



Australian and New Zealand College of Veterinary Scientists

Membership Examination

June 2019

Veterinary Emergency and Critical Care Paper 1

Perusal time: **Fifteen (15)** minutes

Time allowed: **Two (2)** hours after perusal

Answer **ALL FOUR (4)** questions

Answer **FOUR (4)** questions, each worth 30 marks..... total 120 marks

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Paper 1: Veterinary Emergency and Critical Care

Answer all four (4) questions

1. Answer **all** parts of this question:

- a) Define pulmonary oedema. *(1 mark)*
- b) Briefly describe the **two (2)** pathophysiologic causes of pulmonary oedema and give an example of each. *(3 marks)*
- c) Briefly describe how the following diagnostic tests can be used to differentiate the pathophysiologic cause of pulmonary oedema in a dog. *(5 marks)*
 - Radiology
 - Ultrasonography
 - Pleural fluid analysis
- d) Regarding brachycephalic airway syndrome:
 - i. List **four (4)** primary anatomical defects associated with brachycephalic airway syndrome. *(2 marks)*
 - ii. Describe the pathophysiology of pulmonary oedema caused by severe brachycephalic airway syndrome. *(10 marks)*
- e) Describe the mechanism of action of frusemide. *(4 marks)*
- f) Briefly discuss whether frusemide should be administered to a patient with pulmonary oedema caused by brachycephalic airway syndrome. *(5 marks)*

Continued over page

2. Answer **all** parts of this question:

a) Regarding osmolarity:

- i. Define osmolarity. *(1 mark)*
- ii. Write the equation that is used to calculate osmolarity in a clinical setting. *(1 mark)*

b) Regarding hypernatraemia:

- i. Define hypernatraemia. Your response should reference approximate clinical values relevant to this condition. *(1 mark)*
- ii. Briefly describe the effect of hypernatraemia on fluid balance. *(4 marks)*
- iii. State the mechanisms by which hypernatraemia may develop in an animal. For each mechanism, give **one (1)** example of a clinical cause. *(3 marks)*
- iv. Describe the physiological protective mechanisms that the cells of the brain employ in response to hypernatraemia. *(5 marks)*
- v. Describe the approach to the correction of severe hypernatraemia. Include any calculations required to create the treatment plan. *(10 marks)*
- vi. Cerebral oedema is a potential adverse effect of the correction of hypernatraemia. Briefly discuss the pathophysiology and clinical signs of cerebral oedema secondary to correction of hypernatraemia. *(5 marks)*

Continued over page

3. Answer **all** parts of this question:

a) Regarding acute renal failure:

- i. Define pre-renal, renal and post-renal failure. For each type of renal failure, state **one (1)** cause. (3 marks)
- ii. Briefly describe the use of blood and urine tests to distinguish between pre-renal and renal oliguria. (4 marks)

b) Regarding acute kidney injury:

- i. Define acute kidney injury. (2 marks)
- ii. Describe the stages of acute kidney injury, including any clinicopathological signs that are associated with each stage. (7 marks)

c) Regarding adverse effects associated with non-steroidal anti-inflammatory drugs:

- i. Non-steroidal anti-inflammatory drugs are associated with renal injury. List **two (2)** additional adverse effects associated with non-steroidal anti-inflammatory drug use. (2 marks)
- ii. Describe the pathophysiology of non-steroidal anti-inflammatory drug-induced adverse effects. Include in your answer the specific mechanisms of renal injury and of each adverse effect described in c) i. (12 marks)

Continued over page

4. Answer **all** parts of this question:
- a) Regarding blood component therapy:
 - i. Define blood component therapy. (2 marks)
 - ii. List **three (3)** advantages of blood component therapy. (3 marks)
 - b) Regarding blood cross matching:
 - i. Briefly describe what a major cross match tests for. (1 mark)
 - ii. Briefly describe what a minor cross match tests for. (1 mark)
 - iii. Briefly discuss the importance of cross matching blood prior to whole blood transfusions in both dogs and cats. (8 marks)
 - c) Briefly describe how paraneoplastic syndromes occur. (5 marks)
 - d) List **four (4)** neoplasms that may be associated with hypercalcaemia of malignancy. (2 marks)
 - e) Regarding tumour lysis syndrome:
 - i. List the risk factors for developing tumour lysis syndrome. (2 marks)
 - ii. Describe the pathophysiology of tumour lysis syndrome. Include in your answer, the common serum biochemical alterations and explain why they occur. (6 marks)

