

## VSCS 930 Principles of Anesthesia & Analgesia

### Laboratory #1 Handout

#### Anesthetic Record Keeping, Controlled Drug Handling, and IV Catheterization Model

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#### Objectives:

- To practice the calculation of drug volumes and infusion rates, oxygen flow rates, fluid rates in volume and in drop/second, and reservoir bag size
- To learn and to practice how to use and complete the preliminary work-up sheet and the anesthetic record.
- To understand how to handle anesthetic controlled drugs
- To practice how to place and tape an intravenous catheter using the catheterization models.

#### Topics and assignments:

- A – Anesthetic Record Keeping
  - Preliminary workup sheet..... page 2
  - Preliminary workup sheet: clinical case practice (dog)\*\*\* ..... page 3
  - Anesthetic record..... page 4
  - Anesthetic record: clinical case practice (dog)\*\*\*\* ..... page 6
  - Anesthetic record: multiple choice questions (horse)\*\*\* ..... page 7
- B – Controlled Drug Handling ..... page 8
  - Controlled Drug Handling: multiple choice questions\*\*\* ..... page 9
- C – IV catheterization model..... page 10

The assignments can be completed in groups of at least 5 students. At the end of the lab, please send a legible copy (photo) of the completed assignments (1 per group) marked with a \*\*\* to Dr. Keila Ida - kida@cvm.tamu.edu) for feedback. Make sure to include your names on the sheets.

# Assignment A: Anesthetic Record Keeping

## Objectives:

- To practice the calculation of drug volumes and infusion rates, oxygen flow rates, fluid rates in volume and in drop/second, and reservoir bag size
- To learn and to practice how to use and complete the preliminary work-up sheet and the anesthetic record.

## Preliminary work-up sheet

### Instructions for completion

This form is completed for each patient prior to anesthesia. It is used to plan the anesthetic procedure. The layout and information may vary but it usually includes the calculated doses for drugs, intravenous fluids, oxygen flow rate, and reservoir bag size so that these items can be prepared and be ready to use.

#### Drug amount and volume calculation:

•  $\text{Amount} = \text{body weight (kg)} \times \text{dose (mg/kg or mcg/kg)} = \text{X mg or } \mu\text{g}$

•  $\text{Volume} = \frac{\text{Drug amount}}{\text{Drug concentration}} = \text{X mL}$

#### Constant rate infusion (CRI) calculation:

•  $\frac{\text{Amount}}{\text{h}} = \text{body weight (kg)} \times \text{CRI (mg/kg/h or mcg/kg/h)} = \text{X mcg/h or mg/h}$

•  $\frac{\text{Volume}}{\text{h}} = \frac{\text{Drug amount/h}}{\text{Drug concentration}} = \text{X ml/h}$

$\text{Oxygen flow rate} = \text{body weight (kg)} \times \text{oxygen flow rate (ml/kg/min)} = \text{X ml/min}$

$\text{Convert from ml/min to L/min} = \frac{\text{X ml/min}}{1000} = \text{X L/min}$

#### Fluid rate calculation: (\*1 hour = 3600 seconds)

•  $\frac{\text{Volume}}{\text{h}} = \text{body weight (kg)} \times \text{fluid rate (ml/kg/h)} = \text{X mL/h}$

•  $\text{Drip Rate} = \frac{\text{X mL/h}}{3600} \times \text{X drops/mL (drip set)} = \text{X drops/s}$

Emergency drugs are anticipated and calculated as a precaution measurement. In case they are needed, the seconds or minutes required to calculate their volumes can be decisive for a good outcome.

- T = temperature
- P = pulse rate
- R = respiratory rate

ASA Physical Status is used to classify the anesthetic risk of the patient according to the presence/absence and severity of a systemic disease. This is going to be addressed in more details in the "Preanesthetic evaluation" lecture.

## Preliminary Student Workup

Day of Anesthesia: T 101 P 100 R 10      Was patient record reviewed  Yes  No  
 VMID: VSCS930 Lab Day/Time: Friday 10am      Group #: XXXXXX  
 Students' names: XXXXXXXX  
 Species: Canine Breed: Mixed Age: 5 years old Gender: Female  
 Patient Name/ID#: XXXXXXXX Weight (Kg): 10 ASA Physical Status 1 2 3 4 5 E

Anesthetic considerations and notes (additional information found in record i.e., problem list, physical exam, behavior, caution):

Write down any problem found during the physical exam, clinical history, behavior (e.g., aggressivity, need to use muzzle), any medication given (e.g. drugs given as part of a treatment for cardiac patients; sedatives given to perform radiographic exam), presence of allergy. If no problem is found when reviewing patient's records, write down that no known disease was detected.

