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Anesthesia Essentials  
For Pet Owners

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AN INFORMATION  
GUIDE



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## How to use this booklet

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This booklet is intended to be an educational resource in the areas of anesthesia, dentistry and pain management. The goal of this information is to help answer questions you may have and encourage discussion on these topics with your veterinarian. Each VCA hospital is unique and while each follows the principles in this manual, there will be variations in individual processes within hospitals. Please ensure that you ask your veterinarian if you have any questions about the anesthetic process. Your pet's health, comfort and safety is our top priority.



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## What is anesthesia?

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Anesthesia is the use of medicine to prevent the feeling of pain, provide muscle relaxation and produce a hypnotic state to create a state of unconsciousness during a surgical or dental procedure. Anesthetic agents are given via injection or through inhaled gases with the goal of inducing analgesia (loss of response to pain), amnesia (loss of memory), immobility (loss of motor reflexes), unconsciousness and relaxation of skeletal muscles. It is very normal for pet owners to be concerned and have questions about anesthesia. This manual is designed to answer some of these questions and to be a resource to help generate discussion with your veterinarian.



## What are the main goals of anesthesia?

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- To create a safe, pain free, unconscious state to allow a procedure to be performed.
- To decrease anxiety, control pain and allow a safe recovery in the post-operative period.

# How can we minimize risks and concerns related to anesthesia?

It is important to thoroughly discuss your pet's anesthetic and medical history with your veterinarian, including previous allergies, previous anesthetic procedures and current medications.

Your pet should have a full physical examination by your veterinarian prior to any anesthetic procedure. This is important to ensure normal vital signs and assess any physical exam abnormalities. During this examination your veterinarian will assess your pet's breathing, heart and circulation, body temperature, nervous system, eyes, ears, skin/hydration, lymph nodes, abdomen and limbs.

## NORMAL VITAL SIGNS

Temperature	100.5-102.5 <sup>0</sup>
Pulse rate at rest (beats/minute)	Dogs: 80-120 bpm* * rates can be higher in puppies and small dogs Cats: 180-200 bpm
Respiratory rate	18-24 breaths/minute
Mucous membrane color	Generally pink
Hydration	1 second * pick up skin on nape of neck and should recoil in approx. 1 second

Follow your veterinarian's recommendations for a full pre-operative work up which could include blood work, urinalysis, blood pressure, electrocardiogram and chest radiographs (see page 12 & Addendum 2 for more detail).

Follow your veterinarian's pre-anesthesia feeding instructions strictly. This typically involves withholding food for approximately 10-12 hours prior to surgery. It is okay for your pet to drink normal amounts of water, unless instructed otherwise. This is very important as it ensures your pet will have an empty stomach during anesthesia and will decrease the risk of vomiting.



# What safety checks and balances are put in place by the medical team?

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- The pre-operative exam and work up...(see page 12 & Addendum 2 for more detail)
- An anesthesia checklist is used for every patient. This increases patient safety by ensuring a double-check system by the technicians and veterinarian for every step in the anesthetic process.
- An emergency drug sheet is created for each patient and ensures that nurses are ready with the correct emergency drug dose in the rare instances it is needed. The risk of anesthesia-related deaths are 1 in 10,000 which is very low. Our teams are trained to respond to any emergency situation .
- As anesthesia can cause nausea in some patients, medications are often used in patients with a prior history of regurgitation or nausea, or in patients undergoing longer anesthetic procedures. This is why it is essential that no food is given to your pet for a period of time prior to anesthesia when at all possible.
- All patients have an intravenous (IV) catheter placed and are supported with IV fluid therapy throughout the procedure. IV fluid therapy is a key part of most anesthetic procedures as it is a key component in supporting blood pressure in patients under anesthesia.
- All patients receive pre-medications. These medications are given approximately 30 minutes prior to anesthesia and they help to decrease patient stress and anxiety, as well as to allow lower doses of subsequent anesthetic medications. Veterinarians choose pre-medications based on the patient's health status, the degree of pain associated with the procedure, the patient's temperament and the length of the procedure.
- Trained veterinary technicians are present for hands-on individual patient monitoring throughout the procedure and during the post-operative period.
- Anesthetic monitoring is an essential part of ensuring a safe procedure. When a veterinary patient is under anesthesia, their vital signs are closely watched in the same manner that human patients are monitored. We use state of the art equipment including blood pressure monitors, electrocardiogram monitors, pulse oximeters and capnographs (see page 14 for more detail). One of the main values that we measure is a patient's blood pressure. Because anesthetic drugs can cause



*Technician monitoring vital signs*

a decrease in blood pressure a veterinary nurse closely monitors this measurement throughout anesthesia. Patients are kept on intravenous fluids during anesthesia to support blood pressure and each patient's anesthetic plan is individually tailored to their needs. Medication can be administered as needed to support blood pressure.

- Each patient is kept warm with a safe forced air warmer called a “bair hugger” (or something similar) throughout anesthesia. Smaller patients, cats and geriatric

patients are at higher risk for a low body temperature (hypothermia) while under anesthesia.

- Strict post-operative recovery procedures are followed and include monitoring of vital signs, protection of the patient's airway, monitoring the level of sedation and continual assessment for signs of pain.

### **WHAT SHOULD I DO THE NIGHT BEFORE ANESTHESIA?**

- The night before anesthesia your pet can eat a normal meal.
- Your veterinarian will make specific recommendations, but typically it is recommended not to give food after midnight. Normal amounts of water are okay, unless instructed otherwise. Recommendations will often vary for diabetic patients, very small patients and neonates (patients < 2 months of age).
- It is also a good idea to keep your pet's exercise to a moderate level the day before anesthesia and to minimize time spent in the sun, especially in warmer temperatures.



## What happens to my pet when I “drop them off” at the hospital the morning of anesthesia?



*Physical examination by a doctor*

- This depends on the type of procedure. A typical plan during the “pre-operative period” is as follows:
- A technician will take your pet’s vital signs, including body temperature, respiratory (breathing) rate, heart rate, blood pressure. A body weight will be recorded.
- A full physical examination is then performed by the veterinarian.
- Pre-operative blood work (and any other tests recommended) will either be performed, or if previously performed, results will be examined by the doctor.
- Your pet will be given a “pre-medication” which is a low dose of sedative and pain medication given to decrease anxiety approximately 30 minutes prior to anesthesia. This also allows treatment of pain preemptively (before it actually occurs in the surgery or dentistry) and allows for better pain control.
- Your pet will have a small area of hair on their ‘wrist’ (front leg) shaved and an intravenous catheter will be placed in their front leg. Your pet will then be started on IV fluids.





*Anesthesia machine*



*IV catheter placed in a front leg*



*IV Fluids*

- Monitoring equipment and the anesthesia machine will be checked to ensure they are ready and the surgery or dental space is prepared.

- Your pet will then be given low doses of injectable anesthetics and when they become sleepy a soft plastic tube will be placed through the mouth and into their trachea (airway) to protect their lungs and to allow for delivery of gas. Each anesthetic drug dose is tailored to each individual patient.

- Once under anesthesia a trained technician will work closely with the doctor to monitor your pet's bodily functions such as breathing, heart rate and rhythm, body temperature, blood pressure and blood oxygen levels during surgery. All of these values are recorded on an anesthesia record and this will become part of your pet's medical record.
- Throughout the procedure your pet will be kept warm with a safe warming blanket system called a 'bair hugger' (or something similar).

## How long will my pet take to recover from anesthesia?

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This depends on the length and type of procedure as well as the anesthetic drugs used, but most pets recover quickly from anesthesia. Once the anesthetic gas is discontinued most pets are awake on oxygen within approximately 10 minutes. Pets will likely be sleepy or groggy for a few hours after this but will steadily become more alert. Within 12-24 hours most pets have fully recovered. This wake up period may be prolonged with longer anesthetic procedures, in geriatric pets, in sicker patients and in neonates (patients < 2 months of age).

