

ACVAA Certifying Examination

Lydia Love DVM DACVAA
2018 Exam Committee Chair
September 2018

- Exam Format
- Exam Committee
- MCQ Exam
- Essay Exam
- Clinical Competency Exam
- Grading
- Cut Score Committee
- Score Reporting



ACVAA Certifying Examination

- Late May/early June
- Centralized location
- 2.5 days
- Multiple Choice Questions (MCQ)
- Essay Exam
- Clinical Competency Exam (CCE)
- All 3 parts must be passed individually



Exam Format

- Computer-based
- ExamSoft Software
- 1st & 2nd days
 - 8a – 11a: 100 MCQ
 - 11a – 12p: required essay
 - 12p – 1p: box lunch
 - 1p – 5 p: choice of 4 out of 5 essays
- 3rd day
 - 7a – 12p: 8 – 12 CCE questions

Exam Format

- Multiple Choice Committee
 - 230 MCQs selected from question bank
 - 20 – 24 are new
 - Submitted by DACVAs
 - Referenced from recent editions of textbooks and articles of high impact within the last 5 years
 - Resident resource & reading list
 - MCQ Committee reviews questions
 - Meeting to finalize exam composition
- “Exam Committee”
 - Writes essay/CCE questions & ideal answers
 - Meeting to finalize exam composition
 - Grades essays and CCE answers

Exam Committee

- Anatomy 7%
- Pharmacology 17%
- Physiology 16%
- Physics 5%
- CPR 3%
- Euthanasia 1 %
- Monitoring 16%
- Case Management 18%
- Public Safety & Regulations 2%
- Professional/Educational Topics & Issues 2%

Multiple Choice Strategies

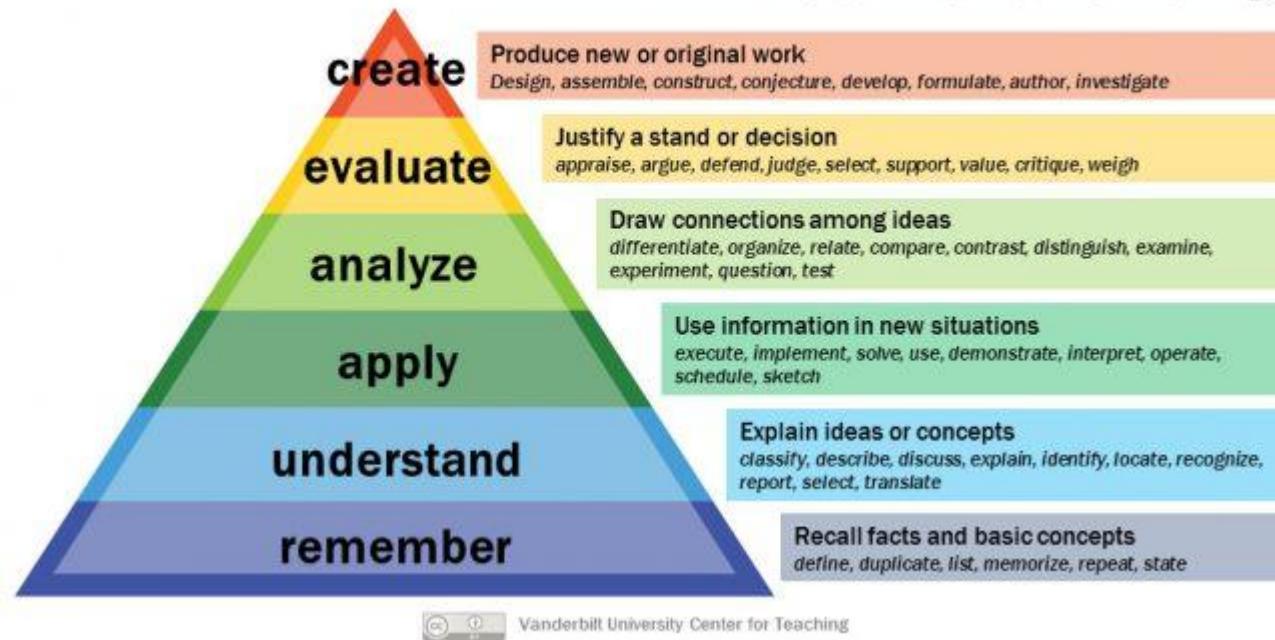
- Read the question carefully and try to answer it before you read the choices.
 - Strike out wrong answers.
 - Mark answers clearly and consistently.
 - Change answers cautiously. Beware of second-guessing yourself.
 - Read all the options before making a choice.
 - If you don't know an answer, move on.
 - If all else fails, make an educated guess!!
-