### Premedication

Drug Methadone Dose 0.2 mg/kg 2 mg 0.2 ml Route IM  
 Drug Dexmedetomidine Dose 2 µg/kg 0.02 mg 0.2 ml Route IM  
 Drug \_\_\_\_\_ Dose \_\_\_\_\_ mg \_\_\_\_\_ ml Route \_\_\_\_\_

### Induction

Drug Propofol Dose 5 mg/kg 50 mg 5 ml Route IV slow  
 Drug \_\_\_\_\_ Dose \_\_\_\_\_ mg \_\_\_\_\_ ml Route \_\_\_\_\_

### CRI

Drug \_\_\_\_\_ Dose \_\_\_\_\_ µg/kg/h \_\_\_\_\_ µg/h \_\_\_\_\_ ml/h Loading dose \_\_\_\_\_ µg  
 Drug Ketamine Dose 0.6 mg/kg/h 6 mg/h 0.06 ml/h Loading dose 10 mg

### Local/Regional Block

Drug Lidocaine Dose 0.5 mg/kg 5 mg 0.25 ml Route Right infra-orbital nerve block  
 Drug \_\_\_\_\_ Dose \_\_\_\_\_ mg \_\_\_\_\_ ml Route \_\_\_\_\_

### Maintenance

Inhalant sevoflurane Oxygen Flow 1<sup>st</sup> 15 min (L/min) 0.6 Maintenance Flow (L/min) 0.5  
 Breathing System Semi-closed Reservoir Bag Size (L) 1 Hoses Adult F-circuit ETT Size 6.5

### Fluids

Type LRS First Hour (ml) 50 Drip Rate 1 drop/5s Drip set: 60 drops/ml 15 drops/ml  
 Second Hour (ml) 50 Drip Rate 1 drop/5s 10 drops/ml pump

### Antibiotics

Drug Cefazolin Dose 22 mg/kg 220 mg 2.2 ml Route IV slow

### Post-operative analgesics or tranquilizers

Drug Acepromazine Dose 0.01 mg/kg 0.1 mg 0.01 ml Route IV  
 Drug \_\_\_\_\_ Dose \_\_\_\_\_ mg \_\_\_\_\_ ml Route \_\_\_\_\_

### Emergency drug dosages

Drug	Dose	Amount (mg)	Volume (ml)	Route
Atropine (0.4 mg/ml)	0.04 mg/kg	<u>0.4</u>	<u>1</u>	<u>IV</u>
Epinephrine (1 mg/ml)	0.01 mg/kg	<u>0.1</u>	<u>0.1</u>	<u>IV</u>
Lidocaine (20 mg/ml)	2 mg/kg	<u>20</u>	<u>1</u>	<u>IV</u>

XXXXXXXX


Student signature

XXXXXXXX

Approval

## Preliminary work-up sheet: Clinical Case Practice

Use the patient record and the anesthesia plan to calculate drug volumes, constant rate infusion (CRI), oxygen flow rate, and reservoir bag size to complete the preliminary workup sheet.

Patient record			
	<b>Patient Name</b>	<b>ID#</b>	
	Minnie	123456	
	<b>Date of birth</b>	<b>Sex</b>	
	1/1/2020	Spayed female	
	<b>Breed</b>	<b>Body weight</b>	
	Mixed-breed	20 kg	
<b>History</b>	Minnie has good appetite but presented with halitosis. She eats a cup of dog food twice a day and never had a dental cleaning before. Needs muzzle for IM/IV injections. Vaccines are up to date.		
<b>Physical exam</b>	<ul style="list-style-type: none"> <li>▪ Temperature (T) 101.2°F</li> <li>▪ Pulse rate (P) 80 bpm</li> <li>▪ Respiratory rate (R) 16 breaths/min</li> </ul>	<ul style="list-style-type: none"> <li>▪ Body condition score (BCS) 5/9</li> <li>▪ ASA physical status 2</li> </ul>	
<b>Laboratory blood exams</b>	<ul style="list-style-type: none"> <li>▪ PCV 45%</li> <li>▪ TP 7.5 g/dL</li> <li>▪ Glucose 100 mg/dl</li> <li>▪ Lactate 0.6 mmol/l</li> <li>▪ BUN 20 mg/dl</li> <li>▪ Creatinine 1.0 mg/dl</li> <li>▪ Albumin 2.2 g/dl</li> </ul>	<ul style="list-style-type: none"> <li>▪ Na+ 133 mmol/l</li> <li>▪ K+ 4.2 mmol/l</li> <li>▪ Ca+ 1.5 mmol/l</li> <li>▪ ALT 50 U/l</li> <li>▪ ALP 100 U/l</li> </ul>	
<b>Planned procedure</b>	Oral cavity radiograph and dental extractions.	<b>Body position</b>	Sternal recumbency