End of paper



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Veterinary Emergency and Critical Care Paper 2

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Answer **ALL FOUR (4)** questions

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Paper 2: Veterinary Emergency and Critical Care

Answer all four (4) questions

1. A three-year-old, female, spayed Papillon is attacked by a dog and presents to your clinic obtunded.

Physical examination findings are:

Temperature	37.7°C
Mucous membranes (MM)	pale
Capillary refill time (CRT)	3 seconds
Heart rate (HR)	188 beats/min
Pupils	mid-sized and equal
Respiratory rate (RR)	100 breaths/min with marked effort and increased lung sounds in the right thorax.

There is a flail chest on the right and puncture wounds over the right scapula.

Answer **all** parts of this question:

- a) Describe the treatment plan for this dog in the first 30 minutes and justify all treatment recommendations. Include in your answer: *(15 marks)*
- the type, volume and rate of any fluids given
 - details of any analgesia provided
 - management of the flail chest.
- b) List **four (4)** intrathoracic differential diagnoses for this dog's respiratory distress. *(2 marks)*
- c) Discuss how the use of point-of-care ultrasound in this dog would assist in the assessment of the abdominal and thoracic cavities in this case. Include in your answer a brief description of how the procedure is performed. *(6 marks)*

Question 1 continued over page

After 30 minutes, the dog still has a marked respiratory effort, despite flow-by oxygen supplementation. You perform an arterial blood gas analysis and obtain the following results:

Parameter	Abbreviation	Units	Result	Reference range
pH			7.06	73.1–7.42
p _a CO ₂		mmHg	100.0	32.0–49.0
p _a O ₂		mmHg	85.0	80.0–105.0
Bicarbonate	HCO ₃	mmol/L	26.3	20.0–29.0

- d) Interpret these results. (5 marks)
- e) State the most appropriate treatment for this dog and justify your answer. (2 marks)

Continued over page

2. Answer **both** parts of this question:

- a) A 30 kg, two-year-old Labrador presents with a four-day history of vomiting, anorexia and progressive lethargy. He has a history of foreign body consumption. On clinical examination, the dog is lethargic.

Physical examination findings are:

Temperature	40.1°C
Mucous membranes (MM)	dark red
Capillary refill time (CRT)	3 seconds
Heart rate (HR)	160 beats/min
Respiratory rate (RR)	40 breaths/min with mild effort.

The femoral pulses are thready. The dog has sunken eyes, an appreciable skin tent and abdominal splinting. There is a palpable fluid wave in the abdomen.

Answer **all** parts of this sub-question:

- i. Briefly interpret the clinical significance of each abnormality. (5 marks)

- ii. You perform some blood tests and abdominal fluid analysis. Interpret the results in the table below, and explain why these changes might occur in this patient. (5 marks)

Blood test results:

Parameter	Abbreviation	Units	Result	Reference range
Glucose	GLU	mmol/L	4.8	3.8–6.0
Lactate		mmol/L	4.3	0.5–2.0

Abdominal effusion analysis:

Parameter	Abbreviation	Units	Result	Reference range
Glucose	GLU	mmol/L	1.2	3.8–6.0
Lactate		mmol/L	15.0	0.5–2.0

- iii. This patient is at risk of hypotension under anaesthesia. Describe the options for managing anaesthesia in this patient to prevent and treat any hypotensive episodes. (5 marks)

Question 2 continued over page

- b) A two-year-old Shih Tzu is presented to your clinic 30 minutes after a fight with another dog. The left globe is proptosed, but the patient is otherwise unharmed.

Answer **all** parts of this sub-question:

- i. Describe the systematic examination of the traumatised eye. *(5 marks)*

- ii. Describe the factors affecting prognosis and the return to function of the eye following traumatic proptosis. *(5 marks)*

- iii. The owner wishes to preserve the eye. Describe the treatment of proptosis within the first six hours. *(5 marks)*

Continued over page

3. A three-year-old, male, neutered domestic shorthair cat presents with an acute onset of generalised tremors following the administration of a topical flea and tick prevention containing synthetic pyrethrins. On clinical examination, he is agitated, has a heart rate of 220 bpm, a respiratory rate of 48 bpm, a rectal temperature of 40.2°C, pink, tacky mucous membranes and a capillary refill time of less than one second. Pulse oximetry is 93% on room air.

