

VEM5470 Veterinary Anesthesiology

SEMESTER: SPRING 2021

CREDIT HOURS: 1 CREDIT HOUR

GRADING SYSTEM: A-E GRADING

PHASE: II

Course Coordinator

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Office Hours: By appointment only.

Course Description

Welcome to VEM 5470, Veterinary Anesthesiology! This one credit course spread across four weeks is designed to introduce students to the most relevant topics regarding anesthesia and analgesia in common domestic animals. We hope this this course will raise your interest level in veterinary anesthesiology and prepare you to safely perform anesthesia for both the upcoming sophomore surgery laboratories and for the clinical anesthesia clerkship. Concepts learned in the course will be built upon in future anesthesia elective courses (VEM 5472 and VEM 5473) and in the anesthesia clerkship course.

Student Learning Outcomes

After successful completion of this course, students will be able to:

1. Perform appropriate pre-anesthetic assessment for veterinary patients undergoing sedation or general anesthesia
2. Identify common features of a basic anesthesia machine
3. Properly prepare anesthetic equipment
4. Describe how to safely use anesthetic equipment
5. List different techniques for capturing an airway in multiple species
6. Describe tools and equipment used to monitor vital signs in the peri-anesthetic period
7. Present the most common drugs used for sedation, analgesia and anesthesia in veterinary medicine and discuss their nomenclature, pharmacology, physiologic effects, benefits, and adverse effects
8. Describe the nomenclature, pharmacology, physiologic effects, benefits, and adverse effects of common drugs
9. Discuss how fluid therapy is utilized in veterinary patients undergoing general anesthesia
10. Describe various methods for assessing perioperative pain and strategies for providing analgesia to patients undergoing anesthesia

11. Tailor anesthetic plans to both healthy and unhealthy patients with common co-existing diseases
12. Describe common complications, accidents and emergencies that can occur during the peri-anesthetic period

Course Schedule

This schedule contains topics, assignments, and exams. Please refer to Canvas for updates and announcements to any changes to this schedule. Three quizzes based on the modules presented in class will be made available on the Monday before the week of lecture and will be available on Canvas. These quizzes will be available for one week and students will be allotted two attempts at each quiz.

Class meetings will be held live in the New Auditorium otherwise specified. Modules with a pre-recorded lecture will not require an in-class meeting. Classes with a mandatory pre-recorded lecture that should be viewed prior to the start of class are indicated with an asterisk. Any pre-recorded lecture that is required before the start of class time will be no longer than 20 minutes.

<i>Date and Time</i>	<i>Topic/Module/Unit</i>	<i>Faculty</i>	<i>SLO # Above</i>	<i>Contact Hours</i>
01-04-2021 at 8:30-9:20 am	Module 1 - Course Introduction: Pre-anesthetic assessment	Gatson	1	1.0
01-04-2021 at 9:30-10:20 am	Module 2 – Introduction to anesthetic monitoring (Pre-recorded Lecture)	Portela	6	1.0
01-06-2021 at 8:30-9:20 am	Module 3 – Introduction to anesthesia machines	Pablo	2-4	1.0
01-06-2021 at 9:30-10:20 am	Module 4 – Breathing circuits and Airway management	Pablo	5	1.0
01-08-2021 at 8:00-9:20 am	Module 5 – Anesthesia Equipment Laboratory (Orange Group) in VAB Surgery Suite	Gatson/Fackler/Cavalcanti	2-6	2.0
01-08-2021 at 10:30-12:20 am	Module 5 – Anesthesia Equipment Laboratory (Blue Group) in VAB Surgery Suite	Gatson/Fackler Cavalcanti	2-6	2.0
01-08-2021 at 1:00-2:50 pm	Module 5 – Anesthesia Equipment Laboratory (Green Group) in VAB Surgery Suite	Gatson/Fackler Cavalcanti	2-6	2.0
01-11-2021 at 9:30-11:20 am	Module 6 – Sedatives, Tranquilizers, and Analgesics (Pre-recorded Lecture)	Romano	7,8	2.0
01-12-2021 at 1:00-1:50 pm	Module 7 – Introduction to injectable anesthetics*	Gatson	7,8	1.0
01-13-2021 at 9:30-10:20 am	Module 8 – Introduction to inhalant anesthetics*	Gatson	7,8	1.0
01-19-2021 at 2:00-2:50 pm	Module 9 – Case scenarios and discussions Part 1	Gatson	1-12	1.0
01-19-2021 at 3:00-3:50 pm	Module 10 – Introduction to locoregional techniques (Pre-recorded Lecture)	Portela	7,8,10	1.0