Anesthesia Plan	
<b>Premedication</b>	<ul style="list-style-type: none"> <li>▪ Dexmedetomidine (0.5 mg/ml): 3 mcg/kg intramuscularly (IM)</li> <li>▪ Methadone (10 mg/ml): 0.2 mg/kg IM</li> </ul>
<b>Induction</b>	Propofol (10 mg/ml): 5 mg/kg IV slow to-effect
<b>Constant rate infusion (CRI)</b>	Fentanyl (50 mcg/ml): bolus of 3 mcg/kg IV slow followed by 5 mcg/kg/h.
<b>Local/Regional block</b>	Bupivacaine 0.5% (5 mg/ml): 0.25 mg/kg left infra-orbital nerve block
<b>Maintenance</b>	<ul style="list-style-type: none"> <li>▪ Inhalant: isoflurane</li> <li>▪ Oxygen flow 1<sup>st</sup> 15 min: 60 ml/kg/min</li> <li>▪ Oxygen maintenance: 30 ml/kg/min</li> <li>▪ Breathing system: semi-closed</li> <li>▪ Reservoir bag size: 90 ml/kg (choose the appropriate size among the available ones 0.5 L, 1 L, 2 L, 3 L, 4 L and 5 L)</li> <li>▪ Hoses: adult F-circuit</li> <li>▪ Endotracheal tube (ETT) size: 8.5 mm internal diameter (ID)</li> </ul>
<b>Fluids</b>	Lactated Ringer's solution (LRS): first and second hours - 5 ml/kg/h using drip set of 10 drops/ml.
<b>Antibiotics</b>	Cefazolin (100 mg/ml): 22 mg/kg IV
<b>Post-operative analgesics or tranquilizers</b>	Meloxicam (5 mg/ml): 0.2 mg/kg IV
<b>Emergency drugs</b>	<ul style="list-style-type: none"> <li>▪ Atropine (0.4 mg/mL) at 0.04 mg/kg IV</li> <li>▪ Epinephrine (1 mg/mL) at 0.01 mg/kg IV</li> <li>▪ Lidocaine (20 mg/mL) at 2 mg/kg IV</li> </ul>

## Anesthetic Record

The American College of Veterinary Anesthesia and Analgesia (ACVAA) establishes monitoring guidelines for anesthetic record keeping in order to enhance recognition of significant trends or unusual events for physiologic parameters and to allow assessment of the response to intervention. The patient monitoring is registered in the anesthetic record, which is a **legal document**. The anesthetic record should also include all drugs and procedures performed in the patient under anesthesia. As a legal document, some instructions must be followed:

- it must be as complete and accurate as possible
- only professional black or blue non-erasable ink is accepted
- marks and corrections must be accompanied by the initials of the name of the person who made them
- always write the "0" in front of the decimal (e.g., 0.2 instead of .2)
- drug amount always in "mcg", "mg", "g" or "IU" (NOT the volume)

The layout may vary between veterinary hospitals and animal species to accommodate specific needs. See the Large Animal Anesthesia Record used at Texas A&M VMTH, which has front and back pages to include information regarding the recovery from anesthesia.

**Large Animal Anesthesia Record  
FRONT PAGE**

**Large Animal Anesthesia Record**

**Patient Sticker**

Case Number: 702100  
 Name: Redwatts  
 Species/Breed: Quarter Horse  
 Sex: Female  
 Age: 2-years-old

Date: 7/1/2022  
 Anesthetist: [Name]  
 Charges: [Amount]  
 Procedure: Head CT & medication CP

Weight: 50 kg  
 Height: 5'9" MA  
 Temperature: 100.0  
 Heart Rate: 36  
 Respiratory Rate: 10  
 SpO2: 96  
 TP: 7

Drugs: [Table with columns for Drug, Amount, Route, Time, Reason/Comment]

Vital Signs: [Table with columns for Time, HR, RR, SpO2, Temp, BP, etc.]

ECG: [Graph area for ECG recording]

Respiratory: [Graph area for respiratory recording]

Temperature: [Graph area for temperature recording]

SpO2: [Graph area for SpO2 recording]

Time: 9:50 AM to 10:10 AM

Student Name: [Name]  
 Anesthetist Name: [Name]  
 Signature: [Signatures]

**Large Animal Anesthesia Record  
BACK PAGE**

**Recovery from anesthesia**

Include all drugs and fluids with amount, route, time and reason for giving during recovery.