Many patients may not have a bowel movement for 24-36 hours after anesthesia. This is a normal response to fasting prior to anesthesia and small meals after anesthesia. Once your pet is eating and drinking normally again, normal bowel movements should occur.

## Key things to remember

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- Ensure your pet is fasted as directed by your veterinarian prior to every procedure
- Make sure you discuss your pet's medical history, including any allergies, and any medications they are currently taking with your veterinarian.
- Every pet that has an anesthetic procedure performed will have a record of it within their medical record. If you know your pet has had a previous allergy or sensitivity to a medication but you cannot remember the name of the medication, you should bring this fact to your veterinarian's attention.
- Talk to your veterinarian about having pre-anesthetic blood work performed to help them learn all information possible about your pet prior to anesthesia. This will increase safety and help guide the anesthetic process and decisions they make regarding the anesthetic drugs they use and pre- and post-operative treatment.
- If you have concerns or questions about the anesthetic process or the surgical/dental procedure please ask. We are happy to explain as much as we can about them. Your pet's safety and health are our top priority.



# The pre-operative work up

## WHAT DO WE RECOMMEND AND WHAT DO THE TESTS TELL US?



### Blood chemistry panel

This panel helps assess overall health by assessing the major organ systems of the body.

### Complete blood count (CBC)

This test evaluates the 3 main types of blood cells that pets have in their bloodstream. These include red blood cells, white blood cells and platelets (cells that are responsible for blood clotting). The CBC tells us whether infection, inflammation or anemia is present. A blood sample is taken with a small needle to run blood tests.

### Urinalysis

Analyzing urine gives veterinarians information on their patient's kidney function and hydration status.

### Blood pressure

Blood pressure measurements are taken on veterinary patients in the same manner as it is taken with human patients - with a blood pressure cuff and a small machine. Anesthetic drugs can cause a decrease in blood pressure; as such, it is important to assess a patient's blood pressure before, during and after an anesthetic procedure. It is also important to detect high blood pressure in patients prior to anesthesia as this could affect a technicians interpretation of this value while their patient is under anesthesia.



*Monitoring blood pressure*

## Chest “x-rays”

Chest x-rays are recommended pre-anesthetically in geriatric pets and in patients where there is concern for compromised function of either the heart or lungs. These x-rays give information on the size of the heart, the size of blood vessels and the appearance of the lung field.

### WHY IS THIS IMPORTANT PRE-ANESTHETICALLY IN PETS?

Knowing these values increases the safety of anesthesia by giving us more information to make key decisions for your pet.

If any of the values on these tests are out of a normal range we may elect to delay anesthesia to focus on correcting the underlying conditions that resulted in these values prior to the procedure.

These values are very helpful in making the best choice of anesthetic drugs and in choosing the most appropriate IV fluid rate for your pet.

### WHAT ARE THE STEPS OF ANESTHESIA?

Most anesthetics are administered in stages: first via intravenous injection with a needle and then via

inhalation. As inhalant gas is often used to maintain anesthesia, patients are usually ‘intubated’ with a soft plastic tube that is inserted through the mouth into the upper airway (trachea or ‘windpipe’). This tube helps deliver these gases and protects the patient’s airway.

### WHAT ANESTHETIC DRUGS DO YOU USE?

Drugs used for veterinary anesthesia and pain control are very similar to (or in many cases the same) as human. The main differences are the doses of the drugs given and the consideration of the unique ways that cats and dogs may metabolize these drugs. Commonly in veterinary anesthesia a combination of drugs are used. This allows small doses of multiple drugs to be given to a patient; this decreases the chance of potential side effects and increases patient safety.

### WHAT DO I DO IF MY PET HAS A SENSITIVITY OR ALLERGY TO A CERTAIN ANESTHETIC DRUG?

Talk to your veterinarian about any concerns you have with your pet and previous drug sensitivities. It is also important for your veterinarian to know whether your pet has previously undergone anesthesia.



# Important anesthetic considerations

## MONITORING ANESTHESIA

All patients will be closely monitored by a technician trained in anesthesia during all 3 phases of the anesthetic process (pre-anesthesia, anesthesia and post anesthesia). Veterinary patients are monitored in a very similar way to human patients.

When patients are under anesthesia key vital signs and other parameters are measured with monitoring equipment which is then watched closely by the technician.

Vital signs include *body temperature, heart rate, and respiratory rate* are closely recorded. As body temperature is closely tied to almost every process in the body, it is

important to focus on keeping it in a range close to normal throughout the procedure. The veterinary nurse keeps an anesthetic record throughout the procedure which includes the measurement of vital signs, oxygen levels, anesthetic gas levels and parameters such as blood pressure from the monitors.

Another key measurement that is monitored by veterinary technicians and doctors is the patient's anesthetic depth – this is assessed by visually testing a patient's reflexes, assessing the patient's values on anesthesia monitors, and listening to a patient's heart and lungs with a stethoscope.



*A technician monitoring a patient's anesthetic depth and assessing values on monitors*

**The 4 main physiological monitors include blood pressure, electrocardiography, pulse oximetry and capnography:**

**Blood pressure**

Normal BP = 120/80  
with some variation

Blood pressure is a function of the tone in the arteries and the volume of blood ejected from the heart. It is important to measure blood pressure while a patient is under anesthesia as many anesthetic drugs can cause a decrease in blood pressure. If a patient's blood pressure drops while under anesthetic drug doses are altered. Fluid support is typically increased to increase blood pressure. Medications that support blood pressure may also be given.

**Electrocardiogram**

Normal lead II =



A device that measures the electrical conduction of the heart. An ECG is used to assess a patient for any abnormal rhythms called "arrhythmias" while a patient is under anesthesia.

**Pulse Oximetry**

Normal = > 98%

A device that measures the saturation level of oxygen in hemoglobin, the molecule which carries oxygen in the blood. This records whether there is enough oxygen in the blood and enough saturation in hemoglobin. A normal value is 98-100%.

**Capnography**

Normal = 35-40 mmHg

A device that measures carbon dioxide levels at the end of a breath to assess ventilation (breathing). This value is used to ensure proper ventilation during the anesthetic process by avoiding hypoventilation (decreased respiratory rate) or hyperventilation (increased respiratory rate)



# Pain control

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Just as with people, pain can accompany a pet's illness, injury or surgical procedure. Pain is considered to be the "5th vital sign" in veterinary medicine and effective pain management is a key part of caring for your pet and assuring their comfort.

Patients are given a combination of injectable and oral pain medications to control different types and degrees of pain. Sometimes patients are sent home with multiple pain medications to treat different kinds of pain. It is important to follow your veterinarian's instructions to ensure that your pet receives this medication. If your pet seems nauseous or is not eating, it is important to call your veterinarian.

## Types of pain

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### PHYSIOLOGICAL PAIN

"Acute pain" or "Adaptive pain." This type of pain is experienced immediately after traumas such as bite wounds, or fractured bones. This pain is typically very localized, intense and transient. Topical anesthetics, local blocks and drugs called opioids are commonly used to treat acute pain.

### PATHOLOGICAL PAIN

"Chronic pain" or "Maladaptive pain". This type of pain can be the result of an inflammatory or neuropathic (injury to a nerve) process. Chronic pain is pain that is associated with a chronic disorder or pain that continues after an injury has healed. An example of this type of pain is chronic arthritis. One of the most important steps in controlling chronic pain is to thoroughly treat the acute pain associated with any initial injury. Opioids and non-steroidal anti-inflammatories are two main categories of drugs that are used to treat inflammatory pain.