<i>Date and Time</i>	<i>Topic/Module/Unit</i>	<i>Faculty</i>	<i>SLO # Above</i>	<i>Contact Hours</i>
01-20-2021 at 9:30-10:20 am	Module 11 – The post-anesthetic period: Anesthetic recovery and Pain assessment*	Gatson	7,10, 12	1.0
01-21-2021 at 2:00-2:50 pm	Module 12 – Anesthesia and diseases: An introduction	Johnson	11	1.0
01-21-2021 at 3:00-3:50 pm	Module 13 – Overview of common anesthetic complications, accidents, and emergencies	Johnson	12	1.0
01-27-2021 at 10:30-11:20pm	Module 14 - Intravascular access and fluid therapy during anesthesia	Pablo	9	1.0
01-27-2021 at 11:30-12:20	Module 15 – Case scenarios and discussions Part 2	Gatson	1-12	1.0
01-28-2021 at 8:00-5:00 pm	Module 15 – Practical Examination OSCE in Reproduction Laboratory in VAB	Gatson/Cavalcanti	2-6	1.0
02-01-2021 at 8:30-10:20 am	Module 17 – Final Examination	Gatson	1-12	2.0
		Total		20.0

Required Textbooks and/or Course Materials

Course Notes and PowerPoint Lecture Slides provided by lecturers

Recommended Textbooks and/or Course Materials

Veterinary Anesthesia and Analgesia, Lumb and Jones' 5th Edition (not required for the course)

Methods of Evaluation

Grades will be calculated based on the following:

Laboratory Attendance	10 %
Module Quizzes (10% each)	30 %
Practical OSCE Examination	20 %
Final Examination	40 %
Total	100 %

Note: Late assignments will not be accepted. Where applicable, exams will be administered via Canvas with proctoring through ExamSoft.

Grading Scheme

Course grades will be assigned based on the following grading scheme. This grading scale is **final**.

A	100.00 – 94.00
A-	93.99 – 90.00
B+	89.99 – 87.00
B	86.99 – 84.00
B-	83.99 – 80.00

C+	79.99 – 77.00
C	76.99 – 74.00
C-	73.99 – 70.00
D+	69.99 – 67.00
D	66.99 – 64.00
D-	63.99 – 61.00
E	60.99 – 0

Course Policies

Lecture attendance is strongly encouraged, but not mandatory. However, laboratory attendance is mandatory. Cell phones should be silenced during class time to limit distractions.

This course will be delivered in-person in the New Auditorium to a group of students on a rotating basis. Faculty who are lecturing in the classroom will be required to wear a mask. The members of the class who are not physically present in the classroom will be attending the live synchronous lecture via Zoom. The group of students who attend physically each day will follow physical distancing and masking requirements. Eating or drinking while in the classroom during lecture is prohibited.

Additional guidelines for online learning and face-to-face learning are detailed below:

Online Learning Policies:

The College of Veterinary Medicine asks that students, when possible, have cameras turned on for courses in the professional curriculum, which facilitates participation and professional communication. Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

Face-to-Face Learning Policies:

In response to COVID-19, the following policies and requirements are in place to maintain your learning environment and to enhance the safety of our in-classroom interactions.

- You are required to wear approved face coverings at all times during class and within buildings. Following and enforcing these policies and requirements are all of our responsibility. Failure to do so will lead to a report to the Office of Student Conduct and Conflict Resolution.
- Sanitizing supplies are available in the classroom if you wish to wipe down your desks prior to sitting down and at the end of the class.
- Follow your instructor's guidance on how to enter and exit the classroom. Practice physical distancing to the extent possible when entering and exiting the classroom.

- If you are experiencing COVID-19 symptoms (<https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html>), please use the UF Health screening system (<https://coronavirus.ufhealth.org/screen-test-protect/covid-19-exposure-and-symptoms-who-do-i-call-if/>) and follow the instructions on whether you are able to attend class.

Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work (<https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>).

Curriculum Policies

DVM curriculum policies are consistently held and reinforced across all DVM courses. Please visit the DVM webpage and review the curriculum policies listed within the student handbook (<https://education.vetmed.ufl.edu/dvm-curriculum/student-handbook/>).

Students with Accommodations

Students who are seeking classroom or testing accommodations must contact the UF Disability Resource Center (<http://www.dso.ufl.edu/drc/> 352-392-8565) for an assessment and to obtain a letter of accommodation. The DRC is located on the main UF campus. ASA (Office for Academic and Student Affairs) works closely with the DRC to ensure student accommodations are met in the classroom and during exams. Melissa Cox in ASA assists in coordinating exams and meeting recommended disability-related requirements for students with accommodations (melissacox@ufl.edu). This process can also be found on the DVM webpage within the student handbook (<https://education.vetmed.ufl.edu/dvm-curriculum/student-handbook/>).

Course and Instructor Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations. A new evaluation system has been developed to be more informative to instructors to enhance teaching effectiveness and to be more seamless through integration with Canvas. Students can complete their evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/> Evaluations are typically open during the last two or three weeks of the course, but students will be given specific times when they are open. Summary results of these assessments will be available to students at the end of the semester.

Appendix A: Faculty Lecturers

Faculty Name: Bonnie Gatson

Email: bonniejh@ufl.edu

Faculty Name: Dr. Lane Johnson

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Faculty Name: Dr. Luisito Pablo

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Faculty Name: Dr. Marianna Cavalcanti

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Faculty Name: Dr. Diego Portela

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Faculty Name: Dr. Marta Romano

Email: marta.romano@ufl.edu

Appendix B: Other Information

ANESTHESIA FOR SPAY-NEUTER LABORATORIES (SHELTER ANIMALS)

Review the pharmacology of the drugs and the operation of the anesthetic machines that you will be using in the surgery laboratory. Students will work in teams assigned by the surgery course.