Patient's behavior before general anesthesia (check all that apply):  
 Calfs  Anxious  Frantic  
 Dreamt/was about patient's bad behavior  
 Tried to bite or kick at the hospital  
 Needs chain halter to be handled  
 Needs sedation to place catheter  
 Needs sedation to raise out the mouth  
 Needs sedation to enter the induction stall area

Activity in recumbence:  
 1 Quiet, occasional stretch, head lift  
 2 Tense, wanting to expel  
 3 Flailing

Movement to stand:  
 1 Smooth, unhesitant  
 2 Fighting but controlled  
 3 Creaking, slipping over

Normal phase:  
 1 Organized with peace  
 2 Nervousness  
 3 Prolonged  
 4 Multiple  
 5 Continues to struggle

Movement to stand:  
 1 Methodical  
 2 Organized assembly  
 3 Good walk for support, steady recovery  
 4 Resisting off walls, extremely wobbly

Reflexes:  
 1 Near full  
 2 Mildly reduced  
 3 Dog sitting before standing  
 4 Repeated attempts due to weakness

Balance and coordination:  
 1 Solid, steady on its feet, able to place feet effectively and maintain balance  
 2 Mechanically wobbly; places feet and maintains balance, but with difficulty. Steering  
 3 Balances wobbly; does not maintain balance well  
 4 Crouching  
 5 Falling down

Swallowing:  
 1 None  
 2 Mild initially - mild  
 3 Blood-tinged only - mild  
 4 All four - moderate  
 5 Excessive, prolonged

Prevalent attitude:  
 1 Calm  
 2 Calveshimmered  
 3 Anxious  
 4 Drowsy, unsteady  
 5 Angry  
 6 Frantic

Total score: [Box]

Check off that applies:  
 Nystagmus:  
 None  Lateral  Normal  Swallowing  
 Prolonged - and time \_\_\_\_\_ sec/pts  
 Lights dimmed  
 Noise from outside  
 Noise from inside  
 Head bumper  
 Blankets  
 Backflapper  
 Damaged valve  
 Flare-by oxygen  
 Ventilation - time \_\_\_\_\_ sec/pts  
 None  Small  Medium  Large  
 Bleeding:  
 None  Mild  Moderate  Severe  
 No injury  
 Minor injury  
 Major injury

Comment section is used to describe any event occurring during recovery that there is no dedicated space elsewhere to be included.

Patient's behavior: check as appropriate (more than one option is possible).

Times in blue may not be applicable to ruminants and swine patients.

Check as appropriate (more than one option is possible).

## Small Animal Anesthesia Record

- Catheter location:**
- RFL = right forelimb
  - LFL = left forelimb
  - RHL = right hindlimb
  - LHL = left hindlimb
  - R Jugular = right jugular
  - L Jugular = left jugular

- ECG: Electrocardiogram
- EtCO<sub>2</sub>: End-tidal carbon dioxide concentration
- SpO<sub>2</sub>: Oxi-hemoglobin concentration
- Temp.: Temperature
- Oscillom.: Oscillometric
- IBP: Invasive blood pressure

**Fluids:** running totals every 30 min. Write the total volume missing from the fluid bag at the time indicated by the vertical line on the right of each 30-min box. E.g.: at 9:30, 125 ml was missing from the LRS bag, so write 125 ml in the box just before 9:30.

**CRIs:** put a comment # in the top (green) line at the time that it was started. Then add this # in the "Comments" section in the (green) bottom of the page followed by the drug, loading dose, rate, route and reason (e.g.: see comments #4 for Fentanyl and #7 for Lidocaine). In the top portion (blue) write only the number (without units) then start the line when the CRI is started. If changes are made to the rate only then a number only is added to the top portion. E.g.: Fentanyl 5-----7-----3----- . If a bolus dose, route or reason change then an additional comment needs to be made (e.g., see comment #6 for Fentanyl).

**Times:** use quarter hours every 15 min (three squares). Each square = 5 min.

**Ab = Antibiotic.** Make a dot at the time it's given and put the "mg" and administration route next to the dot.  
**Sevoflurane %:** concentration set in the vaporizer.  
**Et (agent) %:** End-tidal inhalant agent concentration measured by the gas analyzer then monitors (may not be present in all monitors).

**Event codes:** use the codes in the "event code legend" at the time that they occur (e.g.: "S" for beginning of surgery at 9:15am, and "S" for end of surgery at 10:30am). Do not draw lines between letters in this new area.

**Vitals:** recorded every 5 min using the symbols in the legend.

**SpO<sub>2</sub>, Temp and PIP:** Readings from the time line to the right of each box (e.g.: first values of temperature 100°F and PIP of 12 cmH<sub>2</sub>O correspond to the reading at 8:45 am).  
**PIP = peak inspiratory pressure.** This is the max pressure that is being given by the ventilator or us (manual/assisted ventilation) during that time period. If PEEP is being used this can be a comment (e.g.: see comment #5).

**Comments:** in the (green) line in the top, add a comment # at the time the event occurred and then use the # on the comment section (bottom green) to describe this event (do not need to write a time). E.g.: transport times (e.g.: see comment #3), reasons for missing a reading, transferring time to another service after recovery (e.g.: comment #12). Include any information that does not have a dedicated space to be described elsewhere in the sheet. This is an official document that must allow any person not present during the procedure to understand exactly what happened throughout just by reading the anesthetic record.

