Veterinary Health Center
MANHATTAN, KANSAS

OFFICIAL PROTOCOL

SMALL ANIMAL ANESTHESIA
STANDARD OPERATING PROCEDURE MANUAL

Introduction

Meet in the Anesthesia Conference Room (C-101) Monday through Friday at 7:00 AM and be prepared to discuss your work-ups for assigned cases.

You should become familiar with the information contained in this manual. You should also re-familiarize yourself with the pharmacological, physiologic, and technical aspects of the practice of anesthesia by reviewing material from previous courses.

The objective of the anesthesia rotation is to provide experience in the clinical use of anesthetic drugs and procedures for rendering a patient insensible to pain and in techniques for monitoring and support of vital organ function during anesthesia.

The student anesthetist, under the supervision of an anesthesia instructor is responsible for the anesthetic management of his/her cases (including immediate pre and post-operative periods). The techniques/drugs used for each patient MUST be discussed with an anesthesia staff member prior to administration.

Always check the anesthesia schedule for changes immediately prior to administering premeds to a patient (i.e., don't give premeds unless directed to do so). Premeds are given at least one hour prior to the scheduled table time, and IV catheterization at least one-half hour prior to table time. Allow more time if necessary. EVERY EFFORT should be made to meet the scheduled table time.

Students are allowed one unsupervised vein catheterization attempt and must seek supervision before another attempt is made. Do not allow hematomas to form.

During the day, when not immediately involved in patient care, students must be available for emergency cases, to accommodate schedule changes, and to assist fellow students. Active involvement in other cases is an expectation of this rotation.

When on evening emergency duty, check at 5:00 PM and take over any late cases. Students must be available by pager/phone etc. (within a 15-minute radius) when on call. The backup student will take over a late case if more than one case is anesthetized.

Students are responsible for all equipment used in the administration of anesthetics and the monitoring and support of patients during anesthesia. This includes insuring that equipment is in working order, and in a state of readiness before anesthesia is induced. All equipment must be returned in a clean, workable condition to its proper location at the conclusion of an anesthetic procedure. Alert the technical staff if any equipment breaks, is broken or non-functional. Students are responsible for the health and safety of the animal from the time of premedication through the recovery from anesthesia.

Anesthesia Checklist

Preoperative Rounds

1. All anesthesia request forms should be turned in to the small animal nurses' station by 3:30 PM the day prior to the procedure. A schedule will be prepared and students assigned to the cases for the next day. This schedule will be posted ideally no later than 4:30 PM.

2. Determine the cases for which you are responsible. Take the yellow copy of the request, and leave the white copy on the schedule board.

3. Review the history, physical, and laboratory information in the record. Attention should be paid to:

a. Primary complaint
b. Concurrent disease processes
c. Prior history of anesthesia
d. Prior history of allergic or drug reactions
e. Previously administered blood transfusion
f. Concurrent and past medication the patient may be taking

Examine the patient yourself. All patients should have an ID collar that matches their description. IF a collar is not present, the referring service should be notified and proper ID should be made.

Thoroughly discuss the case with the referring student. Ask questions to get needed answers. Obtain all pertinent information regarding the patient and procedure. Do not contact the owner or the rDVM. The referring service should do all owner/rDVM communicating.

If the animal has been previously anesthetized at KSU's VHC, the anesthesia record must be obtained and reviewed by the anesthesia student.

If any additional examinations or lab tests are desired, the anesthetist should discuss this with the anesthesia staff. If necessary the referring clinician will be contacted by anesthesia clinicians or house officers. Anesthesia students should not request the referring service to run additional laboratory tests.

Determine the status of the physiologic compromise and estimate the anesthetic risk:

Physical Status	Anesthetic Risk
1	Normal healthy animal
2	Patient with mild systemic disturbance (e.g. simple fracture, anemia, healthy geriatric or obese patient)
3	Patient with moderate systemic disease that limits activity but is not incapacitating (e.g. compensated mitral valve insufficiency)
4	Patient with severe incapacitating systemic disease that seriously interferes with the animal's normal activities (e.g. respiratory insufficiency, uncompensated cardiac disease)
5	Animal presents to anesthesia in moribund condition. The term moribund implies that medical treatment cannot improve the animal's condition and surgery is required "now"
E	Emergency operation. Any patient falling in the above classifications operated on as an emergency. (all E patients should also have a numerical physical status assigned as well, e.g. 4E)

4. Construct an anesthetic plan and fill in the anesthetic SOAP sheet completely, including pertinent pre-op findings, planned anesthetics and dosages, and all intended support and monitoring devices. Circle the risk category.