Listed below are the agents that we will be using to anesthetize dogs in the Surgery laboratories. Read drug concentrations and calculate doses carefully.

Drug concentrations

Drugs	Concentration
Acepromazine	10.0 mg/ml or 1.0 mg/ml (prepared by dilution). Use the 1.0 mg/ml (if available) for very small patients (≤ 10 kg) for accurate dosing.
Atropine	0.54 mg/ml
Bupivacaine	7.5 mg/ml
Buprenorphine (C-IV)	0.3 mg/ml
Buprenorphine (Simbadol™)*	1.8 mg/ml
Carprofen*	50 mg/ml
Diazepam or Midazolam	5.0 mg/ml
Hydromorphone (C-II)*	2.0 mg/ml
Ketamine (C-III)	100.0 mg/ml
Lidocaine	20 mg/ml
Morphine (C-II)	10.0 mg/ml
Propofol*	10.0 mg/ml

- *Drugs will be provided by the Anesthesia personnel on the day of surgery*

PREPARATION

On the day before surgery:

1. Weigh the dogs.
2. Calculate drug doses and emergence drugs.
3. Calculate fluid rate (5.0 mL/kg/hour) and drops per second needed.
4. Perform a physical examination on your animal and record results on the anesthetic record sheet.

Check:

- a. Heart rate, rhythm, pulse character
- b. Mucous membrane color, capillary refill time
- c. Respiratory rate, depth, rhythm, lung sounds
- d. Body temperature
- e. Mentation

Fill in the **Anesthesia Student Soap Form** before the Spay-Neuter, preferably on Monday night. **The form should be submitted and placed in a designated box in the Prep Area on the morning of surgery not later than 9:00 AM. Failure to submit the form will lead to your group starting very late in the afternoon of the lab.**

On the day of surgery:

PREANESTHETIC

1. Administer preanesthetic agents 20-30 minutes before induction time:
 - Acepromazine (10 mg/ml) - 0.05 mg/kg IM
 - Simbadol (1.8 mg/ml) - 0.2 mg/kg SC
2. While waiting for the premedicant to take effect, gather items for induction and maintenance of general anesthesia and check your anesthetic machine.
 - a. Check the anesthetic machines (both the machine in the Prep area AND in the OR). Turn on the oxygen E tank using the wrench provided in the Prep area. Oxygen pipeline outlets are not available in the Prep room. Make sure the oxygen tank is at least half full (> 800 psi). For the anesthesia machines in the surgery room, the oxygen pipeline (green hose) should be connected to the wall outlet.

Connect the scavenging hose (either white or purple hose) to the evacuation female adapter on the wall.

Check if the vaporizer has enough anesthetic.

Check the activity of the sodalime. How can you tell if the sodalime has still CO₂ absorbing capacity? If there is any reason for concern, check with the anesthesiologist helping you in the laboratory.

Connect the appropriate anesthetic breathing circuit:

- 1- 7 kg non-rebreathing system (T-piece or Bain)
- >7 kg circle breathing system

Perform a low pressure leak check:

For a circle system:

- Close the "pop-off" valve.
- Occlude the Y-piece (patient-connect port) with your hand.
- Turn the flowmeter on and fill the reservoir bag with oxygen until the pressure gauge shows a pressure of about 20 cm H₂O. Oxygen flush can be used initially to fill the breathing bag.
- Turn the flow meter off. If the pressure falls more than 5 cm H₂O in 30 seconds, notify a staff member.
- If the anesthetic machine does not have a pressure gauge connected to the breathing circuit, a quick way of checking for leak is to squeeze the rebreathing bag while it is inflated. If positive pressure can be achieved or the breathing bag does not collapse as you squeeze, the circuit can be used.
- Use the same breathing circuit and reservoir bag to repeat the low pressure leak check for the anesthesia machine in the surgery room. When you are finished with the leak check, replace the breathing system and reservoir bag on the anesthesia machine in the Prep area.

For the non-rebreathing system (Jackson-Rees system):

- Occlude the patient end and the exhaust end with your hands.
- Fill the system with oxygen and observe for leaks. Attempt to squeeze the bag attached to the non-breathing system. If positive pressure can be achieved or the breathing bag does not collapse as you squeeze, the circuit can be used.

AFTER YOU HAVE COMPLETED THE MACHINE CHECK, IT IS IMPERATIVE THAT YOU DOUBLE CHECK THAT THE ADJUSTABLE PRESSURE LIMITING (POP-OFF) VALVE IS COMPLETELY OPEN.

Failure to do so may lead to barotrauma to your patient, which can result in fatal pneumothorax.

b. Get the items needed for induction and maintenance:

This is your checklist.

- Chlorhexidine and alcohol swabs
- IV catheter (20-G 2 inch catheter for dogs) with injection cap
- Bag of fluids (Lactated ringer's solution) 1L
- Administration or IV set (10 or 15 drip set for large dogs, 60 drip set for smaller dogs) should be inserted into the bag of fluid and the fluids should be run through the line. An 18 or 20G needle should be attached to the end of the drip set.