Case Number: 123456  
 Name: Sammie  
 Sex: Female spayed  
 Date: 1/12/2022  
 Procedure: Enterotomy and nasogastric tube placement  
 Weight: 2.0 Kg  
 ASA: 1 X 3 + 1 E

Monitors:  ECG  SpO<sub>2</sub>  Oscillom.  Temp.  Bar Hugger =  Doppler =  HotDor =  Transwarmer =

Drugs:  
 Methadone 6 mg IM 1M 8:50 am  
 Midazolam 4 mg IV 8:25 am  
 Propofol 50 mg IV 8:25 am

Fluids:  
 LRS 200 ml  
 Fentanyl 292 mcg  
 Lidocaine 80 mg

Vitals:  
 SpO<sub>2</sub> (%) 95-100  
 Temp (°F) 100.0-100.5  
 PIP (cmH<sub>2</sub>O) 12-15

Event Codes Legend:  
 A: Anesthesia Start  
 P: Prep Start  
 S: Surgery Start  
 X: Imaging  
 V: Vitals  
 M: Mean  
 D: Distal  
 R: Resp  
 EtCO<sub>2</sub>

Comments:  
 (1) 2.2% isoflurane masked in the right cephalic vein. (2) LRS 100 ml bolus IV over 10 min for hypotension. (3) Routed to the LRS. (4) Fentanyl 50 mcg IV over 3 min followed by start of CRI at 5 mcg/kg/h IV for pain management. (5) Added PEEP of 3 cmH<sub>2</sub>O for hypoxemia. (6) Fentanyl 50 mcg IV bolus for increased nociception. (7) Lidocaine 40 mg IV over 2 min followed by start of CRI at 5 mcg/kg/h for increased nociception. (8) Propofol 20 mg IV for right anesthesia. (9) Nasogastric tube placement. (10) Moved to radiology. (11) Moved to recovery. (12) Transferred to ICU.

Student Name: \_\_\_\_\_ Anesthetist Name: \_\_\_\_\_ Anesthesiologist Name: \_\_\_\_\_  
 Student Signature: \_\_\_\_\_ Anesthetist Signature: \_\_\_\_\_ Anesthesiologist Signature: \_\_\_\_\_

**TPR:** of the morning of the procedure

**Size:** internal diameter of the endotracheal tube (ETT)  
**Incisors:** length where the incisors hit the ETT.

**Fluids/CRI totals:** total volume of fluids and amount (mcg or mg) of CRI drugs written at the end of each of the corresponding lines.

**Assisted ventilation =** manual ventilation

## Anesthetic Record: Clinical Case Practice (dog)

Use the information given so far (patient record, drugs, calculated drug amounts, and administration route) with the description below to complete the **anesthetic record**.

### Anesthesia

- Premedication drugs (drugs, amount, and administration route in the workup sheet) administered at 8 a.m. caused moderate sedation. A venous 20-gauge venous catheter was placed in the right front limb (RFL).
- Patient was monitored with electrocardiogram (ECG), end-tidal carbon dioxide concentration (ETCO<sub>2</sub>), pulse oximeter (SpO<sub>2</sub>), temperature (Temp.), non-invasive blood pressure (NIBP) oscillometric technique. Warming devices: BairHugger® and HotDog®.
- LRS 5 mL/kg/h started at 8:30 a.m. (comment #1). LRS total at 9 a.m. was 50 ml.
- Anesthesia induced with propofol IV at 8:33 a.m. A 5 mg/kg dose was calculated, but only 80 mg was needed.
- Orotracheal intubation was performed at 8:35 a.m. with a Murphy type 8.5 mm internal diameter (ID) endotracheal tube (ETT) with incisors at 25 cm of the length of the tube.
- Anesthesia started at 8:35 a.m. with isoflurane at 1.5%. Oxygen flow was started at the same time as isoflurane at XXX L/min in the first 15 minutes and then reduced to XXX L/min (rates calculated in the preliminary workup sheet).
- Anesthesia machine #1 was used. Ventilation was assisted manually (assisted) and mechanically (ventilator) with a tidal volume (TV) of 10 ml/kg (calculate the volume using the patient's body weight).
- Patient transported to x-rays room at 8:40 a.m. (comment #2). Radiographic exam (imaging) performed from 8:40 a.m. to 8:45 a.m. Patient transported to dentistry at 8:45 a.m. (comment #3) and placed in sternal recumbency.
- Cefazolin (antibiotic) at 8:45 a.m. (amount and administration route in the workup sheet).
- Left infra-orbital nerve block (local block technique) with bupivacaine at 8:45 a.m. (drug amount in the workup sheet)
- Surgery started at 8:50 a.m.
- At 8:55 a.m., Fentanyl loading dose IV (include amount) over 5 minutes due to increased nociception (comment #4). Fentanyl CRI (include amount) from 9:00 a.m. to 9:10 a.m. Sevoflurane reduced to 1% at 9 a.m.
- At 9 am, LRS 100 ml IV over 10 minutes due to hypotension (Comment #5).

