. This aspect affects how they respond to us in a clinic setting and deserves to be discussed further in this presentation. Relying on the “fight or flight” or epinephrine response, they escape situations viewed as dangerous. From the perspective of a cat, we are, and what we do is, dangerous. Accordingly, one of the great challenges we see on a daily basis is the frightened and assertive cat. It is essential to remember at all times that this small creature feels more threatened than we do so that we do not become frightened ourselves. Because cats are small, they try to avoid physical confrontation at all costs and attempt to intimidate using sounds and posture as much as possible.

Handling the uncooperative cat: a comprehensive physical examination can usually be done using a towel as a protective barrier. Facing the cat away from you is less threatening for him/her. Confining the cat between your legs as you sit on the floor provides adequate persistent firm restraint that is reassuring rather than frightening.

Collection of blood and urine can be done by bundling a difficult cat’s forelimbs, torso and head in a towel and using the medial saphenous vein and a lateral approach for cystocentesis. This vein is also a superb choice for catheter placement and administration of intravenous medications.

Blood pressure evaluation may also be done recognizing that a persistently elevated systolic value of greater than 170 or 180 mm Hg is probably represents true hypertension rather than the stress response. If in doubt, repeat the value later on during the visit.

Feliway, a synthetic analog of a facial pheromone produced by cats has, in general, a calming effect on cats. Spray it into kennels and carriers and even on your clothing before handling an anxious cat. Let the substance evaporate for a few minutes before placing kitty into the sprayed space. Plugging the diffuser form of Feliway into treatment and hospitalization areas as well as reception and consultation rooms can help patients relax. [http://www.feliway.uk.com/]

Elevated blood glucose and glucosuria may be a result of persistent stress. The diagnosis of diabetes, therefore, is dependent on finding and elevated serum fructosamine or glycated hemoglobin.

Domestic cats have evolved from the wild cat model remarkably little. (They display a much narrower diversity of phenotype than dogs.) They are anatomically and physiologically adapted to eating 10-20 small meals throughout the day and night. This allows them to hunt and eat when their prey are active. Small rodents make up the majority of their diet, with rabbits, birds, insects, frogs and reptiles making up a smaller proportion. The average mouse provides 30 kcal of energy, which is about 8% of an average feral (i.e. active) cat’s requirements. Repeated hunting behaviours throughout the 24 hour period are needed to meet this need; this has evolved into the normal grazing feeding behaviour of domestic cats. Under stressful situations, cats will refuse a novel food; under other circumstances, the same cat may be very adventurous and chose a new diet over their familiar food.

A critical difference in cats is that, while other species are able to rest their metabolic pathways from the efforts of glucose (energy) synthesis when they have been fed cats must continue gluconeogenesis in both the fed and fasted states. When cats are anorectic, they catabolize body proteins. Protein supplementation during fasting will slow hepatic lipid accumulation. Urea cycle enzymes in the liver of cats are always „turned on”. This does not, however, imply that cats cannot use carbohydrates as they are capable over the longterm to adapt to lower protein diets. Adult cats have a much higher requirement for protein than dogs or humans. Expressed as a percentage of diet, adult cats need 29% vs. the adult canine requirement of 12% or the human need for 8%.

Esophagostomy tubes are easy to place in under 10 minutes of anaesthesia. Feeding can be started within 2 hours after recovery. Using a syringable food such as Hill’s a/d or
Royal Canin Recovery (1.3 kcal/ml) or Eukanuba Maximum Calorie (2.1 kcal/ml) is ideal. Should they need diluting, use a liquid feline diet, such as Clinicare (1 kcal/ml) rather than water in order to avoid loss of caloric density. These tubes are easy to maintain and can be removed as soon as the patient is eating on his/her own enough to prevent weight loss without nutritional support over a one week period. Should they clog, infusion of 10 ml of a cola drink or meat tenderizer in solution will unplug the tube if left for 10 –15 minutes. Gradually increase the volume of each meal reducing the number of feedings needed to meet the daily caloric requirements, the goal being to have 4 feedings/day, as this is a reasonable number that clients can cope with at home. If, in so doing, vomiting recurs even with a small volume of food (e.g. 10 ml) then “trickle feeding” can be instituted. This consists of fill an empty IV bag with either of the aforementioned diets, Clinicare or another liquid diet, attach it to an IV line, and run the line as a drip throughout the day attached to the feeding tube. Either gravity flow or IV pump are suitable. Use a fresh bag and new solution every 12 hours to prevent bacterial or yeast growth.