- White adhesive tape (1-inch width)
- About 10 ml of heparinized saline
- Induction agent (propofol)
- A range of appropriately sized endotracheal tubes (E-tubes)
 - Check that the cuff works by inflating it until it is slightly tense. How much air did you put in? Leave the cuff inflated for a few minutes while you continue doing our set up. Visually inspect the cuff. Is it deflated? If so, the tube needs to be discarded, and you need a new tube. Is still inflated? As you deflate it, can you get out the same amount of air that you put in?
 - How do you know if you chose the right sized E-tube? There are three methods described: palpate the trachea of your patient to estimate the overall external diameter; measure the width between your patient's nares and choose an E-tube with a similar external diameter; visually inspect the larynx upon intubation to better estimate the correct E-tube size
 - Make sure to have one size above and one size below your estimated E-tube size in case the size you picked was either too large or too small
- K-Y Jelly for tube lubrication.
- Piece of gauze to secure tube (about 15 inches for a medium sized dog)
- Laryngoscope (make sure the light works)
- Esophageal stethoscope and pulse oximeter
- 12-ml syringe to inflate the cuff of the endotracheal tube (not sterile)
- Ophthalmic ointment
- Facemask
- Stethoscope
- Rectal thermometer

Complete the check list provided to make sure you are not forgetting anything.

3. Once the sedation has taken effect, catheterize the cephalic vein of the dog.

Clip the site neatly. Prep the site with alternating chlorhexidine and alcohol. An assistant holds off the vein. The catheter is inserted. Someone will be in the lab to help you with intravenous catheterization. Once the in-dwelling catheter is in the vein, the infusion cap is screwed into the hub. At this point, the catheter is flushed using heparinized saline. The

catheter is taped securely. If the dog is not cooperative during catheterization, it is advisable to secure first the catheter with adhesive tape before flushing it.

INDUCTION OF ANESTHESIA

1. Turn on the oxygen flow meter to 4-5 L/min and pre-oxygenate the dog for at least 2 minutes by attaching the patient end of the breathing circuit to a facemask and holding the facemask over the dog's muzzle. This will increase the FiO_2 to about 30-40%. If a facemask is not available, the end of the breathing circuit can be held close to the dog's nose, but will not provide as high of an FiO_2 . What is the rationale behind this?
2. In the meantime, perform a quick assessment of your premedicated patient. What is the heart rate? Can you hear any arrhythmias? Are the mucous membranes still pink? What is the level of sedation? Heavily sedated patients likely need lower doses of induction agent compared to slightly sedated patients.
3. Now you can administer propofol. Your calculated dose is 4.0 mg/kg. Half of the calculated dose (2.0 mg/kg) of propofol is given slowly over 60 seconds. After slow administration, check if you can intubate dog. The following signs indicate that the dog can be intubated: ventro-medial rotation of the eyeball, lack of jaw tone, tongue can be gently pulled out without resistance. If the dog is swallowing, give additional propofol (1.0 mg/kg) over approximately 30 seconds). Repeat the same dose as needed until the dog can be intubated.
4. Tracheal intubation in dogs
Place the animal in sternal recumbency. Use the laryngoscope to visualize the glottis. Use the tip of the endotracheal tube to displace the soft palate, which is usually positioned below and in front of the epiglottis. This will expose the epiglottis and the arytenoid cartilages. Do not place the tip of the laryngoscope blade directly on the epiglottis, as this could result in laryngeal edema. The tip of the laryngoscope must be on the base of the tongue! Insert the endotracheal tube into the trachea. Make sure that you **see** the tube entering the trachea. Attach the endotracheal tube to the Y-piece of the breathing circuit and set the oxygen flowmeter to 2-3 liters/minute. Inflate the endotracheal cuff until no gurgling sound or noise can be heard while squeezing the bag to a pressure of 15-20 cmH₂O. *(For more specific instructions on sealing the endotracheal cuff in small animals, please read the instructions below.)* **Check for the presence of the femoral pulse!** Turn the vaporizer to about 2.0%. Secure the tube in place with gauze. You can tie the gauze around the maxilla, behind the canine teeth or behind the ears, around the neck area.

What could happen if the endotracheal tube you use is too long for your patient? How can you estimate how far in your tube should be introduced? How can you rule out esophageal

intubation, considering that you do not have a capnograph available? (HINT: LISTEN to your patient's breathing sounds with your stethoscope!)

Technique used to seal the endotracheal tube cuff in small animals

- a. Attach a syringe filled with about 5 ml of air to the inflation valve of the endotracheal tube.
- b. Close the adjustable pressure limiting (pop-off) valve.
- c. Listen to any blowing or gurgling sound coming out of the mouth as an assistant squeezes the rebreathing bag up to 20 cmH₂O; if the gurgling sound is present, it indicates that there is an air leak around the tube, therefore you have to inflate the cuff; if you do not hear anything, it means the tube is already sealing the airway, so the cuff does not need to be inflated at this time. To prevent injury to the tracheal mucosa, the cuff should not be overinflated.
- d. If there is a leak, the assistant squeezes the rebreathing bag until the peak pressure on the pressure gauge reaches 20 cmH₂O while the pop-off valve is closed. Inject air into the cuff until the noise stops. The idea behind this technique is that we want the cuff to seal the trachea, to protect the patient from experiencing aspiration of gastric content, which may lead to aspiration pneumonia.
- e. Remember that general anesthesia relaxes the tracheal rings. Even if your cuff passed the leak check immediately after induction, you may have a leak as your patient becomes more relaxed. Check your cuff again during the maintenance phase, i.e., while the animal is being clipped/prepped or once in the operating room.