Vitals were taken throughout anesthesia:

Notes: SAP = systolic arterial pressure. MAP = mean arterial pressure. DAP = diastolic arterial pressure. Et (agent) = end-tidal inhalant concentration (in this case, isoflurane). PIP = peak inspiratory pressure.

	Et (agent) (%)	SAP (mmHg)	MAP (mmHg)	DAP (mmHg)	Pulse (pulse/min)	Resp. (breaths/min)	ETCO <sub>2</sub> (mmHg)	SpO <sub>2</sub> (%)	Temp. (mmHg)	PIP (cmH <sub>2</sub> O)
8:30	-	120	80	60	88	18	-	-	-	-
8:35	-	116	75	55	90	8	40	99	-	-
8:40	-	110	74	56	80	8	40	99		
8:45	1.3	103	73	58	76	8	40	98	99.4	10
8:50	-	108	72	54	73	8	40	99	-	-
8:55	-	150	97	70	130	20	30	98		-
9:00	1.1	100	55	37	68	8	40	99	98.7	15
9:05	-	90	62	48	65	10	35	99	-	-
9:10	-	95	69	50	70	8	40	99	-	-
9:15	1.0	100	67	50	67	10	35	99	99	10

- Surgery and anesthesia (isoflurane discontinued) ended at 9:10 a.m.
- Patient transported to recovery at 9:15 a.m. (comment #6). Oxygen discontinued.
- Patient extubated at 9:20 a.m. Temperature 99 °F, Pulse rate 75 bpm, Resp. rate 10 breaths/min, SpO<sub>2</sub> 99%. Recovery was uneventful. Comments: none.
- Meloxicam for post-operative analgesia at 9:25 a.m. (comment #7) – include drug amount and administration route).
- LRS total at 9:30 a.m. = 180 ml. Patient placed in the kennel and transferred to dentistry at 9:30 a.m. (comment #8). Fluids/CRI totals were: Fentanyl 76.7 mcg and LRS 180 ml.

**Anesthetic Record: Multiple choice question (horse)**

A1. A 500-kg horse was administered Ketamine (100 mg/ml) at 2.2 mg/kg IV and Midazolam (5 mg/ml) at 0.02 mg/kg IV at 8:08 AM for induction of anesthesia. Is this indicated correctly in the figure on the right? More than one correct option is possible.

	Drug	Amount	Route	Time
Induction	Ketamine	11 ml	IV	8:08 AM
	<del>Diazepam</del> Midazolam	5 ml	IV	8:08 AM

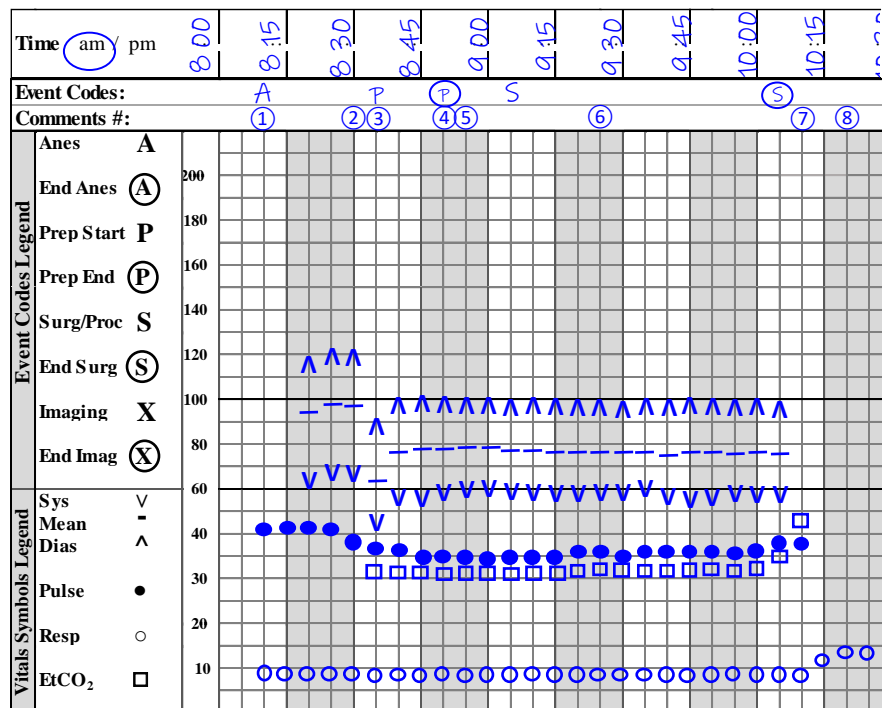
- a) Yes, any error can be crossed over with the correct word written next to it only.
- b) Yes, the amount of Midazolam and Ketamine is correct.
- c) No, the initials of the person who crossed over “Diazepam” should have been included next to it.
- d) No, the amount of Midazolam should be 10 mg.
- e) No, the amount of Midazolam should be 2 ml.
- f) No, the amount of Ketamine should be 1100 mg.