MCQ Exam Domains

- Historical question maximum 5%
- Questions from the previous year limited to 10%
- About 10% are new questions
 - May be eliminated based on performance
- Difficulty ranked according to Bloom's taxonomy

MCQ Exam

Bloom's Taxonomy



- EC divided into 3 groups of 4
- 4 essays created per group
- 1 required essay each day from the following:
 - Cardiovascular Physiology
 - Respiratory Physiology
 - Anesthetic Equipment and Physics



Essay Exam

- Choice of 4 out of 5 essays in the afternoon
 - Pathophysiology of Disease
 - Core species (canine, feline, equine, ruminants, swine)
 - Other species
 - Case management and application
 - Pain
 - Pharmacology
 - Fluids, electrolytes and acid-base
 - Complications and CPR
 - Monitoring

Essay Exam

A reflex is a near-instantaneous response to a stimulus that undergoes little to no central integration and involves minimal synapses.

Discuss 5 of the following cardiovascular reflexes:

- the Bainbridge reflex
- the baroreceptor reflex
- Bezold-Jarisch reflex
- Brantham's sign
- Cushing's reflex
- the dive response
- the oculocardiac reflex (20 points each).
- Include in your answer:
- Stimulus
- Afferent pathway
- Efferent pathways
- Resulting physiologic effect
- Clinical relevance to anesthesia (points divided evenly for each reflex).

Essay Example

- **Bainbridge Reflex**
- **Stimulus – distention of the vena cavae and right atrium** due to an increase in central blood volume. Detected by **atrial stretch receptors** (mainly atrial B mechanoreceptors) located at the junction of the vena cavae in the right atrium and in the pulmonary veins.
- **Afferent pathway – vagal afferents** to medullary vagal nuclei. (Different texts list different nuclei as responsible but should be the sensory nucleus of the vagus: the nucleus tractus solitarius. The nucleus ambiguus is also listed but this contains the cell bodies for vagal motor neurons to cardiac ganglia and so is actually part of the efferent pathway.)
- **Efferent pathway – inhibition of vagal parasympathetic outflow** to the SA node (and reduction in ADH release).
- **Physiologic Effect - increase in heart rate**
- **Clinical Relevance** – Fast infusion of intravenous fluids and the **resultant increase in central venous blood volume and pressure** can elicit a **seemingly paradoxical increase in heart rate**. In addition, centralization of blood volume with vasoconstrictors or a change in body position may induce the Bainbridge reflex. This reflex also appears to **mediate HR changes associated with a respiratory sinus arrhythmia**. Interestingly, a **reverse Bainbridge reflex may cause bradycardia in the face of hypotension** during spinal and epidural anesthesia due to an increase in venous capacitance and reduced central venous pressure. Additionally, a recent case report implicated a reverse Bainbridge reflex (or possibly the Bezold-Jarisch Reflex) as a possible causative factor in the development of bradycardia during caval occlusion in a dog.

Essay Example

- EC groups create 12 clinically-oriented questions with subparts
 - Each question has overall time limit
 - Suggested time for each subpart
 - Indicates point value of answer
 - Information can be revealed
 - Backward navigation is not allowed
 - Last part of every question:
Do you have anything more to add?
- 8 – 12 questions may be asked
 - Depending on suggested length of time

Clinical Competency Exam

- CCE Domains
 - Local and regional anesthetic techniques
 - Pain management
 - Case management of common domestic species
 - TIVA
 - Monitoring
 - Inhalant anesthesia
 - Breathing circuits and systems
 - Avian, zoo laboratory, and wildlife anesthesia
 - Radiographic and imaging interpretation
 - Emergency therapy
 - Interpretation and management of blood gases, acid base, electrolyte and metabolic disorders
 - Fluid therapy