Successful management of a cat with diabetes mellitus requires a committed healthcare team. The client needs to know that they will see improvement, that this will take several months and that they have their veterinary team behind them. Confirming the diagnosis using a serum fructosamine, we book a counselling appointment. At this time, we listen to the client’s concerns and beliefs about diabetes and help them understand the pathophysiology. The client is taught to handle insulin and syringes properly, nutrition is discussed and they are taught how to use the diary. The first blood glucose curve (hourly measurements for 12 hours) is booked for two weeks hence; at this time, the insulin dose most likely is adjusted and the client is taught how to perform glucose measurements at home before administration of insulin.

Thereafter, curves are performed every 2 weeks until the cat’s condition is stable. These are initially performed in clinic. After one month on insulin, a fructosamine is evaluated again. Once the client is comfortable enough with monitoring blood glucose, curves are performed at home and reported by email, phone or fax to the doctor for recommendations.

Being largely self-dependent, cats mask illness and pain extremely well. The signals of problems are often subtle. Listening carefully to clients when interviewing them for the history and their concerns is extremely important. Often clients detect changes intuitively that represent real problems. This is more common, in the author’s experience, than the client who is blissfully unaware of significant health problems. By asking open-ended questions, one elicits a more detailed history than using only specific questions. For example: starting with: “Have you noticed any changes in the contents of the litter box?” results in a yes/no answer. Asking: “What does his stool look like?” Provides a useful answer.

One simple technique for detecting subtle changes is measuring body weight at every visit and calculating the percentage change in body weight. By 12 –15 months of age, a cat should reach their adult weight. By noting slight changes in weight, either increases or decreases, one can follow trends and hopefully avert significant problems such as lipodosis or obesity and detect malabsorption of nutrients or catabolism of cancer in the earlier stages.

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\text{% change} = \frac{\text{previous weight – current weight}}{\text{previous weight}}
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Monitoring body weight in hospitalized cats is invaluable in helping to assess the success of rehydration efforts as well as the adequacy of feeding. Weight gain in the face of fluid therapy without voiding could be an indicator of third space fluid accumulation. Thus, cats in clinic on IV fluids should be weighed at least twice a day; cats boarding or otherwise in the hospital should be weighed daily. The “grumpy” cat can be weighed in towel and, by subtracting the weight of the towel, we get the body weight with being minimally intrusive. Other uses for scales are to evaluate volume of urine produced by knowing the weight of the unused litter box and comparing it to the used box; a postage scale may be used to determine volume of blood in surgical swabs.

Urine collection: Agitation of the bladder just before collection of urine by cystocentesis provides a better sediment yield. Because sediment is heavier than urine and is gravity dependent, resuspension of the sediment within the bladder is diagnostically beneficial. A low number of white blood cells, trace protein or the absence of bacteria should be interpreted with suspicion in dilute urine. A culture and sensitivity may be warranted when the specific gravity is < 1.025 in this situation. Conversely, when high numbers of bacteria are seen in a highly concentrated urine (e.g. usg > 1.050), collection induced contamination should be expected, especially when a mixture of rods and cocci are reported.

Blood pressure evaluation should be performed in every cat over the age of eight years and in any ill or anaesthetized patient. Hypertension is common in cats with renal insufficiency or with hyperthyroidism. Hypotension in an ill cat may signal hypovolemia or sepsis. During anaesthesia, hypotension precedes alterations in pulse oximetry and, if remedied promptly, can prevent hypoxemia from developing.

Hematocrit tubes provide vital information. Not only should the PCV and total solid (TS) be noted, but also the percentage buffy coat, as an estimate of massive white cell number changes and the character/colour of the serum. Icterus may be noted in the serum (or in the urine) before serum bilirubin rises or before it becomes evident in the pre-auricular skin, the conjunctive or the soft palate. Calculation of fluid rates for patients requires knowledge of the TS along with the PCV. These measurements should be taken minimally once a day; in more anemic and volume fragile patients, more frequent measurements are indicated. Like blood glucose measurement, blood for hematocrits may be collected by ear pricking with minimal annoyance for the patient.