## **CATS AND DOGS EXPRESS PAIN IN A VARIETY OF WAYS WHICH MAY INCLUDE:**

Vocalizing-whimpering/yelping in dogs; yowling in cats

Sleeplessness

Trembling

Inappetance

Restlessness or standing /sitting in unusual positions

Reluctance to move or walking with a stiff gait

Flattened ears or “clamped tail”

Nausea, hypersalivation

Lameness or any gait abnormality

Inappropriate elimination (urine, feces)

Depression



## Fluid therapy

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An important part of anesthetic safety involves support of the cardiovascular system with IV fluid therapy throughout the procedure. Anesthetic inhalant gases cause blood vessels to dilate which can cause a decrease in blood pressure. Fluids are given intravenously to balance these changes. The dose and type of fluid given is based on the needs of your pet as well as their medical history. If your pet has a history of cardiovascular disease, IV fluids are given at lower doses. Pediatric patients often require higher fluid doses, while geriatric patients may require lower doses.

Another type of fluid that may be used during anesthetic procedures are colloids. Colloids may be naturally occurring (plasma, albumin or whole blood) or synthetic (such as products like Vetstarch or Hetastarch). Just as in people, animals who experience trauma or blood loss during a surgical procedure may require a blood transfusion. We are able to give blood transfusions to pets. Just like people, cats and dogs have their own blood types and strict protocols are followed to ensure safety during transfusion.



# Post-anesthesia recovery and home care

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## MONITORING

Once your pet has returned home with you it is important to monitor them for potential post-anesthetic effects for the following 48 hours. It is not unusual for a pet to have little interest in food or water for the first evening after anesthesia. Most pets should return to normal appetite and thirst by the following morning. Your veterinarian will send home any special feeding instructions. If your pet is interested in food the evening after an anesthetic procedure a good general rule to follow is to decrease the size of their normal meal by 50% for the first evening.

## SIGNS TO WATCH FOR

It is important to notify the hospital if you observe any of the following signs in your pet after anesthesia:

- Vomiting, regurgitation or retching
- Persistent diarrhea or blood in the stool
- Coughing or any difficulty breathing. Some pets might have a slight cough from irritation from the soft plastic tube that was in their airway during anesthesia. If this cough becomes more frequent or persists longer than 24 hours your pet should be rechecked.
- Pale gum color, lethargy

## MEDICATIONS

You may be sent home with pain or anti-nausea medication - or other medications for your pet's specific medical condition. Please follow directions closely and call the clinic if you have any questions about how to administer these medications or possible side effects. Pain medications and antibiotics can cause nausea in some pets. Please call if you have any concerns or questions about continuing a medication.

## PAIN CONTROL

Effective pain management is a very important part of caring for your pet and helping them recover post-operatively. See earlier section on page 17 for ways that cats and dogs may express signs of pain. It is important to contact your veterinarian if you are concerned that your pet continues to be painful after a procedure while being treated with a pain medication at home.

## ACTIVITY RESTRICTION

Your pet has undergone an anesthetic procedure. It is important to keep them quiet and restrict their exercise for the first 48 hours after anesthesia. Your veterinarian will give you instructions on specific activity restriction needs for your pet. Restricting activity post-surgery is crucial to ensure the success of your pet's surgical procedure and to allow healing from injury. While restricting their exercise, your pet should not engage in the following activities:

- Running
- Jumping (including up/down furniture or in/out of vehicles)
- Bathing/swimming
- Running up/down stairs
- Excessive horseplay with you or other pets

## INCISION CARE

If your pet has a surgical incision it is important to check this incision at least twice a day for the following 14 days, or until your veterinarian has removed all sutures. Not all surgical incisions have external sutures. You will be informed by your veterinarian if your pet needs to return for suture removal. When checking the skin each day, it should either appear unchanged or more like normal skin than the day prior. Please call the hospital if you notice increased redness, swelling, discharge, loss of sutures/opening on incision, pain at the incision site or if the area around the incision feels warm to touch.

## POST-SURGICAL/MEDICAL PROGRESS EXAM

If your pet has had surgery or dentistry performed your veterinarian may recommend a medical progress exam to recheck your pet's surgical incision or dental extraction site(s) within one week of the procedure.



# Specific breed/age group concerns

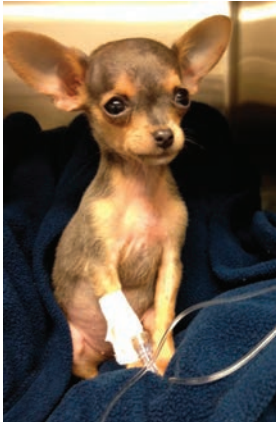
Although there are no true breed related anesthesia sensitivities, there are some age, body-size and breed related concerns that are important to be aware of.



## GERIATRIC PATIENTS

Large dogs >7 years of age.  
Small dogs > 12 years of age.  
Cats > 14 years of age.

Just like people, as animals age organ function often decreases thus leading to an increased sensitivity to anesthetic drugs. This means that geriatric patients require lower doses of anesthetic drugs.



## NEONATAL PATIENTS

(< 2 months of age)

Younger patients do not have fully mature cardiovascular systems (heart/lungs) and often require higher IV fluid rates and lower doses of anesthetic drugs.

## BRACHYCEPHALIC BREEDS

(ie. French bulldogs, English bulldogs, Pugs)



The physical changes in the snout and upper airway of these breeds can lead to an airway that is narrower than other breeds. This can lead to difficulty when they take a breath in (inspire). It is important to wake these breeds up slowly from anesthesia and to keep the plastic tube (called an endotracheal tube, or ET tube) in their airway while they are waking from anesthesia. These breeds can also be prone to regurgitation so it is essential to ensure that they are fasted prior to anesthesia. Many of these breeds are given medications prior to anesthesia to help decrease nausea.



## COLLIES/AUSTRALIAN SHEPHERDS

Approximately 60 % of these breeds have a mutation in the ABCB1 gene which encodes P- glycoprotein, a protein that is important in the transport of certain drugs. This makes these breeds (if they have this mutation) very sensitive to certain drugs including Acepromazine and Ivermectin. It is important to talk to your veterinarian about this if your pet is a Collie or Aussie Shepherd (or a mix of these breeds) as you may be interested in getting your dog tested for this mutation.

## DOBERMANS

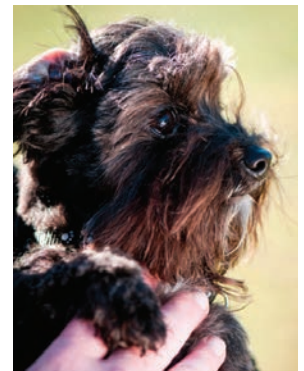
A number of dogs within this breed have a hereditary deficit in an essential blood clotting factor called vonWillebrands (vWF) factor. The first time a Doberman has surgery preoperative blood work including a specific clotting test called a BMBT (buccal mucosal bleeding time) should be performed before the procedure. A dog with a vWF deficiency may have normal platelet numbers on a CBC but the function of those platelets could be abnormal. A Doberman with this clotting factor deficiency can still have surgery but they will likely need support with specialized blood products. vWF deficiency can happen in any dog, but more common breeds to see this besides Dobermans include Standard Poodles, Shetland Sheepdogs, Scottish Terriers, Golden Retrievers, and Corgi's.

## SMALL SIZED DOGS

Due to their small body size, smaller dogs are prone to lower body temperatures under anesthesia. A very important focus with smaller dogs is keeping them warm under anesthesia. There are also drugs in concentrations specifically designed for smaller dogs.

## GIANT BREED DOGS (Great Dane, Pyrenees)

Due to their large body size anesthetic drug doses must be carefully considered in giant breed dogs. Doses should always be based on the lean body weight of the patient and ideally on body surface area, not body weight. Most giant breed dogs require lower anesthetic doses than those typically calculated based on their full body weight. We carefully calculate the dose of drugs for each individual patient.



# Specific disease concerns/compromise

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## PATIENTS WITH KIDNEY DISEASE

The choice of anesthetic drugs and drug doses are very important in patients with kidney disease. Maintaining a normal blood pressure throughout the anesthetic procedure is also very important. Lower drug doses are often used in patients with kidney disease.