5. Present the case and your plan to the clinician in charge (or a technician) in rounds the morning that anesthesia is to be administered. Come to rounds with a complete plan.

6. All small animal patients must be fasted 12 hours prior to anesthetic induction. Check the cage in the morning for a No Food tag and that there is no evidence of food in the cage. Patients may have water unless otherwise ordered. An anesthesia clinician should be notified if there is evidence that a patient may have eaten during the previous 12 hours.

Pre-Induction:

1. Check for any schedule changes

2. Get the record and patient from the ward, check the ID, and take the animal in a roll cage to the proper prep room at least one hour prior to the scheduled table time. Animals in ICU may remain there for observation until the time of induction (coordinate timing with anesthesia staff).

3. Administer premedications; record the amount, time, and route of administration on the anesthetic record (should be at least one hour prior to table time, half hour prior to induction). Narcotics and other controlled drugs are obtained from the anesthesia staff. All animals that have been premedicated should have a "sedated" sticker affixed to their roll cage or ICU cage door.

4. Set up the anesthesia machine

a. Plug the white vacuum hose into the house vacuum, or use an F-air canister to scavenge waste gases.

b. Plug green oxygen hose into the house O2 supply.

c. Turn on O2 tanks and check cylinder pressure. i. Change O2 cylinder when pressure is less than 200 PSI, useful time ≈ 30 min at one L/min

d. Check vaporizer anesthetic levels, fill if less than half full.

e. Select breathing circuit: rebreathing or non-breathing

i. Most animals less than 7 kg can use a Bain non-rebreathing circuit, animals over 7 kg can use a circle.

ii. For patients with known bacterial or fungal respiratory infections, consider a Bain circuit because it is easy to clean and sterilize. All disposable endotracheal tubes can be discarded if used on a known infected patient. Bivona (silastic) tubes are expensive and not discarded, but can be steam sterilized.

iii. See Recommendations for Setting up Equipment Sheet for details for pre-operative machine setup.

f**.** Assemble:

- Patient record
- IV catheter
- Catheter caps or T-ports
- Scrub and alcohol cotton ball containers
- Tape
- Saline flush syringes
- IV fluids with appropriate administration set
- Induction agent (labeled syringe)
- Endotracheal tubes with functional cuffs
- Lubricating jelly

- Laryngoscope with functional, appropriate blade size
- Face mask (if preoxygenating)
- Lidocaine (feline patients) spray device
- Orange ET tube tie
- Esophageal stethoscope and ear piece
- Eye lubricant

Support and monitoring equipment

- Circulating warm water pad or Bair Hugger
- ECG monitor
- Doppler blood pressure instruments
- Direct blood pressure transducer and cable (if indicated)
- Ventilator appropriate for breathing circuit
- Thermometer and/or monitor temperature probe
- Capnograph and appropriate airway adaptor
- Pulse oximeter

g. Check cuffs on ET tubes for leaks. Inflate the pilot balloon and remove syringe. Leave inflated for few minutes to ensure there is not a slow leak or malfunction of the pilot balloon valve. If in doubt hold the tube with inflated cuff underwater and check for bubble formation. Check lumen for patency and cleanliness.

h. Clip and prep cephalic or saphenous vein. Catheterize the vein and secure the catheter with tape. Flush the catheter with saline. All patients subjected to general anesthesia will have a preplaced IV catheter.

i. Lightly lubricate the cuff of the ET tube (avoid getting lubricant in tube lumen and murphy eye) with lubricating jelly prior to intubation.

j. Check heart rate, rhythm, and pulse quality prior to induction. Attach ECG leads; check that the ECG is functioning and that the waveform, rate and rhythm is acceptable prior to inducing anesthesia.

Induction:

1. Carefully inject induction agent at appropriate rate and dose, allowing time for equilibration of drug in the patient. Monitoring of pulse, respiration, mucous membrane color, and other vitals may be appropriate at this time. IV fluids may be started prior to induction if indicated.

2. Intubate the patient. The ET cuff should be placed midway between the larynx and thoracic inlet. Measure tube placement with an alternate ET tube using the point of the shoulder as a landmark for insertion depth. Connect the ET tube to the Y piece or Bain. Inflate cuff with a nominal amount of air. Set an appropriate O2 flow. Assess depth and set vaporizer to an appropriate setting.