A2. This 500-kg horse was administered intravenous lactated Ringer’s solution (LRS) at 4 ml/kg/h from 8:30 a.m. to 10 a.m. Is this information registered correctly in the figure below? More than one correct option is possible.

Time	am	pm	8:00	8:15	8:30	8:45	9:00	9:15	9:30	9:45	10:00	10:15	10:30	10:45	11:00	11:15	11:30	...	Totals	
LRS					1L		2L		3L											3L

- a) No, “1L” should be written in the second and third boxes, respectively.
- b) Yes, the LRS total volume was correctly indicated in the box just before the indicated time.
- c) No, the LRS total volume should be written in the box just after the corresponding time.
- d) No, the LRS volume given during 30 minutes only should be written in each box.
- e) No, the total volume of LRS at the end was 2 Liters (4 ml/kg/h in a 500-kg horse = 2000 ml = 2 L per hour).
- f) Yes, the total volume of LRS at the end was 3 L (4 ml/kg/h in a 500-kg horse = 2000 ml = 2 L per hour, thus 3 L per 1 hour and 30 min)

A3. Anesthesia was performed from 8:10 to 10:15 AM, dry and wet preparation was performed from 8:35 to 8:50 AM and surgery from 9:05 to 10:05 AM. No imaging procedure was performed. All vitals were within the normal range for anesthetized horses. Is this information registered correctly in the figure on the right? More than one correct option is possible.



- a) No, each column should correspond to 15 minutes rather than 5 minutes.
- b) No, the vitals should be monitored every 15 minutes rather than every 5 minutes.
- c) No, the systolic and diastolic arterial blood pressure symbols are flipped.
- d) No, the end of anesthesia symbol is missing.
- e) No, the start and end of imaging symbols are missing.

## Assignment B: Controlled Drug Handling

Objective: to understand how to handle anesthetic controlled drugs.

Anesthetic drugs are considered controlled substances under the Controlled Substances Act, which means that they have been identified by the United States Department of Justice/Drug Enforcement Administration (DEA) as having the potential for abuse (<https://www.deadiversion.usdoj.gov/schedules/>). These substances have been categorized by the federal government into five categories or schedules based on whether they have a currently accepted medical use in treatment in the United States, their relative abuse potential, and likelihood of causing dependence when abused. The five levels of controlled substance schedules are:

- Schedule I: drugs with no current medical use, per analysis by the DEA and FDA. These substances carry a high potential for abuse and addiction. Veterinarians have no authority to prescribe them. E.g.: Heroin, LSD, Marijuana, Ecstasy.
- Schedule II: highly addictive with a dangerous potential for abuse but considered medically acceptable in particular cases. E.g.: mu-opioids (e.g.: morphine, hydromorphone, methadone, fentanyl, remifentanyl) and pentobarbital.
- Schedule III: low to moderate potential for physical and psychological dependence. E.g.: buprenorphine and ketamine.
- Schedule IV: clear evidence of viable medical use and low probability for misuse and abuse. E.g.: benzodiazepines (e.g.: diazepam, midazolam, and zolazepam), alfaxalone, and butorphanol.
- Schedule V: very low potential for abuse relative to substances listed in Schedule IV. They consist primarily of preparations containing limited quantities of certain narcotics. E.g.: cough preparations containing no more than 200mg of codeine per 100ml or per 100g (Robitussin AC®, Phenergan with Codeine®).

An updated and complete list of the schedules is published annually in Title 21 Code of Federal Regulations (C.F.R.) §§1308.11 through 1308.15 (<https://www.deadiversion.usdoj.gov/21cfr/cfr/2108cfrt.htm>).