## PATIENTS WITH HEART DISEASE

Fluid therapy doses during anesthesia are typically decreased in patients with heart disease. Drugs that may increase the workload on the heart or make the heart more prone to arrhythmias are avoided.

## PREGNANT PATIENTS

Pregnancy poses a unique challenge for anesthesia as drug choices will impact both the mother and the unborn babies. Fluid support is essential for pregnant mothers as the demands on their heart is increased but their blood pressure tends to be lower. Low doses of drugs and drugs that are safe for neonates are typically chosen for a caesarean-section surgery.

## CRITICALLY ILL PATIENTS

Critically ill patients are at higher risk under anesthesia because their physiologic reserves are already compromised. Safe drug choices as well as the use of low doses of drugs are essential in these patients. These patients are always supported with IV fluids and often supported with medications to support blood pressure.

## OBESE PATIENTS

Anesthetic drugs are typically dosed on the lean body weight of a patient, not the full body weight. Obese pets have a harder time metabolizing (processing) normal doses of anesthetic drugs, therefore it is important to tailor doses individually to each patient. Obese patients may also have more difficulty breathing than other patients and their post anesthesia recovery may be prolonged. These patients are closely watched post-operatively to ensure normal recovery.

## DIABETIC PATIENTS

The majority of diabetic patients are being treated with insulin. You will be instructed how to balance your pet's food and insulin prior to anesthesia, the evening of and the day following. It is important that blood glucose is closely monitored in diabetic patients undergoing anesthesia. A nurse will draw blood for a blood glucose level during anesthesia to ensure safety. Another focus with diabetic patients is to use anesthetic drugs that allow the patient to wake up quickly and return to normal eating as soon as possible. Anesthetic gases like sevoflurane and isoflurane are often used in these patients.

# Cats

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Cats typically handle anesthesia well. As cats are small in size a very important focus is on keeping them warm throughout anesthesia. This is accomplished with forced air warmers called 'hair huggers'.

A complete pre-anesthesia exam and workup is essential in cats, particularly as they age. Older cats are prone to heart disease and kidney disease and it is important to know this prior to anesthesia. Cats with heart disease and kidney disease can have very successful anesthetic procedures with proper adjustments made to medications and fluid therapy.



# Addendum 1:

## Types and phases of anesthesia

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What are the different types of anesthesia?



### GENERAL ANESTHESIA

Anesthesia that provides an unconscious state and total lack of sensation – when a patient is ‘asleep.’ This is most commonly achieved with the use of inhalant gas.

### SEDATION

Anesthetic drugs are used to decrease nerve signals between higher and lower brain centers therefore decreasing anxiety and creating a decreased level of sensation. An example of this is light sedation in a patient to perform x-rays of the hips.

### REGIONAL ANESTHESIA

When one large area of the body is ‘made numb.’ An anesthetic drug is injected near a cluster of nerves, numbing a larger area of the body. An example of this is a nerve block that blocks pain sensation to the entire front leg of a patient.

### LOCAL ANESTHESIA

When a small part of the body is ‘made numb.’ Local anesthetics block the nerves that connect to a particular body part, preventing the nerves from carrying pain signals to your pet’s brain. Local blocks are commonly used during dental procedures for extraction of a tooth.

# What are the different phases of anesthesia?

## PRE-ANESTHESIA

This includes the period of time prior to anesthesia. During this time the pre-anesthesia checklist is examined and completed. An intravenous catheter is placed in the front leg of the patient and the patient is started on IV fluids. They are also given drugs called pre-medications that cause mild sedation and decrease anxiety.

## ANESTHESIA

This involves the patient receiving 'induction' anesthetic drugs that put them fully under anesthesia. Once they receive these induction drugs, an endotracheal tube (soft plastic tube) is placed in their trachea (wind pipe) to allow delivery of oxygen and anesthetic gas. Once the patient has the tube in their airway, oxygen and gas anesthetic are delivered. The patient will be connected to the anesthesia monitoring equipment discussed earlier and monitored closely throughout the procedure.

## POST-OPERATIVE RECOVERY STAGE

Once the procedure is finished, the gas anesthesia is discontinued and the patient slowly starts to wake up. The patient is continued on oxygen support and the plastic tube in their trachea is kept in their airway until they wake up to a level that they are aware and are able to swallow. At this time the plastic tube is removed from the patient's airway. A veterinary nurse closely monitors the patient in this post-operative stage to ensure that they have normal vital signs and are waking up normally. They also monitor patients closely for signs of pain, nausea or anxiety during this period.



## Addendum 2: Details on the pre-operative workup

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What do the individual values mean?

### Blood chemistry panel:

#### LIVER

An organ that is essential to process blood and remove bacteria and toxins. It is also critical in the digestive process by breaking nutrients into smaller components for use by the body. The liver is essential for the metabolism (processing) of most anesthetic drugs.

#### **ALT (alanine aminotransferase)**

An enzyme from liver cells indicating liver cell injury.

#### **ALKP (alkaline phosphatase)**

A liver enzyme that can be increased by a number of things including cholestasis (abnormal flow of bile from the liver), Cushing's disease (adrenal gland disease), multiple drugs etc.

#### **GGT (gamma glutamyl transferase)**

A liver enzyme that may indicate cholestasis.

#### **TBILI (total bilirubin)**

Increases in this liver value may be seen with liver disease (cholestasis and insufficiency).

#### **ALB (albumin)**

A protein that may be decreased with decreased liver function, blood loss, kidney disease or GI (gastrointestinal) disease. Increased albumin may indicate dehydration.

#### KIDNEYS

Organs that filter metabolic waste products and maintain water balance in the body. Kidneys are essential for the excretion (elimination) of most anesthetic drugs.

#### **BUN (blood urea nitrogen)**

Metabolic waste product that the kidneys remove from the bloodstream. This can be increased with decreased kidney function, dehydration, shock, with a urinary obstruction and after eating a high protein diet.



**CREA (creatinine)**

A metabolic waste product that the kidneys remove from the bloodstream. Increases may be seen with decreased kidney function as well as with items listed for BUN except a high protein diet.

**PHOS (phosphorus)**

Increases in phosphorus are seen with kidney disease, GI tract disease and trauma. Increases in growing young animals (puppies and kittens) are typically normal.

**CA (calcium)**

Decreases in calcium are seen with kidney disease, certain toxicities, certain cancers and parathyroid disease.

**PANCREAS**

The pancreas is an organ that produces a number of digestive enzymes and hormones that regulate metabolism.

**LIPA (lipase)**

A pancreatic enzyme that may indicate cell injury/inflammation. Increases can be seen with pancreatitis, GI disease, and kidney disease.

**AMYL (amylase)**

A pancreatic enzyme that may indicate cell injury/inflammation. Increases can be seen with pancreatitis, GI disease, and kidney disease.

**ELECTROLYTES**

Electrolytes are essential to normal body function and must be maintained in very narrow ranges.

**Na<sup>+</sup> (sodium)**

An essential electrolyte for regulation of water in the body. Increases in sodium may indicate dehydration while decreases may indicate Addison's disease (adrenal gland disease), kidney disease or loss through vomiting/diarrhea.

**K<sup>+</sup> (potassium)**

Increases in potassium is critical to normal cellular function, especially cardiac cells. Increases may indicate urinary obstruction, Addison's disease, and dehydration while decreases may be seen with vomiting/diarrhea.

**Cl<sup>-</sup> (chloride)**

Chloride is another very important electrolyte that may be elevated with dehydration and decreased with vomiting/diarrhea.



## PROTEIN

### TP (total protein)

Increases in total protein may indicate dehydration or inflammation while decreases can occur with blood loss, gastrointestinal loss, loss through the kidneys or with liver disease.

### GLOB (globulin)

Increases in globulins can be seen with inflammation and chronic infection while decreases may be seen with immune deficiencies, blood loss and GI loss.