3. Tie the ET tube to the maxilla, mandible, or around the back of the head. Assure the animal is breathing well and that the rebreathing bag is moving appropriately with each breath. Observe for a

CO_2 wave form on the capnograph when the adapter is in place between ET tube and breathing circuit. If the animal is apneic, ventilate at least once every 30 seconds until spontaneous ventilation returns.

4. Proper inflation of the cuff is accomplished by one of two methods depending on the type of ET tube being used.

5. The clear PVC ET tubes have a high volume cuff and appropriate inflation is accomplished by using the special inflation syringe that has green and red marks on the barrel. Fill the syringe about half full with room air. Attach the syringe tip to the pilot balloon luer adaptor. Push syringe plunger slowly until the black indicator line is midway into the green area on the special inflation syringe. Hold the syringe plunger in place and remove the syringe tip from the cuff inflation luer adaptor. When it comes time to remove the ET tube and extubate the patient use the standard syringe to remove the air from the pilot balloon.

6. When using the silastic ET tubes the special inflation syringe will not work due to the elastic nature of the close-fitting cuff. Using a conventional 12 ml syringe inflate the cuff and apply positive pressure to the anesthesia circuit by closing the pop-off valve and squeezing the rebreathing bag. Proper inflation is reached when the cuff is inflated to a volume that will just allow an audible leak of air at 20 cm H_2O, but does not leak at 15 cm H_2O. **Be sure to open the pop-off valve after testing for leaks around the ET tube cuff!**

7. Place esophageal stethoscope, if one is being used, in your patient as part of the monitoring technique. Place the thermistor probe in the esophagus so the tip is at the level of the base of the heart.

8. Once the ET tube has been positioned, effort should be made not to disturb this position. This is critical in the cat and brachycephalic breeds of dogs where excess manipulation of the tube results in high incidence of post anesthetic airway problems including laryngeal edema or tracheal tears. Disconnect the patient from the anesthesia breathing circuit prior to repositioning the patient. Immobilize the circuit once the patient is placed in position utilizing a tube tree.

9. Eyes should be lubricated shortly after induction with the eye ointment. After applying ointment, gently close the eyelid a couple of times to distribute it over the cornea. Anesthesia markedly decreases tear production during the anesthetic and up to 24 hours after, so eyes need to be re-lubricated every hour. Optixcare gel is acceptable if ointment is not available. Taping the eyelids closed is necessary if you cannot access the head during surgery. Please re-lubricate the eyes when the patient reaches recovery.

10. Record the induction drug dose or doses in mg, route and time of induction on the anesthesia record. Begin recording vital signs on the chart.

11. Evaluate anesthetic depth. Check vaporizer and flowmeter settings. Recommended flow for a Bain circuit is 200 mL/kg/min. Recommended flow for a circle breathing circuit is 30 mL/kg/min.

12. Place a Doppler flow probe and cuff for the blood pressure measurement. Choose a cuff with a width that is approximately 40% of the circumference of the extremity. Secure the cuff snugly to the limb with the center of the inflatable bladder directly over the artery to be occluded. The Doppler can be placed prior to induction if the patient allows, it should definitely be placed prior to induction if the patient is critical. Common sites for Doppler application are the front or hind paws or the ventral surface of the tail.

13. Monitor continuously, record HR, RR, BP, and vaporizer setting at five-minute intervals. Monitor and record fluid infusions, temperature, and urine output (when applicable) every 15 minutes. Record oxygen flow setting and if changes are made record the new setting. The vaporizer setting should be indicated with an unbroken line. If changes are made the line will be altered in a square wave fashion.

Moving from Induction Area to Another Destination

a. Leave the oxygen tanks on and disconnect the machine from the house oxygen supply. Disconnect vacuum line and move the waste gas hose to the charcoal canister. Adjust ventilator settings if necessary.

b. Anesthetist is responsible for maintaining control of the airway when transporting.

c. Once the Patient arrives at destination, monitor HR, BP, RR, depth, and adjust depth as indicated. Check Doppler and cuff and readjust if necessary.

d. Attach the anesthesia machine to house oxygen and vacuum when available.

e. Check ECG lead placement. Avoid allowing the leads to come in contact with stainless steel surfaces and keep them clear of the cautery plate.

f. Check IV line. Rate of fluid administration is typically 5 mL/kg/hour, but may change based on the physiologic needs of the patient.

g. Temperature probe should be positioned in the esophagus to a mid-thoracic level. Place temperature probe and utilize additional monitors as deemed necessary.