Clinical Competency Exam

- *Equipment Question Total Time: 25 minutes*
- *Question 1 of 4: Suggested Time 10 minutes*
- *A veterinarian contacts you to ask about an issue he had today in his small animal practice with the anesthesia of two different canine patients. Both patients were healthy young animals, a 1 year old Labrador and a 2 year old mixed breed dog, and the procedures were elective ovariohysterectomies. He generally doesn't have any anesthetic problems or major complications. However today he had "severe issues", including hypotension, tachycardia, hypocapnia, and apnea with the first dog. He woke her up without performing the surgical procedure. However, the same thing happened with the second dog.*
- *What 8 or more questions would you ask this veterinarian to help him with this issue?*



CCE Example

- *Question 2 of 4: Suggested Time 6 minutes*
- *The following information was provided with your questioning:*
- *Monitoring included ECG, EtCO₂, NIBP, SpO₂ and temperature.*
- *No agent analyzer is available.*
- *Within 5-10 minutes of inhalant anesthesia with isoflurane vaporizer set at 2.5% (as usual), both dogs experienced severe hypotension, apnea, bradycardia, and hypocapnia ; SpO₂ was >95% throughout. The eyes were central, jaw tone was slack, and no palpebral reflex was noted.*
- *Inhalant anesthesia was discontinued and the patients rapidly recovered and were normal.*
- *A circle rebreathing system with oxygen flow of 1 L/min was used for each patient.*
- *There is another anesthesia machine available in the practice.*
- *The veterinarian does not have any other inhalational anesthetics in the hospital.*
- *What recommendations would you make to this practitioner?*

CCE Example



- *Question 3 of 4: Suggested Time 6 min*
- *At your suggestion, the practitioner switches to the other anesthesia machine safely and has no more issues. For the vaporizer with the problem, the service technician reports that at the 2.5% setting on the dial, the vaporizer output was 11% isoflurane. The practitioner has called you back to ask how this could this have happened.*
- *What will you tell him is the likely cause and how to prevent this in the future?*

CCE Example



- **Inhalant Anesthesia Case:** Question 4 of 4: Suggested Time 3 min
- Classify the vaporizer the veterinarian is using according to agent specificity, method of output regulation, resistance, vaporization method, & location.

CCE Example



- ***Final Opportunity:***
- If you have time and there is anything you wish to add related to this case, please do so here.

CCE Example

- *Equipment Question Total Time: 25 minutes*
- *Question 1 of 4: Suggested Time 10 minutes*
- *A veterinarian contacts you to ask about an issue he had today in his small animal practice with the anesthesia of two different canine patients. Both patients were healthy young animals, a 1 year old Labrador and a 2 year old mixed breed dog, and the procedures were elective ovariohysterectomies. He generally doesn't have any anesthetic problems or major complications. However today he had "severe issues", including hypotension, tachycardia, hypocapnia, and apnea with the first dog. He woke her up without performing the surgical procedure. However, the same thing happened with the second dog.*
- *What 8 or more questions would you ask this veterinarian to help her with this issue?*



CCE Example

- **When were the anesthetic issues observed?**
- **What anesthetic protocol was used on the animals?**
- What was the size of the dogs?
- **What type of breathing system was being used?**
- **What oxygen flow was being used?**
- What size of rebreathing bag was being used?
- Do they have a ventilator?
- **What monitoring equipment does he use?**
- **Who monitors anesthesia?**
- **How did the anesthetic depth appear during the events?**
- Are the drugs brand new bottles? Are they compounded drugs or commercially available?
- **Was the SpO₂ OK while having “issues”?**
- Do they have a gas analyzer?
- Does the vaporizer have a color coded/pin coded filling port?
- Was the right inhalant being poured? Are they sure no one manipulated the filling port or the neck of the bottle?
- **Is there another anesthesia machine in the hospital that can be used?**

CCE Example

- *Question 2 of 4: Suggested Time 6 minutes*
- *The following information was provided with your questioning:*
- *Monitoring included ECG, EtCO₂, NIBP, SpO₂ and temperature.*
- *No agent analyzer is available.*
- *Within 5-10 minutes of inhalant anesthesia with isoflurane vaporizer set at 2.5% (as usual), both dogs experienced severe hypotension, apnea, bradycardia, and hypocapnia ; SpO₂ was >95% throughout. The eyes were central, jaw tone was slack, and no palpebral reflex was noted.*
- *Inhalant anesthesia was discontinued and the patients rapidly recovered and were normal.*
- *A circle rebreathing system with oxygen flow of 1 L/min was used for each patient.*
- *There is another anesthesia machine available in the practice.*
- *The veterinarian does not have any other inhalational anesthetics in the hospital.*
- *What recommendations would you make to this practitioner?*