### ALB (albumin)

Increases in albumin may indicate dehydration while decreases may be seen with decreased liver function, GI loss, liver disease some types of intestinal disease.

## MISC. CHEMISTRIES

### GLU (glucose)

Glucose is the basic unit of nutrients for the body. It can be increased and decreased for a number of reasons. Increases can occur with diabetes, liver disease, seizure and decreases can occur with sepsis (systemic infection), and in neonates (young animals < 2 months of age).

### CHOL (cholesterol)

Increases in cholesterol can be seen with multiple conditions including diabetes, pancreatitis, Cushing's disease and hypothyroidism. It can be decreased with liver deficiency and some types of intestinal disease.

### CK (creatine kinase)

Increases in CK are associated with muscle damage.

### AST (aspartate aminotransferase)

Increases in AST are associated with liver or muscle damage.

### Lactate

Lactate is a common value tested in critically ill patients. Increases in lactate indicate decreased blood flow to body tissues. This test is commonly run in dogs with bloat or in dogs with shock.



# CBC

## Red blood cells (RBC's)

RETIC = immature RBC

MCV = mean cell volume

MCH = mean cell hemoglobin

RBCs are the most numerous of the cells in the blood. They are essential because they contain a special protein called hemoglobin which binds to oxygen in the lungs. The RBCs transport this oxygen around the body. A low RBC count is called anemia.

## White blood cells (WBC's)

### TYPES OF WBCS:

**NEU** = inflammatory cell associated with infectious and non-infectious disease

**LYMP** = immune cell responsive to stress and may be increased during chronic infection

**MONO** = inflammatory cell

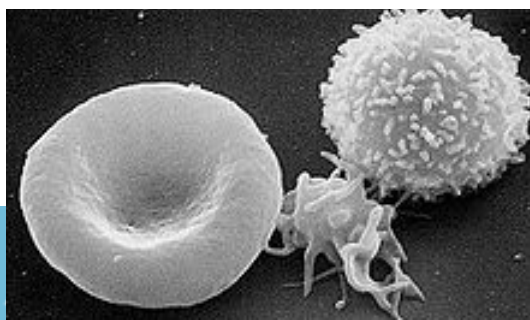
**EOS** = inflammatory cell associated with parasitic disease, allergy and hypersensitivity

**BASO** = inflammatory cell similar to EOS

WBCs are the main cells in the bloodstream that fight infection. Increases may be due to inflammation, infection, stress and leukemia while decreases may be due to inflammation or a problem with the bone marrow. There are five different types of WBCs and they each have different functions.

## Platelets ( )

Platelets are essential cells that play a critical role in forming a blood clot (preventing bleeding).



*Single red blood cell, activated platelet and a white blood cell (from left to right)*

# Urinalysis

---

## Specific gravity (USG)

USG reflects the ability to concentrate urine which is a measure of kidney function.

## pH

pH is a measure of the acid-base status of a patient.

## PRO (protein)

Normally there are only small amounts of protein in the urine. Larger amounts may indicate kidney disease.

## GLU (glucose)

High levels of glucose in the urine are usually associated with a high blood glucose level. High urine glucose may indicate diabetes.

## KET (ketones)

Elevated levels of ketones may suggest a serious diabetic state as it indicates an increase in the breakdown of lipids in the body.

## RBCs

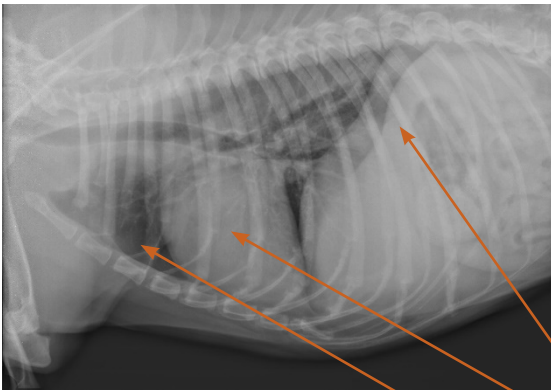
Blood in the urine may indicate infection, inflammation or trauma.

## WBCs

Increased WBC numbers indicate inflammation in the urinary tract.

# Chest radiographs

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*Normal xray of a dog's chest*

This is a normal chest (heart and lung) x-ray for a dog. This x-ray helps veterinarians look at the size of the heart, whether the blood vessels entering and leaving the heart are normal in size and whether the appearance of the lung fields look normal.

**DIAPHRAGM**

**HEART**

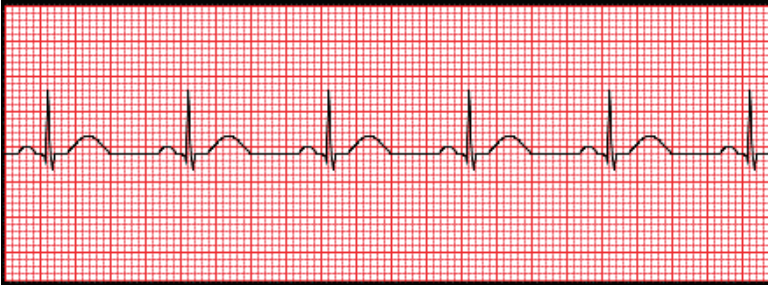
**LUNGS**



## Electrocardiogram (ECG)

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Below is an example of a normal heart rhythm in a dog. This ECG strip is called a 'lead II' ECG and it is the most common recording observed while your pet is under anesthesia. This recording helps veterinarians evaluate the electrical activity (heart rate and rhythm) of your pet's heart.





# Addendum 3: The WHO and VCA pre and post-operative checklist

## THE WHO (WORLD HEALTH ORGANIZATION) PRE-OPERATIVE & POST-OPERATIVE CHECKLIST

### What is this?

This is a one page checklist of essential equipment to check and essential questions to have answered prior to, during and after every anesthetic procedure. In human medicine the use of the checklist has been shown to decrease anesthesia and surgical complications by 36%. **The main goal of the checklist is to increase patient safety.** The WHO checklist is used for human anesthesia and surgical cases.

Surgical Safety Checklist		
		World Health Organization Patient Safety <small>A World Alliance for Safer Health Care</small>
<b>Before induction of anaesthesia</b>	→ <b>Before skin incision</b>	→ <b>Before patient leaves operating room</b>
<small>(with at least nurse and anaesthetist)</small>	<small>(with nurse, anaesthetist and surgeon)</small>	<small>(with nurse, anaesthetist and surgeon)</small>
<p><b>Has the patient confirmed his/her identity, site, procedure, and consent?</b></p> <input type="checkbox"/> Yes	<p><input type="checkbox"/> <b>Confirm all team members have introduced themselves by name and role.</b></p> <p><input type="checkbox"/> <b>Confirm the patient's name, procedure, and where the incision will be made.</b></p> <p><b>Has antibiotic prophylaxis been given within the last 60 minutes?</b></p> <input type="checkbox"/> Yes <input type="checkbox"/> Not applicable	<p><b>Nurse Verbally Confirms:</b></p> <input type="checkbox"/> The name of the procedure <input type="checkbox"/> Completion of instrument, sponge and needle counts <input type="checkbox"/> Specimen labelling (read specimen labels aloud, including patient name) <input type="checkbox"/> Whether there are any equipment problems to be addressed
<p><b>Is the site marked?</b></p> <input type="checkbox"/> Yes <input type="checkbox"/> Not applicable	<p><b>Anticipated Critical Events</b></p> <p><b>To Surgeon:</b></p> <input type="checkbox"/> What are the critical or non-routine steps? <input type="checkbox"/> How long will the case take? <input type="checkbox"/> What is the anticipated blood loss? <p><b>To Anaesthetist:</b></p> <input type="checkbox"/> Are there any patient-specific concerns? <p><b>To Nursing Team:</b></p> <input type="checkbox"/> Has sterility (including indicator results) been confirmed? <input type="checkbox"/> Are there equipment issues or any concerns?	<p><b>To Surgeon, Anaesthetist and Nurse:</b></p> <input type="checkbox"/> What are the key concerns for recovery and management of this patient?
<p><b>Is the anaesthesia machine and medication check complete?</b></p> <input type="checkbox"/> Yes	<p><b>Is essential imaging displayed?</b></p> <input type="checkbox"/> Yes <input type="checkbox"/> Not applicable	
<p><b>Is the pulse oximeter on the patient and functioning?</b></p> <input type="checkbox"/> Yes		
<p><b>Does the patient have a:</b></p> <p><b>Known allergy?</b></p> <input type="checkbox"/> No <input type="checkbox"/> Yes		
<p><b>Difficult airway or aspiration risk?</b></p> <input type="checkbox"/> No <input type="checkbox"/> Yes, and equipment/assistance available		
<p><b>Risk of &gt;500ml blood loss (7ml/kg in children)?</b></p> <input type="checkbox"/> No <input type="checkbox"/> Yes, and two IVs/central access and fluids planned		
<p><small>This checklist is not intended to be comprehensive. Additions and modifications to fit local practice are encouraged.</small></p>		
		<small>Revised 1 / 2009</small>
		<small>© WHO, 2009</small>

