



Australian and New Zealand College of Veterinary Scientists

Membership Examination

June 2017

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** questions each worth 30 markstotal 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 the term septic shock. (2 marks)
- b) List the diagnostic criteria for systemic inflammatory response syndrome (SIRS). (4 marks)
- c) List and briefly describe the consequences of systemic inflammatory response syndrome (SIRS) on the systemic vascular system. (4 marks)
- d) Describe the available treatment options for circulatory support in septic shock and their indications. (10 marks)
- e) Describe the PIRO system for staging sepsis. (4 marks)
- f) Describe the pathogenesis of urosepsis. (6 marks)

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

- a) Describe the pain pathway. (7 marks)
- b) The analgesic agents listed below are commonly utilised in emergency practice. Describe their modes of action, the potential benefits, and adverse effects of **each**. Provide an example of an agent in **each** class listed below: (15 marks)
 - i. opioids
 - ii. local anaesthetic agents
 - iii. NSAIDs
 - iv. dissociative anaesthetic agents
 - v. alpha-2 agonists.

Question 2 continued over page

- c) Describe the pathophysiology of anaesthetic induced hypotension. For the purpose of this question, consider a patient anaesthetised with acepromazine, an opioid, propofol and isoflurane. The specific mechanisms of action of the various agents are not required.

Discuss how this anaesthetic emergency should be managed. (8 marks)

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

- a) Describe Virchow's triad. (3 marks)
- b) Describe the cell based model of coagulation. (12 marks)
- c) List the screening tests for the evaluation of haemostasis for **each** of the following, and the pathways/factor evaluated: (9 marks)
- i. primary haemostasis
 - ii. secondary haemostasis.
- d) List potential causes of coagulopathy arising as a consequence of fulminant liver failure. (3 mark)
- e) List the laboratory changes commonly associated with the diagnosis of disseminated intravascular coagulation (DIC). (3 marks)

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

- a) Define hypoxaemia. *(1 marks)*

- b) List the **five (5)** primary causes for reduced partial pressure of oxygen in arterial blood, give an example for **each** cause. *(5 marks)*

- c) State the **two (2)** types of respiratory failure. *(2 marks)*

- d) Describe the pathophysiology of acute respiratory distress syndrome (ARDS).
(9 marks)

- e) List the proposed criteria for identification of acute lung injury and acute respiratory distress in dogs. *(4 marks)*

- f) List the primary causes of ventilator associated lung injury and briefly describe any consequences of **each** cause you list. *(9 marks)*

End of paper



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Veterinary Emergency and Critical Care Paper 2

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

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Answer **ALL FOUR (4)** questions

Answer **FOUR** questions each worth 30 markstotal 120 marks

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Paper 2: Veterinary Emergency and Critical Care

Answer all four (4) questions

1. A six-year-old male neutered crossbred dog weighing 20 kilograms is presented to your clinic immediately after being struck by a car.

On presentation, the dog is laterally recumbent with obtunded mentation and bilateral epistaxis. He has a heart rate of 180 bpm, with pale mucous membranes and weak pulses. He has a respiratory rate of 60 breaths per minute with moderate effort.

During your examination, you note the patient has an open femoral fracture and numerous abrasions on the right hindlimb.

Answer **all** parts of this question:

- a) Write an initial problem list with the most likely differential diagnoses for **each** problem for this patient. (5 marks)
- b) Discuss the **most** appropriate initial investigations **and** management strategies for this case in the first 30 minutes after presentation. Presume there are no financial constraints and you are in a fully equipped emergency centre. (15 marks)
- c) Despite initial stabilisation with crystalloid fluids to a mean arterial blood pressure of 90 mmHg, the patient suddenly becomes profoundly hypotensive with a mean arterial blood pressure of 54 mmHg. During your reassessment of this patient, you note moderate abdominal distension with a fluid wave. State the most likely differential for these clinical signs. (1 mark)
- d) Outline an appropriate management plan for this problem **and** justify your answers. Include diagnostics that should be performed to confirm a diagnosis **and** treatments that should be given. (9 marks)

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2. A six-year-old, female spayed, terrier cross is presented to your clinic. She has been unwell over the last few days with intermittent vomiting and diarrhoea. She has become progressively lethargic to the point of collapse today.

Physical examination findings:

Heart rate: 170 beats per minute
mm: pale and tacky
CRT: 2.5 seconds
Pulse: weak femoral pulses
Respiratory rate: 24 breaths per minute
Temperature: 37.1°C
Skin tent: increased
BCS: 3/9
Body weight: 10 kg

Estimated 10% dehydrated

The remainder of your clinical examination is unremarkable.