h. Note time of start and termination of procedure in the space on the anesthesia record. Comments on the bottom of the chart should include explanation for changes in physiologic status, blood loss, additional drugs or treatments, etc. Do not give any drugs such as antibiotics, steroids, etc. unless you have the permission of one of the anesthesia staff.

i. When the procedure is completed, transport to the recovery room. If the animal is doing well, remove monitoring equipment, fluid lines, and flush IV catheter. Clean ECG gel from the patient's skin and hair. Allow patient to breathe room air if there is no respiratory compromise. Turn off the O2 flowmeter and vaporizer. Untie the ET tube once the patient is disconnected from the circuit. Deflate the cuff prior to extubation. Monitor oxygen saturation throughout the recovery period.

j. The patient should be extubated when it no longer tolerates the ET tube. Voluntary chewing or swallowing are indications for extubation. The patient should be able to maintain an Sp02 > 94% when disconnected from the anesthesia circuit and breathing room air. After extubation, continue to monitor with pulse oximetry and provide supplemental oxygen until that goal is reached.

i. Prior to extubation, examine the oral cavity and pharynx for foreign material (mucus, sponge, stomach or esophageal contents, esophageal stethoscope)

ii. Once extubated, examine ET tube for pus, mucous, blood, other obstruction and make

note on the chart as necessary

iii. Once extubated, observe patient for continued adequate ventilation (depth, pattern, airways should be done if necessary. Observe for airway obstruction (laryngeal edema, spasm, emesis, mucus, soft tissue – epiglottis, tongue)

iv. Inform the referring service the patient is now their responsibility.

v. Make sure the medical record accompanies the patient to the recovery room and is turned over to the referring service.

k. Complete all parts of the anesthetic record. Have the record signed by an anesthesia nurse, resident, or clinician. The white portion goes in the patient's medical record, the yellow portion is returned to the anesthesia conference room along with the SOAP sheet.

Clean up

A. Clean up the anesthesia machine; return it to the equipment room.

B. Wash breathing hoses or Bain circuits with water, insure removal of any foreign material. Place breathing circuits in the chlorhexidine tank to soak for 12 hours. Then, rinse and hang to dry.

C. ET tubes and esophageal stethoscopes are cleaned in the equipment room. The protocol is posted over the sink. They are then soaked in the chlorhexidine soak tank. Esophageal stethoscopes are placed in the vertical PVC tube in the tank.

D. Doppler: carefully clean probe with water. **Do not use alcohol or disinfectant on the crystal.** Replace crystal in its protective case

E. Temperature probe: clean with alcohol. Coil without kinks and put probe and unit back on shelf in equipment room

F. ECG Machine: Clean off clips, coil cable neatly and replace on the hook next to the monitor.

G. Clean and replace all other equipment in its appropriate area (e.g. tape, laryngoscopes, needles, etc.)

H. If there is contamination to equipment with infectious agent, let the anesthesia staff know and suitable decontamination procedures will be implemented.

POST ANESTHESIA RECOVERY ROOM PROTOCOL

Admittance:

A. Each patient entering must have an ID band attached to the patient, and it must be accompanied by its medical record.

B. Anesthetist must stay with the patient until it is extubated and cage-safe. At this time responsibility for the patient is turned over to the referring service.

Monitoring:

A. Monitor vitals, and record important events every 15 minutes until patient is extubated and care is turned back over to the referring service.

B. Common problems and treatments: always contact anesthesia staff and referring service if a problem develops.

a. Excited, rough recovery: restrain patient to prevent self-induced trauma, perhaps administer a small dose of tranquilizer or sedative (only give drugs if instructed to do so by anesthesia staff members)

b. Vomition: lower head and neck, obtain assistance from anesthesia staff, suction or swab pharynx if possible. Auscultate trachea and lungs (aspiration?), evaluate for desaturation with a pulse oximeter.

c. Hypothermia: place on warm water blanket or sandwich between warm blankets, consider a forced air warmer (Bair Hugger)

d. Hyperthermia: place patient directly on cool floor and consult with an anesthesia staff member.

e. Hypoxemia: face mask with high flow oxygen (100 – 300 mL/kg/min)

f. Pain: consider an analgesic, contact anesthesia staff to obtain drugs.

g. Upper airway obstruction (Alert staff immediately): Open mouth, extend head and neck, pull the patient's tongue forward and consider re-intubation

h. Seizures: Midazolam (0.2-0.5 mg/kg IV), re-anesthetize?

i. Respiratory arrest: call for help, re-intubate and ventilate

j. Cardiac arrest: call for help, re-intubate and ventilate, institute cardiac compressions, call for a code