### HOW IS IT USED?

This is a checklist that is used by the doctor and the technician every time they have a patient undergo anesthesia. Using this checklist ensures that procedures are done in the same way every time to prevent mistakes and increase safety for the patient.

The next page gives an example of a veterinary anesthesia checklist.

# VCA anesthetic checklist

All VCA hospitals have an anesthesia and surgical checklist that is used before, during and after every anesthetic procedure.

## VCA Pre-operative checklist:

- Physical exam
- Allergies?
- Previous anesthetic problems
- Airway concerns
- Emergency drugs ready
- Equipment check : Anesthetic machine, monitoring equip
- Pre-op blood work
- Pre-op BP and ECG
- Eyes lubed
- Pre-oxygenation
- CRI? Antibiotic?

### ASA Score:

I: Normal, healthy  
 II: Mild disease  
 III: Mod-Severe disease  
 IV: Life-threatening  
 V: Critical

Pre-operative lab values: PCV / T.S. \_\_\_\_\_ BGLU \_\_\_\_ BUN \_\_\_\_ Body wt (kgs) \_\_\_\_\_

## Supportive Medications Administered (pre or intra-op):

Time	Medication	Dose/Quantity	Route	Initials

## Anesthesia pre or intra-op concerns:

\_\_\_\_\_

\_\_\_\_\_

## VCA Post-operative checklist:

- Post operative analgesics
- Recovery concerns
- Additional oxygen needed
- Remove IV catheter?
- Walk?
- Samples submitted

## Patient Recovery Vitals and Pain Scoring:

Time	Temp	HR/Pulse	RR/Quality	mm	CRT	Pain Score	Supportive Tx	BP	Fluids TVI	Initial
									/	
									/	
									/	
									/	

Extubation Time: \_\_\_\_\_ Initials: \_\_\_\_\_

\* Transfer IV Fluid totals to treatment sheet

## Recovery Notes:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### Pain Score:

0. None  
 1. Mild  
 2. Moderate  
 3. Moderate-severe  
 4. Severe

# Addendum 4: ASA score, pain pathway, pain score and pain scale

## AMERICAN SOCIETY OF ANESTHESIOLOGISTS PHYSICAL STATUS CLASSIFICATION SYSTEM (ASA)

This is a classification system based on a patient's health prior to anesthesia that guides a veterinarian in making the best anesthetic drug choices for each patient. It is essential that anesthetic drug choices are individually tailored to meet the needs of each patient. This classification system is part of the anesthesia checklist in VCA hospitals to increase patient safety. Your pet will be given an ASA classification and this will help guide decisions surrounding the anesthetic procedure.

ASA Classification	Animal health description
ASA I	Normal, healthy
ASA II	Mild disease
ASA III	Moderate-severe disease
ASA IV	Life-threatening disease
ASA V or E	Critical

## PAIN PATHWAY

The experience of pain in animals is very similar to humans. The “pain pathway” is a description of 4 steps that occur every time an animal experiences a painful sensation. The 4 steps in this pathway are transduction, transmission, modulation and perception (see page 36 for diagram). Pain control is most effective when it is tailored to address pain at all 4 sites of the pain pathway.

### 1.) Transduction

The site where the sensation of pain is initiated.

### 2.) Transmission

The relay of the pain signal from the sensory nerve cells to the spinal cord.

### 3.) Modulation

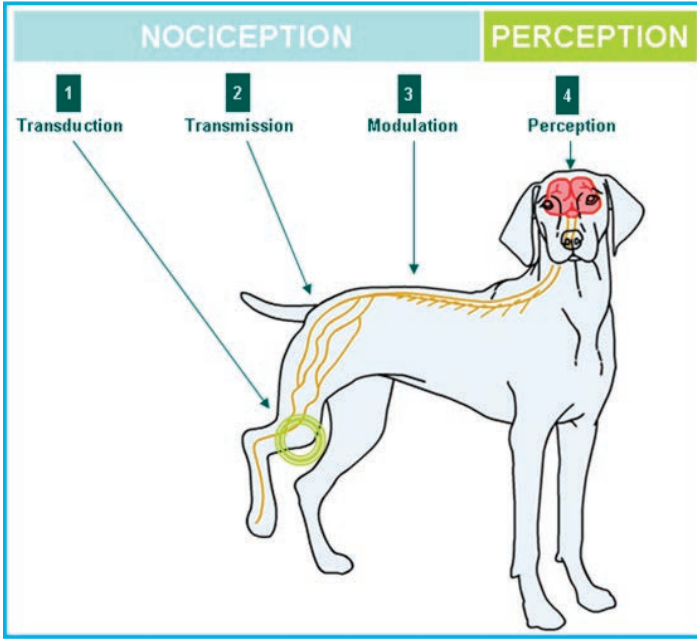
The sensation of pain is modulated (either inhibited or enhanced) within the spinal cord.

### 4.) Perception

An animal perceives pain after the pain signal is carried to the brain.



# Pain scoring



*Pain pathway diagram courtesy of Zoetis*

## PAIN SCORE

When a patient undergoes a procedure, a pre-operative, intra-operative and post-operative pain assessment is performed. It is essential that this assessment is repeated throughout the patient's stay. A patient's pain medications are adjusted based on their individual pain score. An example of a visual pain scoring system (scale) for dogs and cats from Colorado State University is printed below.

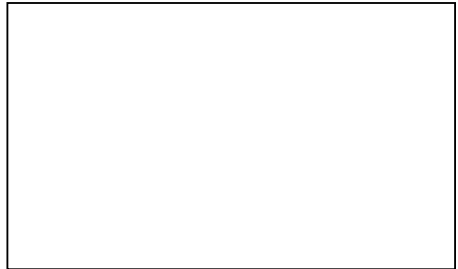
PAIN SCORE	DESCRIPTION
0	None
1	Mild
2	Moderate
3	Moderate-severe
4	Severe

# CSU pain scale for dogs



Date \_\_\_\_\_

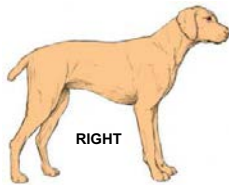
Time \_\_\_\_\_



Colorado State University  
Veterinary Medical Center  
Canine Acute Pain Scale

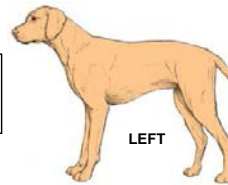
Rescore when awake  Animal is sleeping, but can be aroused - Not evaluated for pain  
 Animal can't be aroused, check vital signs, assess therapy