CCE Example



- **Rationale:** The **patients** sound like they were **very deep** due to the physical exam findings of **no jaw tone & central eye position**, combined with **severe hypotension and apnea**.
- Recommend the practitioner immediately **stop using that vaporizer** and that the vaporizer be serviced and output of isoflurane checked.
- Since there is another anesthesia machine in the practice, suggest for him to use the other machine until the vaporizer is checked and serviced.

CCE Example

- Question 3 of 4: Suggested Time 6 min
- At your suggestion, the practitioner switches to the other anesthesia machine safely and has no more issues. For the vaporizer with the problem, the service technician reports that at the 2.5% setting on the dial, the vaporizer output was 11% isoflurane. The practitioner has called you back to ask how this could have happened.
- What will you tell him is the likely cause and how to prevent this in the future?

CCE Example



- **Rationale:** Most likely someone tipped the pole of his anesthesia machine and the **vaporizer tilted**.
- Tipping of this type of vaporizer may cause **delivery of high concentrations, since liquid from the vaporizing chamber may get into the bypass channel, the mixing chamber or the outlet.**
- Modern vaporizers include safety valves that close the vaporizing chamber. These valves are associated with a transport ,“T”, position of the concentration dial that allows transport in any position as long as the dial is set at “T” position. Tilting in this position constitutes no hazard.
- *Could mention that if no other method for getting the vaporizer serviced existed, one could flush the vaporizer with a high flow of fresh oxygen for several hours.*

CCE Example

- **Time Limit: 21 minutes**
- **Ruminant Case:** Question 1 (a-c) of 3: Suggested time 7 min
- You are presented with a 1.5 yo, 66.2 kg, female Nubian goat that has a 2 day history of being weak, depressed and inappetant. The owner has seen a few episodes of diarrhea and there is evidence of diarrhea around the rectum. The goat has tacky, pale pink mucous membranes, cervical skin tent is about 6 seconds, and the eyes are sunken into the orbit. The distal limbs are cool to the touch. Heart rate is 130 bpm and respiratory rate is 60 bpm. Temperature is 99.2 °F. The surgeon suspects an intussusception and would like to take this goat to surgery for an exploratory laparotomy.
- a. Based on the information provided in the scenario, what is the estimated level of dehydration (a range is acceptable)?
- b. How much crystalloid fluids would be required to correct this deficit (if you used a range for part a, calculate with one value and show work)?
- c. What minimal additional information would you request for this patient prior to administering this volume of fluids? Be specific.

CCE Example #2

- Rationale:
- a. **7-15 % dehydrated**
- b. **Deficit 7-15 % dehydration x 66.2 kg = 4.6-9.9 liters**
- c. **PCV, TS, Glucose, lactate, electrolytes**
- **Calcium**, venous blood gas,
- CBC, albumin
- blood pressure
- (if candidate indicates chemistry, they must include specific variables such as electrolytes, alb, calcium, lactate etc)

CCE Example #2

- **Ruminant Preanesthetic Stabilization Case:** Question 2 of 3: Suggested time 7 min
- *NOTE: The scenario and all additional information will continue to be available as an attachment as you proceed through this case.*
- The following information is available (prior to administration of fluids):
- BP 70/40 (50) mm Hg.
- Abdominal ultrasound indicates decreased intestinal motility with one section of small intestine measuring 2.5 cm in diameter and distended mesenteric vessels. No obvious free fluid is noted in the abdomen.
- Bloodwork (see attachment).
- Describe any abnormalities found on the bloodwork and what may be contributing to these abnormalities.