Requirements for using controlled substances:

- Authorization: veterinarians and veterinary businesses must have a DEA registration with an approved Controlled Substance Use Authorization.
- Purchase: all controlled substances must be purchased under the DEA registration. A purchase requisition is required, even if the drugs are being provided by the vendor without charge.
- Storage: controlled substances and the records of their use must be kept securely locked, with access limited to only those individuals specifically authorized to use them.
- Records & Documentation: a detailed log must be kept to record and account for all use of controlled substances. Keep detailed and legible records of each scheduled drug for a minimum of 5 years. Information required in the records: name of the drug, date of acquisition, quantity purchased, date administered or dispensed, quantity administered or dispensed, name of client and patient receiving the drug(s), name of authorized person and witness administering and dispensing the drug, and total balance on hand of the scheduled drug.
- Disposal: controlled substances which have expired or are no longer needed, as well as all empty vials, must be disposed in a controlled drug disposal compartment according to the "Secure & Responsible Drug Disposal Act of 2010" ([https://www.deadiversion.usdoj.gov/fed\\_regs/rules/2014/2014-20926.pdf](https://www.deadiversion.usdoj.gov/fed_regs/rules/2014/2014-20926.pdf)). DO NOT discard or dispose controlled substances in the regular trash or down the drain. Any discard or waste of a controlled drug must be registered with the signature of a witness.



## Controlled Drug Handling: multiple choice questions

### **B1. Which of these drugs are considered controlled substances? Why are they considered controlled drugs?**

- a. butorphanol, ketamine, pentobarbital, and carprofen because although these drugs have clear evidence of viable medical use, they also have the potential for physical and psychological dependence (human abuse)
- b. alfaxalone, ketamine, and carprofen because they have clear evidence for human abuse
- c. butorphanol, ketamine, and midazolam because although these drugs have clear evidence of viable medical use, they also have the potential for physical and psychological dependence (human abuse)
- d. propofol, midazolam, and carprofen because they have the potential for physical and psychological dependence (human abuse)
- e. butorphanol, propofol, and carprofen because these drugs have clear evidence of viable medical use

### **B2. Which options contain information that needs to be recorded when using controlled drugs? More than one option is possible.**

- a. Name of the drug, date of acquisition, and quantity purchased
- b. Date administered, quantity administered, name of client and patient receiving the drugs
- c. Name of authorized person administering the drug and name of witness
- d. Total balance on hand of the scheduled drugs

### **B3. At the end of an anesthetic procedure, you realize that there are 10mg of ketamine left. Which option(s) contain what you need to do with this remaining amount of ketamine? More than one option is possible.**

- a. Register the name of the drug, date of acquisition, quantity purchased, date dispensed, quantity dispensed
- b. Record name of client and patient for which the drug is being dispensed, name of authorized person and witness dispensing the drug
- c. Dispense the drug in the regular trash
- d. Dispense the drug in a controlled disposal compartment
- e. Dispense the drug down the drain

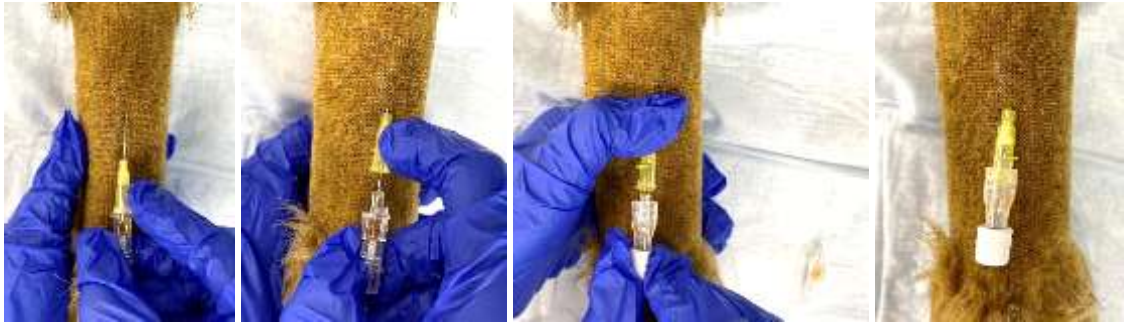
## Assignment C: Introduction to IV Catheterization

Objective: to be introduced on how to place and tape an intravenous catheter. There is no form to be turned in for this assignment.

**1) Preparation:** clipping and aseptic preparation of the puncture site is essential before placing a catheter in a living patient. Make sure to have a catheter, an IV injection port (or T-port), and 2 adhesive tapes (3 tapes if using a T-port).

### 2) Placing the catheter:

- Remove the cap of the catheter without touching the part protected by the cap. The protected part goes inside the vein, so it must be maintained aseptic in live animals.
- Angle the catheter to approximately 30° in relation to the vein.
- Once the tip of the catheter is in the vein you will see blood (saline with dye in this case) in the clear needle hub. Feed the catheter using the push off plate on the catheter hub. The catheter is advanced forward off the needle into the vein.
- Remove the needle and connect the IV injection port (or T-port) to the catheter hub.



### 3) Taping the catheter in place:

Tape 1:



Tape 2:



If a T-port (rather than an IV injection port) is being used, a 3<sup>rd</sup> tape is used to tape it in place.