Pain Score	Example	Psychological & Behavioral	Response to Palpation	Body Tension
0		<input type="checkbox"/> Comfortable when resting <input type="checkbox"/> Happy, content <input type="checkbox"/> Not bothering wound or surgery site <input type="checkbox"/> Interested in or curious about surroundings	<input type="checkbox"/> Nontender to palpation of wound or surgery site, or to palpation elsewhere	Minimal
1		<input type="checkbox"/> Content to slightly unsettled or restless <input type="checkbox"/> Distracted easily by surroundings	<input type="checkbox"/> Reacts to palpation of wound, surgery site, or other body part by looking around, finching, or whimpering	Mild
2		<input type="checkbox"/> Looks uncomfortable when resting <input type="checkbox"/> May whimper or cry and may lick or rub wound or surgery site when unattended <input type="checkbox"/> Droopy ears, worried facial expression (arched eye brows, darting eyes) <input type="checkbox"/> Reluctant to respond when beckoned <input type="checkbox"/> Not eager to interact with people or surroundings but will look around to see what is going on	<input type="checkbox"/> Flinches, whimpers cries, or guards/pulls away	Mild to Moderate Reassess analgesic plan
3		<input type="checkbox"/> Unsettled, crying, groaning, biting or chewing wound when unattended <input type="checkbox"/> Guards or protects wound or surgery site by altering weight distribution (i.e., limping, shifting body position) <input type="checkbox"/> May be unwilling to move all or part of body	<input type="checkbox"/> May be subtle (shifting eyes or increased respiratory rate) if dog is too painful to move or is stoic <input type="checkbox"/> May be dramatic, such as a sharp cry, growl, bite or bite threat, and/or pulling away	Moderate Reassess analgesic plan
4		<input type="checkbox"/> Constantly groaning or screaming when unattended <input type="checkbox"/> May bite or chew at wound, but unlikely to move <input type="checkbox"/> Potentially unresponsive to surroundings <input type="checkbox"/> Difficult to distract from pain	<input type="checkbox"/> Cries at non-painful palpation (may be experiencing allodynia, wind-up, or fearful that pain could be made worse) <input type="checkbox"/> May react aggressively to palpation	Moderate to Severe May be rigid to avoid painful movement Reassess analgesic plan



RIGHT

○ Tender to palpation  
 X Warm  
 ■ Tense



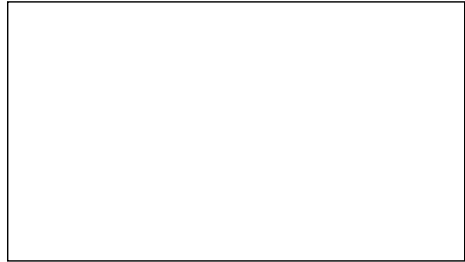
LEFT

Comments \_\_\_\_\_

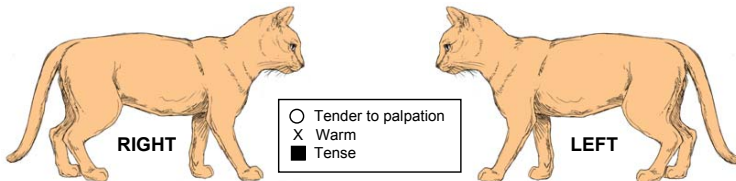
# CSU pain scale for cats



Colorado State University  
Veterinary Medical Center  
Feline Acute Pain Scale



Pain Score	Example	Psychological & Behavioral	Response to Palpation	Body Tension
No Score		<input type="checkbox"/> Animal is sleeping and cannot be evaluated		
0		<input type="checkbox"/> Content and quiet when unattended <input type="checkbox"/> Comfortable when resting <input type="checkbox"/> Interested in or curious about surroundings	<input type="checkbox"/> Not bothered by palpation of wound or surgery site, or to palpation elsewhere	Minimal
1		<input type="checkbox"/> Signs are often subtle and not easily detected in the hospital setting; more likely to be detected by the owner(s) at home <input type="checkbox"/> Earliest signs at home may be <u>withdrawal from surroundings or change in normal routine</u> <input type="checkbox"/> In the hospital, may be content or slightly unsettled <input type="checkbox"/> Less interested in surroundings but will look around to see what is going on	<input type="checkbox"/> May or may not react to palpation of wound or surgery site	Mild
2		<input type="checkbox"/> Decreased responsiveness, <b>seeks solitude</b> <input type="checkbox"/> Quiet, loss of brightness in eyes <input type="checkbox"/> Lays curled up or sits tucked up (all four feet under body, shoulders hunched, head held slightly lower than shoulders, tail curled tightly around body) with eyes partially or mostly closed <input type="checkbox"/> Hair coat appears rough or fluffed up <input type="checkbox"/> May intensively groom an area that is painful or irritating <input type="checkbox"/> Decreased appetite, <b>not interested in food</b>	<input type="checkbox"/> Responds aggressively or tries to escape if painful area is palpated or approached <input type="checkbox"/> Tolerates attention, may even perk up when petted as long as painful area is avoided	Mild to Moderate <b>Reassess analgesic plan</b>
3		<input type="checkbox"/> Constantly <b>yowling, growling, or hissing</b> when unattended <input type="checkbox"/> May bite or chew at wound, but <b>unlikely to move</b> if left alone	<input type="checkbox"/> <b>Growls or hisses at non-painful palpation</b> (may be experiencing allodynia, wind-up, or fearful that pain could be made worse) <input type="checkbox"/> <b>Reacts aggressively to palpation, adamantly pulls away</b> to avoid any contact	Moderate <b>Reassess analgesic plan</b>
4		<input type="checkbox"/> Prostrate <input type="checkbox"/> Potentially <b>unresponsive</b> to or unaware of surroundings, difficult to distract from pain <input type="checkbox"/> Receptive to care (even mean or wild cats will be more tolerant of contact)	<input type="checkbox"/> May not respond to palpation <input type="checkbox"/> May be rigid to avoid painful movement	Moderate to Severe <b>May be rigid to avoid painful movement</b> <b>Reassess analgesic plan</b>



Comments \_\_\_\_\_

# Addendum 5: Special focus on Dentistry and anesthesia

## WHAT IS PERIODONTAL ('GUM') DISEASE?

- It is an infection of the tissues and bones that surround and support the teeth.
- It is the most common clinical problem in adult cats and dogs.

## WHAT CAN I DO FOR MY PET TO HELP PREVENT PERIODONTAL DISEASE?

- Have an annual veterinary dental cleaning performed. This includes a thorough oral and tooth exam, dental x-rays, a complete cleaning below the gum-line and professional scaling and polishing of the teeth.
- Daily home dental care including brushing and the use of dental treats.

## WHY DO SOME PLACES DO DENTAL PROCEDURES WITHOUT ANESTHESIA AND WHAT IS THE DIFFERENCE?

**We do not support non-anesthetic dental procedures at VCA hospitals for the following reasons:**

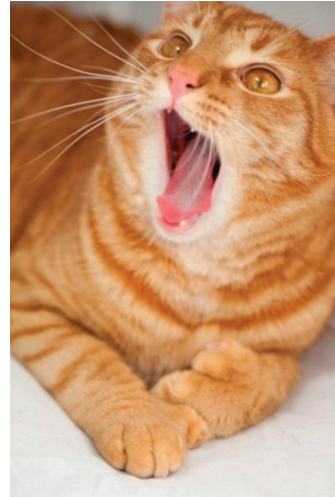
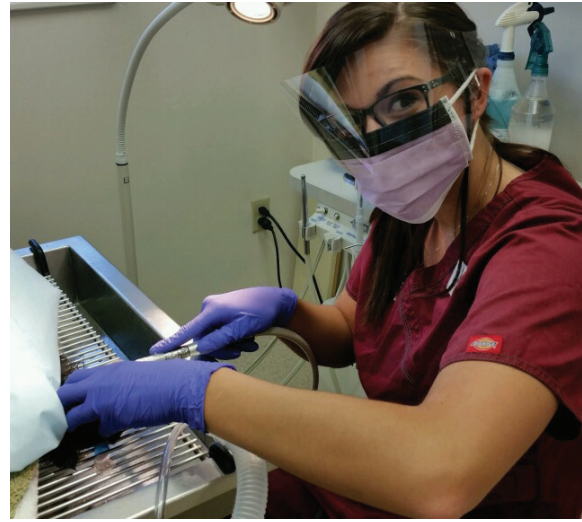
- An oral examination in an awake patient only allows veterinarians to see only 50% of the oral cavity - and only in the most cooperative of patients. Doctors are often able to see just the crowns of the teeth. The rest of the tooth (roots) is under the gum and in the bone – so this type of dental procedure will not help

prevent periodontal disease.