CCE Example #2

- **Answer:**
- **Metabolic acidemia, partially compensated – dehydration/volume depletion with compensatory hyperventilation**
- **Hyperlactatemia – poor perfusion, dehydration**
- **Hypokalemia - diarrhea**
- **Hypocalcemia – GI loss, sepsis**
- **Hypernatremia & hyperchloremia – dehydration/volume depletion d/t GI loss**
- **Hypoglycemia- sample error/slow run time; anorexia; sepsis?**
- **Azotemia – r/o pre-renal vs primary renal**

CCE Example #2

- ***Ruminant Preanesthetic Stabilization***
Case: Question 3 of 3: Suggested time 7 min
- With the information available, describe how you would correct fluid and electrolyte derangements and acid-base balance of this patient prior to general anesthesia. Include your rationale for the specific components of the fluids and be specific regarding type, route, dose, and rate.

CCE Example #2

- **Answer:**
- **Needs parenteral fluids** not just oral. Does not need all fluids before surgery but must have plan for administration.
- **Maintenance** = $40-65 \text{ ml/kg/day} \times 66.2 \text{ kg}$ plus calculated **deficit** over few hours (calculated in question 1) plus **ongoing losses**
- **(Range accepted** – just must explain how ongoing losses determined and be reasonable – 1-3 L)

- Maintenance = 2.6 L/day- 4.3 L/day (110 ml/hr – 165 ml/hr)
- Deficit = 4.6 L-9.9 L
- Ongoing loss = 1-3 L/day
- Total = **8.2L/day -17.2 L/day**

- May consider colloids, HTS
Recheck physical exam and vital signs after bolus of fluids.
Crystalloid fluids for maintenance.

- **Needs to suggest some plan to deal with low K and Ca. Not faster than 0.5 mEq/kg/hr for K and Ca+** if bolus must watch ECG.

- Bicarb deficit = base deficit $\times 66.2 \text{ kg} \times 0.3$ give 1/3-1/2 over 2 hours if not resolved with rehydration.

- Glucose – recheck glucose (treat if still below 60-100 mg/dL with 2.5-5% glucose)

CCE Example #2

- Exam Format
- Exam Committee
- MCQ Exam
- Essay Exam
- Clinical Competency Exam
- Grading
- Cut score Committee
- Score Reporting



ACVAA Certifying Examination

- MCQ immediately scored by Exam Soft
- Essays and CCE
 - Blinely graded online by 2 examiners
 - Re-graded if scores differ by >1 pt
 - Graded by a 3rd examiner if still >1 pt difference
- 1 = No or minimal relevant information
- 2 = Some relevant information, overall inadequate answer
- 3 = Marginally adequate answer
- 4 = Adequate answer for an entry level diplomate
- 5 = Strong answer, beyond expectation for entry level diplomate

Grading



- 8 – 12 DACVAs w/diverse experience
- Work with Prometric to calibrate each part of the exam
- MCQ
 - Discuss definition of minimally qualified candidate
 - Read & answer each MCQ
 - Predict the % of minimally qualified candidates who will answer each question correctly
 - Discuss the results and then go through test again
 - Statistical analysis to arrive at cut score (standard error)

Cut Score Committee

- Essays and CCE
 - Review scoring procedures for the essays and the CCE in order to make judgments about the holistic quality of candidate performances in light of the standard for the minimally qualified candidate.
 - Review each of the questions, identifying which questions or components thereof might prove challenging to the minimally qualified candidate.
 - Holistically evaluate several candidates' performances as a practice exercise.
 - Rate the performance of a sample of ~10 additional candidate responses.
 - Evaluate candidates' entire body of work & give each candidate a single acceptable/unacceptable rating.
 - Statistical analysis to identify cut score (standard error)

Cut Score Committee

- Exam Committee
 - Reviews recommended cut score for each part of the exam
 - Can accept the recommended cut score or up to 3 standard errors of judgment in either direction
 - Makes recommendation to ACVAA BOD
 - Final decision can be modified by BOD

Final Cut Score Decision

- All parts of exam are weighted equally
- Scores are transformed to a scaled score
 - Linear transformation 300 – 900
 - 650 is cut score
 - Allows for comparison from year to year
- Sections that are passed are reported as Pass
- Failed sections are reported with the scaled score

Score Reporting

- 29 candidates
- Overall pass rate of 55%
- 1st attempts 75%
- 2nd attempts 40%
- >3rd attempt 0%
- MCQ pass rate 74%
- Essay pass rate 63%
- CCE pass rate 62%

2018 results

ACVAA Certifying Examination

Lydia Love DVM DACVAA
2018 Exam Committee Chair
September 2018