Answer **all** parts of this question:

- a) Briefly describe the initial stabilisation of this patient. Provide a brief reasoning for your treatments and the drugs you may use. (6 marks)
- b) The following blood test results are obtained. State the most likely reasons for each abnormality in this patient. (10 marks)

Parameter	Abbreviation	Units	Result	Reference range
Packed cell volume	PCV	%	58	25–45
Alkaline phosphatase	ALP	U/L	100	14–111
Alanine transaminase	ALT	U/L	173	12–130
Gamma-glutamyltransferase	GGT	U/L	2	0–4
Total bilirubin	TBIL	µmol/L	5	0–15
Cholesterol	CHOL	mmol/L	4.78	1.68–5.71
Urea	UREA	mmol/L	14.1	5.7–12.9
Creatinine	CREA	µmol/L	220	71–212
Phosphorus	PHOS	mmol/L	1.85	1.00–2.42
Total protein	TP	g/L	92	57–89
Albumin	ALB	g/L	45	22–40
Globulin	GLOB	g/L	47	28–51
Glucose	GLU	mmol/L	12.13	4.11–8.84
Creatine kinase	CK	U/L	973	49–688
Sodium	Na	mmol/L	160	150–165
Potassium	K	mmol/L	3.1	3.5–5.8
Chloride	Cl	mmol/L	118	112–129
Lactate	LAC	mmol/L	4.5	0.5–2

Question 3 continued over page

- c) Describe how synthetic pyrethrins cause clinical signs of toxicity in cats.
(4 marks)
- d) Intravenous lipid emulsion (IVLE) may be used in the treatment of patients with pyrethrin toxicity and other toxicities.

Answer **all** parts of this sub-question:

- i. Describe how IVLE is effective in the treatment of toxicities.
(4 marks)
- ii. Briefly explain what determines if IVLE will be an effective treatment option for a particular toxicity. (3 marks)
- iii. List the potential adverse effects associated with the use of IVLE.
(3 marks)

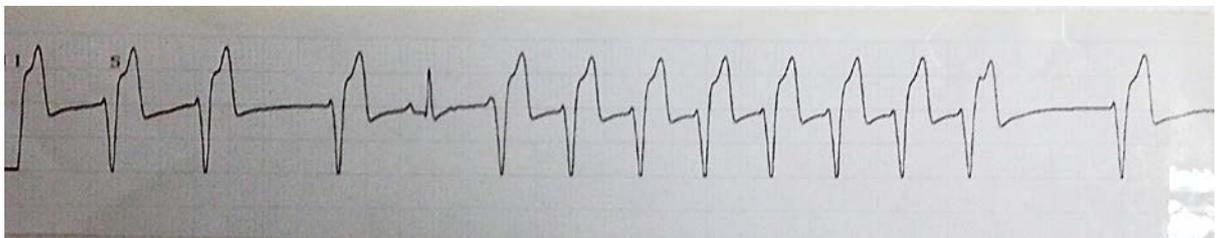
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4. A nine-year-old, male, neutered Great Dane presents with a seven-hour history of non-productive retching, agitation and an increasingly distended abdomen. Physical examination reveals dull mentation, dark red mucous membranes, a capillary refill time greater than 2 seconds, a heart rate of 150 bpm, panting and a rectal temperature of 39.4°C. A single right lateral abdominal radiograph is performed and confirms the presence of gastric dilation and volvulus (GDV).

Answer **all** parts of this question:

- a) Describe the treatment plan for the first 30 minutes, including type, volume and rate of any fluids given. Justify all of your treatment recommendations. Do not include monitoring or diagnostics in your answer. (10 marks)
- b) List **three (3)** risk factors, specific to this dog, for the development of GDV. (3 marks)
- c) Briefly discuss the use of serum lactate as a prognostic indicator in dogs with GDV. (4 marks)
- d) Briefly describe the surgical technique for managing GDV. (8 marks)

Twenty-four hours post-operatively, an ECG is performed and the following rhythm is obtained:



The dog has a heart rate of 210 bpm, weak femoral pulses with missed beats and is weak.

- e) Answer **both** parts of this sub-question:
 - i. State the electrocardiographic diagnosis. (1 mark)
 - ii. Briefly describe your initial treatment of this cardiac rhythm. (4 marks)

End of paper