Assessment of degree of dehydration should take all of the following parameters into consideration: skin turgor, eye position, mucous membrane moisture and TS as well as the character of their stool. Replacement of volume deficit plus maintenance requirements of 60 ml/kg/day should be calculated using the normal, hydrated weight not the ill weight. When prescribing subcutaneous fluid therapy as part of home

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\text{V}_{\text{fluid}} = 0.06 \times \text{body weight} \times \text{body weight (corrected for hydration)}
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care for a patient (for constipation, renal insufficiency, etc.), assuming the patient is adequately rehydrated, the volume to be given at home should be 60 ml/kg/day, not an arbitrarily assigned 50, 100, 150 ml/day based on the size of the cat.

Intubation of cats can be easily accomplished without the use of a laryngoscope, which can be cumbersome. With the assistant holding the cat’s mouth open with one hand (hand over head, fingers at angle of jaw), she/he pulls the skin over the larynx rostrally. Simultaneously, the person intubating pulls the tongue forward and down, exposing the laryngeal folds. These are numbed with a drop of lidocaine and then the lubricated cuffed endotracheal tube is easily slid into the clearly visualized opening.

Bronchopulmonary disease diagnostics requires the harvesting of airway secretions for cytologic and microbiologic evaluation analysis for differentiation and diagnosis of the various causes of coughing and/or wheezing in the cat. Tracheal wash is readily available to all practitioners and samples the contents of the larger airways. Using a sterile endotracheal tube is less stressful than the traditional trans-tracheal technique. Pass a 3-5 Fr. red rubber feeding tube through an opening made in the end of its packaging, through the endotracheal tube until slight resistance is met. Flush two 6 ml aliquots of nonbacteriostatic physiologic sterile saline and aspirate the wash back into a sterile collection syringe. Repeat this procedure until 6-12 mls of saline have flushed the airways. Submit some of the collected sample on air-dried slides, in an EDTA tube as well as in a sterile red top tube for culture, should the fluid cytology show significant organisms. The presence of Simonsiella bacteria or squamous cells indicates oropharyngeal contamination.

Transfusions are an underutilized therapeutic modality. They are simple and life-saving as whole blood provides not only oxygen carrying capability of the red blood cells, but also platelets to initiate clotting, coagulation factors, oncotic properties of albumin to raise blood pressure, electrolytes, nutrients and white blood cells to fight infection.

It is important not only to blood type the recipient and use a suitably typed donor, but also to cross-match the potential donor to the recipient. There are too many type B cats in the population to not blood type and because of numerous alloantibodies as well as antibodies to things a cat has been exposed to, we mustn’t err by not cross-matching. Either small blood bags can be used or 12 or 20ml syringes with CPDA1 added. The PCV and TS of both the donor and recipient are needed. With this information, the ideal amount of blood to be given may be calculated. Mostly one collects 40-50ml from the donor and gives the entire unit. An 18G needle and extension set (rinsed with CPDA1) or butterfly catheter can be used for collection from a sedated donor. A three way stop cock or one-way valve is helpful for changing syringes during collection. An in-line pediatric filter is needed for the administration of the blood. The most important thing (other than typing and cross matching) is that the human team are all relaxed. This is not a difficult procedure!

**Donor requirements:**
- Retrovirus and mycoplasma negative
- Good health, good body weight, well hydrated
- High PCV with normal TS
- Care of donor after collection:
  - Subcutaneous or IV fluid therapy
  - Iron orally or by IM injection
  - Good nutrition...and a treat!
  - LOTS OF TLC
- Care of the recipient after transfusion:
  - Administer the transfusion over 1-2 hours and monitor body temperature, RR and attitude closely during transfusion.
  - Check a PCV and TS after 24 hours

Bone marrow taps are another procedure that may intimidate some practitioners in the relatively smaller feline patient. The author uses 16G needles rather than a Jamshed needle and readily harvests both a bone corer as well as marrow for evaluation of marrow diseases. Sites that may be used for collection are the femur, medial to the greater trochanter, the wing of the ilium or the humerus. After surgical prep the samples collected should be placed into EDTA tubes, at least 6 slides should be made and air-dried and the bone core placed into formalin in a red top tube. Be sure to collect a blood sample for a CBC at the same time to evaluate how the cells are being released into the periphery.