Open the pop-valve after sealing the endotracheal cuff!!!!!!

MAINTENANCE

1. Set the oxygen flowmeter to about 2-3 liters/minute for the first 5 minutes of inhalant anesthesia or until the patient is in a good plane of anesthesia.
2. The vaporizer setting may be turned down as the animal shows signs of medium or good plane of anesthesia. A dog may be maintained using isoflurane at 1.25-1.5% vaporizer setting. Remember that these are only guidelines. There are many factors that contribute to the anesthetic requirement of a patient. Adjust the vaporizer setting according to the desired depth of anesthesia as assessed by jaw tone, eye position, palpebral reflex, heart rate, pulse quality and respiratory rate.

Note that the patient is generally not inspiring the concentration of anesthetic that you have set on the vaporizer dial when using a circle breathing system.

If the scavenging system and the pop-of valve are functional, the oxygen flow can be set at 1.0 liter/minute for the duration of the surgery laboratory. Adjustments to the

oxygen flow rate need to be made if your scavenging system and pop-off valve are faulty. Most of the time, the pop-off valve should remain fully open.

3. The fluid (Lactated ringers' solution) should be administered at the rate of 5.0 ml/kg/hour. The "10 drops per ml" or "15 drops per ml" administration set should be used in dogs weighing more than 10 kg. Use the "60 drops per ml" set for smaller dogs (≤ 10 kg).
4. Apply the ophthalmic ointment on the eyes of the dog.

MONITORING

1. Insert the esophageal stethoscope. This is used to listen to the heart and lung sound.
2. Feel the lingual or femoral pulse.
3. Observe the mucous membranes.
4. Observe the movement of the chest.
5. Record heart and respiratory rates every 5 minutes. At all times in between recordings you should be 100% sure, at minimum, that your animal is breathing and that the heart is beating!
6. Check the depth of anesthesia and respond appropriately.
7. Record pertinent information in the Anesthesia Record every 5 minutes. Any medications given during anesthesia should be recorded. Any unusual events that happen during anesthesia should also be recorded.
8. Monitor oxygen saturation using the pulse oximeter.

If your patient inadvertently "gets light", list three maneuvers that you could perform to regain a surgical depth of anesthesia.

RECOVERY

Remember, most of the anesthesia-related mortality occurs in the postoperative period! Do not underestimate this phase.

- When the procedure is over, turn the vaporizer off, and increase the oxygen flow rate to 2-3 liters/min (this will speed up the wash-out of isoflurane from the circuit)
- Turn your patient in lateral recumbency
- Make sure you have a syringe to deflate the cuff.
- Always keep a hand on the patient. Animals can recover suddenly from general anesthesia and may fall off the table.
- When the procedure is done, the patient is transported back to the prep area.
- Once the patient swallows 2-3 times, you can remove the tube after you have deflated the cuff. If the patients arouses suddenly, remove the tube even if you have not seen the patient swallowing.
- Now the patient is extubated. What do you need to make sure of?

- If the patient tolerates it, connect the pulse oximeter before you move the patient to the cage.
- There will be Bair Huggers in the prep area to bring your patient's temperature back to normal. Check body temperature at least every 10 minutes. Once your animal is extubated and has a body temperature above 98°F, your patient can be removed from the Bair Hugger area and replaced in the cage. Make sure the animal breathes well and is not nauseated, and that it progressively recovers from general anesthesia.
- The IV catheter should be removed and the patient should have an E-collar placed before leaving the animal alone in the cage.

Postoperative Analgesia

For dogs, carprofen 50mg/ml (4.0 mg/kg SQ) is given either preoperatively or postoperatively. Bupivacaine (7.5 mg/ml) at a dose of 2mg/kg will also be splashed onto the linea alba prior to subcutaneous closure. Simbadol's (buprenorphine) effect lasts for 24 hours and it will not be repeated. A short form of Glasgow Pain Scale will be used to assess your patient's level of pain the night of surgery. If the patient scores above 5 on the pain scale, then additional analgesia will be ordered for your patient (Hydromorphone).

SPAY-NEUTER ANESTHETIC PROTOCOL FOR DOGS

Premeds:

	Dose	Route
Acepromazine (10 mg/ml)	0.05 mg/kg	IM
Simbadol (1.8 mg/ml)	0.2 mg/kg	SC

Wait for the sedative effect. The effect may be seen in 15 minutes.

Place an intravenous catheter into the cephalic vein.