- Cleaning (scaling) the crown of the tooth without cleaning under the gum is only cosmetic and will not promote dental health.
- In patients that have gum disease, deep cleaning of the gingival pockets (the space between the tooth and the gum) is essential to help control the progression of the disease. Thorough cleaning can't be done in a cat or dog who is awake.
- A complete oral examination is done under anesthesia. Measuring pockets and taking x-rays indicate which treatment should be done while the patient remains anesthetized.
- 30% of periodontal disease (tooth and gum) is diagnosed with dental xrays. These x-rays cannot be performed in a patient who is awake.



- As previously discussed, when a patient is under anesthesia a soft plastic tube is inserted into their trachea to protect their airway. There is no protection of the airway during a non-anesthetic dental cleaning and the pet could accidentally inhale tartar, saliva or a loose tooth into their lungs.
- Non-anesthetic dental cleanings cause increased stress and anxiety to the pet and can also be painful.
- Dental procedures performed under anesthesia is the standard of care recommended by the American College of Veterinary Dentistry (see [www.avdc.org/afd](http://www.avdc.org/afd) for excellent reference materials), the American College of Veterinary Anesthesia and Analgesia and by VCA Animal Hospitals. This allows a controlled, medically thorough and stress-free procedure for your pet.



### **WHY ARE DENTAL RADIOGRAPHS IMPORTANT?**

- 50% of the tooth (the roots) is under the gum and in the bone which cannot be visualized and evaluated without dental x-rays. X-rays help identify problems that are under the gum-line.
- Dental radiographs are important because 30% of dental abnormalities are detected by taking and evaluating x-rays.



# Dental x-rays from a cat



Figure 1 – Upper right jaw

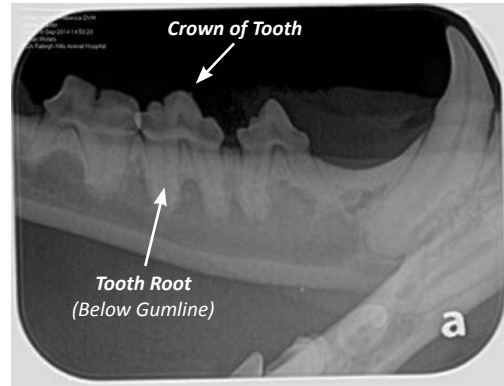


Figure 2 – Lower left jaw

## IF MY PET IS OLDER AND NEEDS A DENTAL PROCEDURE DOES THAT CHANGE YOUR APPROACH TO ANESTHESIA?

- Older pets handle anesthesia very well as long as some important changes that occur with aging are taken into consideration when planning the anesthesia protocol.
- Important considerations in older pets include decreasing anesthetic drug doses, judicious use of IV fluids and careful monitoring throughout the three phases of anesthesia.
- Another common technique that can be used with geriatric patients is the use of local anesthetic nerve blocks to control pain locally and allow lower levels of other anesthetic drugs to be given.
- It is typical for older pets to take a little longer to recover from an anesthetic procedure.

## IF MY PET HAS TEETH EXTRACTED DURING A DENTAL PROCEDURE HOW DO YOU TREAT THEM FOR PAIN?

- Pain associated with dental procedures is treated with anti-inflammatory pain medication as well as opioids when needed.
- Most dental procedures are also treated with local nerve blocks which help control pain.
- A diseased tooth often causes more pain than the procedure to remove it and a patient typically feels much better once these teeth are removed. Your pet will be treated for pain during the procedure and your veterinarian will send medication home with you to use to treat your pet for any post-extraction pain.



## Tips for care of your pet after dental cleaning with extractions

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- Please refer to your veterinarian's discharge instructions for medication doses and how frequently the medication can be given.

It is best to feed soft food for at least three days after dental extractions. Recommended dietary options include feeding a soft (canned) version of your pet's regular food and/or soaking dry kibble in warm water prior to feeding. You may notice a small amount of blood or blood-tinged saliva in your pet's water or food bowl after eating or drinking. This is a normal occurrence after having teeth extracted (removed) as the gums will be inflamed and should resolve within 24 hours.

- Your pet should be fed 50% of the usual amount of food they receive for their first meal after anesthesia. Anesthesia and pain medications can both cause nausea; slowly introducing your pet's diet back to their usual amount of food helps decrease the potential for nausea.

Please don't hesitate to ask your veterinarian if you have any questions or concerns about surgery, dentistry or anesthesia. VCA veterinarians are here to answer questions and to focus on ensuring the safest procedure possible.

Your pet's health, comfort and safety is our top priority.



## NOTES ON SOURCES

**WHO surgical checklist, 2009** – **World Health Organization** focus on decreasing surgical complications rates in human hospitals around the world.

**CSU Canine and Feline Acute Pain Scales** – this is one example of a veterinary pain scale that is used in the field. Colorado State University is a leader in the field of pain assessment/management.

**Avdc.org (American Veterinary Dental College)** – this web site includes great resources for clients and veterinarians on the health benefits of routine dental care.

## THANK YOU TO THREE KEY CONTRIBUTORS TO THIS MANUAL

**Dr. Tamara Grubb** is a boarded anesthesiologist with a strong clinical interest in respiratory physiology and pain management. Dr Grubb is an Assistant Clinical Professor of Anesthesia and Analgesia at Washington State University (WSU) in Pullman, WA. Our thanks to WSU for allowing us the opportunity to work with Dr. Grubb to create this resource.

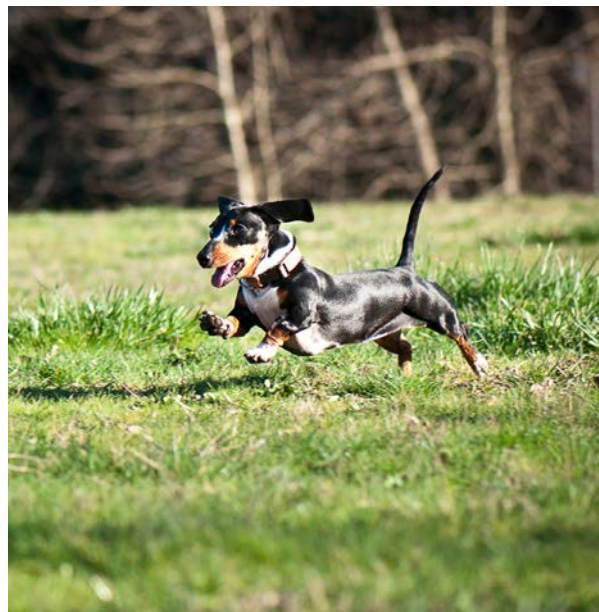
**Dr. Stephen Kochis** is a Senior Regional Strategic Veterinarian with Zoetis. Dr. Kochis has multiple years of experience in the field of emergency medicine and his clinical interests lie in the area of pain management and anesthesia.

**Dr. Randi Brannon** is a boarded dentist with an extensive background in both equine and small animal dentistry. She lectures nationally and internationally on the subject and is a contributing author to multiple dental journals and books. Dr. Brannon is a member of the Zoetis Veterinary Specialty team.

## SPECIAL THANKS

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**VCA Animal Hospitals**  
[vcahospitals.com](http://vcahospitals.com)

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