Complete blood count:

Parameter	Value	Reference range
RBC	7.5	5.65–8.76 x 10 ⁹ /L
HCT	43.4	37.3–61.7%
HGB	16.4	13.1–20.5 g/dL
RETIC	61.1	10.0–110.0 x 10 ³ /L
WBC	10.9	5.05–16.76 x 10 ⁹ /L
NEUT	9.02	2.95–11.64 x 10 ⁹ /L
LYM	2.34	1.05–5.10 x 10 ⁹ /L
MONO	0.98	0.16–1.12 x 10 ⁹ /L
EOS	0.42	0.06–1.23 x 10 ⁹ /L
BASO	0.00	0.00–0.10 x 10 ⁹ /L
PLT	365	200–500 x 10 ⁹

Question 2 continued over page

Chemistry:

Parameter	Result	Reference interval
Glucose	3.9	4.2–6.1 mmol/L
BUN	>45	2–9 mmol/L
CREA	444	27–124 µmol/L
PHOS	10.2	0.93–2.13 mmol/L
TP	54	54–82 g/L
ALB	20	25–44 g/L
GLOB	34	23–52 g/L
ALT	248	10–100 U/L
ALKP	158	23–212 U/L
GGT	3	0–7 U/L
TBIL	4	2–10 µmol/L
CHOL	4.3	1.7–5.8 mmol/L
AMYL	1500	500–1500 U/L
LIP	1468	200–1800 U/L

Venous blood gas results:

Parameter	Value	Reference interval
pH	7.210	7.350–7.440
pCO ₂	33	33.0–52.0
SBE	-12.9	-4–2
Lactate	5.4	<2.4

Electrolyte results:

Parameter	Value	Reference interval
Sodium	128	140–153
Potassium	6.3	3.6–4.6
Chloride	120	106–120
Ionised calcium (7.4)*	1.20	113–1.33

*value is pH corrected

Question 2 continued over page

Urinalysis:

Sample collection: cystocentesis
Gross exam: clear yellow urine

USG*	1.022
pH	6.5
Protein	negative
Glucose	negative
Ketone	negative
Bilirubin	negative
Bacteria	negative/HPF

*sample collected before initiating fluid therapy

Answer **all** parts of question 2:

- a) For the clinical pathology results above, list the abnormalities and interpret the results. *(12 marks)*
 - b) List the **two (2)** most likely diagnoses **and** how you would differentiate them. *(3 marks)*
 - c) Create a fluid therapy plan for this patient for the next 24 hours. Include in this plan fluid choices, reassessment parameters and the management of electrolyte derangements. Include any calculations performed during your fluid planning. *(15 marks)*
3. For the following clinical scenarios describe the clinical signs of intoxication, diagnostic testing required, treatment and potential progression of the condition:
- a) A cat that has ingested paracetamol and is now displaying clinical signs. *(10 marks)*
 - b) A dog that has ingested iron EDTA slug bait in the last six hours. *(10 marks)*
 - c) A cat that has ingested bromethalin rodenticide two to four hours ago. *(10 marks)*

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4. A 14-year-old female spayed domestic shorthair cat presents to your clinic. She is known to have chronic renal failure, previously diagnosed as IRIS stage two. Her owner has been away for the week and the cat was in kennels. During the last few days the cat has become progressively lethargic and stopped drinking.

Physical examination findings:

Heart rate: 160 beats per minute

Grade 2/6 left parasternal murmur

Respiratory rate: 16 breaths per minute

Temperature: 37.6°C

Kidneys small and irregular

mm: pale and tacky

Integument: increased skin tent

Body weight: 5 kg

Venous blood gas and electrolyte results:

Parameter	Value	Reference interval
pH	7.12	7.390–7.480
SBE	-14	-4.0–2.0 mmol/L
pCO ₂	36	32.0–42.0 mmHg
Lactate	2.2	<2.4 mmol/L
Bicarbonate	14	22–24 mmol/L
Na ⁺	168	140–153 mmol/L
K ⁺	2.4	3.6–4.6 mmol/L
Cl ⁻	124	106–120 mmol/L
Ca ⁺⁺	1.14	1.10–1.35 mmol/L
HCT	30%	

Chemistry:

Parameter	Result	Reference interval
Glucose	7.2	4.2–7.4 mmol/L
ALKP	67	23–212 U/L
ALT	46	10–100 U/L
ALB	44	22–35 g/L
BUN	35	2.4–9.6 mmol/L
CREA	364	44–159 µmol/L
PHOS	6.2	1.3–2.3 mmol/L

Question 4 continued over page

Answer **all** parts of question 4:

- a) Using the semi-quantitative approach, list **three (3)** likely contributors to the metabolic acidosis in this case. (3 marks)
- b) Calculate this patient's free water deficit? Over what period of time should this deficit be replaced? For your calculations assume the normal feline sodium (Na⁺) to be 150 mmol/L. (5 marks)
- c) Briefly explain the potential consequence(s) of rapid correction of serum sodium concentration that could develop in this patient. (3 marks)

You wish to administer an iso-sodium solution to this patient. The following solutions are available in your practice:

	Osm mOsmol/L	Sodium mmol/L	Chloride mmol/L
0.9% NaCl	310	154	154
20% NaCl	6800	3400	3400

- d) Describe how to create an iso-sodium solution for this patient. Show all calculations. (4 marks)

While in hospital the cat's mentation suddenly becomes altered and the cat develops bilateral epistaxis.

Physical examination findings:

Heart rate: 180 beats per minute

SAP 240 mmHg on 3 serial measurements

Temperature: 38.9°C

She is now euvolaemic and well hydrated.

Her sodium was decreased to normal limits over an appropriate time frame.

- e) State the likely cause of this cat's new symptoms. (1 mark)
- f) List **four (4)** organ systems normally affected in the situation identified in section 4 e) and an expected clinical sign associated with **each** organ system. (8 marks)
- g) Define the aim of emergency treatment for this condition. (2 marks)
- h) List **four (4)** drugs that can be used in the treatment of this case. State the mode of action for **each** drug you list. (4 marks)

End of paper