Induction:

Propofol (10mg/ml)	4.0 mg/kg	IV
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Maintenance: Isoflurane (0.5-3% as needed)

Post-operative Analgesia:

Carprofen (50 mg/ml)	4.0 mg/ml	SC
Bupivacaine (7.5 mg/ml)	2 mg/ml	Splash Block

Monitoring:

- Heart Rate (every 5 minutes)
- Respiratory Rate (every 5 minutes)
- SpO₂ (every 5 minutes)
- Body Temperature (every 15-20 minutes)
- Depth of Anesthesia (every 5 minutes)
- Vaporizer setting and O₂ flow rate (every 5 minute)
- Others (if available): Blood pressure, end-tidal carbon dioxide
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BASIC TROUBLESHOOTING IN THE SURGERY LABORATORY

1. Dog wakes up soon after induction

- a. Endotracheal tube is in esophagus rather than trachea. Administer more induction agent (Propofol) to eliminate swallowing (about 1/4 calculated dose)

and replace tube. Instead of using more induction agent, the dog can also be masked down with isoflurane and then re-intubated.

- b. Vaporizer setting is too low.
- c. Oxygen flow rate is very low. Remember to start at about 2 liters/min to shorten "wash-in" time.
- d. There is no anesthetic in the vaporizer.
- e. Breathing circuit is disconnected.
- f. Oxygen tank is empty or the central oxygen supply runs out.

2. Apnea soon after induction

- a. "Induction apnea"
 - due to the depression of the respiratory center caused by the induction agent
 - generally innocuous if the patient is intubated and ventilated with oxygen at about 3-4 breaths per minute. The apnea will disappear within about 5 minutes. Always check the pulse and rule out cardiac arrest.
- b. Too deep plane of anesthesia or cardiac arrest
 - should be differentiated from apnea caused by the induction agent using other signs of too deep plane of anesthesia (e.g. eyes central, no palpebral reflex or tearing);
 - depending upon the depth of anesthesia, set isoflurane vaporizer at a very low setting or do not administer any anesthetic; provide ventilatory and circulatory support.
 - animal in cardiac arrest (absence of femoral pulse, heart sounds cannot be heard, eye is central and reflexes are absent)
 - * discontinue anesthesia
 - * call for help and begin CPR (remember: C A B!!)

3. Slow respiratory rate (<6 breaths per minute)

- a. Individual response to drugs.

- if the animal is not in a deep plane of anesthesia as assessed by the position of the eyes, muscle relaxation and cardiovascular state, simply support ventilation by squeezing the rebreathing bag with the "pop-off" slightly closed. The animal should receive a total of at least 5-6 breaths/minute.

b. deep anesthetic plane

- assess depth of anesthesia. if in doubt, always lighten up anesthetic plane.
- reduce your vaporizer setting; if you need to rapidly change the depth of anesthesia, flush the circuit with oxygen using the oxygen flush to remove the vapor from the system.

4. **Bradycardia**

- Defined as heart rate lower than 80 bpm in small breed of dogs; lower than 60 bpm in medium-large breed dogs
 - a. vagally-mediated reflexes
 - Stop the stimulus; if heart rate does not increase by stopping the stimulus, administer atropine (0.02-0.04 mg/kg IV) or glycopyrrolate (0.01 mg/kg IV)
 - b. drug effect
 - Administer atropine or glycopyrrolate.
 - c. deep anesthetic plane
 - Check anesthetic plane.
 - If deep, lighten anesthetic plane. Stimulating the animal by pinching the toe may increase the heart rate.
 - d. hypothermia
 - Hypothermic animal will not respond to atropine or glycopyrrolate.
 - Definitive treatment: Warm the patient.

DOSAGES OF COMMONLY USED EMERGENCY DRUGS IN SMALL ANIMALS

DRUGS	DOSAGES	ROUTE
Epinephrine (1.0 mg/ml)	0.01 mg/kg	IV
Atropine (0.54 mg/ml)	0.02 mg/kg	IV
Lidocaine (20 mg/ml)	Dogs: 2.0 mg/kg Cats: 0.25-0.5 mg/kg	IV
Glycopyrrolate (0.2 mg/ml)	0.01 mg/kg	IV

MODIFIED GLASGOW PAIN SCALE**SHORT FORM OF THE GLASGOW COMPOSITE PAIN SCALE**

Dog's name _____

Hospital Number _____ Date / / Time

Surgery Yes/No (delete as appropriate)

Procedure or Condition _____

*In the sections below please circle the appropriate score in each list and sum these to give the total score.***A. Look at dog in Kennel***Is the dog?*

(i)		(ii)	
Quiet	0	Ignoring any wound or painful area	0
Crying or whimpering	1	Looking at wound or painful area	1
Groaning	2	Licking wound or painful area	2
Screaming	3	Rubbing wound or painful area	3
		Chewing wound or painful area	4

In the case of spinal, pelvic or multiple limb fractures, or where assistance is required to aid locomotion do not carry out section **B** and proceed to **C**
Please tick if this is the case then proceed to C.

B. Put lead on dog and lead out of the kennel. C. If it has a wound or painful area including abdomen, apply gentle pressure 2 inches round the site.*When the dog rises/walks is it?*

(iii)	
Normal	0
Lame	1
Slow or reluctant	2
Stiff	3
It refuses to move	4

Does it?

(iv)	
Do nothing	0
Look round	1
Flinch	2
Growl or guard area	3
Snap	4
Cry	5

D. Overall*Is the dog?*

(v)	
Happy and content or happy and bouncy	0
Quiet	1
Indifferent or non-responsive to surroundings	2
Nervous or anxious or fearful	3
Depressed or non-responsive to stimulation	4

Is the dog?