Analgesia has thankfully come of age in veterinary medicine. We now have numerous types of agents that we can use safely in cats. The American Animal Hospital Association (AAHA) and the American Association of Feline Practitioners (AAFP) have jointly created Pain Management Guidelines in 2006. Whether we chose opioids, NSAIDs, antispasmodics may be beneficial and humane along with an analgesic. Whether we chose opioids, NSAIDs, antispasmodics, antiseizure meds or acupuncture, we must be proactive.

Conditions commonly seen in feline patients for which we may not routinely provide anesthetics include lower urinary tract disease (LUTD), pancreatitis, and arthritis. In LUTD, antispasmodics may be beneficial and humane along with an anti-inflammatory agent. Arthritis requires the use of agents that can be given long-term, such as judiciously dosed NSAIDs, glucosamine and chondroitin sulphate and acutnapine if available and tolerated. A wonderful resource for learning about the recognition and alleviation of pain is: Pain H.U.R.T.S. available through www.jonkar.ca/RS/Pain/

Recently aerosol inhalers (for both steroids and bronchodilators) have been recommended and used with success clinically in small animal medicine. Fluticasone is an inhaled steroid, which comes in 3 dose strengths (44, 110, 220 mcg/dose). Beta₂-adrenergic agonists come in a selection of albuterol, salmeterol or terbutaline. These may be delivered with the use of an Aerokat (www.aerokat.com) held over the cat’s muzzle for 30 seconds. Drug delivery remains a significant question, both getting effective drug concentrations into the affected airways as well as avoiding...
excess drug/the potential of overdosing these small animals. There is an excellent website resource for clients to learn more about their asthmatic cat and use of inhaled medications: http://www.fritzthebrave.com

Tips on aerosol use:
• Acclimate kitty to device over several days, letting him/her investigate it.
• Reward fearless approaches to device and start placing it near kitty’s face. (Praise, food, catnip, stroking?)
• Practice with the mask over the cats face without anything in the chamber
• Pre-load the chamber with a puff of albuterol (in addition to the dose required)
• Make sure the mask is over the muzzle for 4-6 breaths
• Administer bronchodilator (albuterol) first, to allow better delivery of corticosteroid

In the patient who is nauseous and swallowing frequently, esophagitis or gastritis may be suspected. Administration of famotidine SC along with an oral bolus of sucralfate suspension will make the kitty much more comfortable for examination.

As well as medical therapy for pruritis, the cat with itchy skin will benefit if SoftPaws™ (www.softpaws.com/) are applied to the nails of their back (+/- front) feet.

As cats age, they tolerate less time in the clinic. Siamese cats are especially prone to depression. Three days is about as long as a cat can stand the indignities of hospitalization, even with daily visits from his/her person. Because cats “see” the world in overlapping clouds of smells, we must provide familiar smells and aim to reduce foreign, medicinal smells wherever possible. Client worn shirts are helpful in their cages/beds. Because their sense of hearing is tuned more finely than ours, we must keep as quiet and reassuring environment as possible. They should not be exposed to the sounds of predators, namely barking dogs. Certain induction agents enhance their sense of hearing, e.g., ketamine, so a safe sounding environment should be achieved. Changing diet while hospitalized is likely to result in inappetance and the development of an aversion, thus if a change in diet is required therapeutically, try to make that change at home, in a gradual fashion.

Client care, i.e. care of the client, is essential to providing complete patient care. It is only through hearing and working with the client that we are able to offer the very best veterinary care.

Remember, in order to provide compassionate and effective care for cats, try to think like a cat. Imagine what their experience might be like. When we reach into a carrier or kennel, we are huge creatures, blocking the light. We smell wrong and don’t sound familiar. Shushing reassuringly sounds like a hiss in cat. Remember that the less is more when restraint is required. Always leaving as much contact with the floor as possible; if collecting from a jugular in sternal position, have the forefeet touch the table; procedures requiring lateral recumbency are less frightening when the front end is sternal. Allow the client to be with the kitty as much and whenever possible. And don’t forget that hissing, spitting, growling and posturing are all attempts to not have to strike or bite you. Cats avoid direct physical confrontation if possible.