(vi)	
Comfortable	0
Unsettled	1
Restless	2
Hunched or tense	3
Rigid	4

ANESTHESIA SOAP FORM EXAMPLE

ANESTHESIA STUDENT SOAP FORM

DO NOT PLACE PATIENT STICKER ON FORM
 MR Number: 123456
 Owner Last Name: ABC Shelter
 Species: Canine
 Breed: Mixed Breed Dog
 Age: 1 Body weight (Kg): 25 Sex (M/F): F

Date: 1/1/20
 Anesthesiologist/Technician: Dr. Anesthesia
 Student Anesthetist: AniP.Some
 Procedure: Ovariohysterectomy
 Presenting Complaint: healthy
 BCS (x/9): 5 ASA status: 1 2 3 4 5 E

PATIENT HISTORY

Relevant Patient History:
 Otherwise healthy shelter dog. up to date on vaccines. No known medical history.

Previous Anesthetic Episode: Y N
 Date: _____ Procedure: _____
 Protocol: _____
 Adverse events: _____

Current and Historical Medications/IV Fluids:

Drug	Dose/Rate/Route	Last dose
None		

PATIENT EXAMINATION

Temp: <u>101.0 F</u>	HR: <u>100</u>	Pulse quality: <u>Strong, Synchronous</u>	RR: <u>36</u>	MM: <u>PK</u>	CRT: <u>< 2 sec</u>
Other Abnormalities: <u>none</u>			Pain Assessment: <u>not currently in noticeable pain</u>		

PATIENT DIAGNOSTICS

Blood Work (List abnormalities & dates):
 PCV/TS/AZO/Glucose: 50% / 6.5 / 5-15
 CBC:
 Chemistry:
 Blood gas:
 Coagulation:
 Blood type/Crossmatch:

Other Diagnostics (List abnormalities & dates):
 UA:
 Rads:
 US:
 CT/MRI:
 Echo/ECG:
 Others: heartworm test negative

PROBLEMS & COMPLICATIONS

<p>Problem List healthy dog</p>	<p>Anticipated Complications Include plan for intervention</p> <ol style="list-style-type: none"> 1) pain → provide appropriate analgesics (opioids, NSAIDs, local anesthetics) 2) hypothermia → monitor body temperature, place on heating pad 3) bradycardia → monitor heart rate, give anticholinergic as needed 4) respiratory depression → monitor respiratory rate & depth, provide ventilation as needed
--	--

EQUIPMENT/MONITORING

<input type="checkbox"/> Difficult airway equip.	<input checked="" type="checkbox"/> Temperature Probe	<input checked="" type="checkbox"/> Pulse oximetry	<input type="checkbox"/> Nerve Stimulator
<input type="checkbox"/> ECG	<input type="checkbox"/> Direct blood pressure	<input type="checkbox"/> Blood gases/BG	<input type="checkbox"/> Capnography
<input type="checkbox"/> Doppler flow probe	<input type="checkbox"/> Indirect blood pressure	<input type="checkbox"/> Ventilator	<input checked="" type="checkbox"/> Other: esophageal stethoscope

ANESTHESIA PROTOCOL

DRUG (Generic)	ROUTE (IM, IV, SQ)	WEIGHT (kg)	DOSAGE (mg/kg) (mg/kg/hr)	DOSE (mg)	CONC. (mg/ml)	VOL. (ml)	JUSTIFICATION
Premed: Acepromazine	IM	25	0.05	1.25	10	0.13	sedation
Buprenorphine (Simbadol)	SQ	25	0.2	5	1.8	2.8	analgesia
Induction: Propofol	IV	25	4	100	10	10	anesthetic induction
Maintenance: Isoflurane							
CRIs:							Regional Anesthesia: Complications? Block: splash block on linea alba
Post-op: Carprofen	SQ	25	4	100	50	2	Drug(s)/Dose: 0.75/Bupiracaine 2mg/kg = 50mg 50mg = 6.7mL

FLUID THERAPY:

TYPE	WEIGHT	DOSAGE	DRIP SET	CONVERSION	DROPS / SECOND
LRS	25 kg	5 $\frac{\text{ml}}{\text{kg} \cdot \text{hr}}$	10 $\frac{\text{drops}}{\text{ml}} \times$	$\frac{1 \text{ hr}}{60 \text{ min}} \times \frac{1 \text{ min}}{60 \text{ sec}}$	1 drop / 3 sec $\frac{\text{drops}}{\text{sec}}$

Approved by:

ANESTHESIA MEDICAL RECORD EXAMPLE

University of Florida Small and Large Animal Hospital Anesthesia Record

Place Medical Record Sticker Here

Date: 1/1/20		Anesthesiologist/Tech/Student: Awesome	
WT: 25 kg	Age: 1	Surgeon/Clinician: Super Great	
Procedures: 1.) Ovariohysterectomy		Drug History: none	
2.)		Pre-Anesthetic Assessment: healthy	
3.)			
MM: DK	Temp: 100	HR: 100	RR: 36
PCV: 50%	TP: 6.5	Hb: -	Na: -
K: -	Platelets: -	WBC: -	
BLU: 5-15	Creatinine: -	ALT: -	AST: -
ALK Phos: -	ASA Status: 1	Machine #: Machine 1	Circuit: circle
Sponge Count: OK	Total Blood Loss: < 5%	Position: dorsal	ET Tube: 7.5cET

Pre Med Time	Drugs and Route	Effect	Induction Agent/Dose; Maintenance Agent or CR	Time	Anesthetic Complications
12:30p	Acepromazine 1.3mg IM		Propofol 7.5mg IV	1:00p	1.) hypothermia
12:30p	Buprenorphine 5mg SQ	amfound			2.)
					3.)
					4.)

CPR Code	<input type="checkbox"/> DNR	<input checked="" type="checkbox"/> Closed Chest	<input type="checkbox"/> Open Chest	ID Band	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
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Total Fluids: 320 mL

Time	1:00	1:15	1:30	1:45	2:00	2:15	2:30	2:45	3:00	3:15	3:30
O ₂ (L/min)	2										
Inhalant: Sevo											
Inhalant: Iso											
CR:											
CR:											
CR:											
TDF											

Monitoring	220	200	180	160	140	120	100	80	60	40	20	0
ECG												
ECO ₂												
Indirect BP												
Direct BP												
Temp												
Oxim												
PN Stim												

Catheter (UR (F)/I) Multi x Size 20A

Notes:

- ① Move to OR
- ② Carprofen 100mg SQ
- ③ Bupivacaine splash block
- ④ Move to Recovery place on Bair Hugger

Recovery:

SpO₂ 98% on room air after extubation

HR = 75 bpm

RR = 12 bpm

Temp (C) (F)	98	97.7	97.3	97.1	97	96.6	96.4
Fluids:	40	40	50	50	40	40	50
1.) LRS	40	80	130	180	220	260	310
2.)							

TIME	FI O ₂	Ven/Art	pH	pCO ₂	pO ₂	HCO ₃	BE	K ⁺	Na ⁺	Ca ⁺⁺	Cl	Lac	Glu

Normal Temp: 98 (C) (F) Time: 4:15 AM (PM)

Regional Anesthesia Time: 3:05 AM (PM)

Type: splash block Drug: Bupivacaine

Observation: 6.7mL (50mg) splashed onto tinned arda

Recovery Evaluation

Smooth, Quiet

Record Checked

CODE: ● Tube ○ Spontaneous Resp Rate × Controlled Resp Rate * CO₂ Δ SpO₂

∇ Systolic Blood Pressure - Mean Blood Pressure * Diastolic Blood Pressure

White Copy: Record Yellow Copy: Service

UFCVM 04/2017

UF | COLLEGE OF VETERINARY MEDICINE

Pre-Anesthetic Examination

1.) General Appearance <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Abnormal	2.) Oral Cavity/Teeth <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Abnormal	3.) Mucous Membranes <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Abnormal	4.) Eyes <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Abnormal	5.) Ears <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Abnormal
6.) Cardiovascular <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Abnormal	7.) Respiratory <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Abnormal	8.) Gastrointestinal <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Abnormal	9.) Musculoskeletal <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Abnormal	10.) Lymph Nodes <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Abnormal
11.) Urogenital <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Abnormal	12.) Integumentary <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Abnormal	13.) Nervous System <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Abnormal	Pain Score: 0	Body Condition Score: 5/9

Emergency Drug Plan

Drug	Route	Weight (kg)	Dosage	Dose	Concentration (mg/ml)	Volume (ml)	Indications
Atropine	IV	25	0.02	0.5	0.54	0.93	bradycardia
Glycopyrrolate	IV	25	0.01	0.25	0.2	1.3	bradycardia
Epinephrine	IV	25	0.01	0.25	1	0.25	cardiac arrest
Lidocaine	IV	25	2	50	20	2.5	ventricular arrhythmias
Other:							
Other:							
Other:							

Glasgow Pain Scale - Short Form

A. Look at dog in kennel: is the dog?

(i)		(ii)
Quiet	0	Ignoring any wound or painful area
Crying or Whimpering	1	Looking at wound or painful area
Groaning	2	Licking wound or painful area
Screaming	3	Rubbing wound or painful area
		Chewing wound or painful area

In the case of spinal, pelvic, or multiple limb fractures, or where assistance is required to aid locomotion do not carry out section B and proceed to section C.
Please indicate here if this is the case then proceed to section C.

**B. Put lead on dog and lead out of kennel:
When the dog rises/walks is it?**

(iii)		(iv)
Normal	0	Do nothing
Lame	1	Look around
Slow and reluctant	2	Flinch
Stiff	3	Growl or guard area
Refusing to Move	4	Snap
		Cry

**C. If it has a wound or painful area (including abdomen)
apply gentle pressure 2 inches around the site:
Does it?**

(v)		(vi)
Happy and content or bouncy	0	Comfortable
Quiet	1	Unsettled
Indifferent or non-responsive to surroundings	2	Restless
Nervous, anxious, or fearful	3	Hunched or tense
Depressed or non-responsive to stimulation	4	Rigid

D. Overall: is the dog?

Total Score (i+ii+iii+iv+v+vi): 3